A Digital Design Training Model for Jua Kali Artisans in Kenya

By
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Award
PhD

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Abstract

Interaction with Kenyan informal sector artisans – also known as the *Jua Kali* (JK) has suggested that their skill acquisition through the informal traditional apprenticeship (TA) system, which is devoid of theory, constrains their product quality and incomes. The JK sector accounts for 84.8% of the national labour force, and produces affordable goods and services for a majority of Kenyans. Thus, appropriate design practice and planning skills among artisans are imperative for uplifting many Kenyans' livelihoods quality and incomes, contributing to Kenya Vision 2030's development objective of transforming the country to middle income status.

The objective of the research reported here was to establish the status of design practice and planning skills among the JK artisans, with the aim of developing and testing a competency-based Digital Design Training Intervention (DDTI) model encountered in the literature, with which to remedy skills shortfalls through m-learning. The model aims at bridging the skills development gap by delivering a tailor-made, learner-centred, competency-based design training model that is accessible online or through mobile technology. Available anytime anywhere with no tuition fees involved, the DDTI would uplift the supply of properly trained JK artisans, in keeping with Vision 2030's aspirations.

The study involved a mixed methods research approach alongside an action research design. The first phase employed situational analysis involving qualitative and quantitative data collection, to establish the existing design and planning skills acquired through TA and the workplace, and the gaps needing attention. The second phase engaged the artisans in the development of a competency-based design-training model for delivery through m-learning, accessed through the web or mobile technology. The final phase tested the model's efficacy among the JK artisans, and among government officials for relevance to Vision 2030's policies and strategies.

The testing established that the DDTI's web-based and mobile phone-based Unstructured Supplementary Service Data models could enhance the JK artisans' design practice and planning, thereby promoting Vision 2030 objectives. These ground-breaking findings introduce ICT into a new realm, the JK manufacturing sub-sector. The study also makes the important finding that Kenya lacks a nationally integrated database on the primary livelihoods sector, whose establishment would allow more nuanced analysis of the role of the JK sector.

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Dedication

I would like to dedicate this dissertation to my very special friend and husband Eng Meshack Otieno Kidenda and the children for the enormous support as slowly meandered to find my way through this jungle of knowledge for years. You always encouraged me, and I will forever be grateful and thank God for you. I thank my late father Samba Gamaliel Obath who kept encouraging me that “it is possible.”

Declaration

I hereby declare that this thesis titled ***"A Digital Design Training Model for Jua Kali Artisans in Kenya"*** is my own original work, and as such, has never been presented for a postgraduate award in any academic or research institution, except as acknowledged and cited in various sections of this document.

Candidate: Mary Clare Akinyi Kidenda

Signature:  Date:……

Acronyms

AR:	Action Research
BLT:	Behaviourist Learning Theory
BPO:	Business Process Outsourcing
CA:	Cognitive Apprenticeship
CAK:	Communication Authority of Kenya
CCK:	Communication Commission of Kenya
CBET:	Competency Based Education and Training
CDMA:	Code Division Multiple Access
CEO:	Chief Executive Officer
CLT:	Constructivism Learning Theory
CoL:	Communities of Learners
CoP:	Communities of Practice
DDTI:	Digital Design Training Intervention
DTM:	Design Training Model
EAC:	East African Community
FAQ:	Frequently Asked Question
FGDs:	Focus Group Discussions
FKE:	Federation of Kenyan Employees
GACs:	General Areas of Competencies
GDP:	Gross Domestic Product
GSM:	Global System for Mobile Communication
ICT:	Information and Communication Technology
ILO:	International Labour Organization
UI:	User Interface
IP:	Intellectual Property
HFCK:	Housing Finance Company of Kenya
HTML:	Hyper Text Mark-up Language
JK:	Jua Kali
JKA:	Jua Kali Artisans
JKAs:	Jua Kali Associations
JKS:	Jua Kali Sector
KAM:	Kenya Association of Manufacturers
KEBS:	Kenya Bureau of Standards
KEPSA:	Kenya Private Sector Alliance

KICD:	Kenya Institute of Curriculum Development
KIRDI:	Kenya Industrial Research and Development Institute
KNBS:	Kenya National Bureau of Statistics
KNFJKA:	Kenya National Federation of Jua Kali Associations
KUCCPS:	Kenya Universities and Colleges Central Placement Service
MC:	Master Craftsman
MDAs:	Ministries, Departments and Agencies
MIED:	Ministry of Industrialization and Enterprise Development
MOEST:	Ministry of Education, Science and Technology
MOLHA:	Ministry of Labour and Home Affairs
MSE:	Micro and Small Enterprises
MSEA:	Micro and Small Enterprises Authority
MSME:	Micro, Small, Medium Enterprises
MTP I:	First Medium Term Plan
MTP II:	Second Medium Term Plan
NGOs:	Non-government Organization
NITA:	National Industrial Training Authority
NOFBI:	National Optic Fibre Infrastructure
OS:	Occupational Standards
PEDOs:	Provincial Enterprise Development Officers
PIN:	Personal Identification Number
SC:	Situated Cognition
SIM:	Subscriber Identity Module
SMS:	Short Message Service
SPSS:	Statistical Package for Social Sciences
TA:	Traditional Apprenticeship
TCs:	Threshold Concepts
TDC	Technical Development Centre
TUK:	Technical University of Kenya
TVET:	Technical Vocational Education and Training
TVETA:	Technical Vocational Education and Training Authority
UNDP:	United Nations Development Program
URL:	Universal Resource Locator
USSD:	Unstructured Supplementary Service Data
VCoL:	Virtual Community of learners

VCoP:	Virtual Community of Practice
WAP:	Wireless Application Protocol
WRL:	Work Related Learning

Preamble

Origins of the Study

The idea of conducting this study arose from my interactions with *Jua Kali* artisans as a student of art and design, a designer, lecturer and a consumer of their products. The problem became obvious when my husband suffered a slipped disc in October 2005. His back deteriorated over the years and he was required to undergo back surgery. This was caused by a trapped sciatica nerve, which caused intense pain on his lower back and right leg. Following surgery to free this nerve, his doctor emphasised the ergonomic requirements of the chairs he used thereafter should be comfortable; with strong back support and a good posture to avoid stress, strain, fatigue and the possibility of any further back injury. As a designer I looked for a comfortable chair with the correct dimensions that would serve the purpose. This meant that he would stop using his favourite chair (see Figure i), which he had used a few weeks before surgery.



Figure i. The chair Meshack used before and a few weeks after surgery.

Author's field photographs, 2011

Before surgery he complained that the chair was not comfortable because the seat was shorter than his buttock-knee length, therefore pressing on his sciatica nerve and causing more discomfort and pain (see Figure ii). The upholstered seat was padded with low-density foam; the seat rail of the chair also pressed on his sciatica nerve causing pain. I had never thought about sitting as a dynamic activity and this became obvious when Meshack started experiencing more pains when he sat on this chair. I did not quite understand the necessary anthropometrics of the chair, the cushioning, arm and head support for a patient with a back injury.



Figure ii: Meshack sitting on the chair I bought from a Supermarket. Nairobi County Kenya

Author's field photographs, 2011

One day we visited Meshacks brother and, I found what seemed to be a nice set of chairs, with what looked like excellent back support and a good sitting height, elbow rest height, thigh clearance and knee height sitting clearance. The chairs looked attractive and the ergonomics seemed just right for him. They also looked strong, stable and durable (see Figure iii and iv)






Figure iii: The preferred chairs at his brothers' house in Oyani Masaai. Migori County Kenya




Figure iv Meshack trying out one of the chairs made by a *Jua Kali* artisan from Kibera. Nairobi County, Kenya.

Author's field photographs, 2012

I ordered three pairs of chairs from the *Jua Kali* artisan from Kibera. Unfortunately, this resulted in additional problems. First, it took an inordinate amount of time to make them; he changed the pricing several times; and the finishing was not aesthetically pleasing. On collecting my

chairs, and to my further disappointment, I discovered that each of the chairs was different (see Figure v).



Figure v Chairs made by the *Jua Kali* artisan in Kibera, Nairobi County Kenya.

Author's field photographs, 2012

At a glance, I could see that their dimensions all looked different. The backrests of the chairs had different sitting heights and this could cause discomfort. The top rails had a similar design but were all different sizes. The armrests or elbow rests height had slight differences in height. The headrests or cresting rails were all at different levels. The legs looked too short to support the popliteal height of his knee height whilst sitting. The seat looked too short to support the buttock-popliteal length of his thigh. The lower rails or horizontal bar or lower rail of the seat backs were too low and would not provide good back support.



Figure vi: Meshack sitting on one of the chairs made for him by the Jua Kali artisans from Kibera. Nairobi County Kenya.

Author's field photographs, 2012

From the images above it is clear that the dimensions were not correct or consistent for the end user. The stile and cresting rail were not sufficient to support his sitting height from his thigh to his head. The arm supports and armrests were not at the appropriate height. The legs were too short because his knee height was not supporting his popliteal height (See Figure iv).

It occurred to me that the artisan should have taken measurements before designing and making the chairs. The seats were small and were not giving good support to the full length of his buttock-popliteal length putting pressure on his thighs and sciatica nerve (see Figure vi above). What emerged clearly was that there was a lack of product design skills, poor standardization and insufficient capacity for mass production in this sector.

I went to a high-end furniture shop to make a second set of chairs. The manager asked me to bring my husband so that he could take his measurements for the chairs dimensions. I chose the fabric and he proposed a design based on my brief. When they were ready Meshack went and confirm that they were designed to function as originally intended- primarily to support his back. (See Figure vii and viii)



Figure vii: The Chairs made for Meshack by the Panesar's Furniture. Nairobi County Kenya.

Author's field photographs, 2012

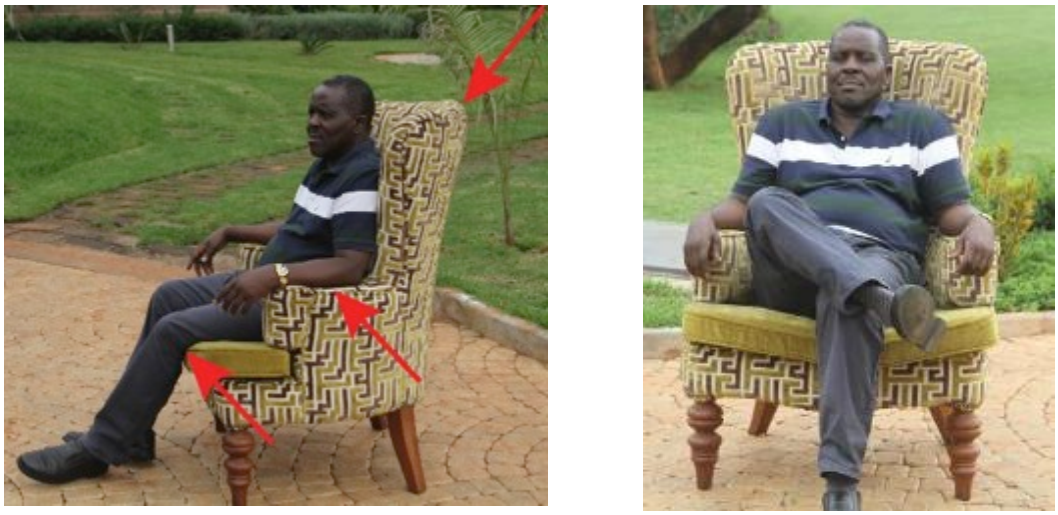


Figure viii: Meshack sitting on the chair from Panesars Furniture. Nairobi County Kenya.

Author's field photographs, 2012

The finished seat was comfortable and accommodated his sitting postures and the backrest supported his back and neck. The elbow rest was the correct length. The seat and the cushions

were the appropriate length and offered support for his buttocks –the popliteal length making it additionally comfortable.

That got me thinking... with the same amount of wood and fabric, plus appropriate knowledge on design practice and planning, the *Jua Kali* artisan may have got the chairs right. Having acquired skills through traditional apprenticeship, there is only a certain amount of design knowledge he could have acquired, because most of the “master craftsmen” in Kenya may not be adequately trained in design practice and planning.

Chapter One

1.0 Introduction

The multi-sectorial Kenyan informal sector, is also referred to as the *Jua Kali* sector (JKS), '*jua kali*' being the Kiswahili term for the hot sun under which the artisans preponderantly operate (Ashraph et al., 2013; Menya et al., 2012; Ngui et al., 2014). As with other sub-sectors, the *Jua Kali* (JK) manufacturing sub-sector is an important source of livelihood for many Kenyans, but is under-rewarding due, amongst other things, to the lack of business and technical skills in design processes. The Jua Kali sector (JKS) employs about 14.9 million of the country's 19 million labour force, this prominence driven by a labour force growth that vastly exceeds that of formal jobs (Kenya National Bureau of Statistics, 2016). Meanwhile, the country has promoted academic education for wage employment, rather than skills for self-employment. The unemployed finding sanctuary in the JKS, learn skills through a traditional apprenticeship (TA) system that does not emphasise effective skills management. Meanwhile, the workplace demands on the artisan is such that they cannot afford the time or fees for further skills training, this research explores the prospects for alternative accommodative JKS skills training.

The concern of this thesis is that if the artisans acquired knowledge in design practice and planning, it could lift their design, innovation and planning capabilities of the artisans. It would also ensure the adequate supply of properly trained JK artisans for the job market, as stipulated in Kenya Vision 2030, the country's long term development blueprint (Government of the Republic of Kenya 2013). The thesis therefore explores the possibility of using the principle of a design-training model (DTM) to educate the artisans by providing the rudiments of design processes to improve their design practice and planning skills.

1.1 Background of the Study

The Kenyan informal sector – or JKS – equates to the micro and small enterprise (MSE) sector of the global literature. JKS working conditions are harsh, severe, and unfavourable, as depicted in Figures 1.1 (a) to (d)



(a) Planing of timber for furniture, Kibuye Jua Kali Association, Kisumu County



(b) Cutting Kisii Stone at Tabaka Jua Kali Association, Kisii County



(c) Making frying pans at Kamukunji Jua Kali Associations, Nairobi County



(d) Collecting hyacinth from Lake Victoria, Kisumu County



Figure 1.1a Planing of timber for furniture making at Kibuye Jua Kali Association, Kisumu County.



Figure 1.1b Cutting Kisii Stone at Tabaka Jua Kali Association, Kisii County



Figure 1.1c Making frying pans at Kamukunji Jua Kali Association, Nairobi County



Figure 1.1d Collecting hyacinth from Lake Victoria, Kisumu County

Figure 1.1. The harsh working conditions in the JK manufacturing sub-sector.

Source: Author's field photographs, 2013

The informal sector is characterised by small-scale activities that are semi-organised, often unregistered, and, therefore, unregulated. The artisans use very basic technologies and employ few people (Kenya National Bureau of Statistics, 2014). These informal sector businesses are differentiated from the formal ones by factors, such as the lack of legal protection, basic infrastructure facilities and modern technology. They are also characterised by weak access to credit, training, property rights, and unconventional operations and transactions. (Keter, 2012; Miyandazi, 2013) The JKS has evolved into four sub-sectors: manufacturing; services; trade; and agri-business (Ndung'u et al., 2011). This research focuses on the manufacturing sub-sector whose entrepreneurs produce a wide range of furniture, pottery, metal work, weaving, handicraft, sculpture, graphic design and painting.

The JKS is significant to the Kenyan economy because of employment creation (Menya et al., 2012); but it also makes a wide range of affordable products for mainly for the local and less for export markets. However, the artisans face challenges because there is no affordable structured, flexible design training, or explicit design knowledge that they can access to achieve useful competencies or to build on their existing skills acquired through traditional apprenticeship (TA). The result is that the artisans acquire design practice and planning skills outside the formal education sector, from semi-skilled or unskilled artisans who have learned on the job.

This sector has the capacity to become a seedbed of design innovation, on-the-job training and entrepreneurship, contributing to the long-term growth of the Kenyan economy if the Kenyan education system was to emphasise skills development for self-employment. The lack of such an emphasis has caused a dilemma: there is an extensive mismatch between the skills required in the job market and graduates from the formal education system. Consequently, the employment growth in formal sector suffers from poor skills supplies, especially in design practice and planning, and low levels of knowledge and specific abilities that would otherwise make the sector highly productive.

The importance of skills development beyond basic education has recently received significant attention in Kenya. The government has decided to increase skills acquisition opportunities given the growing labour force and rising rate of unemployment, which can foster social discontent and political unrest. The need for skills development in the informal

sector has, therefore, become a recurrent theme in key government strategic documents, such as the Kenya Vision 2030 and other sectorial policy documents. These documents also acknowledge the need to increase the quality of facilities delivering vocational education and training, and improving access to skills development opportunities.

Kenyan TA has worked well in the past; but technological developments offer new opportunities for further, better learning for artisans. In the traditional formulation, the knowledge base that the artisan could tap into was limited to the sum of master craftspeople (MC) and exemplars of their work. The transmission of production skills and methods was also limited to the universe of MC/apprentice touch-points or skills that have been passed down through many generations. This 'infrastructure' limited the archive of artisanal knowledge and access to it. This has resulted in prevalent inadequate artisanal skills due to the unavailability of qualified trainers, training facilities, or training programmes, while workplace demands mean that most artisans have little or no time for training. With sub-optimal design skills and knowledge base, the artisans resort to trial and error in their design processes, constraining the range of available opportunities, leading to long production times, material wastage, high production costs, poor design, and poor finishing, in a context lacking of proper management and marketing skills.

The JK manufacturing sub-sector is a major supplier of comparatively affordable goods and services for Kenya's lower income households. Yet, their market is constrained by their inability to ensure expected quality, accessibility, affordability and sustainability of their products. This study looks at how technology gleaned from the literature can build on skills acquired through the MC/apprentice relationship, to gain new competencies design knowledge and skills.

Limited academic research has been undertaken on how Kenyan JK artisans in the manufacturing sub-sector, as a community of practice (CoP) and a community of learners (CoL) acquire skills in design practice and planning during TA. A review of the Kenyan TA literature found very little on design processes. In the context of Kenya's pioneering use of mobile technology and other ICT developments, the evidence of an emerging government focus on apprenticeships motivated this study's consideration of the scope for mobile technology and ICT based learning for JK artisans.

A review of the literature reveals a proliferation of such initiatives, prompting this study to consider the scope for using mobile technology-based learning for design education with appropriate content for artisans. Such learning would complement the skills acquired during apprenticeship and at the workplace, which have vulnerabilities due to their being informal, unstructured, under-resourced, and relatively unregulated.

To address these issues the study proposed to develop a solution by suggesting the development of a curriculum or framework which in this study is a modularized framework whose content is built on a competency-based education and training (CBET) concept where it is modularized, learner-centred and practice-oriented. The curriculum was developed using the CBET's functional analysis methodology where key design practice and planning tasks were identified and developed into four modules. These were further broken down sub-skills. The content for the curriculum was developed based on the design gaps established in the field study and through the literature review to develop a relevant and responsive human resource development by linking design education and training to the skills needed in the job market in Kenya.

The curriculum or framework was used to develop competency-based digital design training intervention (DDTI) model. The DDTI is an interactive teaching and learning model that was developed to enable the JKA to acquire design practice and planning skills through m-learning. The DDTI used mobile technology to facilitate JKA as a community of learners (CoL) to access design education progressively by accomplishing specific design skills and building strong intellectual connections through dialogue between the artisans as learners and trainers. The artisans' participation allowed the introduction of new design competencies to build on existing skills. The literature also suggested access constraints that the DDTI addressed by availing training content on-line or via mobile technology.

1.2 Outline of the Central Argument

The JKS has been important to the Kenyan economy because it has become the primary employer of the country's growing labour force. The acquisition of skills for the JK artisans is largely through TA, whose output is limited to what the MC delivers in an informal system devoid of any theoretical founding. Consequently, the artisans experience numerous challenges related to the acquisition of knowledge and skills development in

design practice and planning. This undermines the quality of their products, and consequently undermines their earning power.

Meanwhile, there is much evidence of the successful use of mobile technology in capacity dissemination; and the mobile phone is very widely distributed in Kenya, including among JK artisans. This study therefore surmised that an application could deliver design training to the artisans, enabling them to improve their crafts and prospects, through a learning approach that would be available anytime, anywhere. Such an intervention would be consistent with the proposal of the Kenya government's Mid-Term Plan 2013-2018, to strengthen the informal sector, which however, remains on the periphery of economic planning.

1.3 Aim of the Study

The aim of this study was to create a competency-based digital design training intervention model that will enhance Jua Kali artisans' knowledge and skills through m- learning in line with Kenya Vision 2030.

1.4 Research Objectives

I. To identify existing skills and skills gap in design practice and planning the *Jua Kali* manufacturing sub-sector;
II. To develop a cost-effective design training model (DTM) for capacity building through m-learning for the *Jua Kali* artisans; and
III. Test the relevance and feasibility of the design-training model with the JKA and Government officials from relevant ministries, departments and agencies .

Research Questions

I. What are the existing skills and skills gap in design practice and planning in the *Jua Kali* manufacturing sub-sector?
II. How can a competency-based design-training model that is adaptive and responsive to skills gap of the Jua Kali artisans be developed?
III. What is the feasibility of implementing the new design-training model among the Jua kali artisans and testing its relevance towards in achieving Vision 2030 with Government ministries, departments and agencies?

1.6 Hypothesis

A competency-based research-driven, design-training model delivered through m-learning will enhance the JKA's knowledge and improve their control of design practice and planning processes.

1.7 Focus of Research

The population for this study was the *Jua Kali* artisans from Nairobi, Kiambu, Kisumu, Homabay, Siaya and Kisii counties in Kenya (See Figure 1.2). Arrows show the counties visited during this study between April 2012 and November 2014.

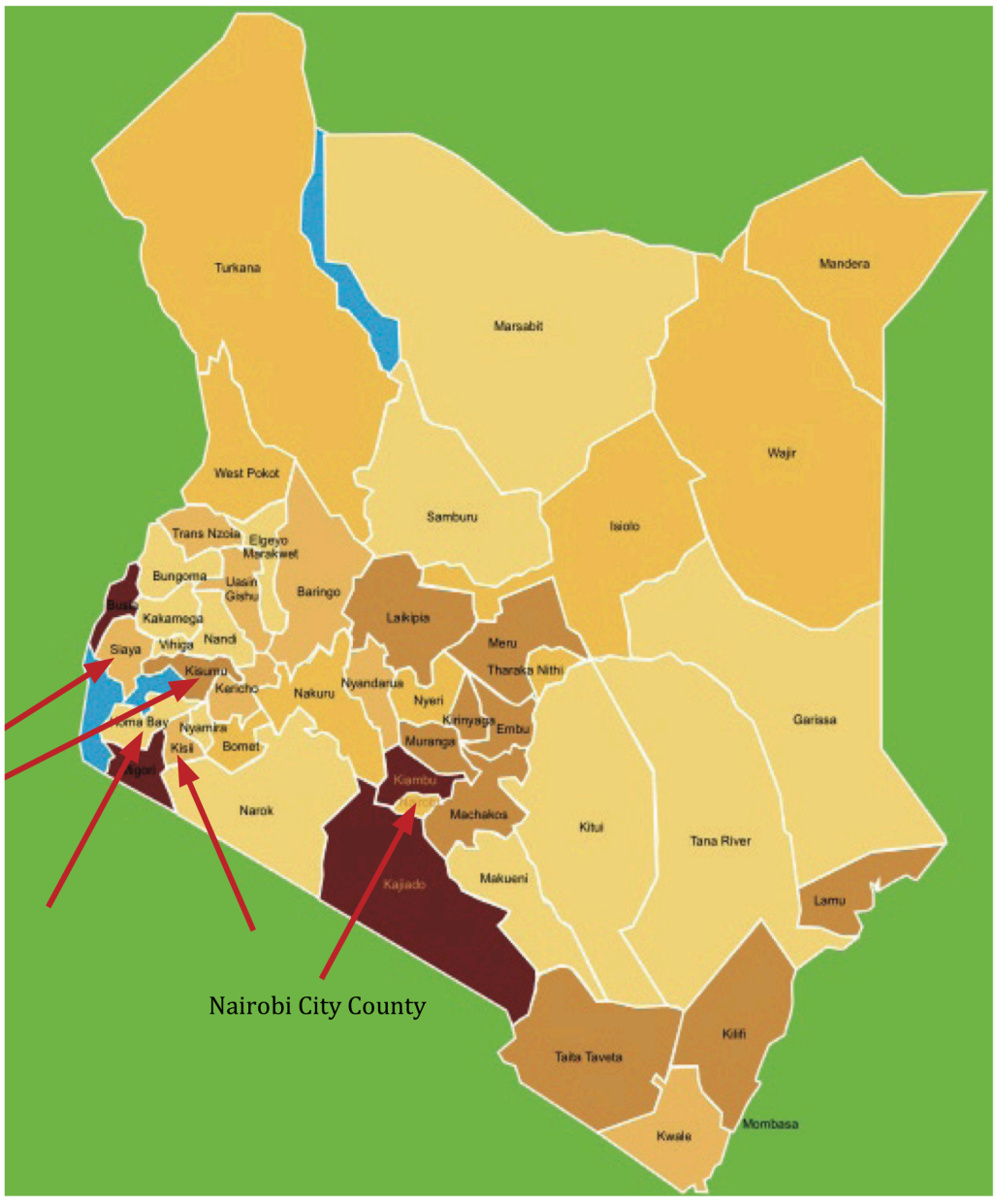


Figure 1.2: Map of Kenya Counties

Source: Commision for Revenue Allocation, 2015).

1.11 Chapter Summary and Thesis Outline

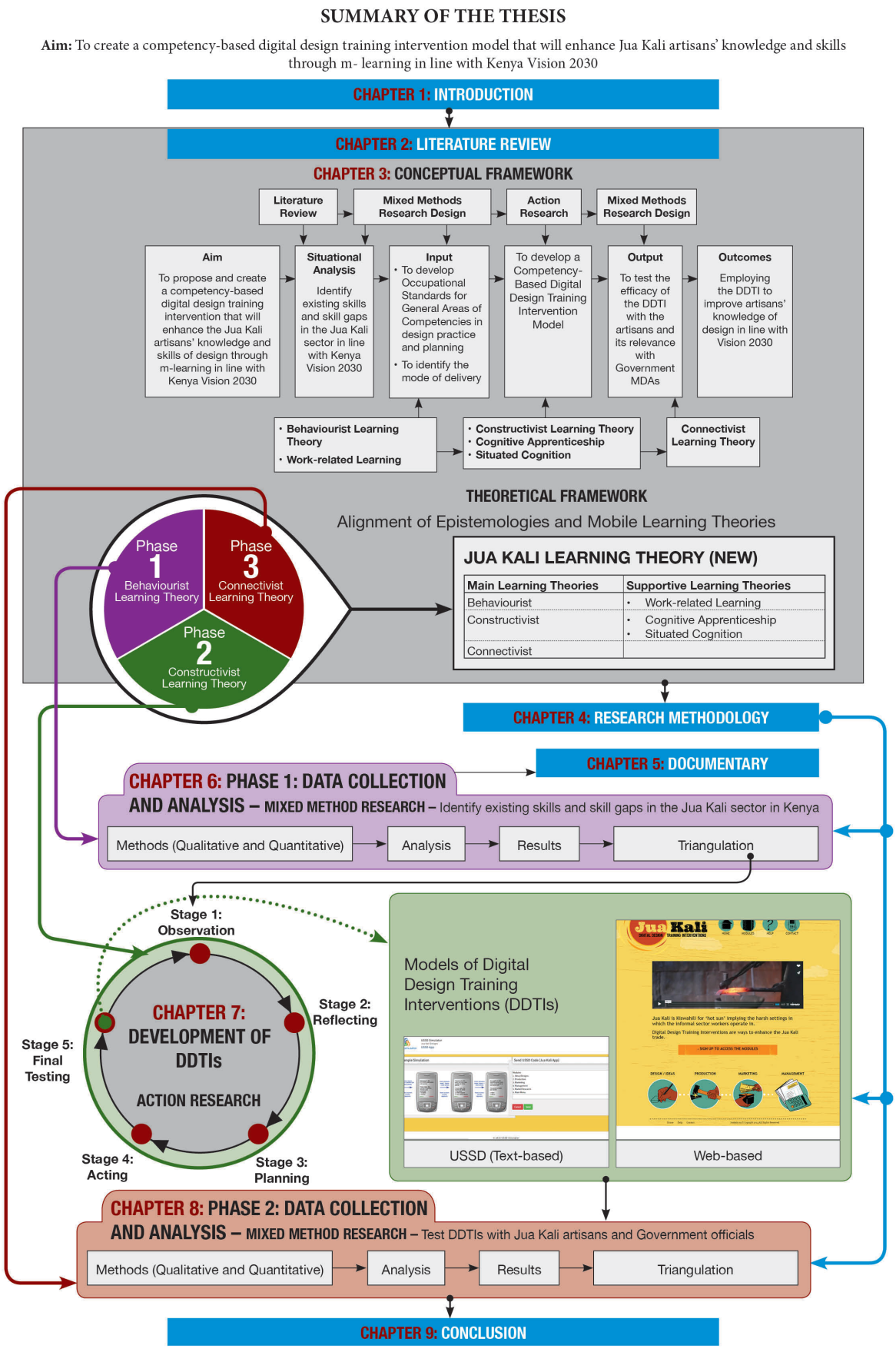


Figure 1.3 Summary of the Thesis

Summary of the Thesis

This study is presented in detail in nine chapters. The whole thesis is preceded by a preamble that explains the genesis of the study from my experiences with the JKA and my interpretation of the sector's craft processes as a designer, an academician and a consumer of their products.

The first chapter has briefly highlighted the background, characteristics, and importance of the JKS to the Kenyan economy in creating an employment sink for the country's burgeoning labour force, while also producing affordable goods and services for the population. It has highlighted the JKS' current lack of design skills development and application of design knowledge in the craft processes in the sector, which undermines returns to artisans. The chapter has introduced the competency-based design-training model, as a potential means of addressing the artisans' skills gap.

The second chapter summarized the importance of informal sector as a source of employment and livelihoods, with the potential to generate income leading to social economic development in Kenya. Consequently, it also offered the macroeconomic context in which JKS operates. It also addressed the various conceptual issues involved in the study, including Reflective practice, the value of apprenticeship, communities of practice and threshold concepts, didactic/Socratic and facilitative learning, work-placed learning, communities of learning and design for tacit learning. The chapter also reviewed the literature on competency-based education and training, and elaborated on its being modularised, learner-centred and demand driven, focusing learner outcomes on acquired skills rather than processes. It reviewed Kenyan mobile phone usage; the second level digital divide, educational levels and ICT competency, network speeds and download affordability. It also undertook a strength, weaknesses, opportunities and threats (SWOT) analysis of mobile learning, and ends by defining the significant gap in design knowledge, practice and planning in the JKS, which the thesis proposed to investigate.

The third chapter discussed the theoretical and conceptual frameworks of the study. The theoretical framework related to the three phases of the study, with Phase One based on the behaviourist theory and work related learning that underlies the mode of skill acquisition in JKS. Phase Two's constructivist learning theory is backed by cognitive apprenticeship and situated cognition to guide the development of the proposed design-

training model. The connectivism learning theory was applied in Phase Three of the study, to test the efficiency of the design interventions. The conceptual framework is a set of broad visual themes, ideas and principles in education design and technology derived from the literature and a situational analysis of the artisans.

Chapter Four presented details on the mixed methods research design, including qualitative and quantitative approaches, alongside an action research design. The chapter discussed the research location, target population, sampling procedures, the data collection methods and instruments, the ethical concerns and analysis of data.

Chapter Five described the twenty-nine minute documentary: The Informal Sector in Kenya – *Jua Kali* Perspectives, on the JK manufacturing sub-sector in Kenya, developed to enhance understanding of the study context, highlighting the concerns of the artisans in their craft trade**.**

Chapter Six presented the findings of the Phase One of the study, including the outputs of analysed qualitative and quantitative data collected to identify the skills and skills gaps in the JK manufacturing sub-sector.

Chapter Seven explained the phases of the development and digital representation of the design training model platforms through action research method. This cycle involved observation, reflection, planning, action, and eventually, the testing for efficacy. The reflection stage developed four learning modules, including the Design, Production, Marketing, and Management modules.

Chapter Eight reported the findings of the testing of the DDTI for efficiency among the artisans, and among the government officers for its relevance for policy and practice towards attaining Vision 2030. The chapter presented a comparative analysis between the web-based DDTI and its Unstructured Supplementary Service Data (USSD) counterpart designed for use with mobile phones.

Chapter Nine is the conclusions and recommendations of the study. It revisited the aims and objectives, and examines how the research undertaken achieved these objectives. It also outlined the contribution to knowledge, the limitations of the work, and suggests how the findings might be taken forward.

Potential Contributions to Knowledge

There is no readily accessible database on JK manufacturing sub-sector in ministries, Micro and Small Enterprises Authority (MSEA), or Kenya National Federation of *Jua Kali* Associations (KNFJKA) especially on the number of artisans, their competencies, training needs and the products they make in the manufacturing sub-sector.

The DDTI is a contribution to knowledge because it is the first training model that has been developed for JKA to access education through m-learning to develop the JKS into a more effective CoL and CoP. It has a web-based and a USSD platform that have been professionally designed to address low literacy levels, lack of ICT skills, lack of qualified trainers, accessible, affordable design training programs, and time constraints to further education.

The study has resulted in a greater understanding of the MC/apprenticeship relationship because it was established that there are significant gaps in the JKS design practice and planning during TA. The DDTI has introduced a new concept in skills development in the JK manufacturing sub-sector by bridging the training gap as well as complimenting the analogue TA training and introducing the artisans to competency-based design education in the digital world to facilitate personalised learning.

The AR cycle used in developing the DDTI is a contribution because it was used to understand the skills needs of the JKA in the manufacturing sub-sector and skills set were developed thereafter to fill the gaps. The DDTI model can be used too for design education by artisans, designers and educators experiencing the same challenges as the JKA.

The DDTI is a contribution to knowledge because *Jua Kali* artisans and Government officials from relevant MDAs confirmed its relevance and feasibility at the testing stage. According to the government officials, the DDTI would promote the access, quality, relevance and equity of design training for the JKS artisans, thereby contributing to facilitate the achievement of Kenya Vision 2030.

Conclusion

This chapter has briefly highlighted the background, characteristics, and importance of the sector to the Kenyan economy. It has also discussed the current lack of design skills development and application of design knowledge in the craft processes in the sector. This chapter also captures the objectives that guide the development and testing of the

competency-based design-training model, and the subsequent formulation of the theory that helps understand learning in the informal sector. The research approaches and learning theories adopted in the three phases of the study are discussed and the whole study is summarized. In the next chapter is a critical view of the literature on the informal sector. Reflective practice, the value of apprenticeship, communities of practice and threshold concepts, didactic or Socratic, facilitative learning (co-learning), work placed learning, communities of learning and design for tacit learning. Characteristics of the *Jua Kali* sector, design process followed by the artisans during traditional apprenticeship, government plans and strategies, competency-based education and learning, mobile phone usage in Kenya and mobile learning technology, gap in knowledge and how this will be addressed in this study.

Chapter Two: Literature Review on the Status of Jua Kali Sector of Kenya

2.0 Introduction

This chapter presents a literature review focused on the importance of the informal sector in developing countries. Specifically, the chapter examined skills development in the sector through Traditional Apprenticeship (TA), with a focus on the manufacturing sub-sector of the *Jua Kali* Sector (JKS) in Kenya as a case study. The chapter examined the characteristics and importance of the informal sector in developing economies, for which the TA system is the dominant skills development approach with its attendant constraints. Several fields of work were briefly discussed in relation to skills development in JKS. These were namely: reflective practice; the value of apprenticeship; communities of practice and threshold concepts; didactic and Socratic learning; facilitative learning; work place learning; communities of learning and design for tacit learning. The review also examined the critical role that the Kenyan government plays in the development of the JKS, including its plans and strategies for the sector. In anticipation of the potential roles of information and communication technology (ICT) in alleviating TA related constraints. The chapter reviewed the usage of mobile phones in Kenya on the education and ICT literacy levels, and the viability of mobile learning – hereafter, referred to as m-learning, for training design skills in the JKS. The gap in knowledge was identified and possible ways of be addressing it were discussed.

2.1 Overview of the Informal Sector

The International Labour Organization (ILO) (1971) originally defined the informal sector as an unstructured sector that emerged in urban areas due to the inability of the urban economies to absorb the immigrants from the rural areas (Tshuma and Jari, 2013). In 1971, a Ghanaian study of urbanization introduced the dichotomy between the formal and the informal sectors, the latter comprising workers who made a living outside the formal wage sector (ILO, 2015).

In 1972, Kenya hosted the first comprehensive ILO employment mission to Africa, whose report defined informality as the way of 'doing things'. Its businesses were characterized by the ease of entry, family ownership, reliance on indigenous resources, and small-scale operations. They were also characterized by skills acquired outside the formal sector, low productivity, labour intensive and adoptive technology, unregulated competitive markets, and lack of linkages with the formal sector. The informal sector also constituted the portion of the urban economy that escapes enumeration in the government's official statistics. At that time,

the Kenyan population was changing in terms of numeracy and literacy levels, raising the need to create employment opportunities, which could not be fulfilled by the formal sector alone.

In 1993, ILO defined the informal sector, as "units of production engaged in the production of goods and services" mainly to generate income and employment. The small-scale economic units often employed family labour; but a few hired workers or apprentices (ILO 2015). In 1997, the ILO expanded the definition of the sector to include private sector non-farm activities and the unregistered and unincorporated businesses. The failure by ILO to agree on a comprehensive definition of the sector by the year 2000 undermined data collection on it, with agriculture soon becaming an additional facet. The lack of a global definition has led scholars to define the sector based on what they consider its critical elements to be within an economy.

Onwe (2013) notes that one of the ways the sector is defined is through its sector activities, employment categories, the location of the sector in the economy and the income and employment potential of the sector. For Fapohunda (2012), the informal economy includes self- and wage-employment that is usually not formally recognized, regulated or protected by any legal or regulatory frameworks, and therefore is not taxed as it lacks adherence to the law.

In Kenya, the term *Jua Kali* (JK) means "hot sun", depicting the harsh and unfavourable working condition of workers in the sector. The *Jua Kali* industry is an economic phenomenon that may be unique to Kenya yet comparable to other phenomena in other developing countries. It is characterized as a self-organizing community or economic unit producing goods and services (Chepkener, 2013a; King, 1996; Ngui et al., 2014). Since the early 1970s, *JK* referred to artisans involved in manufacturing and repairs, mainly comprising of the self-organizing communities of mechanics and tradesmen, carpenters, masons, tinsmiths, sculptors and welders. The JK concept is based on the ideology of hard work, self-reliance, a self-driven economy and the need to do something for oneself even if the government does not assist. It is propelled by technologies learnt on the job from other workers, or through intuition or inherited skills. Eventually, JK broadened in scope to refer to businesses that produced cheap, low quality products, often operating without fixed locations. The informal sector, or the JKS, is made up of micro and small enterprises (MSEs)

The informal sector follows no laid down staffing criterion: recruits find their way into the sector through informal channels, such as family and friendship ties. Recruits are largely primary school and high school dropouts; with college graduates participating in to overcome employment constraints. Often arriving without skills, recruits are taken up as apprentices in the respective crafts or trades.

The micro-enterprises have less than ten employees whereas the small enterprises have between ten and fourty nine employees (Kenya National Bureau of Statistics, 2016). According to MSE Act (2012), the JKS is currently made up of four subsectors, including manufacturing, services, trade and agri-business. They include informal businesses, registered small-scale businesses that deal in trade, service or manufacturing with an annual turnover of less than Ksh. 500 000. The Act notes that the manufacturing sector consists of enterprises that make products by adding value to basic raw materials, transforming them into consumer and capital goods largely targeting lower income Kenyan households and portions of the international market. According to the MSE Act, these enterprises have plants, machinery or registered capital of less than Ksh.10 million Kenya shillings.

Currently, the JKS is a great vehicle for Kenyan employment creation, creating about 75% of the new jobs in the economy annually. There are implications of stagnation in that whereas there is rapid horizontal expansion of the sector, there has been no corresponding vertical growth, hence no significant graduation from one enterprise level to another (Kenya National Bureau of Statistics, 2016). The manufacturing sector is the second largest in the MSE with about 2000 enterprises falling within the ‘medium’ category, while 7000 are classified as ‘small enterprises’ (Kenya National Bureau of Statistics, 2016; Muriithi and Mburu, 2017). (See Figure 2.1 below)

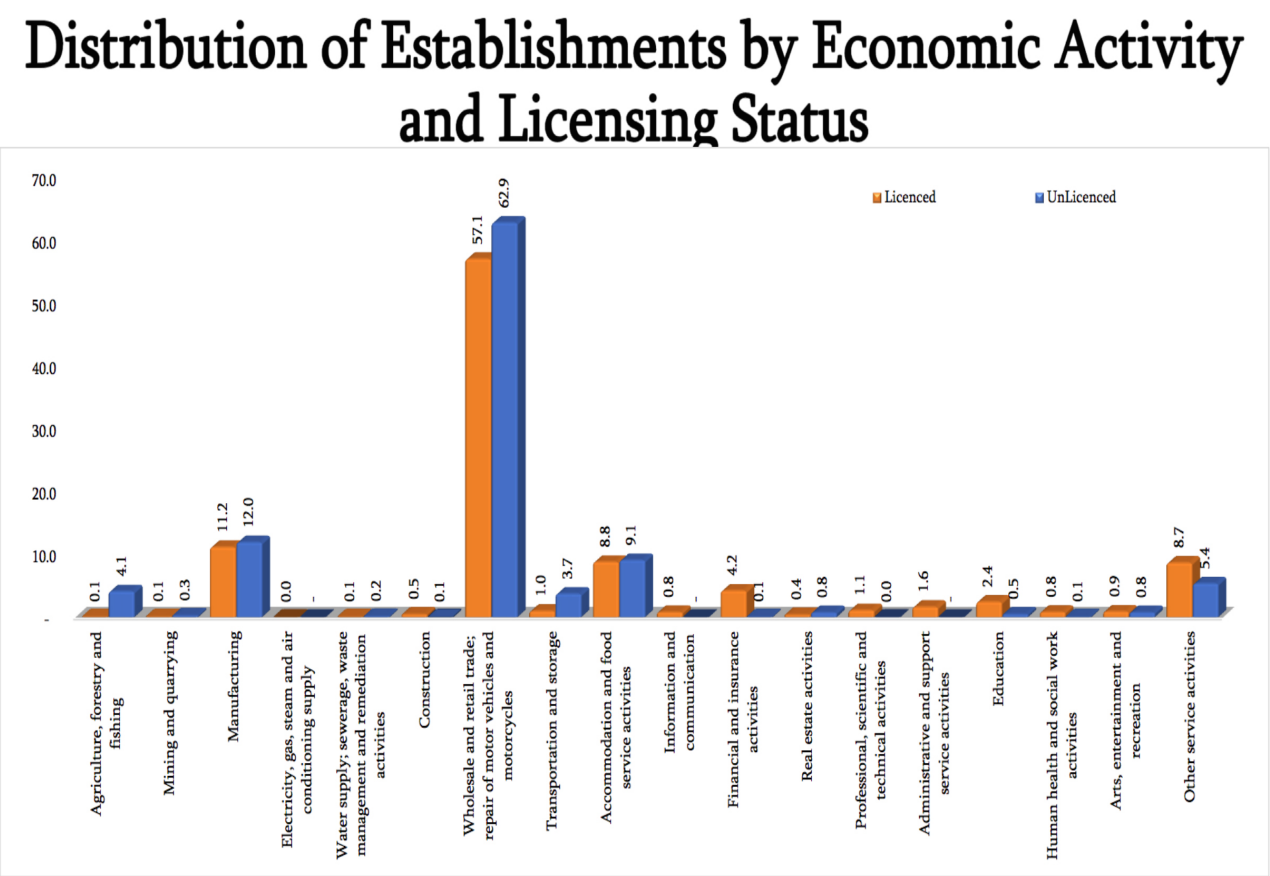


Fig. 2.1 Distribution of Establishments by Economic Activity and Licensing Status

Source: Kenya National Bureau of Statistics (2016 : 27)

The JKS reflects the response of the public and government to unemployment due to the failure of the formal sector to provide adequate employment opportunities for the increasing population. Besides, some formal sector workers have enterprises in the JKS to augment their income, or as a backup plan in case of retirement or retrenchment (Gikenye 2012; Miyandazi 2013).

Based on the foregoing definitions and characterizations of the JKS, this study's working definition is:

The Jua Kali sector is a community of practice that comprises of artisans running micro and small enterprises that are not fully integrated into the mainstream formal economy. These enterprises produce a variety of products and services using skills acquired mainly through traditional apprenticeships from master craftsmen, the majority of whom have not mastered the multi-dimensional phenomenon pedagogical dimension that involves using a variety of support material and various forms of teaching to acquire knowledge, expertise and practice in design practice and planning.

This working definition reflects the study's purpose of identifying and examining the existing skills in the sector, and whether there is a skills gap in design practice and planning during TA for the JKS' manufacturing sub-sector.

Importance of the Informal Sector

The informal sector is important to developing economies largely for employment creation and income generation. Khan and Khalique (2014) note that economic growth in developed economies results from the focus given to the informal sector as an integral component of the economy. The sector accounts for over 98% of the total enterprises, providing 65 % of employment opportunities and contributing over 50% of the GDP for the developed economies.

In Africa, 80% of total employment and 90% of new employment opportunities are found in the informal sector (Walther, 2013), with the non-farm informal sector providing an employment safety net (Adams et al., 2013). In South Africa, informal sector enterprises contribute about 30% of the GDP (Tshuma and Jari, 2013), while in Uganda, it employs 85% of the total workforce and contributes 20% to economic development (Komunte, 2015).

In Ethiopia, 50.6% of the urban workforce is employed in the informal sector (Garoma, 2012), while in Nigeria where non-farm employment is 40% of total employment, it creates about 35 000 employment opportunities annually and is credited for stimulating and enhancing innovation and adaptation of technologies (Fapohunda, 2012). In Rwanda, the sector creates about 79% of employment while in Tanzania it accounts for 47%. Notably, the sector in Rwanda and Tanzania is still largely agrarian with about 25% of the total employment in the non-farm informal sector (Adams et al., 2013). (See Table 2.1 below)

Table 2.1: Employment in the informal sector

Sector	Ghana	Nigeria	Rwanda	Tanzania	Kenya
Total employment	6 900	53 697	3 971	18 780	9 737
Farm	3 408	31 818	3 048	13 991	4 856
Non-farm	3 492	21 879	923	4 789	4 881
Formal	985	6 172	190	2 550	1 404
Informal	2 507	15 707	733	2 239	3 477
Non-farm employment as percentage of total employment	51	50	23	26	50
Informal employment as percentage of non-farm employment	72	71	79	47	71

Source: Adams et al. (2013: 48)

In Kenya, the JKS is the biggest employer, serving as a cushion for the ever-increasing unemployment compounded by a fast shrinking share of formal sector employment (Miyandazi, 2013). As seen in Table 2.1, the sector creates 70% of non-farm employment, including that in the manufacturing subsector composed of clusters, such as metalwork, woodwork, pottery, beadwork, and handicraft.

In the 1970s, JKS accounted for only 10% of the total Kenyan labour force, but had grown to 63% by 1996 (Miyandazi, 2013). The 1999 National MSE Baseline Survey reported the sector had about 1.3 million enterprises employing 2.4 million people. In 2012, Kenya's Economic Survey reported that the sector had absorbed 4.2 million people in 2000 and 5.1 million in 2002, accounting for 74.2% of the total workforce. By 2009, the sector accounted for 82.5% of the total workforce, up from 80.3% in 2008 (Kaane, 2014; KIPPRA, 2014). In 2015, the sector created approximately 713 600 jobs, which accounted for 84.8% of all the new jobs in the economy. Currently, the total employment in the sector is approximated at 14.9 million.

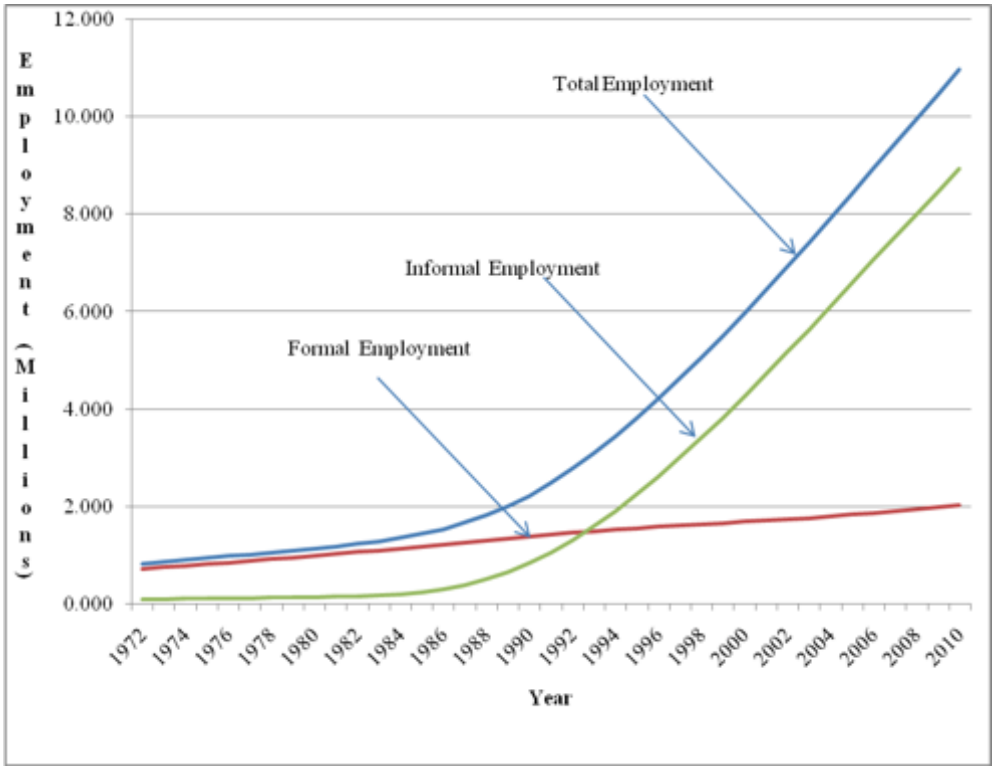


Figure 2.2: Share of informal sector employment against Formal Employment

Source of Data: Republic of Kenya, Economic Survey (Omolo, 2012).

The value of the sector's output in the year 2015 was about Ksh.3 317 billion against the national output of Ksh.9 971 billion, representing a contribution of about 33.8% of output

(Kenya National Bureau of Statistics, 2016). The JKS is expected to continue creating employment in the economy as indicated in Figure 2.2 above.

The small and micro enterprises are also recognized for fostering innovation, and as important sources of goods and services (Kenya National Bureau of Statistics, 2016). Specifically, the *Jua Kali* artisans in the manufacturing sub-sector supply the local market with affordable hand-made products that call for low capital investments (Miyandazi, 2013; Neilsen, 2012). They also produce a variety of handicrafts, which preserve Kenya's cultural heritage. However, the enterprises are not fully integrated into the mainstream formal economy (Miyandazi, 2013; Kenya National Bureau of Statistics, 2014).

2.2 The General Characteristics of the Informal Sector in Kenya

Majority of the JK enterprises are semi-organized, small-scale and not registered, especially the ones owned by individuals who do not belong to *Jua Kali* associations (JKAs). The may lack formal structures and are set up on illegal land (Kamunge et al., 2014; Wanambisi and Bwisa, 2013), and are likely owned by self-employed artisans or apprentice graduates. Notably, the majority of the unlicensed enterprises in the Micro, Small, Medium Enterprises (MSME) sector are the micro enterprises. The lack of registration implies that the enterprises are unregulated and therefore, lack legal protection. The artisans do not register their enterprises, ostensibly to avoid paying land rates and business permits, exposing them to disruptions by the county governments who have the power to demolish their illegal structures, or relocate them.

Such uncertainties undermine their planning, functioning and production processes since they deter investment in fixed structures, modern equipment and secure and reliable working environments accessible to clients. While the enterprises are located in both rural and urban areas, are more common in urban areas with access to infrastructure, notable water and electricity. Nearness to urban markets also minimizes costs.

TA is a common pre-employment training scheme in JKS, which targets mainly the youth from poor households, largely with basic education attainments. Indeed, as seen in Figure 2.3, four in ten of the artisans have not finished eight years of basic primary education, while a quarter have completed secondary, vocational, university and postgraduate education. The low education levels persists after joining the sector since the artisans cannot afford further education and vocational training (Adams et al., 2013; Ashraph et al., 2013; Robb et al., 2014; Kenya National Bureau of Statistics, 2016). This limits the artisans' ability to upgrade skills and

adopt new technologies, with 2016 KNBS data showing a correlation between the levels of education in the sizes of MSMEs enterprises. Primary education graduates dominate the unlicensed MSMEs, followed by operators with no education. However, Secondary only graduates dominate licensed enterprises followed by primary only graduates. While graduates own 10% of the licensed enterprises, their participation in unlicensed enterprises is quite modest.

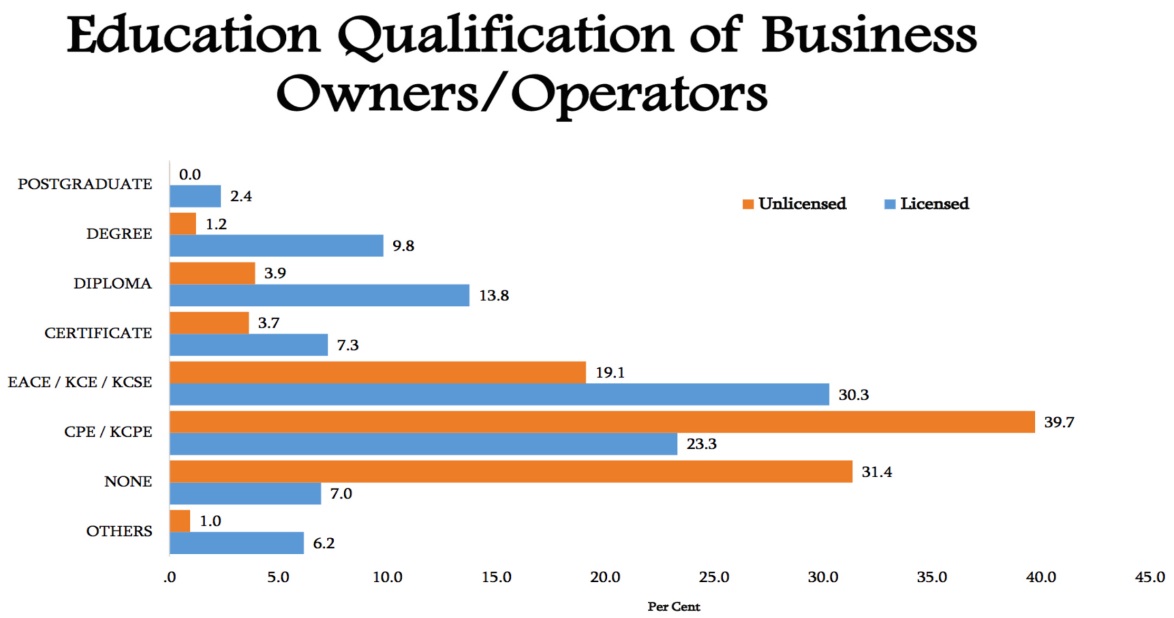


Fig. 2.3 Highest Education Qualification Attained by Business Owners/Operators

Source: Kenya National Bureau of Statistics (2016 : 36)

Most sector workshops lack space and have poor storage facilities. Some artisans work without protective gear like gloves, goggles, dust masks, gumboots, ear muffs and welding goggles, exposing them to occupational hazards, such as pollution by noise and toxic fumes (Ashraph et al., 2013; Chepkener, 2013; Keitany, 2012; Theuri, 2012). If the products are not safe and do not have market appeal, they can affect the product quality leading to safety problems which can damage the sector's reputation. It also inhibits the design processes and affects the product output since their refurbishment or recycling might injure the consumers. The aesthetics and functionality of a product must relate to the environment in which they are used. For instance, a metalworker needs to make metal frame office furniture that are not just light and easy to move, but must also support the working load of the person using it.

The lack of standardization in the JKs means that Kenya Bureau of Standards (KEBS) and the occupational safety authorities have no yardstick to work with; yet safety is essential for the

success of the design process, and must be observed throughout product development and fabrication. The KEBS is a statutory body under the Standards Act Cap 496 of the Laws of Kenya, responsible for inspection of and quality assurance for locally manufactured and imported products, while the Occupational Safety and Health Act provides guidelines over the design, installation, and competent operation and maintenance of workplace machinery and equipment, including protective equipment and hand tools. It also addresses workspace in relation to toxic fumes and fire risks. Consequently, most JKS artisans do not comply with the health and safety regulations stipulated by KEBS (Chepkener, 2013) and the Occupational Safety and Health Act, 2007 (Gikenye, 2012). Despite the JKS poor public image because of their poorly finished products, their durability makes them competitive in the market. This competitiveness despite the lack of KEBS' standardisation mark (S-Mark) results from their greater affordability compared to formally provided goods and services. The S-Mark process involves sampling products, testing suitability and safety for consumers, and assessing production line processes, which ensures the quality of the end-products.

TA contributes to 70% of skills acquisition in the JKS (Adams et al., 2013; Mutai, 2011). At the Kamukunji *Jua Kali* Association, the TA system serves as an entry point for nearly 80 % of the metal work artisans, and the apprentices acquiring required skills while socializing in the *Jua Kali* environment (Obare, 2013). The *Jua Kali* clusters at Racecourse, along Ngong Road in Nairobi, hire artisans and train apprentices at a fee. For example, Moses Metalwork takes on as many as thirteen apprentices at a time (Bull et al., 2016). The alternative training programmes available to the players in the sector are mainly management, ICT and technical issues, which are provided by government agencies, non-government organisations (NGOs), individuals, self-help groups, and co-operative organisations (Kenya National Bureau of Statistics, 2016). An improved understanding of the strengths and limits of the TA system is one objective of the study reported here.

The JKS in general, and its manufacturing sub-sector in particular, has the potential to generate more income and become a seedbed of innovation towards the aims of Vision 2030. Against the backdrop of the sector's characteristics and constraints discussed above, the Government has encouraged the establishment of *Jua Kali* Associations (JKAs) into which artisans should enroll to enable them access resources and training.

2.3 Jua Kali Associations in Kenya

Since the 1980s, the Kenya government has encouraged *Jua Kali* artisans to form associations as vehicles for accessing resources, such as worksites, credit and training (Scott and Garofoli, 2011). Initially, the government claimed the formation of the associations was essential in enhancing the economic activities; but it was more interested in using them as instruments for controlling the 600 associations in the sector (Neilsen 2012). Therefore, instead of strengthening the capacity of the JKS, the associations largely served the purposes of government policy.

The JKAs are clusters or communities built on strong informal social relations or networks with multiple identities, whose members regularise their membership through registration (Chalhoub, 2012). The social network assists the new entrants to familiarise themselves with the sector, learn new skills, assist in access to new markets, and resolve emerging conflicts. Some of the most active associations have included the pioneering Kamukunji (1984) and Kayole JKAs in Nairobi city, Kibuye and Kisumu Centre JKAs in Kisumu city, and the Mchanganyiko Craft Association of Kakamega

The Kenya National Federation of *Jua Kali* Associations (KNFJKA) is the umbrella body for the associations, founded in 1992, about six years after the government officially recognized the JKS (Moyi, 2014). The KNFJKA has attempted to streamline the sector by identifying 18 occupational subsectors, and provided artisans with learning opportunities through exhibitions, such as '*Jua Kali* Nguvu Kazi' and others hosted in different East African countries. The federation also safeguards associations' interests, recently getting the Nairobi County Government to intervene against land grabbers. Such usurpation of association land rights is a common threat in Nairobi County where only 50 of the 245 associations have title deeds (Otieno, 2016).

The JKAs are made of clusters with the characteristics of communities of practice (CoP) and communities of learners (CoL), which are important to the sector in numerous ways. These communities increase social networks, collective action and informal forms of social protection- such as fro government harassment, while also jointly identifying problems, which are resolved collectively**.** For instance, in 2014, Mafundi wa Kenya Association (MWAKA) partnered with Alibhai Sharrif Centre of Excellence, which seeks to develop competencies amongst the local artisans in order to empower their small businesses, training 73 artisans, ten per cent of these being women (Shariff, 2014).

The JKAs are a form of CoP because they have some common visions, goals and interests, to create employment and generate income. They also collaborate in sharing ideas and solving problems in their domains of knowledge. The domain creates the common ground and a sense of common identity (Wenger et al., 2013). The JKS artisans engage in collective learning in their shared domains, where they learn new skills through TA to enable them to make and sell products. The domain of knowledge in the JKS already creates some common ground and a sense of common identity in a group of micro and small-scale enterprises. As a CoP, the JKA should focus more on their domain of knowledge in specific craft areas like handicraft, pottery, woodwork and metal work. In the process of achieving these goals and interests, they should use common practices, similar tools and express their ideas with a common language. They will therefore, end up holding similar beliefs and sharing a value system in the quest to develop better practices (Barnett et al., 2016; Osmond and Tovey, 2015; Petersen, 2013)

Community is the critical component of any CoP, and a source of coherence because of the mutual agreement and engagement of participants as they interact to develop their ideas through sharing interests in their domain, developing skills and members engaging in joint activities and discussions as they share knowledge. It advocates for voluntary membership instead of mandatory organizational affiliations as members are also at liberty to leave; but members constantly negotiate with each other (Khuzaimah and Hassan, 2012).

One of the characteristics of the informal relations and associations is membership exhibited in multiple identities, as shown by the nature of their membership. The JKAs have domains that are legitimized by the community through affirming its purpose and values to members and other stakeholders, and by creating a common ground and a sense of the community's common identity. There are cases where membership is open to all individuals who have specific skills, activities, gender or age, or members who have interest to learn a skill. The JKAs domain, members regularize their membership through registration, implying a commitment to the domain, and therefore, a shared competence that distinguishes members of that community, such as the Kamkunji JKA, from other people.

A domain inspires members to contribute and participate, but not necessarily guide their learning and give meaning to their actions because they observe and imitate (Wenger et al., 2013). Knowing the boundaries of the domain in the JKS should enable the members to decide exactly what is worth sharing, how to present their ideas, and which activities to pursue. The

artisans value their collective competence more and learn from each other, even though few people outside the group may value or even recognize their expertise.

A community is formed when there is synergy that builds on the ideas of the members, helping them pursue their interests in their domain; engage in joint activities and discussions, and share information. They build relationships to enable them learn from one another without necessarily working together on a daily basis. Community is thus a product of ability and talent as recognized by the peers, which is needed in achieving the goals of the community (Serrat, 2011; Wenger et al., 2013). Kenya's JKS and its KNFJKA have created a suitable environment based on their social networks that enables mutual learning relationships and generate incomes.

Some of the JKA are CoPs that are willing to share ideas and production with very little concern over confidentiality. The JKA members collaborate over big orders, collectively negotiations and producing, in complex mutual engagement arrangements (Scott and Garofoli, 2011). For example, the dozen or so independent wheelbarrow makers at the Kamukunji cluster set up joint production lines in response to an exclusive large order, to enable the quick delivery of standardized units.

At the Kamukunji association, each business has a different innovation network, relying heavily on the networks within the cluster. However, they are remotely linked through their JKA, or through training and micro-finance, to formal institutions like government Ministries, Departments and Agencies (MDAs), including the Micro and Small Enterprise Authority (MSEA), National Industrial Training Authority (NITA), Kenya Association of Manufacturers (KAM), Federation of Kenyan Employees (FKE), and Kenya Private Sector Alliance (KEPSA) (Bull et al., 2016).

According to Kweyu, (2014) the social networks also facilitate the learning of new skills and access to new markets. For instance, in 2014, the Nairobi County Fair and Community Development Association held a three-day trade fair, where its 1,640 members showcased the work of Nairobi self-help groups, while some artisans have marketed their products in the East African region. The KJAs are therefore an integral component of the operations in the sector, informing the composition and activities of the clusters as CoP in regards to issues, such as strong social networks, training through TA, access to markets, production process and access to financial resources.

2.4 Overview of Skills Development in the Informal Sector

Apprenticeship training is regarded as a critical contributor to skills supply, fostering economic development in any country; but is also an area that is highly vulnerable to underinvestment by key stakeholders, such as governments (Fuller and Unwin, 2013). Alongside training, the apprentice in specific trade skills whilst socialising, they must be attached to a real job and deliver broad and transferable skills (Lyon, 2011). It facilitates the transmission of skills from a custodian of knowledge, the Master Craftsman (MC) to an apprentice with little or no academic study, classroom work or reading. Most apprenticeship training involves the apprentice working for an employer in exchange for the former's labour, for a period agreed to deliver some basic competencies (Idowu et al., 2015).

Craftsmanship is a central concept in, and desirable outcome of, apprenticeship, focused on acquiring the skill 'right' rather than 'fast'. It entails carrying out the craft process as the apprentice develops attitudes that make them self-sufficient, moulding the identity of the apprentice in terms of who they are, what they can do, and the belief they have in themselves as practitioners (Lucas and Spencer, 2014). Consequently, apprenticeships facilitate the transition from school to work, providing relevant work experience for an industry (European Commission, 2013; Molz, 2015).

Notably, TA is the dominant system of skills acquisition, especially in the developing countries (Adams et al., 2013; Ademola and Anyankora, 2012; Nordman and Pasquier-Doumer, 2012; Onwe, 2013). In Nigeria, informal sector workers acquiring skills through TA are twice as many as those who go to Technical Vocational Education and Training (TVET) (Okoye and Chijioke, 2013). TA's dominance stands at 90% in Ghana (Amedorme and Fiagbe, 2013; Anokye and Oduro-ofori, 2014), 40 % in Senegal, and 80 % in Morocco (Walther, 2013).

Even though the TA system varies in terms of specific practices, its features are largely the same (Akoojee et al., 2013; Lancy, 2012; Sanghi and Sensarma, 2014). TA begins with a training agreement between the MC and the apprentice – often merely verbal, between relatives, friends, or simple acquaintances. The apprentice could pay for the training either in cash or by working for the MC, he latter benefitting through cheap labour, or augmented income (Lancy, 2012; Steedman, 2012). Educational qualifications are not a consideration, hence the JKS' low education levels (Sanghi and Sensarma, 2014).

Initially, the apprentice does menial work for the MC, which is a staged arrangement of sub-errands with no formal instructions, such as fetching clay, water, or wood. Such sub-errands inculcate the work ethic, and the motivation necessary for the impending physically tiring activity. The apprentice demonstrates, sometimes over a lengthy period, their readiness for the training and ability to persevere, learning through observing the more experienced at work. They are discouraged from asking any questions since verbal communication is adjudged a disincentive to learning. The duration of this stage depends on the specific needs of a particular craft, and the TA context; but it corresponds to the apprentice's physical, social and psychological maturation (Gowlland, 2012; Lancy, 2012).

In the next stage the apprentice takes part in actual production, involving a reconstructive observation-imitation process. The apprentice integrates what they have observed during the TA into their own work. Generally, the knowledge and skills acquisition process involves didactic teaching as the core pedagogical process, based on observing, imitating and repeating what the MC is doing – employing trial and error (Akoojee et al. 2013). The MC is always at hand to ensure that the apprentice's interpretation is accurate and intervenes against mistakes. For example an apprentice in pottery, may be required to make miniature pots that have no decoration, which could be fired and sold or given away; or just thrown away without undergoing the process of firing (Lancy, 2012).

TA does not encourage originality: learning is through repetition with consistent practice helping the apprentice improve their skills and work speed, improving understanding of the craft making processes. Notably, the unspoken (tacit) and observational TA production processes have an order and logic to them, which significantly determines the processes of the apprentice system (Lancy, 2012).

Generally, the TA learning process is unstructured, with no theoretical explanations (Darvas and Palmer, 2014; Nordman and Pasquier-Doumer, 2012): apprentices may be unable to rationalise the processes undertaken. Theoretical knowledge of the product design processes would however, make them knowledgeable artisans, capable of adhering to a systematic approach to product design and development (Lancy, 2012). Additionally, the TA learning process uses improvised and adapted teaching technologies (World Bank, 2012) . In Pakistan for instance, the skills and technologies employed in traditional apprenticeship are outdated (Sanghi and Sensarma, 2014); and in Ghana, the apprenticeship system is disconnected from

current technological advancement, limiting the introduction of new product designs and product technologies. Without training in current technologies, the apprentices do not acquire skills to upscale the quality of their products by improving the functional and aesthetic requirements to reduce their economic constraints.

In some societies, the third and final stage of the TA is marked by a celebration or graduation of the apprentice whose confidence, skills and knowledge can enable them open their own workshop, while others might prefer to continue working for their MCs. However, this mode of JKS skills development comes with numerous limitations that will be discussed later in this study. While some graduates continue working for their MCs, others opt to open their own workshops (Adams et al., 2013; Momanyi, 2014).

2.5 The Kenyan Jua Kali Design Process during Traditional Apprenticeship

The products generated through a structured design process or apprenticeship training system, accompanied by some classroom reading, should always function well, be aesthetically pleasant, safe to use, environmentally friendly and affordable. Design solves problems in terms of the product's requirements, its physical looks and also through taking into account its intangible features regarding the customers' needs, image, aspirations and culture (Gitobu, 2012). However, Kenyan JK artisans join many other globally who learn their skills mainly through TA, estimated to account for over 70% of all pre-employment training (Adams et al., 2013; Mutai, 2011).

According to Nelima (2015), the design processes taught in the JKS during TA is generic, characterized by the acquisition of raw material, product development, and the finishing of the product. The JKA therefore do not follow a structured design process compared to the formal design processes (William, 2015) .The design process includes defining the problem through market research, collecting background information with which to define market needs. This is followed by idea generation to create potential market-driven solutions. Next step is crafting prototype solution, which is optional. Finally is selecting an option that delivers the solution to the design brief by enabling production of the final product. Feedback is then obtaining form the end user. Thus, artisans work arbitrarily, with little or no attention to the design issues above, or to the purpose of the product, cost competitiveness, functionality, aesthetics, economics, ergonomics, safety and its effects on the environment.

The *Jua Kali* artisans' conditions are unique and different from best practice apprenticeship, which focuses simultaneously on career development and improvement of skills, understanding and knowledge (Dawson, 2012; Ofsted, 2015). As discussed previously, Kenyan TAs is based largely on verbal contracts between affiliates, family, ethnic or other. Apprenticeship requires no prior education, and is therefore open to all in society with an aptitude for the trade, or some basic knowledge of some skill (Daniels, 2010; Keitany, 2012; Neilsen 2012). The duration of the TA is not specified.

There is minimal documentation of TA processes from which apprentices can learn. Instead, they learn tacit skills and knowledge through didactic learning from the MC (Gikenye, 2012; Kwanusu, 2013). According to Jana et al., (2013), tacit knowledge is often acquired implicitly, and is therefore difficult to explain in the form of words, numbers, codes or symbols. The design knowledge in the JKS is largely tacit because it is acquired informally through observation, imitation and conversation.

Valuable knowledge acquired by the JKA overtime can be lost through exists of artisans. Tacit knowledge is described as being resident in the mind of an individual; it includes the skills, experience, insight, intuition and judgment (Poggenpohl, and Satō, 2011) The challenge of retaining this knowledge lies in the fact part of the knowledge is tacit in nature and highly if not totally inarticulately that comes from form a combination of explicit knowledge domains in a dynamic thinking process.

Chang et al., (2014) argue that tacit learning is the foundation upon which tacit knowledge is acquired; that tacit learning is also representative of the structure of the learning environment. Tacit knowledge is typically seen in design process where designers or artisans apply tacit knowledge to come up with innovative designs. In the JKS the artisans acquire tacit knowledge on design practice and planning through unconscious learning that lacks theory on the hands-on training (Adams et al. 2013) though it also a result of involuntary learning that guides how they behave and act. This creates a knowledge gap because TA many not train the apprentice well enough for them to be able to grasp the keys of learning quite easily to enable them to also transfer tacit knowledge, solve design problems and make reasonable judgment.

According to Jana et al., (2013) tacit knowledge is often unsuspected and it is not easy or even possible to explain it in the form of words, numbers, codes or symbols. The design knowledge in the JKS is largely tacit because acquire it through observation, imitation and conversation. It

is primarily transferred informally through social networks, direct interaction between individuals and shared through highly interactive stories, conversations and shared experiences. The transfer of tacit knowledge depends on the credibility of the transferor. It is most effectively realized through face-to-face interactions The sharing of tacit knowledge may involve some risks to the individual such as losing one's competitive advantage over their peers (Dijkstra et al., 2013; Jana et al., 2013, Chang et al., 2014).

Tacit knowledge acquired by the JKA is quite personal because MC to apprentice. It is hard to formalize; it is rooted in action where they learn by doing, values are based on their backgrounds, emotions and commitment. This is because each artisan forms their own tacit knowledge based on their previous experience, knowledge, skills and mental models. Therefore, the teaching and transfer of tacit knowledge is quite difficult. However, with a well-prepared development method, tacit knowledge can be transmitted easily, creating in the mind of the learner some receptors that the forming and moulding of tacit knowledge much easier (Dijkstra et al., 2013; Jana et al., 2013). As the sole custodian of knowledge, majority of the MC don't avail a synchronized developmental system for the apprentice to acquire tacit knowledge and which could affect their reliability. This creates a knowledge gap because artisans have form their own tacit knowledge founded on their apprenticeship. JKS acquire knowledge and skills through on-the-job training, which includes informal procedures of training but the learning of the skills, may not necessarily be procedural.

The levels of uncertainty and risks involved with transferring tacit knowledge are reduced through trusting relationships (Jana et al., 2013). The agreement between the apprentice and the MC is in most cases verbal and only enforceable based on the goodwill of both parties. This gives room for exploitation of the apprentice since the MC may not teach the full skill sets that will allow the apprentice to do complex tasks and becoming competitive. Beside, since the training lasts for unspecified duration the MC may take advantage to use the apprentice as free or cheap labour (Aggarwal, 2013). The sharing may involve some risks, such as the loss of one's competitive advantage over peers (Dijkstra et al., 2013; Jana et al., 2013, Chang et al., 2014)

JKA acquire tacit skills from their practice. This occurs through social networks, direct interaction between individuals, and shared experiences; but it depends a lot on the credibility of the transferor. Tacit skills are the bits of information and knowledge that are not

easily expressed as formal knowledge but are nevertheless quite essential for doing work correctly and efficiently. The tacit skills that are essential for a particular job are normally learned through having long experience on the job. Tacit skills vary from one job to another. Tacit skills generally involve one's ability to evaluate a range of options when determining how to undertake a particular task. They combine the formal knowledge to define the working knowledge that is required for a particular job (Hodson and Sullivan, 2012).

The tacit learning in the JKS needs to be continuous because, tacit skills are typically seen when designs are manufactured through the application of craftsmanship. When tacit design knowledge and manufacturing skills are combined in synergy they result into the creation of new and innovative knowledge. Brödner, (2014) proposes design by doing as the most appropriate method for acquiring tacit skills. Design by doing would make the artisans draw on their tacit knowledge and take into account their labour processes and its technical support, tools and techniques that allow them to design by doing. This would help the apprentice to articulate their demands and wishes in a concrete way through using simulated tools in their working environment.

In this first stage of the TA process, the artisan's copy product ideas, especially those that seem to penetrate the market well, or those they have learnt of during TA. This is because most artisans lack the capacity to identify, define and meet the specific needs, wants and wishes of clients. This incapacity leads to the saturation of the market with similar products.

The second stage in the design process is the collection of background information with which to generate a brief based on markets demands. Competitive products have attributes that are dictated by market research, technological developments, market demands, functionality, attractiveness and affordability (Jonassen, 2011; Haik et al., 2016). The resulting briefs that could also be developed by a client can help designers to evaluate and articulate the consumers' problems, and to specify the functional requirements of the product as they develop a suitable design solution. Ideal products must respond to operational requirements, performance and safety. Artisans must cost their intentions, economic viability and production costs before commencing manufacturing. Adherence to such briefs could be verbal or written to maximize the benefits for both the designer and user.

According to Wangare (2015), the absence of such briefs in the JKS design process undermines artisans' understanding of the demands of target markets, enabling the production of quality,

functional and affordable products. The use of structured verbal explanations, visual representations, simple sketches or models would help artisans to develop concepts, and to visualize, clarify and test their thoughts. This demands decisive information gathering on, and understanding of, current market trends over products.

The third stage in the design process involves concept development or ideation, which synthesises research findings into an idea based on the design brief (Jonassen, 2011; Haik et al., 2016). Brainstorming, modelling or sketching enhance understanding of the brief, and generate potential design solutions that shed light on the ideal methods, material, tools, and techniques necessary for production. This stage requires divergent but collaborative thinking for the idea to be wholesome and relevant to the design problem. According to Nelima (2015), the JK design process does not include idea conceptualization, as artisans acquire materials, and proceed to product development based on tacit skills and knowledge skills acquired during TA. The artisans "generate ideas" by observing, copying, sharing and imitating as they develop tacit skills. However, other artisans obtain design ideas from catalogues, magazines, newspapers and imported goods. Thus, there is some idea generation, as artisans adapt these copied designs to suit the local market contexts.

In Kenya, the artisans also generate product ideas based on the needs of their clients' product specifications or the clients briefs (Wangare, 2015). This provides one of the reliable channels through which designs filter to the JKS artisans from outside the sector. Other design filtering channels include interaction among artisans at national and regional trade fairs. But sketching is infrequent; and JKS artisans have rarely kept traditional portfolios of the best design practices or knowledge they acquire. Wangare posits that mobile phone handsets have presented a popular mode of design knowledge documentation is photographs in albums. A further challenge to the accumulation of artisanal knowledge is the exit of artisans to other subsectors, the formal sector or into retirement.

The *Jua Kali* product development process does not normally progress through a series of definite stages from raw material to final product. After the casual agreement between the MC and apprentice, the latter is exposed to the real working environment where they acquire tacit knowledge and skills (Ondieki et al., 2013; Robb et al., 2014). The JKS production process begins with the acquisition of the raw material that is used in developing a product. The artisans sometimes select low quality materials to reduce production costs, which in turn

yields low quality products (Mukoche, 2015). JKA then acquire tacit knowledge and skills as the apprentice observes the MC, imitates and repeats (Nelima, 2015). The apprentice is a passive listener and the learning process is hands-on with minimal if any theoretical explanations of the production process. The MC is the sole custodian of the knowledge and skill that he teaches, but may engage the apprentice in conversation about the craft. In the acquisition of tacit knowledge and skills through TA, creativity is not encouraged The disadvantage is that the apprentice is limited to learning the MC's skills.

Tacit knowledge acquired by the JKA is quite personal because it is from MC to apprentice. It is hard to formalize; it is rooted in action where they learn by doing, values are based on their backgrounds, emotions and commitment. This is because each artisan forms their own tacit knowledge based on their previous experience, knowledge, skills and mental models. As the sole custodian of knowledge, the majority of the MCs do not avail a synchronized developmental system for the apprentice to acquire tacit knowledge and which could affect their reliability of the apprentice to learn skills. This creates a knowledge gap because artisans form their own tacit knowledge founded on their apprenticeship. JKA are trained on-the-job training to acquire knowledge and skills through TA that includes informal procedures of training though the learning process may not necessarily be procedural.

JKS operations are labour intensive with the majority of artisans making their products manually, often using improvised hand-made tools and adapted technology or low-grade equipment. However, these improvisations result in efficient game-changing innovations that better address local market needs, and are therefore less wasteful. For example, Gikomba in Nairobi City County has some of the most creative fabrication techniques, with artisans using some object as some tools for multiple functions during production (Ashraph et al. 2013; Gikenye 2012; Kamau and Masese 2014, Daniels, 2010).

The fourth stage prototyping or design development, focusing of technical feasibility and functionality, allowing comparative product testing, as a basis for selecting an ideal design (Ambrose and Harris, 2010; Haik et al., 2016). The prototype also tests the visual aspect of the designed product, giving the designer the ability to visualize and get an idea of the product's physical presence and tactile attributes. The fifth stage involves choosing from the proposed models, with attention to costs and budgets. To focus on the one that best meets the needs and goals of the design brief, and will effectively communicate to the target audience. The

other factors that determine the selection of a prototype include the cost, available budget and the time required for production.

In the sixth stage, the chosen solution is implemented, sometimes in consultation with the client. It involves the implementation of the solution to the design brief. Once a design has been selected it is then implemented or produced. This stage entails the fabrication of the actual product that the client required, or as it was envisaged in the design brief and handed over to the client. It involves physically putting into effect many of the design decisions previously taken to achieve the expected results. The designer needs manufacturing skills at this stage to enable the construction of a model and the optimisation of the solution. The designer-may come together with the client to evaluate the end-results. Modifications may be needed until the client is satisfied with the product(Cowdray, 2012; Holston, 2011; Jonassen, 2011). The design details at this stage will have arisen during the definition stage. They may have been defined and refined during the ideation stage and possibly tried and clarified at prototype stage to guarantee desired outcomes.

The seventh stage generates feedback on the process to date, including the extent of fidelity to needs captured in the brief and resonance with target markets (Ambrose and Harris, 2010; Haik et al., 2016). This design evaluation stage whereby the designer checks if the design meets the defined needs of the brief and if the product resonates with the target audience, accounts for the design product through measuring its outcomes, whether they are financial, behavioural or attitudinal as per the reactions of the target market. The designer at this stage seeks to ascertain what worked and what needs improvement. The designer may come together with the client to evaluate the end-results. Further modification may be needed until the client is satisfied with the product. This serves to facilitate the production of increasingly optimal solutions in the future Feedback from the users of the developed product about the success of the implementation and aspects that can be improved would be important because this feedback would provide learning opportunity from what has happened throughout the design process, and further development of the product.

During TA the apprentice acquire materials and go straight into production skipping most of the structured design process. After having acquired the required craft skills, some apprentice continue working for their MCs, others opt to open their own workshops (Adams et al., 2013; Momanyi, 2014).

Arguably, the effective management of the seven steps of the design process is dependent on the marketing and management functions of the implementing design enterprises. On the one hand, marketing is the process through which enterprises create value for their customers and build strong customer relationships. According to Neilsen, (2012) most JKS artisans lack the knowledge and capacity to connect directly to their clients, and understand them better, in order to further improve their marketing strategies. While such contact is important for sustained patronage and revenue bases, the artisans' constraints often necessitate reliance on middlemen to whom they sell cheaply, with the latter consequently making large profits on the market. Such disconnection with the market undermines valuable feedback with which to improve products.

The introverted nature of the JKS industries is such that many are rapidly approaching saturation with competition so intense that it is difficult to make substantive profits (Kiveu and Ofafa, 2012; Adams et al., 2013). The prevalence of similar products brings competition and lowers bargaining power among artisans, who are also adept at copying any innovation among peers. The resulting disincentive to invent and innovate creates a knowledge gap, undermining the artisans' ability to satisfy customer needs in profitable ways.

Well-managed design enterprises promote successful design processes by harnessing inter-disciplinary relationships, such as design, business analysis, marketing, procurement procedures, finance and legal and regulatory requirements. It also involves the management of various roles, such as the designers, customers, project teams and the stakeholders (Best, 2010; Stone, 2011). Such a transformation would curtail the current high mortality rates among start-ups (Afande, 2015; Kamunge et al., 2014; Muiruri, 2014; Ngui et al., 2014). For one, the JKA are self-employed artisans and are motivated by the immediate need to make a living rather than growing them into big business entities enjoying scale economies. With proper training, the *Jua Kali* artisans could master the design management process, including managing finances, strategic planning, and operational activities, thus reducing start-up failure rates.

2.5.1 The Strengths of Traditional Apprenticeship in the Jua Kali Sector in Kenya

The *Jua Kali* artisans learn skills through a system of training that facilitates the transmission of skills from a master to an apprentice through on-the-job training in the real working environment, but is not often accompanied by study, classroom work and reading. The

strengths of TA is based on the value that it adds to the design training of the apprentices in the JKS. The JKS traditional apprenticeship is based on the strong social dimensions in the sector, where the apprentices enter the sector as friends or relatives to the MCs. This provides no barriers to the acquisition of design knowledge irrespective of the education level of the entrant. In this way, the JKS traditional apprenticeship is based on the concept of CoP, which links both learning and practice.

JKS has the potential to generate income through its marketing of affordable, largely hand-made products requiring low capital investment bases; and MCs also generate money directly through fees, or indirectly through free labour (Aggarwal, 2013 ; Robb et al., 2014; Miyandazi 2013). Some TA graduates eventually become Master Craftsmen (MCs) and may open up their shops near their original MCs. An example is a MC called Sam, who runs a furniture shop at the Racecourse cluster in Nairobi City County. Sam was one of the first few entrepreneurs to settle in the area because of its proximity to the city centre where he enjoys high-end clientele, enabling him to pay rent for the premises. He gradually took on apprentices and trained them in tasks necessary for the business. He employs ten apprentices every year, half of who are usually new. Once his first group of apprentices graduated, some of them set up shop in the neighbourhood. Since they had only been able to work with certain materials and styles of furniture, they tend to compete directly with their master. They do compete with each other, but most apprentices are grateful to their former masters and play nice by sharing materials, labour and knowledge.

The MCs have a wealth of work experience because they have practical skills and have knowledge of local production methods, and a thorough understanding of the local terrain. The MCs' work experience is important for work and learning because workplace learning largely relies on the experience of the worker, which involves how they make sense of the situations that they encounter at the workplace on a daily basis. The social networks and clusters in this sector help the artisans share technology and equipment, as well as information on how to solve problems in their craft practice and planning. Linkages among artisans can occur in two different ways: horizontally through collaboration among producers; and vertically through relationships along the supply chain.

2.5.2 Weaknesses of Traditional Apprenticeship

According to Lancy (2012), the TA duration is generally lengthy, and the process is not always successful. Researchers suggest the low completion rate of apprenticeships is intentional, with MCs considering graduates as future competition. Lancy posits that Togolese MCs deliberately withhold critical knowledge and skills from their apprentices, to undermine their becoming effective competitors when they eventually start up on their own.

The literature reviewed above revealed knowledge gaps in skills development in design practice and planning during TA in the JK manufacturing sub-sector in Kenya. Additionally, minimal academic research has been carried out to understand the MC/apprentice relationship in Kenya. For example, some research has been done broadly on management and marketing, but design and production largely remains unexplored (Kamunge et al, 2014).

TA facilitates the narrow transmission of skills, but often without any study, classroom work and reading (Wendrich, 2012; World Bank, 2012). This means the graduate is constrained to replicating the MC’ s product range. Therefore as a CoP, TA does not fully enable the artisans to create a direct link between acquiring design competencies and performance to enable the artisans take collective responsibility for managing the design knowledge required in their design practices and in planning because of lack of theoretical explanations and an accessible design education. Additionally, TA would enhance credibility if the workers identified the design education gaps as obstacles to their success.

Work place learning has been successful to a certain degree in the JKS because the MC have specific skills that the apprentice can learn from though the apprentice is not trained based on knowledge gaps in design practice and planning that have been identified. Instead, TA is initiated by the search for employment. TA creates a gap in design planning and practice that could be filled if the work place learning gained more prominence in the JKS. This gap could be filled if as Siadaty (2012) states it is important to identify the knowledge gaps and learning needs based on the needs of a particular task before training and guiding the apprentice. It would be important to identify skills needs so that they are attached to MC who can then train them in a structured way.

TA is focused on the skills the artisans achieve at the end of the apprenticeship programme. Since TA involves connoisseurship or specialization, the apprentice knowledge range is limited whereby they are only able to make specific products learnt from the MCs. The apprentices

are not encouraged to become innovative through exploring a range of products other than what the MC makes (Adams et al., 2013). Their skills are therefore not optimized and their knowledge base is limited to that of the MC. This creates a knowledge gap because the apprentice may not be fully and adequately trained by the MC, the apprentice has no way of determining that they have been sufficiently trained to become an independent craftsman. The system does not encourage the apprentices to explore product ranges outside what the MC trained them in, which might be necessary to address the needs of their markets.

The evident correlation between the education levels of MSMEs operators and the size of their enterprises (KNBS, 2016), explains the generally lower, erratic and unpredictable JKS earnings compared to formal sector, monthly-paid workers. Such limited cash flows are the basis of artisanal survival, meaning they cannot take time off to attend school during the day, perpetuating an education knowledge gap. Notably, the share of unlicensed enterprises increases as the level of education reduces, such that among Kenya Certificate of Primary Education (KCPE) holders, 39.1% were unlicensed compared to 23.3% who were licensed.

As previously noted, entry into sector TA is dictated by social networks and affiliation of the apprentice to the MC (Keitany, 2012). It would be important to identify the apprentice skills needs so that they are attached to relevant MC for training. TA has the legitimate peripheral participation within CoP where the old timers or MCs pass on their knowledge and skill to the novices, supporting the community to reproduce but not diversify. This creates a knowledge gap in encouraging horizontal progression between the jobs, and replication of products; but it does not facilitate vertical progression to develop a wider variety and better quality products that can generate more income.

Since TA involves connoisseurship or specialization, the apprentices' knowledge range is limited to that acquired from the MC, with little scope for innovation (Adams et al., 2013). The resulting knowledge gap arises because the apprentices' capacities are never fully exploited, and the MCs conspire to provide less than full education for apprentice independence. A further constrain is because JKS operations neither subscribe to occupational health and safety guidelines, nor to KEBS certification. Arguably, most of JKS workers do not acknowledge these limitations, being satisfied with whatever skills the sector does provides.

Non-adherence to Occupational Health and Safety guidelines also affect the production of their goods. Their products are therefore not KBS certified so they are unable to openly

compete with others. This leads to saturation, overproduction and duplication of products coupled with lack of planning skills and marketing strategies. Their products tend to have strong similarities because they lack proper marketing skills that would enable them comprehend their markets and create customer value by identifying, anticipating and satisfying the clients needs. Manufacturing desirable goods that have superior value and competitive prices would increase profitability.

TA does not expose the apprentices to new technology (Adams et al., 2013; Momanyi, 2014). They lack facilities and infrastructure for modern training and have limited access to new technologies and pedagogical sources of training that use modern technology and modern business practices. Many artisans are in the 2nd level digital divide or digital capability divide and involves both inequality in the access to ICT and contextual factors such as low literacy levels, majority are not ICT competent and the artisans' have basic mobile phones not able to easily access the Internet. The apprentices are therefore not equipped with the technological skills and techniques that the industry requires of them to become competitive craftsmen.

The foregoing literature review has highlighted the extents to which the TA-based system presents challenges regarding design skills and practices. The TA system does lead to JKS employment and livelihood, and contribute to Kenyan social and economic development. However, while it has led to quick horizontal expansion in jobs, there has been no corresponding vertical expansion reflecting economic expansion. Consequently, skills development beyond basic education has recently received significant attention in Kenya with the realization of the importance of skills training for economic growth.

2.6 Government Plans and Strategies

2.6.1 Introduction

This section discusses the government's plans and strategies based on Kenya Vision 2030, which is the long-term blue print for social, political and economic development. The focus is on the plans and strategies that are relevant to the *Jua Kali* manufacturing subsector, especially with regards to skills development through TA, and the mechanisms instituted to address the limitations of the apprenticeship system, through enhancing skills development in design education.

2.6.2 The Kenya Vision 2030

The Kenya Vision 2030 launched in 2008 is based on three pillars: the economic, social and political pillars (Republic of Kenya, 2008). Each of these pillars identifies intervention areas to be addressed through successive development plans, or medium term plans (MTPs). The First Medium Term Plan – MTP I – was implemented between 2008 and 2012, while MTP II runs from 2013 to 2018. Vision 2030 has flagship projects and programmes through which the goals of each pillar are to be achieved (Government of the Republic of Kenya 2013).

The recognition of the JKS in Vision 2030, and its subsequent inclusion in national plans and strategies – as summarised in Table 2.3, reflects the government's recognition of the sector's importance to the social and economic development of the country (Adams et al., 2013). However, exploitation of the sector's full potential requires government interventions with respect to funding, infrastructural expansion, legal environment and more importantly, skills development.

Table 2.3: JKS-focused Mandates of Government Ministries, Departments and Agencies

Government Ministries, Department and Agencies	Mandate
Ministry of Devolution and Planning	▪ Tracks, coordinates and implements the Vision 2030, specifically the Second Medium Term Plan 2013–2018
Ministry of Education, Science and Technology	▪ Re-alignment of the Education Sector to the Constitution (2010) and Kenya Vision 2030, through reforming the education and training to provide a holistic and integrated development of individual learners' potential and, to develop a Competency Based Education and Training (CBET) curriculum.
Ministry of Industrialization and Enterprise Development	▪ The Buy Kenya policy, private sector development policy, small and medium enterprise training and the development of the MSEs
	▪ Micro and Small Enterprises Authority (MSEA) ▪ Develop MSEs infrastructure; capacity building programmes and markets ▪ Provide marketing services; promote technology transfer and acquisition; and availing and managing funds.
Ministry of Labour, Social Security and Services	▪ Manage vocational apprenticeship, industrial training and trade testing. ▪ Manage vocational training, national productivity and competitiveness improvement
Ministry of Information Communication Technology	▪ Promotes ICT literacy and capacity building, innovation and enterprise based on provisions of the National ICT Master Plan 2017
Kenya Private Sector Alliance	▪ Implement the Kenya Youth Empowerment Project for improving youth employability by providing skills and work experience in both formal and informal sectors.

2.6.3 The Economic Pillar of the Kenya Vision 2030

The Economic Pillar of the Vision 2030 aspires to achieve an average annual 10 % GDP growth to 2030. While the JKS consists of small and almost negligible enterprises, collectively, its

contribution to the country's GDP is significant (Miyandazi, 2013), with agriculture and its non-farm activities contributing an 18.4% share in 2012 (Gikenye, 2012; Kiveu and Ofafa, 2012).

The JKS employment strides the rural/urban divide ((Miyandazi,, 2013; Government of the Republic of Kenya, 2013), with 87% and 78% shares of respective rural and urban working populations engaged in its activities. This extensive integration leads to several flagship projects under Vision 2030's Economic Pillar. The Economic Pillar's seven key sectors include tourism, wholesale and retail, agriculture, trade, manufacturing, financial services and Business Process Outsourcing (BPO). Of the seven key sectors under the Economic Pillar, this JKS study focuses on the manufacturing and trade sectors, whose flagship projects and programmes apply to the JKS. The two key ministries involved in the relevant JKS activities are the Ministry of Industrialization and Enterprise Development (MIED), and the Ministry of Labour, Social Security and Services. Executive Order Number 2/2013, tasks the MIED to amongst other mandates, develop the MSEs in Kenya.

The Micro and Small Enterprises Authority (MSEA) oversees the operations of MSEs in Kenya. The authority was formed by the MSE Act 2013, which was a landmark legislation that is aimed at enhancing the JKS prospects, through formalization (regulation) and segmentation, attracting private equity and venture capital investors (Mbogo, 2013; Republic of Kenya, 2015).

The Authority addresses the development and promotion of MSEs in numerous ways, including: development of infrastructure; capacity building programmes; development of markets and provision of marketing services; technology transfer and acquisition; and availing and managing funds. The authority is also mandated to: identify *Jua Kali* product markets, and link artisans to them; organize trade fairs and shows to promote *Jua Kali* products; and conduct market research, surveys, and analysis on behalf of the artisans. (Government of Kenya, 2012)

MSEA has so far facilitated the participation of about 1,450 MSEs in various exhibitions in various countries. It also collaborated with the East African Community (EAC) in hosting the *Jua Kali /Nguvu Kazi* Exhibition in the region, exposing Kenyan MSE products to the larger regional market. The Authority has also developed and operationalized 16 workshops. In terms of skills development, MSEA has provided entrepreneurial and skills upgrading training

programmes for about 2,086 MSEs across the country (Republic of Kenya, 2015). However, MSEAs capacity building programmes are yet to be fully developed to train the artisans in design practice and planning.

In line with Vision 2030, the ministry is implementing the Transformation of Kenya Industrial Research and Development Institute (KIRDI) Flagship Project, which aims at expanding the physical infrastructure of the *Jua Kali* enterprises while upgrading their equipment to facilitate technology transfer. These projects are already underway in Kisumu and Eldoret towns, and are expected to improve the product design process of the artisans and to promote product innovation (Republic of Kenya, 2015).

The skills development initiatives under the KIRDI Flagship Project include the leather development modular training at Nairobi, Thika, and Kisumu (KIRDI, 2016). These modular two-week training courses involve design and pattern cutting for footwear and leather goods, covering material cutting, costing, closing and assembly. The modules also include basic leather manufacture, post tanning processes and operations, leather finishing, and the chemical and physical testing of leather. A significant departure from the TA system is that admission to the certificate-awarding courses requires either an Ordinary level certificate, or vocational training in a relevant field, or industrial experience in leather and related goods industry.

Executive Order Number 2/2013 mandates the Ministry of Labour, Social Security and Services to among other functions, manage vocational apprenticeship and industrial training, vocational training and national productivity and competitiveness improvement (Republic of Kenya, 2013). The ministry includes departments such as National Industrial Training Authority (NITA), which is charged with promoting the highest standards in terms of efficiency and quality of industrial training in Kenya, and with ensuring the supply of suitably trained manpower at all levels of the industry (NITA, 2015). NITA therefore manages and supervises training and apprenticeship training and skills upgrading of craftsmen and technicians.

NITA is currently providing technical and vocational education and training (TVET) certificate programmes in business management, fashion design and garment making, food production, and mechanical engineering. The Authority is also offering fulltime short courses in welding, fabrication and dressmaking, and short-term skills upgrading courses in mechanics, metalwork, woodwork and tailoring (NITA, 2016). The Authority also carries out trade testing

and certification, inspects training providers, and administers the four industrial training centres in the country (NITA, 2015). The artisans may apply to undergo a trade test in more than one trade or occupation, provided they have the necessary skills and qualifications. The skills tested include carpentry, dressmaking, welding, leatherwork, painting/decoration, wood carving, wood machinist and shoe making amongst others (NITA, 2016). However, NITA's trade testing at different levels is not based on curricula that will train the artisans to be designer makers in preparation for various trade testing grades 1,2 and 3. This has created a knowledge gap in design practice and planning because there are no performance criteria for advancement or preparation of the trade testing. It is entirely up to the artisans to decide they have acquired enough skills to enable them to apply for the trade testing.

2.6.4 The Social Pillar of Kenya Vision 2030

The Social Pillar of Vision 2030 seeks to achieve a cohesive and just society, focusing on: education and training; health; water and sanitation; environment, housing, and urbanization; and gender, youth, and vulnerable groups. For the JKS, the focus is on education and training, with the two key ministries being the Ministry of Education Science and Technology, and the Ministry of Information Communication and Technology.

Executive Order Number 2/2013 mandates the Ministry of Information Communication and Technology (ICT) to develop the national communication capacity and infrastructure and maintain the fibre optic infrastructure (Republic of Kenya, 2013). Consequently, the ICT Policy aims at: providing an ICT-enabling framework for its contribution to achievement of the national development goals of Kenya Vision 2030; facilitating the increased, equitable and affordable access to ICT services and products so as to transform Kenya into an information and knowledge based society; deploying the widespread use of ICT in a bid to enhance the ease of doing business; and enhancing the use of ICT across the economy for the purpose of increasing productivity and efficiency (Republic of Kenya, 2014), and JKS is no exception to the ICT services. The ICT policy is implemented by the ICT Authority, which is mandated to rationalize and streamline the management of all the ICT functions of the government. The Authority promotes ICT literacy, ICT capacity building, innovation and enterprise according to the provisions of the National ICT Master Plan 2013 (Republic of Kenya, 2014).

JKAs have not fully adopted and exploited IT for capacity building (Gikenye and Ochola, 2012), primarily because the majority of TA graduates inherited ICT illiteracy from respective MCs'

face-to-face teaching with no technology. The arising knowledge gap means that artisans did not develop the scope for learning on the go in an accessible and affordable manner anytime anywhere, and cannot connect with other artisans virtually, or take advantage of the mobility of technology and learning to become a Virtual Community of Practice (VCoP).

Executive Order Number 2/2013 mandates the Ministry of Education, Science and Technology (MOEST) to oversee various elements of the education sector including curriculum development, quality assurance in education, education policy management, management of technical training institutes – including youth polytechnics, and the management of national polytechnics (Republic of Kenya, 2013). This is relevant for this JKS study given that skills development in the JKS should be aligned to the labour market. There is also need for the improvement of the quality and delivery of vocational education and training to increase the access of skills development opportunities by the *Jua Kali* artisans (Adams et al. 2013).

One of MOEST's goals is to promote social, economic, technological and industrial needs for national development by preparing the learners to play effective and productive national roles. Sessional Paper No. 2 of 2015 on Reforming Education and Training in Kenya affirms that the education sector is guided by a national philosophy, which places education at the centre of the country's human and economic development. The sessional paper recommends reforming the education and training sectors to provide for the development of the learners' potentials in a holistic and integrated manner, while producing intellectually, emotionally and physically balanced citizens. It further recommends a competency-based curriculum, among other initiatives. Education should promote individual development and self-fulfillment to provide opportunities for the learners to develop to their fullest potential. This includes development of one's interests, talents, and character for positive contributions to the society. The paper re-aligns the education sector to the Constitution of Kenya 2020 and Kenya's Vision 2030 (Republic of Kenya, 2012).

The Kenya Vision 2030 and Sessional Paper No 2 of 2015 emphasize science, technology and innovation; but the current education system neither employs appropriate pedagogical approaches, nor allocates sufficient resources for such skills development. This is one of the causes in the knowledge gap in the JKS because innovation, and vocational and technical skills have not been considered important for meeting the demand for skills; and the country's industrialization goals are also not well integrated into the curriculum. The new education

curriculum to be launched in 2018 proposes to shift the focus from a subject-based approach to a competence-based one. The Students will spend two years in pre-primary school, six years in primary school, three years in junior secondary school, three years in senior secondary school, and four years in tertiary education and training or university.

The current education system does not provide flexible education pathways for identifying and nurturing aptitude, talents and learner interests early enough for preparation for the world of work, career progression and sustainable development (Republic of Kenya, 2015, 2012). The Government hopes to reduce unemployment by nurturing every learner's potential because the policy will ensure preparation of a relevant competency based curriculum which will enable all learners to acquire competencies and qualifications capable of promoting national values, and inspiring individual innovation and lifelong learning.

The education ministry is also charged with the implementation of the TVET Infrastructure, and to oversee various aspects of the education sector, including: curriculum development, quality assurance, and implementing equipment and flagship projects (Republic of Kenya, 2015).The TVET training programmes are currently provided through the Technical and Vocational Education and Training Authority (TVETA), which is mandated to provide for "the establishment of a technical and vocational education and training system and assessment, examination and certification" of the artisan students in TVET institutions . Its training programmes seek to promote innovation and creativity, and to improve professional qualifications and update knowledge and skills. They also aim at providing complementary education for receiving technical, vocational and education training in the form of on-the-job training or other training in institutions. The programmes are geared towards integrating ICT in order to multiply access and improve training capacity, delivery modes and life-long employability of graduates.

In summary, the JKS artisans are consequently faced with challenges, including the lack of training in design practice and planning because of their graduation from a narrowly focused TA system, the varied demands of their respective markets, and known opportunities for informal/non-formal training, which they often avoid due to the work demands on their time. Given that the Competency Based Education and Training (CBET) approach provide a remedial opportunity, could CBET as defined below provide a training solution for JKS artisans? This consideration grows from the provisions of Kenya's Vision 2030 aspiration to transform Kenya

into a newly industrialised middle-income country, providing a high-quality life in a clean and secure environment for all its citizens. For this vision to be actualised, the country needs to develop a reliable pool of human capital, especially in the high employment creation *Jua Kali* or informal sector, with the necessary array of skills and knowledge to act as the key drivers of economic activities.

2.6.5 The Competency Based Education and Training approach

Competency-based education is training that is largely focused on outcomes, which are the expected competencies that the students should learn. CBET provides relevant learning opportunities through an appropriately designed curriculum targeting expected competencies. CBET also includes the assessment of the learners for the competencies, which is a significant component of the training (Haralambie,2016; Muoka et al., 2013). CBET is increasingly gaining currency in many TVET institutions as the preferred approach of imparting knowledge and skills to learners. The philosophy underlying CBET is that all learners can learn skills equally if they are provided with customized instructions to help them grasp concepts and principles, and consequently, demonstrate them practically (Shakes, 2011). As an alternative approach to the traditional outcome-based training approach, CBET should bridge the gap between the industry or informal sector and the TVET Institutions.

Klein-Collins (2012) points out that in the CBET context, competency indicates the specific level of performance that the learner is expected to master. It is similar to work placed learning because deliberate learning is starts after identifying a knowledge gap. TA leaves a knowledge gap because it is based on the MC's knowledge that alone predetermines the context in disregard of the peculiar needs of individual apprentices or markets.

The CBET approach moves away from the limitations imposed by traditional teacher-centred learning approaches, liberating the learner to adopt workplace learning based on their learning needs (Barman and Konwar, 2011; Muoka et al., 2013). The CBET approach is comprehensive in requiring the demonstration of the learning process and the application of the acquired competencies in numerous work-related situations. It also structures the learning activities in such a way that the individual learner can meet their set of pre-determined competencies, with the system ensuring training relevance through collaboration with the relevant informal sectors. It will develop the learner's ability to choose and apply skills, knowledge, and attitudes in realising a task or work function within a particular domain.

The teaching process is based on the assumption that all learners can master the required competencies provided they are given sufficient time, and the appropriate training methods are applied (Ayonmike et al., 2014; Edwards, 2014). To build on the skills already acquired by the apprentice, the teaching process, therefore, includes the use of tools, techniques and methods that are attributed to the special tasks and duties to acquire the skills. A variety of support material, including printed literature, audio-visual and simulation models, can be used in mastering the required competencies..

TA is teacher-centred so it fails to prioritise the interests of the apprentice. But just as in Socratic and facilitative learning, CBET would change this and give precedence to the apprentices' interests and equip them with skills for real-life situations (Klein-Collins, 2013; Weise, 2014). CBET would emphasize on the role of the MC as collaborative partners in the learning process. Introducing CBET to the JKS context would build a more authentic CoP and CoL by facilitating a student-centred learning.

CBET is practically-oriented learning conducted through actual performance rather than just observing (Kaaya, 2012; ICM, 2012). CBET will enhance informal apprenticeship, which is also hands-on training, just as TA does; but CBET involves theory to provide the learner with the underpinning knowledge to supplement the practical design knowledge and competencies. Essentially, CBET focuses on metacognitive awareness in an experimental learning process that sustains the transfer of learning outside the classroom environment. In this way, CBET training integrates the theory with the practice, enabling the learner to demonstrate and explain their target competencies.

CBET programmes are self-paced: the learners acquire measurable competencies built on their existing knowledge and skills, before progressing to the next module, the time taken depending on individual efficiency and motivation (Porter and Reilly, 2014; Serdenciuc, 2013; Weise, 2014). The learning process focuses on "what" the learner acquires rather than "how" the learner acquires it; or indeed, the duration of learning. That CBET learning objectives are measurable guides the facilitators to learn and improve on their teaching by connecting the learners to new knowledge.

Contemporary formal and non-formal training have placed a premium on courses, which demand that *Jua Kali* artisans leave their workshops to attend classes (Kaaya, 2012; Klein-Collins, 2013; Serdenciuc, 2013). This undermines uptake of these training programmes since

the artisans can only leave their workplaces if they can afford to forego revenues. CBET would be attractive since its programmes are based, not on the traditional teacher-centred learning approaches, or numbers of course schedules, but rather on modules that leaners access at own convenience (Muoka et al., 2013). Learner access to such workplace learning is based on their knowledge needs rather than academic qualifications. Furthermore, CBET would provide second-chance education opportunities for artisans with limited schooling and poor business practices, by enabling them to pursue studies they deem relevant (Oandasan and Saucier, 2013). Given the high mobility rates within JKS, CBET would benefit even it they are not able to complete the whole unit. The CBET curriculum advocates for an assessment that validates learning (Klein-Collins 2013; Ayonmike et al., 2014). However, this study did not include the testing of the competencies, and instead recommended further research on the subject.

The introduction of CBET in Kenya has also seen partnerships between the government and the private sector (Njanja, 2014). For instance, VSO Jitolee is a non-profit organisation that has partnered with the Housing Finance Foundation, to work towards increasing the number of competent artisans in the fast growing building and construction industry. The two institutions intend to revise the technical and vocational training curriculum at the Thika Road Mall Artisans' Academy to ensure that it is competency-based and demand driven. The artisans' academy was launched in June 2014, and provides free vocational training in carpentry, painting, electrical works and metal fabrication. In imparting these technical skills at the tertiary level, this centre aims to address the shortage of skills in the country, which is slowing down the pace of socio-economic development.

The Housing Finance Company of Kenya (HFCK) development resulted from the partnership between HFCK and the former Ministry of Higher Education, Science and Technology in 2013, where they launched a nationwide campaign that targeted to train one million artisans by 2016. The Army of 1 Million Artisan Flagship Project focused on upgrading the skills for sustainable economic development at the TVET institutions. The programme targeted artisans with no formal training; and Housing Finance also planned to develop a databank of certified artisans that firms can refer to when sourcing for various services. This campaign was aligned with the TVET Act 2013, which champions mechanisms for promoting access and equity in TVET institutions to assure standards, quality, and relevance through competency-based training.

While CBET is a revolutionary instructional approach, it also faces some challenges (Kaaya, 2012). It has not undertaken a skills needs- assessment and does not therefore know what to focus on. It pays little or no attention to the identification of the essential job skills; so its courses are highly likely to be ineffective in training learners in relevant competencies for the for the job market unless a prior needs-assessment is undertaken alongside follow-up assessment for CBET graduates.

This study hopes to be part of the actualisation of developing a reliable pool of human capital with the necessary array of design skills, and to act as the key drivers of economic activities through a design-training model delivered by m-learning technology. This m-learning mode of training delivery raises interest in the status of mobile phone usage in Kenya.

2.7 Mobile Phone Usage in Kenya

As mentioned above, JKS artisans wish to upgrade their competencies, but cannot afford to leave work for the classroom. Meanwhile there is emerging global and Kenyan evidence of ICT-based learning platforms that use mobile phones. This section looked at the mobile phone outreach in Kenya, and the scope of using m-learning for design education. Since 2000, the ICT sector's annual growth of 20% has outperformed other sectors in the Kenyan economy, driven by infrastructure development, favourable government policies, and an innovative private sector (Crandall et al., 2012; Deloitte Touche Tohmatsu Limited, 2011). Factors such as affordability, tax exemption of VAT on mobile handsets, and the access to electricity and solar power, have also boosted mobile telephony penetration (Crandall et al., 2012).

According to a Communication of Kenya (CAK) report, the mobile telephony penetration in Kenya stood at 88.7% by the end of 2016,with 96.4% of users being pre-paid customers (CAK, 2016). These rates translate into about 37.8 million active mobile phone users in a population with the Internet-cum-data market of about 21.6 million users (Kariuki, 2016). According to the The most common types of phones used in Kenya are the Global System for Mobile Communication (GSM) and the Code Division Multiple Access (CDMA) (CAK, 2014).. The GSM are second-generation (2G) phones that have a wide coverage internationally and use Subscriber Identity Module (SIM) cards, which makes it easy for its users to switch between handsets, and also allows the easy importation of cell phone data, such as text messages or contacts. Additionally, the 2G's battery talk time is also longer than that of the CDMA phones.

On the other hand, the CDMA phones have special coding schemes that enable multiple users to share a network, and have a wider coverage than the GSM. They also have better reception even in areas with low signal strengths, and are thus ideal for rural areas. Besides, CDMA phones have a better capacity for data and voice communications compared to other commercial mobile technologies. This allows more simultaneous connections, and provides the common platform onto which the third generation (3G) technologies are built. The smartphones fall under the CDMA category.

The CAK report showed that 31.9 million subscribers were active mobile money subscribers, transacting about Kenya shilling 1.1 trillion in 2016. Notably, mobile commerce accounted for 262.6 million transactions with about Keya shillings 586.4 billion paying for goods and services. On Internet usage, the report noted that the last quarter of 2016 saw the growth of Internet data services to about 26 million subscribers, driven by numerous technologies and services offering reliable and faster Internet connections. The affordability of smartphones and Internet bundles by the various service providers also boosted the numbers of mobile phone Internet users. Research suggests that diversification of revenue streams by service providers creates demand for, and affordability of, advanced mobile phones (Crandall and Grosskurth, 2013; Omwansa, 2014).

However, there are other factors undermining Internet uptake, such as unfamiliarity with technologies, and uncertainty of the ICT benefits in the sector (Onyango, 2013). The 2nd level digital divide reflects the inequality to access ICT and contextual factors such as lack of computer skills. For example, the majority of Kenyan JKS artisans are at the '2nd level digital divide', because of the digital capability divide, which involves both inequality in access to Kenyan ICT and low literacy level and slow and expensive downloads. The laying of the National Optic Fibre Infrastructure (NOFBI) was based on the old district boundary system of administration, which does not take into account the current devolution of resources to the 47 County governments (Ratemo, 2011). The 2nd level digital divide has contextual factors, such as that JKS artisans have low ICT skills competencies, likely only have basic mobile phones without internet connectivity, have low basic education attainments, work in contexts with low network speeds, are likely to find downloads unaffordable, and live from hand to mouth (Kenya National Bureau of Statistics, 2016).

Nonetheless, the mobile phone is increasingly invaluable for all Kenyans, including the JKS artisans, as attested to by Gikenye and Ocholla (2012) and Kiveu and Ofafa (2013). The artisans use the mobile phone to order raw materials and services, contact customers, and communicate with employees on errands. They also use their phones to tell time, surf the Internet, and as a calculator, radio and camera. The artisans also use their mobile phones to transfer and receive money (Kones, 2014; Onyango et al., 2014). The phones also provide "access to timely, reliable and relevant information on market opportunities, production, technology and government regulations is inadequately provided by informal sources of information (Gikenye and Ocholla, 2012, p.15)." However, little research has addressed the scope of using mobile telephony for teaching design processes to artisans, despite Litondo and Ntale (2013) arguing for this given the phones' computer features.

2.8 Mobile Learning

This research has established that Kenya had a mobile phone penetration of about 89% as at the end of 2016 (CAK, 2016), meaning that m-learning could be key to making learning material more accessible universally. In their extensive study of literature on m-learning, Issa et al. (2014) conclude that the popularity of m-learning is not as a result of advanced technology and the use of mobile phones, but rather, the twin concepts of mobility and learning. This is because wireless technology, alongside the growth of 3G mobile networks, and the maturation of technology, devices and infrastructures, has transformed the learning society from a wired one to a wireless one (Abdullah et al., 2013). The radical social and economic changes in people's lifestyles have shifting pedagogies in the field of education radically.

JKA in the manufacturing sub-sector acquire tacit knowledge and skills through TA that eventually require enhancement. The constraints faced by JK artisans have been articulated above, including low formal education, time and resources constraints, amongst others. But they do have mobile phones, which makes an m- learning pedagogy approach viable, based on its concepts of mobility and learning.

M-learning would involve an instructional paradigm shift that fundamentally changes the way students learn (Kaur and Bhullar, 2013; Lai et al., 2013), from analogue pedagogy to social, self-directed digital learning facilitated by a teacher. M-learning would facilitate informal learning in out-of-school environments, enabling artisans to build on existing skills, balancing

the pursuit with the obligation to generate incomes. Given the characteristic mobility of JKS artisans, the transportable technology of m-learning means it can take place anytime and anywhere (Ng, 2011), and is cost-effective (Crandall et al., 2012) in reaching large numbers simultaneously.

M-learning will transform the JKS into a Virtual Community of Practice (VCoP) and Virtual Community of learners (VCoL), because learners will have the ability to connect, communicate, collaborate, gather and share information and create new knowledge using the readily available tools on their mobile devices (Mehdipour and Zerehkafi, 2013). Mobile learning is device-centred and portable because mobile phones can connect to, access and deliver Internet content and instruction at learners' convenience (Douglas and Penny, 2014).

The increased availability of mobile telephony, its convergence of media of voice and video recording, and its Internet access is ideally placed to facilitate personalized learning since a multimedia device can be customised to all user requirements (Elias, 2011; Kaur and Bhullar, 2013; Lai et al., 2013). Its workplace learning capacity allows the incorporation of new technologies into the existing pedagogical strategies using apps and cloud technologies, with personalised content providing greater autonomy, self-esteem and self-confidence. Numeracy and literacy skills of the artisans – many with eight years of basic education – are improved through data entry, reading, writing, developing visual representations or models. Some could progress to consider the ergonomics, anthropometrics and correct measurements of their products as they conceptualise and actualise their designs and production processes.

2.8.1 Examples of Best Practice Mobile Learning in Kenya

Twenty years ago, it was difficult to imagine that Kenyans would be using mobile technology to learn, socialize and conduct everyday business; but today, the technology is widely used to deliver services. The evolution of wireless technologies and the development of applications for mobile devices in Kenya are in the process of transforming education using M-learning, with various programmes being piloted for effectiveness, acceptability to teachers and learners, and improved learning outcomes. Reports suggest an average 27% improvement in learning outcomes, in more interactive and informative environments, making the tools acceptable to teachers, learners and parents (Africa Evidence Network, 2014). This sub-section reviews successful Kenyan m-learning experiences in education, agriculture and the informal sector, as summarised in Table 2.4

The Power of M-Learning Project is a collaboration between Qualcomm Wireless Reach, BBOXX (a solar power provider), Safaricom, Motorola, iHub Research and eLimu, which are e-learning social enterprises (Baker et al., 2015; Ochieng', 2014; Okuttah, 2014). These entities have worked together to design the existing content for primary schools in order to leverage the strength of mobile telephony in Kenya. The interactive eLimu app delivered through 3G enabled tablets, seeks to realize a quality revision tool for upper primary schools, challenging the traditional face-to-face approaches to teaching and learning in schools.

Table 2.4: Kenyan M-learning initiatives in education, agriculture and the informal sector

Name of App	Developer	Focus	Benefits	Regions Covered
eLimu model	Qualcomm Wireless Reach, BBOXX (a solar power provider), Safaricom, Motorola, iHub Research and eLimu	Use mobile technology to enhance interactive engagement of the students in the learning process.	▪ Re-purposes the Kenyan curriculum from textbooks and adding onto it engaging, interactive games, songs, animations and quizzes ▪ Provides quality revision tools for Kenya Certificate of Primary Education students. ▪ Minimizes school absenteeism by providing captivating content that is delivered through innovative technology	Piloted at Embakasi Garrision Primary School in Nairobi City, involving 38 teachers and 430 students of upper primary.
Shupavu 291 (Collymore, 2016)	Eneza Education and Safaricom	Deliver interactive content and use text messages to engage the students.	▪ Addresses the student-teacher ratio, which undermines learning quality. ▪ Helps teachers and parents to monitor and evaluate students' performance. ▪ Increased students study time by about two hours every day.	Used by 1.1 million people in 9 countries in Africa. In Kenya the app has 40 000 active users, with 17 000 teachers enrolled on the platform to assist the students
M-farm application	M-farm Limited in collaboration with Samsung	Provide farmers with access to information on the current market prices to enhance productivity.	▪ Links farmers with farm input suppliers and agricultural extension officers, saving them from exploitation. ▪ Connects the farmers with their customers. ▪ Alerts farmers regarding climate changes, enabling them to plan and avoid associated risks	
M-Shamba application	M-shamba Limited	Provide customised information to farmers through their mobile phones.,	▪ Avails customized information to farmers based on their location, crops or animal preferences; allowing them to share information with each other. ▪ Enables farmers to grow new crops, adapt to climate change and adopt new technologies.	Used 4 000 rice farmers in Mwea, Bunyala, West Kano and Ahero
Kilimo Salama Application	Syngenta Foundation for Sustainable Agriculture and Safaricom	Insure farmers' inputs such as seeds, chemicals against the changing weather risks through providing climate data.	▪ Insures crops like maize, wheat, sorghum and beans; farmers receive payment on their phones through M-Pesa. ▪ Enables farmers to invest in quality seeds and inputs without fearing adverse weather changes that can totally damage their crops.	Used by farmers in Eldoret, Kitale, Northern Rift, Busia and Nyanza.

Shupavu 291 also addresses illiteracy problems using mobile technology (Collymore, 2016). It targets Standard Four to Form Four students, and under-25 school dropouts, and is being used in Kenya, Ghana, Rwanda, Tanzania, Malawi, Iraq, Benin, South Africa and Zambia (Ipsos Kenya, 2016; Murumba, 2016). Independent of the Internet, the app is accessible through feature phones for Kenya shillings 10 per week for Safaricom subscribers. Notably, Safaricom is Kenya's leading mobile phone service provider. The students dial *291# and follow instructions, choosing any topic as a tutorial or mini lesson. They also access revision content that comes with instant marking and corrections, and an "Ask A Teacher" feature covering the breadth of examinable subjects. Teachers access the students' content, provide guidance, assign homework and receive feedback. Weak and inactive students can be monitor and make the necessary interventions (Oluwatobi and Olurinola, 2015). Additionally, the platform includes games for student leisure.

The M-farm application is used in the agriculture sector, connecting farmers, their customers, suppliers, and manufacturers, enhancing the farmers' productivity and incomes by providing information on current market prices from different regions based on cost analysis. The registered users send inquiries to the number 3535 (Wangari, 2015).

The M-Shamba application is an interactive platform providing information to farmers, and bridges the information gap between research institutions and small-scale farmers. The application uses various mobile phone features, including cross-platform applications that are in both feature phones and smartphones. Information on production, harvesting, marketing, credit facilities, climate and the weather is delivered by SMS. Information can be customized based on location, crops or animal preferences, and farmers are able to share information with each other (Ashoka and Ashoka, 2016). Kilimo Salama is a weather-based insurance mobile app that was developed by Syngenta Foundation for Sustainable Agriculture and Safaricom, and provides an advance line for messages to improve farming techniques (Qiang, et al., 2012; Wangari, 2015).

There mobile learning platforms already being used successfully in Kenya as mentioned above, this study proposed to develop a DTM to educated artisans from JK manufacturing sub-sector because there is no m-learning platform with information on design practice and planning addressing design challenges in the JKS.

2.8.2 Challenges of Mobile Learning

Most JKS artisans have feature phones, which account for about 85% of the mobile market, despite the introduction of more expensive high-end phones. Smart phone prices in Kenya are dropping, meaning that artisans could afford them in future. A major challenge of m-learning devices, especially mobile phones, is their small screens (Elias, 2011; Kaur and Bhullar, 2013). A typical phone screen measures 8-12 cm long and 6-8cm wide, with the alternative of a landscape or portrait presentation mode on smartphones. Screen resolutions also vary with some lacking the back, front or side lit images with colour (Elias, 2011). The small-screened black and white phones limit the legibility, readability, and effectiveness of the access of richly interactive content.

The low download speed on mobile devices significantly affects the access of content on mobile platforms (Elias, 2011; Franklin, 2011). Despite the availability of fibre optic network in Kenya of the, Internet costs remain high, largely reflecting the high connectivity infrastructure investment costs. Thus, Internet costs constraint access to content online, particularly through mobile phones, and its cost could deter m-learning.

Data inputting on small m-learning devices also poses another challenge for learners (Elias, 2011). Data inputting keys vary: feature phones have numeric keypads, while smartphones and touch phones have an A-Z keypad. Most JKS artisans have feature phones whose data inputting could be more tedious. Storage space on mobile phones is also important for content downloads for later use. Additionally, the limited storage space slows down the mobile phone's processor, limiting artisans' access to information on design processes. Thus, while m-learning is available in Kenya, but it has yet to penetrate the manufacturing sub-sector of JKS. This study proposes to explore the scope for such an intervention.

2.9 Limitations of the Study

The literature review in this study revealed some significant limitations surrounding JKS issues. For one, bottlenecks arise over the implementation of government policies, developed without consulting the targeted artisans; and JKS has limited structured collaboration with the formal sector, particularly in regards to design education and training. Besides, the current national education curriculum does not orient graduates towards artisanal work in the informal sector.

Majority of the JKA do not belong to JKAs, their business are not registered and are run individually or in small groups widely spread across the country. Specific data is therefore lacking on the distribution of JKA in the production of crafts, existing skills, and products made in various clusters of the manufacturing subsectors. There is limited documentation about the sector especially in regards to design training that resulted in a limited understanding of design processes in the sector. This made it imperative for the researcher to practically carry out fieldwork to identify their challenges in skill development.

The study took a long time as the artisans had limited time to engage in this study because their craft business was their source of livelihood. The study was affected by the artisans low education levels and limited ICT competency. Most of the artisans had basic feature phones (Elias, 2011; Kaur and Bhullar, 2013), with low Internet connectivity speeds whereas the cost of Internet access was also prohibitive to them.

2.10 The Gap in Knowledge

The review of literature pointed out that there is a knowledge gap in skills development in design practice and planning in the *Jua Kali* manufacturing sub-sector where traditional apprenticeship (TA) is the predominant approach of skills acquisition. This is due to a combination of factors that will be discussed below.

There is no readily accessible database on the number of artisans, existing craft skills, design practice and planning training needs, products made by different clusters in JK manufacturing sub-sector across the country**.** The government should create and avail the database. Majority of the artisans have low and unpredictable earnings compared to the formal sector workers, limited cash flow, depend on their income for survival and so cannot attend formal school program. This creates another knowledge gap because they have limited access to educational training that is flexible and takes into account their low levels of education and ICT literacy, time, and money constraints. They lack facilities and infrastructure for modern training and have limited access to new technologies and pedagogical sources of training that use modern technology and modern business practices. This makes the sector under-rewarding because of the lack of business and technical skills in design practice and planning

The JK manufacturing sub-sector in Kenya is an important source of employment and livelihood to many Kenyans. It has the potential to become a seedbed of design innovation, on-the-job training, and entrepreneurship, and a major income generator; but it is under-rewarding because of the lack of business and technical skills in design practice and planning. There is minimal academic research on how the artisans acquire skills, to design, manufacture, sell and market, as well plan their businesses. This study will develop literature design processes in the JK manufacturing sub-sector. The chapter has provided some evidence of the need for training the JKS artisans in design practice and planning.

The literature review has ascertained that TA is the predominant mode of training in the informal sector in Kenya but there is no systematic design process followed during skills acquisition. The JKA acquire skill mainly through observing and replicating the MC. The TA in the JKS does not encourage innovation, needed for adapting the sector to the changing social and economic context in Kenya context through capacity building. The sector lacks a model for training the apprentices in response to social and economic challenges as stipulated in Kenya Vision 2030. As a CoP the JKS has the MC as the old timers who pass their knowledge and skill to the novices thus supporting the community to reproduce itself. While this promotes horizontal progression between the jobs and replication of products it does not facilitate vertical progression to develop a wider variety and better quality products that can generate more income. Close monitoring and evaluation would permit Kenya to improve its training system and focus on resources on the most efficient programs for the *Jua Kali* manufacturing sub sector.

The artisans develop tacit skills through TA that is practical with no structured theoretical explanations of the craft processes. TA is largely didactic and lacks organized theoretical explanations, and a structured training framework. It is not individualized or customized to the unique needs of the artisans, to include programs that are self-paced and can fully train the apprentice in competencies for the job market.

The JKS has strong internal social networks that facilitate the transmission of skills from one generation to another. Entry into TA training is based on the social networks or family ties of the apprentice to the MC, as opposed to identifying the skill needs before training. Greater in-depth research on TA and MCs relationship in skills development should be done because there is also limited understanding of the MC/apprentice relationship during

skills development in TA because the MC does not plan to address particular skills that the apprentice would desire to learn before starting TA to gain routine expertise. This would involve gaining specialized competencies for the skill the apprentice is acquiring**.** Minimal academic research has been carried out to understand the master craftsman, apprentice relationship in Kenya and the process the artisans go through to acquire skills through.

This study proposed to address the need of training by investigating and identifying skills and skill gaps in design practice and planning in the JK manufacturing sub-sector. This study would find out the value placed on workplace learning in TA in the sector, to guide in identifying the skills gap, how they conduct work place learning, and if there is any ranked relationship between the MC and apprentice. This will guide the development of the proposed Design Training Model (DTM) or framework with tailor made content for a competency-based curriculum for design education to be delivered through mobile technology

Development of Digital Design Training Intervention to Fill the Knowledge Gap

In the DTM proposed to have the General Areas of Competencies (GAC) or modules that should be learner-centred, simplified, and modularized with well-structured content that supports training through a tactile performance. It will be developed through an iterative process that should focus and build on the artisans' design competencies. The DTM will propose possible assessment that validates learning and advocates a practical-oriented learning process through mobile technology. Taking into account that majority of the artisans have low levels of education, the proposed DTM will be based on self-paced training, rather than some time-bound formal courses. Integrating CBET into the DTM should embrace the assumption that all learners can master the required competencies provided they are given autonomy, sufficient time and the appropriate training methods. It proposes not have not pre-set entry qualifications for artisans to access.

The competency based DTM should provide artisans with the autonomy to develop and determine their unique skills needs, teaching them to reflect as they learn, in the process engaging them in continuous cycles of self-observation to understand their own actions and the reactions they prompt in themselves (Abdelrahman, 2011)**.** As a CoP, the proposed competency-based DTM will use reflective practice to build the capacity of the artisans to

reflect while in action as they undertake, develop and monitor their design practice and planning**.** Reflection is accompanied by action, which involves using or translating prior knowledge into action. It typically includes creative ideation, by recalling and considering memories of past experiences and/or observing and considering things in the present environment, to develop and improve products and services (Helyer, 2015; Plattner et al., 2012). Reflection would therefore be part of the progression in their design processes, and according to Maddux and Johnson(2013), the development of reflective skills can assist with the process of knowing how to learn, accepting the individual's centrality to their own learning. This would make the apprentice reflect and create ideas, as opposed to being a passive learner who is fully dependent on the MC's knowledge.

Reflective practice is located within the older tradition of experiential learning and also the more recently defined perspective of situated cognition. Experiential learning theorists, including Dewey, Lewin and Piaget, maintain that learning is most effective, most likely to lead to behavioural change when it begins with – especially problematic – experience. The goal of student reflection is not necessarily to address a specific problems or questions defined at the outset, but rather to observe and refine the practice of learning something in general and in an on-going basis (Madden et al., 2015).

The competency based DTM will use reflective practice to teach the artisans as a CoL, to focus on informed, evidence-based judgments about design practice. This should be achieved if apprentices are involved as responsible open-minded, dedicated and enthusiastic learners who dialogue with other colleagues with an active desire to listen. Through dialogue, mediation and collaboration with colleagues, the reflective learners will be able to enhance their professional learning and their personal fulfilment (Erlandson, 2014; McGregor and Cartwright, 2011; Paige-Smith, 2011).

As a CoP, the DTM will introduce facilitative learning (FL) which is also regarded as co-learning and shares some characteristic with CBET and Socratic learning, to emphasize the role of teachers and students as collaborative learning partners (Budd et al., 2015; Merk et al., 2013) Alongside other scholars, Rogers argued that learning takes place when the teacher acts as the facilitator, thereby establishing an environment in which the learners are comfortable to acquire new ideas (Nelson et al., 2012; Sirazeeva, 2015). Through the DTM, the teachers should be scaffold builders and critical reflection enhancers, by passing

design knowledge to learners and building scaffolds to extend that knowledge to a broader and deeper understanding of the design process. This would constitute an important context for the educators developing the DTM, to learn and improve the opportunities for teaching, by connecting the learner's existing knowledge to the new knowledge. The DTM will encourage the apprentices and artisans as learners to use cooperative learning because it is best used to generate student comprehension, generalization, and expansion of concepts that have been taught. It works best when students are solving a problem or seeking information on a topic (Okada et al., 2015; O' Toole, 2015).

If facilitative learning were implemented in TA, the MC would not get in the way of learning but would facilitate the acquisition of skills by collaborating with the apprentice in a comfortable working environment for the artisans to acquire new knowledge. The MC would also create a framework to support the apprenticeship to develop a deeper understanding of the design process. TAs a as a CoP and community of learners (CoL) the DTM through CBET, would gradually move training in the JKS to high levels since they will have equal learning opportunities through the customized instructions that will help them grasp concepts and principles, that should lead them to practical demonstrations with theoretical explanations of the processes. The content of the DTM should facilitate vertical progression to develop a wider variety and better quality products that can generate more income**.**

The DTM should provide training for a broad range of accessible training in design processes needed to increase efficiency of apprenticeship as well as improve the value of products required in the market. The DTM aimed at developing skills carefully and appropriately and targeted to improve the performance of the JK enterprises by developing specific design programs, availing training content through modern technology to upgrade the master craftsperson skills and improve on the apprenticeship programme. This study proposed further research on how JKA could be involved in assessment of training and market demand, advocate on benefits of training and supervise training outcomes in liaison with the TVET institutions. Determining the performance criteria, validating of functional maps and the development of standards for assessing the general areas of competencies of modules to enable artisans join mainstream education; were recommended for further development.

The JKA are a community of learners (CoL) who are emotionally connected to the MC and fellow artisans because of their social connections based on their entry into the sector. They are a community of passive learners who don't have the privilege as members to get involved in the learning process as both learners and teachers. As apprentice they don't intellectually engage with fellow artisans to reflect and inquire on the content that is relevant to them because the MC is the content provider.

AS a CoL learning through the proposed DTM, will consist of expanding and forming networks, connecting to special sources of information to acquire current knowledge while taking into account the diverse design education opinions available. As a CoL the DTM will teach them to learn tasks and socialize at the workplace, share information and learn from virtual trainers online and face-to-face. As work placed learning the DTM will teach them to integrate a broad scope of theoretical explanations, help them identify knowledge gaps for some particular present or future tasks and learn tasks and socialize at their workplace. This will enhance learning through varied inputs to build on self-learning and availing just in time content to help artisans master the design practice and planning competencies. The competencies could be regarded as thresholds given the various learning outcomes expected at the end of every GAC on the proposed DTM.

Erik Meyer and Ray Land established that the key concepts in the mastery of every subject could be regarded as the thresholds given that they have particular common features. The threshold concepts are therefore the core processes and ideas in any field, which define the discipline and are also quite ingrained in the practitioners to the extent that they do not often talk about them or even recognize them (Hofer et al., 2012; Kinchin, 2010; Townsend et al., 2016, 2011). This study looked at threshold concepts as what the apprentices in the JKS must learn and practice for them to be able to act and think like professionals. A cross section of JKA should participate in the development of the DTM to verify if threshold concepts (TCs) would open up new conceptual gateways and affective territories for the artisans in design practice and planning. If the DTM was introduced to the JKS, it may transform the way of viewing, interpreting and understanding design processes by opening up to the artisans new ways of thinking about design practice and planning that was previously inaccessible to them.

There are certain design concepts that the MC might not have because of being trained-on-the job. Introducing the TC in DTM could bridge the knowledge gap in TA and bring out the design concepts that are key to their design practice and planning that the artisans may not know. TC could also attempt to bridge the gap between the world of academia and the world of *Jua Kali* in line with design education. This is because the idea of TC has the potential to bridge, as well as challenge the CoP model because it deals with moments of encounter within the framing of an academic discipline as a whole. Different subjects have their own threshold concepts, which could be thought of as centrally defining what constitutes any locally negotiated regime of competence i.e. the knowledge and skills of any specific CoP (Hofer et al., 2012; Osmond and Tovey, 2015).

The DTM should introduce creativity as a threshold concept with an intended learning outcome in design or visual art studies (Allen, 2014). This is because some of the concepts like transformative, integrative, probably irreversible, possibly bounded, potentially troublesome implies a perspective shift that changes the world-view of the learner or artisan. The DTM should also have the quality that can be used to enhance workers performance in business for desirable outcome). TA apprenticeship does not encourage creativity yet innovation is important for the artisans to engage in successful design process for them to be independent, open and ready to learn before they can move to new levels of understanding and developing the confidence and ability to make a leap of faith to new zones of learning design knowledge and skills.

Testing of the DTM would be like getting conceptual gateways in threshold concepts in design practice and planning. Threshold concepts (TC) are transformative, which implies they require a shift in thinking. Understanding of a subject marks an important initiation into any subject culture that the DTM should introduce. It also means that once a student understands a concept the potential effect is the shift in their perception of the subject. On mastering a threshold concept the learner begins to think, as does a professional in that discipline and not simply as a student of that discipline. For instance, the learner begins to think like a designer (Hofer et al., 2012; Tight, 2014; Townsend et al., 2016).

The artisans have been acquiring tacit skills through TA where they could have been encountering conceptual difficulties in their design practice and planning. This is because they learn tacit skills from observation and imitation with no theoretical explanation of the

design processes. The DTM intends to transform the artisans to professionals by modularizing the content to come up with learning outcomes that demonstrate and explain how the design knowledge and skills have been acquired.

According to Osmond and Tovey (2015) threshold concept (TC) should introduce transformative learning. This could be achieved through the DTM which will introduce a conceptual shift to enable JKA to start asserting independent thinking that would help them understand their capabilities in design practice and planning. The DTM should bring together what formerly appeared to be desperate design elements into one coherent relationship and provide a new meaningful perspective. For the artisans to be creative in their learning experience the DTM will engage them in a design process that is transformative where they will be challenged with pre-existing beliefs and assumptions in order to induce transformational changes that scaffold their design practice and planning to make them independent thinkers. Transformative learning should shift the artisans thinking from learning through observing and imitating to allow open design learning opportunities so that they can make meaningful connections by aligning design ideas and frameworks to their skills and knowledge acquisitions differently, while seeing design practice and planning anew. TA does not usually transform the artisans to look for new design opportunities that allow them to uncover the often hidden connections and opportunities between their discrete learning opportunities instead of wholly relying on the MC.

The DTM proposed the integration of a design concept in the training that should enable the learners to achieve conceptual leaps both outside and inside the JKS. The learner students or apprentice should recognize that everything they learn and experience is a legitimate source of inspiration (Osmond and Tovey, 2015). The learner is also able to point out the hidden interrelatedness of something (Tight, 2014). Artisans should learn new skills by doing and build on their experiences facilitated by the MC. The acquisition of design skills and knowledge in *Jua Kali* TA lacks the cognitive aspect but provide the apprentices with the tacit knowledge to undertake the design processes.

The DTM should create a reformation in the way artisans acquire skills in design practice and planning and trigger a shift in the artisans' personal interpretation of design processes. Just like in TA, once a concept is learnt in TC, it becomes impossible to forget, the

knowledge or skill learnt becomes irreversible. This transformation incurs a cognitive shift in terms of students' design confidence.

Therefore, specified thresholds become one of the mechanisms through which a discipline like design recognizes itself and inculcates its disciplinary knowledge and boundaries into the next generation (Boys, 2011; Hofer et al., 2012; Townsend et al., 2016). That is what informed competency-based DTM to broken down into modules, skills and sub skills and to have specified thresholds. This was because the design Knowledge could be new troublesome to the artisans since it is conceptual, difficult, unfamiliar, inert, tacit or ritual. The learning of new concepts in design processes may therefore result into uncomfortable, resistant acceptance and difficulty in learning for the JKA. This is often due to the previous knowledge that the learner has, which gets into the way of the incoming new knowledge. The learners should accept that they will constantly experience and re- experience this 'surfacing around as they hunt for a solution, even when they attain the status of professional designer (Osmond and Tovey, 2015). Such powerful transformative shift in thinking will clearly also affect a shift in the learner's personal interpretation (Land et al., 2016). The DTM should give rise to a state of uncertainty in which the apprentice or artisans may waver between old and evolving understanding of design processes. The artisans should reach points where they experience difficulty and may get trouble some as they require a letting go of customary ways of seeing things, of prior familiar views in their skills development.

The DTM would be difficult to understand because the TC is difficult to master, due to the fact that they are troublesome; the learning process is characterized by struggle and difficulty. Haverford College Professor Laura McGrane describes her students 'narrative of threshold concept as an experience with punctuated equilibrium – we climb, we plateau, we slip, we climb again (2013). Crossing a TCs involves mastering the concept and also feeling comfortable in their new knowledge (Land et al., 2016). In TA the apprentices learn on-the-job from the MC where the MC is the expert. The apprentice simply watches and imitates the master. This has created a gap in their design practices because they fully depend on their master and they are not encouraged to be innovative. Introducing the DTM to the artisans conceptual space in design practice and planning should break boundaries into new conceptual areas; they should be able develop their skills and hand

them down to the next generation though it may be troublesome because it is new. The older and some new artisans are resistant to change and they are usually reluctant to learn new skills and this may affect their interpretation.

A disposition for creativity is to embark for unknown destinations, to overcome reliance and habitual responses to unfamiliar states, it entails passing through a threshold from the place that is well known, without the promise of emerging (Allen, 2014). For the *Jua Kali* artisans to do this, the DTM should train the artisans to develop confidence in their creative process, and the ability to navigate the unknown spaces to drastically reduce total dependence on the MC. If the artisans' creativity could be flexible, more courageous and curious; more determined and patient, the DTM would take them into liminal space. That would be the kind of learning that is central to the intellectual, personal and professional development at the post-compulsory level like the JKS that would involve a transition through a liminal space. Liminality is viewed as a transformative state in the process of learning, which is supplemented by a modification in the learner's subjectivity. During this passage, the student is in a liminal space that exists "betwixt and between" established categories, such as novice or expert (Turner, 1964). While the student is in this "liquid space", the potential for learning, experimentation, and growth, are maximized. Mayer and Land call liminality a "transformational space" (Land et al., 2016).

To inhabit and be productive within a liminal space of an unknowing is characteristic of creative thinking and creative activity. The disequilibrium and certainty of the liminal space is an essential element of creativity and transformation" (Land et al., 2016). It reflects the creative process itself, where risk of embarking on an original idea, design or action is likely to provoke discomfort and insecurity during the transformation of existing ideas, understandings and products into new representations (Allen, 2014). Once the artisans get into this liminal space, they are bound to encounter insecurity and uncertainty, ambiguity, seemingly undefined, stuck or trapped and potentially disorienting, also liberation, receptiveness and growth. The DTM should engage the artisans with mastering in design practice and planning because of learning is central to the intellectual, personal and professional development at the post-compulsory level to transition through a liminal space. The artisans who will remain in a state of pre-liminality, understanding for them would at best vague.

While this study acknowledges that the practice of TA in Kenya may have worked well in the past, developments on the technology front offer new opportunities for further and better learning through mobile technology. The DTM proposed to connect learning across time and spaces to enable artisans develop new knowledge and ideas through mobile technology and fill the significant knowledge gap in design practice and planning within the sub-sector. The proposed competency-based DTM would be supportive of the education and training changes being proposed in the Kenya Vision 2030, that were piloted in May 2017 for implementation in 2018. In turn, this would ensure that training qualifications are harmonized through the integration of apprenticeship into the CBET at all levels, to increase the access to design education, improve training capacity and life-long employability of the artisans.

M-learning it will modernize the learning infrastructure in the JKS and provide design content, which is critical for rapid change and growth in the sector. M-learning would accelerate and transform the delivery of design education and training and create the need to further develop design content that can be accessed anywhere and anytime. M -earning will assist in overcoming the obstacles of having long, drawn out classroom sessions by providing learners with access to topical and contextual design learning material, speeding their time to acquiring competency. It would also be possible to prevail m-learning training material to the artisans at a quicker pace.

The content for the DTM will be digitized to hopefully fill the knowledge gap caused by lack of accessible design education knowledge, qualified trainers, training programmes, and the time constraints of artisans with low levels of education. The gaps could be caused by that fact that the artisans are in the 2nd level digital-divide caused by the digital capability-divide by inequality in the access of information technologies. They lack facilities and infrastructure for modern training, and have limited access to Internet, new technologies, and current pedagogical training sources that use modern technology and modern business practices. Low levels of education and limited ICT literacy, coupled with the majority having low-end phones running on USSD-based implemented mobile application, and comparatively high download costs, present entry barriers to digitizing the content for the DTM tom be accessed through m-learning.

Due to increasing availability of mobile technology in Kenya and globally, it is the first time in Kenya that an educator proposes to avail to the JKA accessible information and knowledge on design practice and planning as an educational resource delivered on mobile technology as an open resource. The DTM will use various technological skills and techniques for training that the industry requires for them to become competitive craftsmen in the CoP. It will also use a variety of teaching methods to impart skills and knowledge that would make the artisans become problem solvers.

To fill this gap, the DTM will propose occupational standards that will be digitized to address accessibility through m-learning. As a VCoP, the artisans will interact with one other, and with their peers and instructors through forums; social networks and links to acquire new knowledge on design processes by discussing, analyzing and reflecting upon their experiences. The VCoPs are a specific type of CoP connecting people with common interests across geographic spreads. It is made up of networks of individuals who share a domain of interests, they communicate primarily online and are also involved in face-to-face interactions (Wenger et al., 2013). Through the DTM they should exchange information and design ideas and skills; seek clarifications; access new information at their pace, critique design ideas and apply the knowledge they have acquired in solving their design challenges and creating new knowledge. The interactive platforms of the proposed DTM should allow the artisan learners to explore, evaluate and integrate the relevant design knowledge that they require, solving their craft design challenges through actual performance. The DTM will shrink the global virtual space and connect artisans from different parts of the world.

The DTM could be used to enhance JKA skills and turn them into a virtual community od practice (VCoP) through the use of new technologies such as the Internet and m-learning technologies, which according to Wenger et al., (2013), have extended the reach of interactions beyond geographical limitations of traditional communities and increased information flow without eliminating the need for community. The growth of the use of these technologies in the late 1990s occasioned the combination of online tools with the CoP theory in the creation of VCoP (Barnett et al., 2012).

The VCoLs should provide the JKS communities with a holistic understanding of the knowledge domain by developing relevant modularized design knowledge that will

enhance increase levels of responsiveness and flexibility where they learn at their own pace. The DTM was to be designed to provide its members with a virtual space, where they can interact irrespective of geographical, cultural or language barriers. They wont be required to belong to any particular *Jua Kali* association as long as they have the required gadgets that connect them to the VCoP. In this way, they may not be limited to what they can learn from the MC but rather acquire a wholesome understanding of the design process through the knowledge that is shared in a VCoP and VCoL. With new technologies such as the Internet the artisans will be able to reach out and interact beyond the geographical limitations in TA and expand communities to increase the flow of design knowledge and also call for new communities.

The VCoP could expand possibilities for community and call for new kinds of communities based on shared design practice. Many artisans are not members of *Jua Kali* associations in Kenya so they are not able to access information on design practice and planning because of their location; but as VCoL they should be able to access information on design practice and planning in an informal social organic way to make them part of the VCoP. The communities will not be limited by formal structures or physical face-to-face interaction; they should be able to create connections among artisans who are widespread across the country. The learners should develop competencies such as knowledge management; continued improvement and members' empowerment that are essential in facilitating the virtual space in a CoL. The members should acquire knowledge through the learning process and synchronic interactions in the group, which the face-to-face interaction may not fully avail (Kazlauskas, 2014; Roderick, 2015; Rodríguez, 2013; Sztangret, 2014).

As a VCoL the DTM should avail interactive learning through mobile technology that will liberate the artisans from fully depending on master craftsman as the custodian of skills, to enable them take part in creating and sharing design knowledge, making inquiries and providing feedback. The DTM should also enable them to create content, get effective feedback and provide progressive indicators, which could make learning exciting and fun as part of the informal learning process to acquire design knowledge and skills to make products that address specific difficulties and the needs of the clients.

2.11 Conclusion

The review of the literature has ascertained that traditional apprenticeship is the predominant mode of training in the informal sector in Kenya and across the globe. The training system, though heavily relied upon for the sector to generate skilled manpower is inherent with significant weaknesses that are reflected in the design practice and planning, which is reflected by their end products in the sector. The mechanisms that the Kenyan government has put in put in place through the Kenya Vision 2030 plans and strategies are all geared towards supporting the introduction of CBET in technical training institutions to support the sector to upgrade their skills. This is aimed at countering some of the TA's weaknesses, such as the outcome-focused approach to training as opposed to demand driven competency-based education training. This study, therefore, adopted competency-based training approach for the DTM based on its strengths such as practical-oriented, learner-centeredness, modularisation of learning. The DTM proposed to increase accessibility, introduce technologically enhanced learning, and use of assessment in validating learning. The review of the mobile telephony penetration in Kenya indicated the possibility of availing the DTM through m learning. This would enhance the competency-based design training through learning progressively.

The next chapter discusses the theoretical and conceptual framework and how the alignment of epistemologies guided the selection of the M-learning theories that were adopted to help in understanding the dynamics of TA in the *Jua Kali* manufacturing subsector. It informed the research questions, methodology and helped to justify the chosen research questions by showing how the research fitted into the existing knowledge and how it has contributed in filling the gaps in the design knowledge and processes through CBET via m-learning as part of the realization of Kenya Vision 2030. The theories also guided in determining the development of the DTM that would be used to enhance design training in the manufacturing sub - sector.

Chapter Three: Theoretical and Conceptual Framework

3.1 Introduction

This chapter examines the research philosophy, and the theoretical and conceptual frameworks of the study. The literature review covered research on the status of the *Jua Kali* Sector (JKS) training, and identified gaps in the design capacity of the traditionally trained apprentice. This part of the literature review provides a critical discussion of the research philosophies and learning theories related to the proposed study, in order to evaluate their merits and relevance to the study. Theoretical approaches, selection of research questions, choice of methodologies, and highlighted conceptual maps that guided our views of the literature analysis and interpretation of data.

This study is founded on a theoretical framework that consists of the interrelated concepts of traditional apprenticeship (TA) and competency-based education and training (CBET), to be delivered through mobile learning (m-learning), to enhance artisans' knowledge and skills in design practice and planning. The interconnected ideas were based on theories that explain the *Jua Kali* phenomenon and its context. In order to establish the framework, relevant learning theories were analysed to structure thinking on probable solutions to address design gaps in the JK manufacturing sub-sector. The conceptual framework provides an interpretation of the relationship between the variables in the three phases of the study.

3.2 Research Philosophy

Research philosophy is the development and nature of knowledge (Skinner et al., 2015). Therefore, all research is expected to contribute to knowledge. The three major philosophies of research that can be adopted are epistemology, ontology, and axiology (See Figure 3.1). Skinner et al define epistemology as the study of knowledge, ontology the philosophical study of the nature of existence or being, and axiology as the study of quality or value. The figure shows the various types of research paradigms, including objectivism, interpretivism, distributed knowledge, subjectivism and constructivism (Skinner et al., 2015; Tekin and Kotaman, 2013).

This study adopted the epistemological approach in shaping the strategy and methodology of its research because epistemology is the study of theory, knowledge, including its nature, scope and limitations. Epistemology adopts several theoretical perspectives or paradigms – essentially lenses – through which to look at the world. Different paradigms call for different assumptions about the nature of the world and the way in which we should attempt to understand it (Gray, 2013; Scotland, 2012). The epistemological approach is the praxis that contributes to the development of knowledge in design practice and planning in Kenya's *JKS*

The epistemological approach investigated how craft skills were developed through TAs in the *JK* manufacturing sub sector. It provided a philosophical background for deciding what kind of design knowledge is legitimate and appropriate, to investigate the need for a design intervention, and create a proposed model of a competency-based design training model (DTM) that could be used to enhance the artisans knowledge and skills of design through m-learning to facilitate the achievement of Kenya's Vision 2030. This approach led to the understanding and clarification of issues regarding the research design. It determined the overarching structure of the research, including the kind of evidence that was gathered from the *JK* manufacturing sub-sector, where it was gathered, and how it was interpreted.

In the first phase, an objectivist epistemological paradigm assumed that reality is external to the mind of the individual, and that knowledge and perception are gained experientially (Nawaz, 2012). Objectivist epistemology implies that reality exists independent of consciousness – in other words, there is an impartial or objective reality that needs to be investigated. This meant studying the artisans' subjective views, values, attitudes, and beliefs objectively by being a non-participant observer. Gray (2013) emphasises that one should strive to exclude own feelings and values.

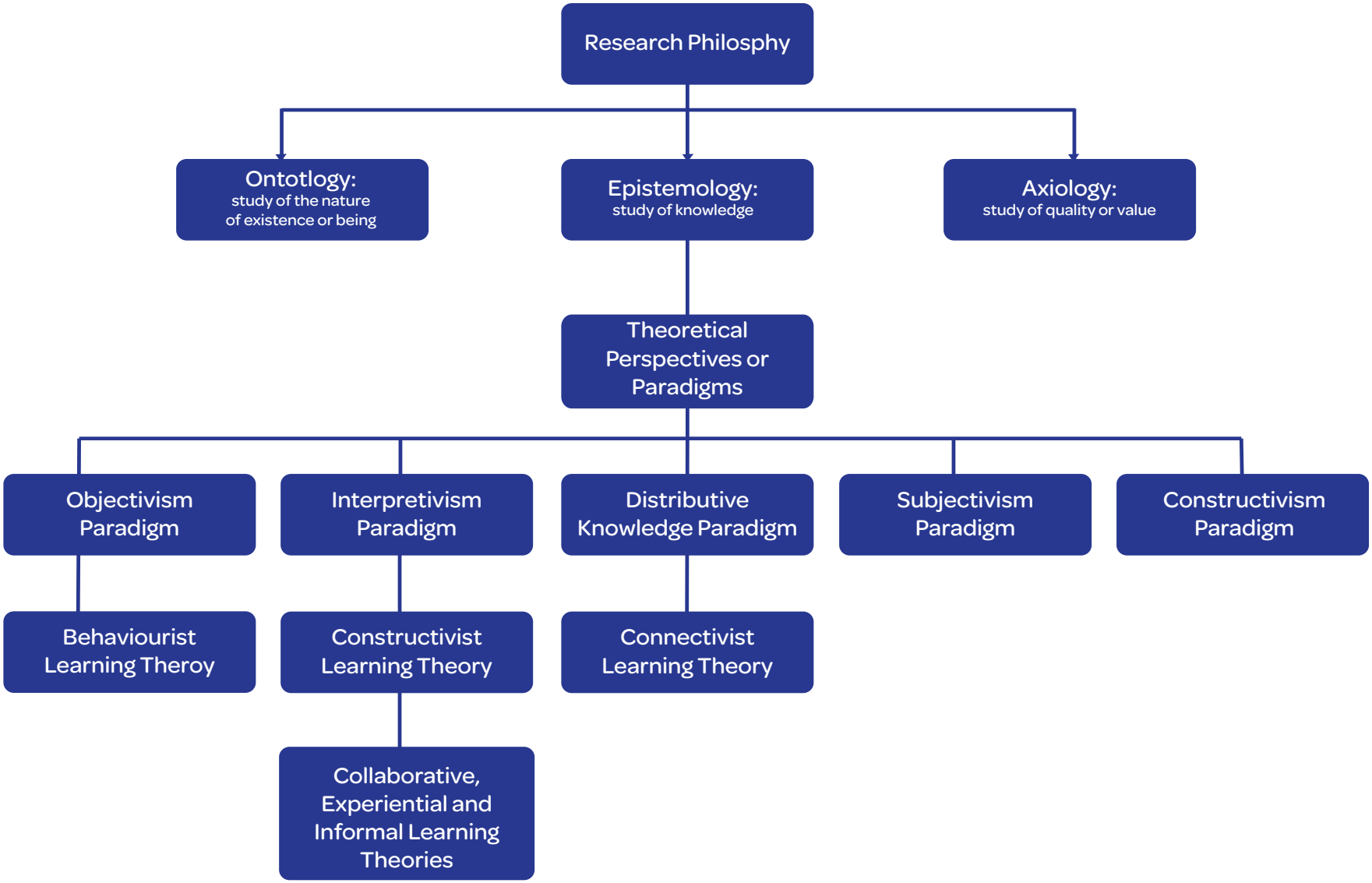


Figure 3.1: Research Philosophy Frameworks

This approach was particularly suitable for the first phase of the research, which entailed investigating how the *JKA* acquired design-related skills through TA from the "master craftsman" (MC), and how objectivist epistemological facilitated identification of their design concerns. A needs analysis was carried out to identify current skills and skill gaps, and to try to understand and interpret how the artisans engage with their masters and their design practices.

The interpretivist paradigm was used in the second phase of the study, which assumes that reality can hardly be observed from outside, meaning it has to be observed from inside through direct interaction with the people involved (Asantey, 2014). It also posits that no universal laws can be established in the study of human behaviour or social sciences. Thus, the role of this research was to be able to understand, explain, and demystify social reality through the eyes of a variety of participants (Gray, 2013), such as the JKA and government officials.

The interpretivist paradigm guided the development of the competency-based DTM with the participation of the artisans as the end-users. This involved observing, interpreting, understanding, planning, taking action, and trying out the DTM with some of the artisans. This step involved research and development, designing the layout and digitization of the content of the DTM. The proposed design intervention was to be modularized, learner-centred, and demand-driven, and it would create high quality interactive, flexible learning pathways that were affordable, scalable and tailored to suit a wide variety of artisans. It would present accessible targeted knowledge and design information that they can access through m-learning.

In the third phase of the research, a distributed knowledge research paradigm was adapted which posits that learning can take place through networks that are normally found online (Gray, 2013). As a VCoP, the artisans should be able to change their design practices, objects, and systems by connecting and feeding information into a learning community, as they interact with DTM. It is hoped that the competency-based DTM would have an impact on information processing, knowledge production and learning in design by Kenyan artisans, due to the increasing role and impact of mobile phone technology. The DTM used Socratic and facilitative learning for collaboration, communication, and interaction between artisans

and content developers via this mobile platform. As a CoL, it would be a linear and developmental journey for the *Jua Kali* artisan to learn in real time according to need. As they get to the different thresholds, they will be able to look at each stage of design education as a new learning outcome to enhance or generate new knowledge.

3.3 Overview of Theories Studied

Theory is an important aspect of epistemology. Researchers acknowledge that there is no research without theory; but they frequently neglect to discuss it (Gringeri et al., 2013). Theoretical frameworks are the lenses through which phenomena are studied, such as the education of JKA in the present study. The theoretical approaches selected at each phase of the research helped to structure thinking about the topic, through conceptual maps that were guided by the research questions, views from the literature, choice of methods, analysis, and interpretation of the data.

The study is grounded in pedagogy, design and ICT as modes of training. It was informed by an interest in the existing theoretical underpinnings of learning dynamics among the *JKA*. Each theory employed a unique vocabulary to articulate the specific factors that would be important in each phase of the study. The learning theories explain how design information was received, processed, and remembered by the artisans, and how their acquisition of new design knowledge could build on their existing tacit skills. The theories presented a systematic way of trying to understand how *JKA* acquire skills through TA, their design practice and planning skill, how competency-based education and training (CBET) could be used to develop content for the DTM, which could be disseminated through mobile technology.

Specific paradigms or various theories of learning explain how information is received, processed, and remembered. This research used learning theories to investigate how the artisans' 'old' knowledge determines the 'new' knowledge they should learn, and how this new knowledge is processed and organised so that it is remembered and used. The learning theories in this study looked at the social contexts of learning (family; peers; work) to determine how such contexts can support learning activities (Levy, 2011). Notably, each of the theories selected uses a unique vocabulary in articulating the essential elements of TA,

CBET and m-learning in design practice and planning, to investigate how the artisans' old craft knowledge determines how the new knowledge is acquired.

The proposed DTM draws on the behaviourist learning theory and work related learning in the first phase of the study. Cognitive apprenticeship, constructivist, and situated cognition were used in the second phase of the study. In the third phase connectivism learning theory was adopted. These theories guided the endeavour to understand the challenges facing *JKA*. It should provide the *JKA* with tasks and activities to underpin and reinforce their knowledge of design and their control of design processes and skills, using DTM to deliver content through m-learning. The ubiquity of mobile technology, the converging media of video and voice technology, and Internet access in Kenya, have contributed immensely in the development of the DTM. The underlying epistemological approach supports learning theories, which in this study encompassed mixed methods and action research design.

Figure 3.2 shows the alignment of epistemology and mobile learning theories that have been used in the three phases of this study to develop a DTM. Phase one of the study was to carry out a situational analysis to identify the existing skills and skills gaps in the *JKS*, in line with achievement of Kenya Vision 2030. The second phase of this study entailed the development of a Competency-based Digital Design Training Intervention (DDTI) model that would teach the *JKA* through m-learning. The third phase was to test the efficacy of the competency-based digital design training intervention (DDTI) model with the artisans and its relevance in achieving Vision 2030 with government Ministries, Departments and Agencies (MDAs).

ALIGNMENT OF EPISTEMOLOGIES AND MOBILE LEARNING THEORIES

Aim: To create a Competency-Based Digital Design Training Intervention model that will enhance the *Jua Kali* artisans' knowledge and skills of design through mobile learning in line with Kenya Vision 2030

Phase 1

Situational analysis to Idenify existing skills and skill gaps in the *Jua Kali* sector in design practice and planning in line with Kenya Vision 2030

5. METHODS: Qualitative (Semi-structured Interviews; Focus Group Discussions; Non-participant Observation)

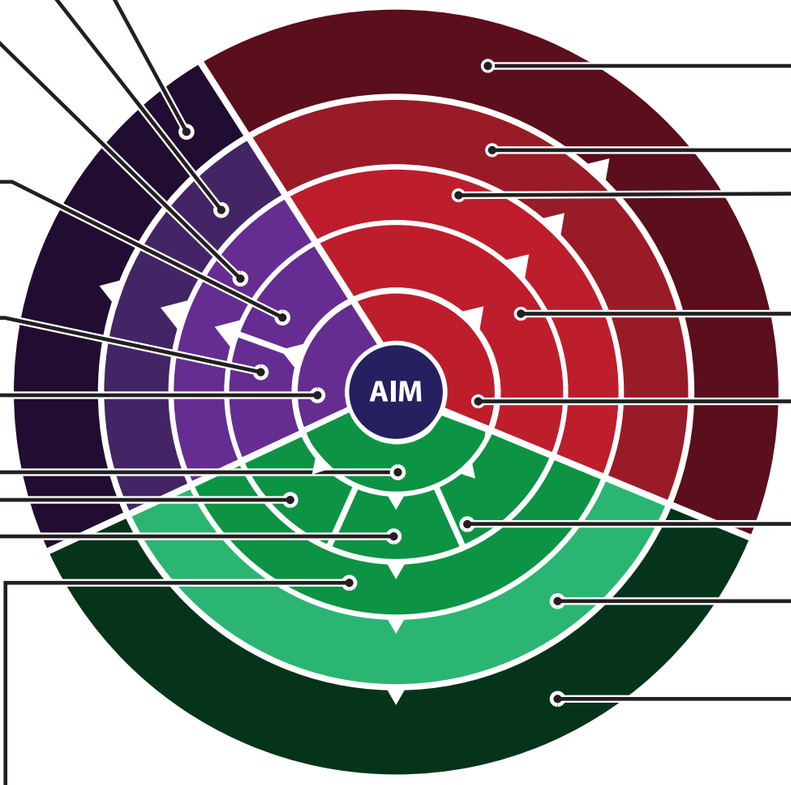
4. METHODOLOGY: Mixed Method Research Design & Action Research (Observation)

3. DDTI Focus:
To identify skills and skill gaps in design practice and planning in the *Jua Kali* manufacturing sub-sector in Kenya

2. a. LEARNING THEORIES:
Bahaviourist
Learning is observant, empirical and measurable:
– Teacher-centred
– Student is a passive participant
– Knowledge acquisition through change of behaviour
– Focus on learning environment

2. b. LEARNING THEORIES:
Work Related Learning
– Learning through direct work experience based on a curriculum
– Learning involves developing skills and knowledge about work

1. EPISTEMOLOGY: Objectivism
Reality is eternal to the mind of the individual and knowledge and perceptions are gained experientially



4. METHODS: QUALITATIVE (Semi-structured Interviews; Focus Group Discussions; Non-participant Observation)
QUANTITATIVE (Questionnaires)

3. METHODOLOGY: Mixed Method Research Design & Action Research (testing)

2b. DDTI Focus: Connectivism
Testing the Competency-Based DDTI model as a design training tool with artisans and its relevance to Government MDAs

2a. LEARNING THEORY: Connectivism
– Community of learners through networks
– Incorporate mobile techniques
– Outcome-based learning
– Learner-centred learning

1. EPISTEMOLOGY: Distributed Knowledge
Learning takes place through network like structure evident in online interaction (Siemens 2008 pg.12)

Phase 3

To test the efficacy of the DDTI with the artisans and Government MDAs

Phase 2

To develop a Competency-Based Digital Design Training Intervention Model

Epistemology: Interpretivism Reality can never be objectively informed from inside; as a result it must be observed from outside through direct experience of people

1. a. LEARNING THEORY: CONSTRUCTIVISM
– Outcome-based learning
– Learner-centred
– Collective sharing of ideas through dialogue between learners and facilitators
– Learning for understanding

2. a. Cognitive Apprenticeship
– A model of instruction that works to make thinking visible.
– The teacher facilitates learning through coaching, scaffolding, feedback and modelling

1. b. and 2. b. – DDTI Focus:
Generate occupational standards for general areas of competencies in design practice and planning for mobile learning

3. a. Situated cognition
– Focuses on the development of higher order thinking skills such as reflection, interpretation and critical thinking
– Learner develops and nurtures relationships because learning is a process and a social function that is facilitated by the teacher
3. Learning occurs when the learner undertakes tasks and solves problems within an environment that reveals the intended use of the knowledge acquired
– Dilemma activities are used as the teaching aids instead of the instructor merely transmitting knowledge

Methodology: Action Research (Reflecting, planning and acting)

METHODS: QUALITATIVE
(Semi-structured Interviews; Focus Group Discussions; Non-participant Observation)

Figure 3.2: Alignment of Epistemologies and Mobile Learning Theories

3.4 Phase One Theory- The Behaviourist Learning Theory

The review of literature revealed that TA is the key mode of informal skills development in the JKS. Thus, phase one of the study sought to establish the existing skills and skill gaps during and after TA in the *JK* manufacturing subsector. In examining the TA context, the Behaviourist Learning Theory (BLT) and Work Related Learning (WRL) were adopted to help understand this informal mode of training because they have a lot of similarities. WRL has different qualities that would be introduced at a more advanced level of the DTM. BLT was used instead to carry out a situational analysis because it shares more characteristics with TA than WRL as will be articulated below.

Kenya is a developing country where artisans work under very difficult conditions. As discussed in Chapter 2, artisans acquire skills through TA under MCs, by observing and imitating in the working environment. The apprentices have low literacy level, lack tools, equipment and working shelters. Many cannot afford to further their education because of lack of time and money, and are content with the basic TA skills acquired through their social networks.

TA and BLT are similar to work-related learning (WRL) in that the MC teaches the apprentice to learn about work, learn through work, and learn for work (Huddleston and Stanley, 2013). But unlike TA that has no academic content, WRL attempts to relate an academic curriculum to the real work context, while also providing hands-on learning. Like in BLT the apprentice is a passive learner who is fully dependent on the MC to learn skill with no reference to a curriculum. WRL on the other hand focuses on learning at work, and in work (Mann et al., 2014), that is why opportunities are determined by the characteristics of the trade, for example breadth, variety of tasks, degree of problem-solving and innovation. It also focuses the information and the social environment like task groups, cooperation, guidance, and feedback from colleagues and supervisors. TA on the other hand is based on skill development for employment, with the entry to TA based on their social connection and not on identified skill requirements. TA like BLT does not encourage innovation and the apprentice skill will be developed based on and limited to the masters' competencies with limited structured theoretical explanations of the process. Consequently, BLT is more relevant for this study.

BLT like TA ignores the key unobservable learning factors, such as problem solving, thinking and reasoning. This is because the theory emphasises the teacher and their instructional materials, rather than the learner (Seel, 2012). In the TA context, this has resulted in apprentices not questioning the rationale for the craft processes taught, meaning they acquire the same design weaknesses that undermine their MCs' competitiveness in the marketplace.

BLT unlike WRL focuses on observable and measurable learning activities as opposed to following a structured syllabus during TA during the experiential learning. The acquisition of knowledge and skills under the BLT is similar to that under TA, as they both involve rote learning where knowledge is acquired only when there is evidence of an observable change in behaviour (Alzaghoul, 2012; ICM, 2012; Neergaard et al., 2012; Geduld, 2014). BLT regards motivation in terms schedules of positive and negative reinforcements: their teaching methods have worked in environments where there is a correct response, or the learning material can be memorised easily (Elena et al., 2015). The teaching process consists of learning the particular skills that are demonstrated by the MC to facilitate learning outside the formal school sector that is not interactive like WPL.

The BLT puts a premium on the learning environment, with a focus on how it particularly influences behaviour (Argote, 2013; Huyanfeng, 2011; ICM, 2012). The theory argues that behaviours are learned through the influence of the environment, meaning that learning is basically achieved through the senses. Therefore, learning takes place as a response to external stimuli. As a result, behaviourism advocates for educators to focus on modifying human behaviour through availing the appropriate environment, external stimuli, and conditioning. Figure 3.2 (b) shows how objective epistemology was applied to BLT and WRL to guide in the establishment of the skills and skill gaps of TA as the basis of JKS training.

Similarly, WRL like TA and BLT places emphasis on the application of the tacit knowledge and skills gained in the work environment. It is explicitly concerned with teaching and learning in context (Huddleston and Stanley, 2013). They focus on practical as opposed to intellectual learning: the learner is provided with first-hand experiences, and opportunities for practical actions in real work situations, but in TA it is not backed by reviews and feedbacks. Like TA, WRL provides general skills and knowledge for employability, and is

concerned with learning in relation to particular situations, problems and organizational objectives.

This is why BLT and WPL guided the understanding of TA whose acquisition of skills happens within workshops and clusters. During TA, the apprentice has to go to the MC's premises for the lessons in making particular products, and is exposed to the tools and equipment required to develop desired skills; but also to the hazards of poor working environments. Therefore, learning goes beyond skills acquisition to adaptation to the working culture and environment.

BLT is teacher-centred and like TA, places much emphasis on the role of the teacher in the learning process (Kantar, 2013; Neergaard et al., 2012; Geduld, 2014). As in TA, the BLT teacher is the authority and knowledge expert who controls the learning environment and determines what the students need to learn. He determines the behavioural objectives of the learning process, which must be achieved before learning is considered successful (Kantar, 2013; Neergaard et al., 2012).

However, BLT suffers a major demerit, especially in the new information age in which learning can take place on-line, without an authoritative figure determining the process (Shapiro and Koren, 2012). In the information age, rote learning is unnecessary because information is accessed and referred to easily. This created a gap in the way the artisans acquire their knowledge and skills by learning on the job. That study proposed a conveniently accessible competency-based DTM that takes into account the salient characteristics of BLT, with a particular interest in the TA teaching approaches.

3.5 Phase Two Leaning Theories

The second phase of the study involved the development of a framework for the competency-based DTM. This included modifying the functional analysis to develop DTM occupational standards (OS), broken down into general areas of competencies (GAC) or modules, and further into skills and sub-skills. The GAC were largely determined by the challenges, needs, and wishes of the *Jua Kali* artisans. The web-based and USSD platforms were developed through observation, reflection, planning, acting, and finally testing the model.

ALIGNMENT OF EPISTEMOLOGIES AND MOBILE LEARNING THEORIES

Aim: To create a Competency-Based Digital Design Training Intervention model that will enhance the *Jua Kali* artisans' knowledge and skills of design through mobile learning in line with Kenya Vision 2030

Objective: Identify existing skills and skill gaps of design capabiltiy facing the *Jua Kali* artisans in Kenya

Phase 1

Situational analysis to Idenify existing skills and skill gaps in the *Jua Kali* sector in design practice and planning in line with Kenya Vision 2030

5. METHODS: Qualitative (Semi-structured Interviews; Focus Group Discussions; Non-participant Observation) QUANTITATIVE (Questionnaires)

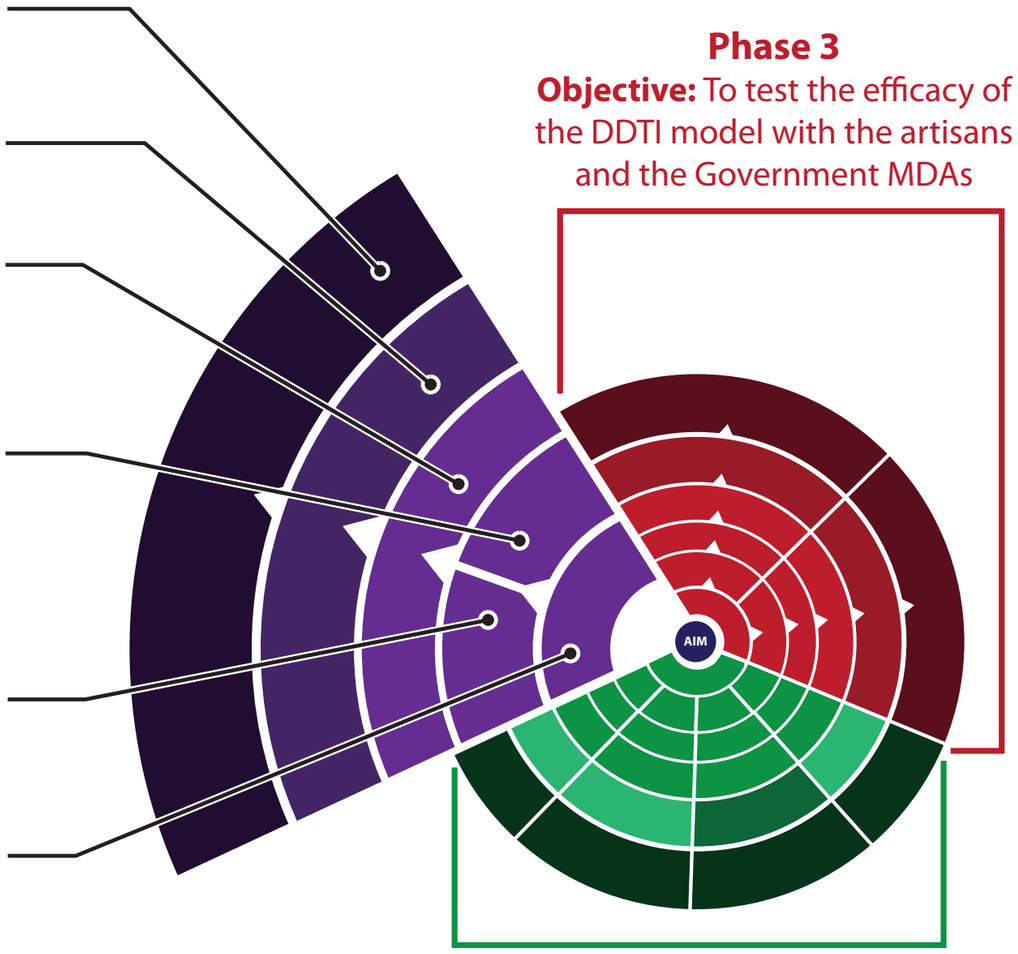
4. METHODOLOGY: Mixed Method Research Design & Action Research (Observation)

3. DDTI Focus:
To identify skills and skill gaps in design practice and planning in the *Jua Kali* manufacturing sub-sector in Kenya

2. a. LEARNING THEORIES:
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Learning is observant, empirical and measurable:
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– Focus on learning environment

2. b. LEARNING THEORIES:
Work Related Learning
– Learning through direct work experience based on a curriculum
– Learning involves developing skills and knowledge about work

1. EPISTEMOLOGY: Objectivism
Reality is eternal to the mind of the individual and knowledge and perceptions are gained experientially



Phase 3
Objective: To test the efficacy of the DDTI model with the artisans and the Government MDAs

Phase 2
Objective: To develop a Competency-Based Design Training Intervention model for mobile learning

Figure 3.3: Alignment of Epistemologies and Behaviourist Learning Theory and Work Related Learning

Figure 3.3 above show how interpretivist epistemology proposes that reality can only be experientially seen through direct collaboration with the artisans involved in this research as CoPs. This was to be achieved by applying constructivist learning theory, cognitive apprenticeship and situated cognition (see Figure 3) to guide in the development of a framework. The OS was digitised to produce a wed based and USSD competency-based DTM to educate the artisans' through m-learning.

3.5.1 Constructivism Learning Theory and Cognitive Apprenticeship

The constructivism learning theory (CLT) was adopted in the development of the DTM, whose concepts were further enhanced through the adoption of the cognitive apprenticeship (CA). The adoption of the CLT was in appreciation of the JKS context where MC- moderated TA is the predominant skills acquisition approach. The current national education curriculum does not orient its graduates for JKS work. It is academic rather than skills focus providing a basic education that neither fosters creativity and innovation, nor prepares graduates for the labour market. Meanwhile, artisans are spread widely across Kenya, in a labour-intensive sector with poor working conditions, including lack of equipment and tools. Their predominant use of basic feature phones completed the background in which this research adapted CLT and CA to guide the initial development of the DTM.

The CLT posits that learning involves the active engagement which integrates new knowledge with the existing knowledge (Crotty, 2012a; Sajadi, 2011; Sultan et al., 2011), rather than just memorizing facts. Knowledge is constructed through interpreting and interacting with the environment, resolving particular problems through acquiring new information and knowledge. This theory elaborated the learning of the JKS artisans as a COL through the integration of new and existing TA knowledge. The model aimed at placing the artisans at the center of the learning activity, thereby prioritizing their learning needs and informing them from the outset of its potential benefits.

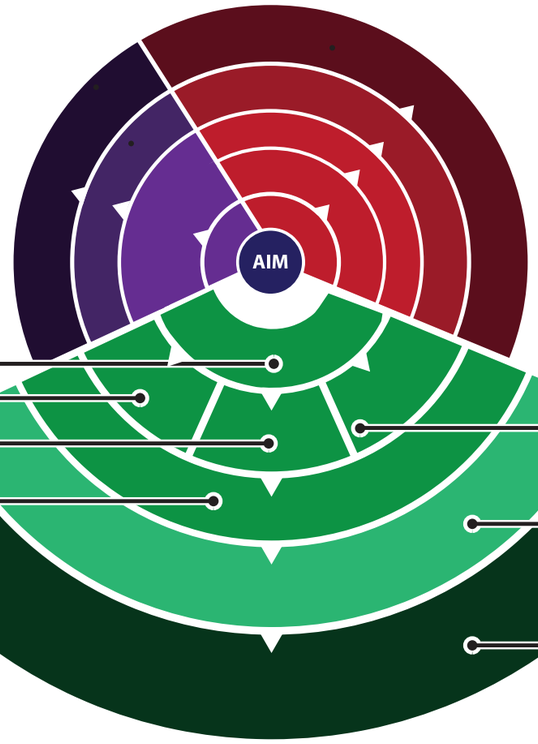
ALIGNMENT OF EPISTEMOLOGIES AND MOBILE LEARNING THEORIES

Aim: To create a Competency-Based Digital Design Training Intervention model that will enhance the *Jua Kali* artisans' knowledge and skills of design through mobile learning in line with Kenya Vision 2030

PHASE 2 OBJECTIVE: To develop a Competency-Based Digital Design Training Intervention model to teach *Jua Kali* artisans' through mobile learning

Phase 1

Objective: To identify the skill gaps of design capability facing the *Jua Kali* artisans in Kenya



Objective: To test the efficacy of the Competency-Based DDTI with artisans and Government MDAs

Phase 3

Phase 2

To develop a Competency-Based Digital Design Training Intervention Model

Epistemology: Interpretivism Reality can never be objectively informed from inside; as a result it must be observed from outside through direct experience of people

1. a. LEARNING THEORY: CONSTRUCTIVISM
– Outcome-based learning
– Learner-centred
– Collective sharing of ideas through dialogue between learners and facilitators
– Learning for understanding

2. a. Cognitive Apprenticeship
– A model of instruction that works to make thinking visible.
– The teacher facilitates learning through coaching, scaffolding, feedback and modelling

1. b. and 2. b. – DDTI Focus:
Generate occupational standards for general areas of competencies in design practice and planning for mobile learning

3. a. Situated cognition
– Focuses on the development of higher order thinking skills such as reflection, interpretation and critical thinking
– Learner develops and nurtures relationships because learning is a process and a social function that is facilitated by the teacher
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– Dilemma activities are used as the teaching aids instead of the instructor merely transmitting knowledge

Methodology: Action Research (Reflecting, planning and acting)

METHODS: QUALITATIVE
(Semi-structured Interviews; Focus Group Discussions; Non-participant Observation)

Figure 3.3: Alignment of Epistemologies and Behaviourist Learning Theory and Work Related Learning

In constructivism learning, both experience and prior knowledge are integral components (Crotty, 2012). Since the artisans already have some TA-based skills, they can use reflective practice to guide in the DTM development, which will take advantage of the twin concepts of mobility and learning to design the platform for m-leaning. Emphasis is on knowledge production: truth and the meaning of design processes would be constructed when artisans interact with the model and learn by connecting specialised nodes or information sources, to maintain and nurture networks to facilitate continual learning. As a mode of training available on mobile phones, this research anticipates the challenges the artisans will face in accessing the competencies, characterised by prior modelling by the MC, ICT illiteracy and low levels of education. That is why CBET-based: the curriculum is modularised, leaner centred, advocates for practice oriented learning, and makes teaching a facilitative role. As a COL the DTM will allow the artisans to learn at their own pace.

Notably, constructivist learning theory share elements with other theories and approaches that interest this study. The theory is learner-centred, as is the case with cognitive apprenticeship, situated cognition, facilitative learning, m learning, and CBET Therefore, knowledge construction would depend on the learner's ability to interact with their environment, analyse, synthesise and evaluate information in the process of coming up with meaning (Amarin and Ghishan, 2013; Tran, 2013; Waite et al., 2013). The learners would construct meaning out of their experience and interaction with the environment. That is why the proposed DTM is a skill-based interactive platform that integrates the theory and practice on design processes, enabling artisans to demonstrate their competencies through experiential learning, while communicating with, and getting feedbacks from, virtual instructor(s). The interactive nature of the model can also enable the artisans create knowledge and solve design problems as long as they are given adequate time and suitable training methods.

Besides, constructivism theory makes the teacher or instructor a facilitator of the learning process, engaging learners in their social interactions (Armstrong, 2011).. Therefore, the instructor on the DTM is not the producer of knowledge, but rather a supporter of learners to help them create concepts and construct meanings. They also prompt the learners to consider using some relevant ideas about particular concepts in

the process of developing new knowledge (.Lunenburg, 2011; Tran, 2013). Thus, the interactive DTM contains knowledge on design and practice and planning, while allowing interaction between learners and virtual instructor, enables the artisans to solve design problems while bridging the gap to academia.

Constructivism learning, like CBET, WPL and design for tacit learning is practice-oriented (Amarin and Ghishan, 2013; Tran, 2013; Waite et al., 2013). The DTM will allow artisans to access information anywhere anytime by connecting the artisans in socially new and unexpected ways using apps and cloud technology. It will be as a process of personal understanding and the development of meaning where learning is viewed as the creation of meaning rather than the memorisation of facts.

The cognitive apprenticeship (CA) model applies the same techniques as TA in learning more abstract tasks: in TA, the processes of the activity are visible like CA. The difference is that CA requires the instructor to situate classroom tasks in multiple meaningful contexts for students, in order to foster the transferability of the skills outside the learning context (Ekoniak and Knott, 2013). Presently the apprentices acquire tacit skills and knowledge through TA not based on any classroom teaching. Initially the DTM will teach the artisans how to transforms prior tacit knowledge and skills to develop and improve on their design processes in their present environment. This can be achieved through the DTM by creating a learning environment, which enable them to perform tasks progressively that are intrinsically related to their goals of interest. CA will be introduced to the to enable them create communities of practice (CoP), to promote intrinsic motivations for learning. More of the CA approach can be incorporated into the DDTI at a more advanced stage because of the literacy level of the artisans. At the outset, the DTM will have basic knowledge on design processes, which can be upgraded through interactions between the apprentice and instructor to further, develop the content and mode of delivery.

The DTM will build on constructivism theory, m-learning and CBET, placing the learning process in the learner's environment (Sultan et al., 2011). The environment is important for determining the learning activities: when structured, it enhances the construction of meaning. This has made constructivism learning essential for developing e-learning programmes.

At a more advanced stage the DTM will use exploration in an instructional method that features in CA and other approaches, such as facilitative and Socratic learning, where students are guided on the modes of problem solving (Kuo et al., 2012; Moya, 2015). Students will explore a problem by framing interesting, solvable questions or problems. The instructional method includes setting initial general goals, which the students are encouraged to approach through sub-goals of own interest, or revise, as appropriate. These can be introduced to the DTM once the artisans can direct their learning at their pace.

The DTM will introduce coaching as a way of training the artisans. It will borrow heavily from CA that involves observation, a mode of training also employed in constructivism learning, CBET, m-learning. Coaching involves observing the learner at work, offering hints, challenges, scaffolding, feedback, modelling, reminders, and new tasks aimed at raising the apprentice's performance towards that of the expert (Kuo et al., 2012, p. 320; Moya, 2015). Coaching relates to specific events or problems a student encounters, and refers broadly to all the different ways that a coach fosters learning, whereas scaffolding refers more narrowly to the supports – suggestions or help – provided to the learner.

DTM's techno-centric activities will be designed by a facilitator and be accessible through mobile devices. The facilitative role played by the virtual instructor is reflected in facilitative, Socratic and m-learning, and on the platform. The artisans will interact with each other on the platform, receiving feedback, and providing suggestions and support where required.

CA will help the learners to explicitly state their knowledge, reasoning, or problem solving processes (Kuo et al., 2012; Moya, 2015). At a more advanced stage, the DTM will use CA train the artisans to articulate their tacit knowledge to make it explicit during their design processes. As a CoL, the artisans will be trained to critic or monitor their activities as they interact with their peers in order to eloquently express their ideas to other learners.

Limitations of the Constructivism Learning Theory

The constructivist theory is limited by the lack of teacher preparation for classroom sessions; which raises conceptual barriers effectively restricting the acquisition of learning (Sultan et al., 2011). However, DTM resolves this limitation through modularisation, consisting of structured skills and sub-skills that are developed based on the design competencies that the *JKA* require in their craft trade.

Constructivism learning also denies the existence of any external reality outside the mind of the learner (Drew and Mackie, 2011), whereas the proposed DTM takes into account the pre-existing knowledge and skills of artisans. Consequently, the learning is non-linear, as students are at liberty to choose only modules that enhance their skills.

3.5.2 Situated Cognition

Situated cognition (SC) focuses on the development of higher order thinking skills such as reflection, interpretation and critical thinking instead of just acquiring facts and knowledge (Leberman et al., 2016) as is the case with TA. The SC was adopted for this study because of its reflective characteristic that facilitates high order thinking amongst the learners through providing them with an authentic context where they can reflect on the application of design knowledge and skills in real life. This was to be achieved through the DTM that teaches the artisans to reflect on their prior skills and knowledge and incorporate ii in the development of new knowledge. That is why the DTM was developed based on identified skills and skills gap in the JKS. The DTM proposes to provide the learner with non-linear pathways that would help artisans as a Community of learners (Col) to direct their learning and focus on thinking processes.

Thresholds were to be introduced at various levels of the DTM to take artisans into liminal spaces and enable them to progress to the next threshold. That is why in DTM the GAC were to be subdivided into skills and sub-skills to allow for the learning in a systematic, logical order. The content was to be simplified, made legible and readable to allow the artisans to think of the design processes as they acquire the knowledge and develop design solution. The interactive multimedia content on the DTM would facilitate critical reflection by building on the capacity of artisans to reflect while in action as they undertake, develop their competencies. The DTM proposed learning activities that would encourage interaction between learners and teachers as the learners collaborate

and hypothesize in the process of coming up with solutions. The DTM used SC to teach the artisans to reflect upon a much broader base of design knowledge to solve problems and completing tasks.

In SC the learner develops and nurtures relationships because learning is a process and a social function that is facilitated by the teacher (Mizera-Pietraszko and Fong, 2015; Leberman et al., 2016). Learning occurs after the teacher transfers both abstract and decontextualized knowledge to the leaner in a social process that results in the co-construction of knowledge. The development and nurturing of relationships allows for the learning to take place (Fonseca and Garcia-Marques, 2013; McInerney, 2014Leberman et al.,2016). The DTM like in SC acknowledges the influence of the social environment on learning and emphasizes the use of interactive skills such as teamwork and collaboration to allow learning to take place when it is embedded in the physical and social content where the knowledge is used.

In SC learning is a social encounter that involves observation, interaction, immersion, scaffolding, problem solving, and negotiating meaning. Coaching and scaffolding is provided at critical stages, during which the teacher enables the learner to complete the tasks. The teacher removes the scaffolds as the learner becomes proficient in their work. The teacher facilitates learning by interacting with and providing suitable experiences and content, sets boundaries and supports the learners against emotional and physical distractions.

The DTM acknowledged the unique environment in which the artisans operate, where they acquire skills through TA based on their social networks. The DTM proposed a platform through which the learners and teachers can exchange their roles; contribute ideas and share constructive criticism in the process of solving particular design problems. The DTM sought to further promote social interaction of the artisans through availing the GACs on a mobile platform, thereby broadening the CoL and CoP beyond their current geographical boundaries. The DTM should facilitate learning by interacting with and providing suitable experiences and content in design education, set boundaries and supports the learners against emotional and physical distractions. The DTM promotes learner centeredness by putting the artisans at the centre of the learning process through enabling them to ask questions, experiment, investigate, provide

solutions to problems and create meaning in their design processes. It encourages the interaction between the learner and their JK environment to enables the artisans to articulate their tacit knowledge into explicit knowledge. In this way the artisans will be able to resolve their design tasks, create new knowledge and use their hands-on experience to solve problems.

SC provides learners with the opportunity for community engagement that enables them to discover their own methods of instruction, and integrate the knowledge that they acquire into their realistic context. The instructor in this case, does more of facilitating and less of direct teaching, while encouraging the learners to assume more responsibility for their own learning (Meyers and Lester, 2013). The DTM supports the collaborative construction of knowledge, through which artisans articulate, negotiate, defend and create new knowledge in design practice and planning.

The situated cognition argues that learning occurs when the learner undertakes tasks and solves problems within an environment that reveals the intended use of the knowledge acquired (Leberman et al., 2016; McInerney, 2014). SC is thus practical oriented involving activities like problem solving and carrying out everyday tasks that enable the learner to experience the intended use of the knowledge and skills being acquired. Learning is grounded in the actions undertaken the learner is encouraged to directly apply what they have learnt by becoming engaged in the process. They observe, reflect, share, and then generalise their knowledge outside their learning environment, to make their learning task reliable for individuals or groups. This makes learning a continuous process that is grounded in the personal experience of the learner. The SC guided in the development of DTM by proposing to provide authentic context that would reflect the way the knowledge will be used in real-life and activities and provide access to expert performance and modelling of design processes. The DTM also proposed synergetic interaction between the learner and their environment through encouraging a working space that is safe for self-exploration. Through analysing, the learners would reflection and acquire design practice and planning skill through m-learning. The learning process will therefore, includes the amalgamation of their existing tacit skills and using them to develop new knowledge.

In SC content is inherent in the task, and the process facilitates the use of the skills in real life (Leberman et al., 2016; McInerney, 2014). SC guided in the development of the DTM by placing emphasis on learning as the development of practical skills instead of regurgitating information, and it would also develop the artisans ability to evaluate outcomes. Learning would therefore a process of creating knowledge rather than a mere outcome as was the case with TA. It is therefore was to be a holistic process of re-learning, and the resolution of a problem results in adaptation. The was to enable DTM to provide authentic design practice and planning activities that will provide an opportunity for artisans to solve design problems and create new knowledge.

In SC dilemma activities are used as the teaching aids instead of the instructor merely transmitting knowledge, thereby bridging the gap between theoretical formal classroom learning and the real life application of knowledge in the work environment (Leberman et al., 2016; McInerney, 2014). Learning is not just about acquiring knowledge; it is rather triggered by the dilemma activities. Knowledge is inherent in the dilemma tasks and their resolution demands the use of skills in real life. The DTM was to be modularized and delivered on mobile technology that will allow for the incorporation of new technologies into existing MC's pedagogical strategies. It will supplement the artisans' formal schooling by creating opportunities to facilitate informal learning in out-of-school environments, by developing reliable content that they can access at their convenience.

The notion of a CoP is an integral component of most situated learning approaches. In an adult classroom, situated learning implies the creation of complicated and ambiguous conditions, which the participant will experience in the real world. In most instances, situated cognition is associated with apprenticeship as a core value and process in learning. The DTM should provide access to expert performances and modelling in design practice and planning that would allow the artisans to observe the tasks before they attempt them. It should enable the artisans to accumulate knowledge through the multimedia design programs and real life situations through applying expert performances that are feasible and effective because they will be based on their identified skill needs.

The DTM was based on mobile platforms in recognition of the mobility of the JKA where learning takes place progressively as the learner simultaneously connects between learning experiences and informal learning. The DTM aimed at helping the artisans' as a CoP to learn and improve their trade as they interact regularly, which would lead to increased social networks, collective action and some informal protection. As a CoL, the artisans would also able to transfer their knowledge and skills to different contexts virtually or face-to-face. The DTM is will be formal but delivered in an informal way.

Conclusion

The DTM proposed to use situated cognition to develop higher order thinking skill in the JKS. The artisans as a CoP and CoL should then develop and nuture relationships because learning is a social function facilitated by a virtual instructor. The DTM should enable the artisans to undertake tasks and solve design problems in their working environment. Being on a mobile platform, the DTM will be personalized to give the artisans autonomy, and build their self-esteem by enabling them to direct their own learning anywhere anytime. They will be expected to initiate and take responsibility for their learning process and be able to build individual skills and capacities

3.6 Phase Three Theory – The Connectivism Learning Theory

The connectivism learning theory (CLT) posits that knowledge acquisition and exchange takes place through social networks that are supported by digital tools as the primary components of the learning process (Shemberger and Wright, 2014; Saadatmand and Kumpulainen, 2014). The theory conceptualises the learning methodology through the vast information and knowledge on the Internet, and the new possibilities that this avails to the learners through networks across the globe. The theory looks at the ability of learners to aggregate the diverse information systems and creates networks of information, contacts and learning resources.

CLT consists of the formation of diverse connections among learners, since the knowledge is spread across networks (Chetty, 2013; Duke et al., 2013; Thota and Negreiros, 2015; 5). Learning is therefore, the ability to navigate and build on the networks with learners becoming creators of knowledge, and not mere consumers. The learners can develop their connections with other learners through social interactions, and then integrate the connections with their personal learning environments, to

enhance the exchange of knowledge. Figure 3.5 shows how the distributive knowledge paradigm will be used in the third phase of the study, to guide in testing the efficiency of the competency based DTM model with the artisans and government MDAs, to find out if learning will take place through social networks supported by digital tools to navigate, create, build, consume and develop connections as a VCoL.

Connectivism learning emphasizes nurturing and maintaining connections to facilitate continuous learning in the VCoL (Bell, 2011; Brooks, 2015; Chetty, 2013; Khatibi and Fouladchang, 2015). This is achieved through maintaining networks and managing the information from these broad connections. Connectivist learners access knowledge, nurture and maintain by identifying the information required to facilitate continuous learning.

The artisans have hither to been using mobile phones for communication, and not for education. However, the DTM was designed to facilitate the artisans as a COL to acquire design knowledge by navigating, building, creating, consuming and distributing knowledge through network-like structures that are evident in online interaction. The DTM would involve an instructional paradigm shift that will fundamentally change the way the artisans learn, to enable them to expand networks beyond that of their physical associations. The DTM should play an important role in the informal learning environment, as the artisans access it to enhance communication, collaboration, and information gathering and sharing. Multiple modes of learning activities will have been suggested to enable the artisans learn and demonstrate required competencies. The learning will incorporate mobile technique for them to access and transfer design skills and knowledge as well as build their network by consuming knowledge exactly when and how they need it.

Connectivism learning involves connecting the learner to special sources of information or nodes (Brooks, 2015; Yusof et al., 2015; Khatibi and Fouladchang, 2015). The learner should, therefore, develop the ability to establish the connections between ideas, fields, and concepts, as this would enable them to quickly find the information that they need. The knowledge is available in extensive online networks, and the learner only select what is relevant to them as determined by respective skill gaps. The DTM has taken into account its diverse options and availability of mobile technology, its converging media

video, voice, recording and internet access that would facilitate personalised learning since multimedia devices can be customised to all user requirements

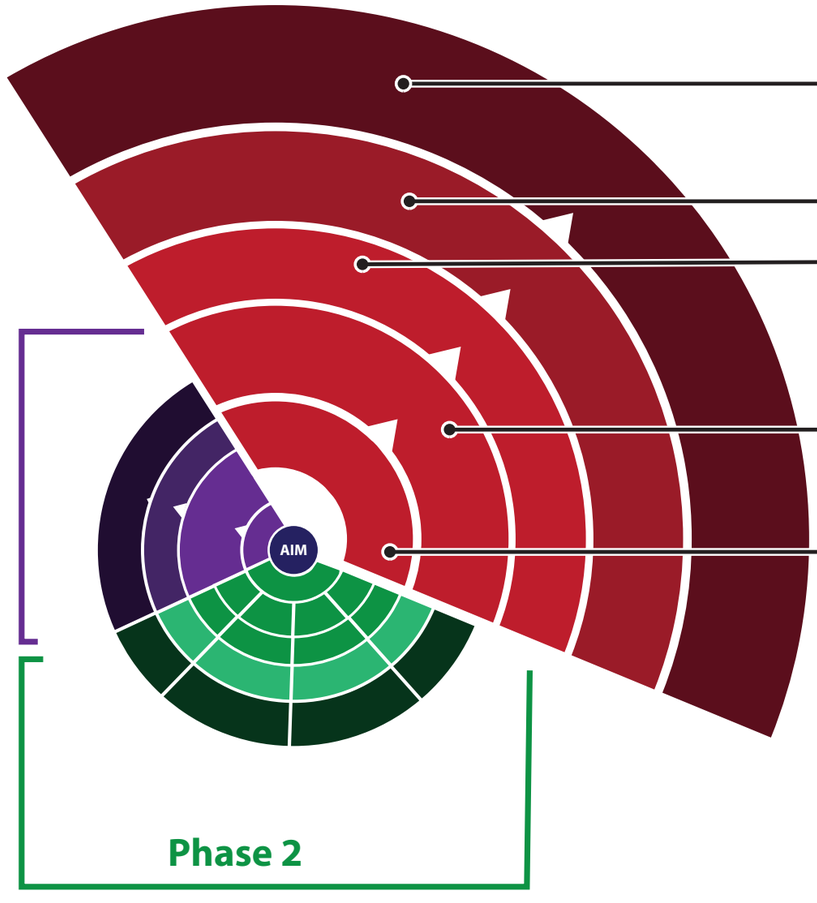
The DTM has availed multiple sources of information since JKS covers a wide range of sub-sectors and clusters, such as woodwork, metal work and handicrafts. The DTM would therefore be used for content development across the clusters and beyond, and help generate effective feedback and progress indicators by connecting the artisans to distinct sources information on design practice and planning. The acquisition of the design knowledge through DTM would leverage on the artisans ability to connect through the platform, choose relevant information, share design ideas, and seek for the solutions to their design problems through mutual interaction as a CoL and CoP.

Decision-making is an essential component of the learning process for connectivism learners (Khatibi and Fouladchang, 2015; Yusof et al., 2015). The learners choose what they require and prioritise their learning based on what is important and urgent. They also freely evaluate the meaning of the information presented to them according to their changing realities. Whereas there could currently be a right answer in regards to a particular problem, the same answer could soon be obsolete as a result of the changes in context. In the DTM the teacher should play a facilitate role in supporting the acquisition of knowledge by guiding the learners to make right decisions on the modules necessary for enhancing their skills and knowledge in realising a task.

ALIGNMENT OF EPISTEMOLOGIES AND MOBILE LEARNING THEORIES

Aim: To create a Competency-Based Digital Design Training Intervention model that will enhance the *Jua Kali* artisans' knowledge and skills of design through mobile learning in line with Kenya Vision 2030

PHASE 3 OBJECTIVE: To test the efficacy of the Competency-Based Digital Design Training Interevention model with artisans' and Government ministries departments and agencies



Phase 1

Objective: To identify skills and skill gaps of design capability facing the *Jua Kaliartisans'* in Kenya

Phase 2

Objective: To develop a Competecy- Based Digital Design Training model for training the *Jua Kali* artisans' through mobile learning

4. METHODS: QUALITATIVE (Semi-structured Interviews; Focus Group Discussions; Non-participant Observation)
QUANTITATIVE (Questionnaires)

3. METHODOLOGY: Mixed Method Research Design & Action Research (testing)

2b. DDTI Focus: Connectivism
Testing the Competency-Based DDTI model as a design training tool with artisans and its relevance to Government MDAs

2a. LEARNING THEORY: Connectivism
– Community of learners through networks
– Incorporate mobile techniques
– Outcome-based learning
– Learner-centred learning

1. EPISTEMOLOGY: Distributed Knowledge
Learning takes place through network like structure evident in online interaction (Siemens 2008 pg.12)

Phase 3

To test the efficacy of the DDTI with the artisans and Government MDAs

Figure 3.5: Alignment of Epistemologies and Connectivism Learning Theory

Conclusion

The theories used in this study were adopted based on their salient features. This helped in understanding the dynamics of skills acquisition during TA in the JK manufacturing sub-sector and in determining the development of the DTM to be used to enhance design training in this sub-sector. Through access to the competencies on their mobile phones, the artisans would be liberated to acquire design knowledge and skills at their own pace because this will be a competency-based DTM that the artisans' would access through mobile learning to build on their existing design knowledge and skills

3.7 Conceptual Framework for Developing a Design Model for Training Jua Kali Artisans in Kenya

The aim of this study was to create a competency-based digital design training intervention (DDTI) that would enhance JKA knowledge and skills in design through m-learning in line with Kenya Vision 2030. The conceptual framework was built on the relationship between variables derived from the phases of the study. Figure 3.6 shows the dimensions of the conceptual framework as derived from.

Since there is limited academic research on skills acquisition in design practice and planning during TA, it was necessary to carry out a situational analysis. Behaviourist learning theory and work-related learning guided in the identification of an appropriate research method, where mixed method research was used to identify existing competencies and gaps in design practice and planning during TA.

An action research cycle was then undertaken to develop a competency-based DDTI to be delivered through mobile technology. Observation, reflection, planning, and acting were used to transform the knowledge about the artisans' needs into a model of a special competency-based DTM for mobile learning. It is hoped that this intervention will modernise the design education in the JKS by supporting learning through mobile technology, allowing the artisans to actually access material from practically anywhere.

Mixed methods research was then adopted to test the competency-based DDTI for functionality and relevance with the JKA as the end users, and with government

officials as policy makers for significance, to facilitate the attainment and advancement of Kenya Vision 2030. The objective of testing the DTM with the artisans and government officials form MDAs for its relevance. The DDTI to be accessed through m learning was the independent variable that was tested with artisans as the end users and relevant Government officials as policy makers. The dependent variable was the improvement of the artisans' design knowledge and control of their design processes.

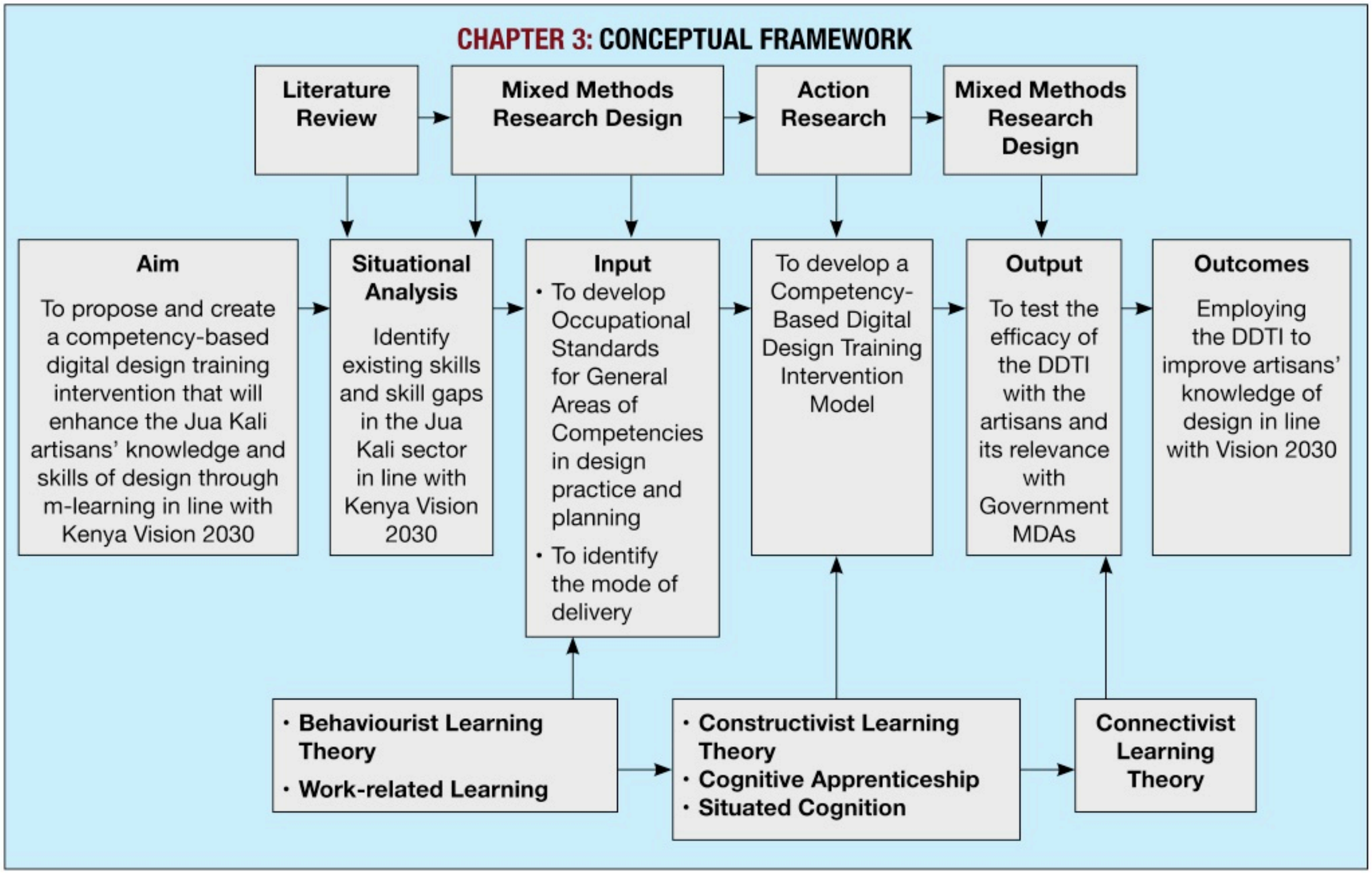


Figure 3.6: A Conceptual Framework for Training *Jua Kali* Artisans in Design

Figure 3.7 is the schematic representation of the conceptual Framework for the proposed competency-based DTM. One-half is the empirical section that shows steps followed to develop content and generate occupational standards for competency-based design training model. The second half is the theoretical part that guided in determining the mode of delivery for the DTM before testing it.

Figure 3.8 is a conceptual model for design education for *Jua Kali* Sector in Kenya. It is the first one to be developed that combines empirical data and theoretical literature for design education in the informal sector.

The proposed DDTI seeks to enhance the design knowledge of the artisans in the manufacturing subsector of JKS in Kenya to enable them improve their control of their design processes. This model is anticipated to contribute towards the realisation of Kenya Vision 2030 in regards to design skills development in the JKS. Vision 2030 regards the development of skills as essential in transforming Kenya into a newly- industrialised, middle- income state providing a high quality of life to all its citizens in a clean and secure environment. The model therefore, seeks to engage JKA at multiple levels of design education to provide a richer and more contextual learning experience.

3.7.2 Conclusion

This chapter examined the research philosophy, and the theoretical and conceptual frameworks of the study. The epistemological approach was adopted for the study in investigating how craft skills are developed through TAs in the *Jua Kali* manufacturing sub sector. The objectivist epistemological paradigm applied in the first phase of the study in understanding the artisans' subjective views, values, attitudes, and beliefs. The interpretivist paradigm was used in the second phase in developing the competency-based DTM. The distributed knowledge research paradigm helped to understand how the artisans should be able to change their design practices through connecting online as a mobile technology-based VCoP.

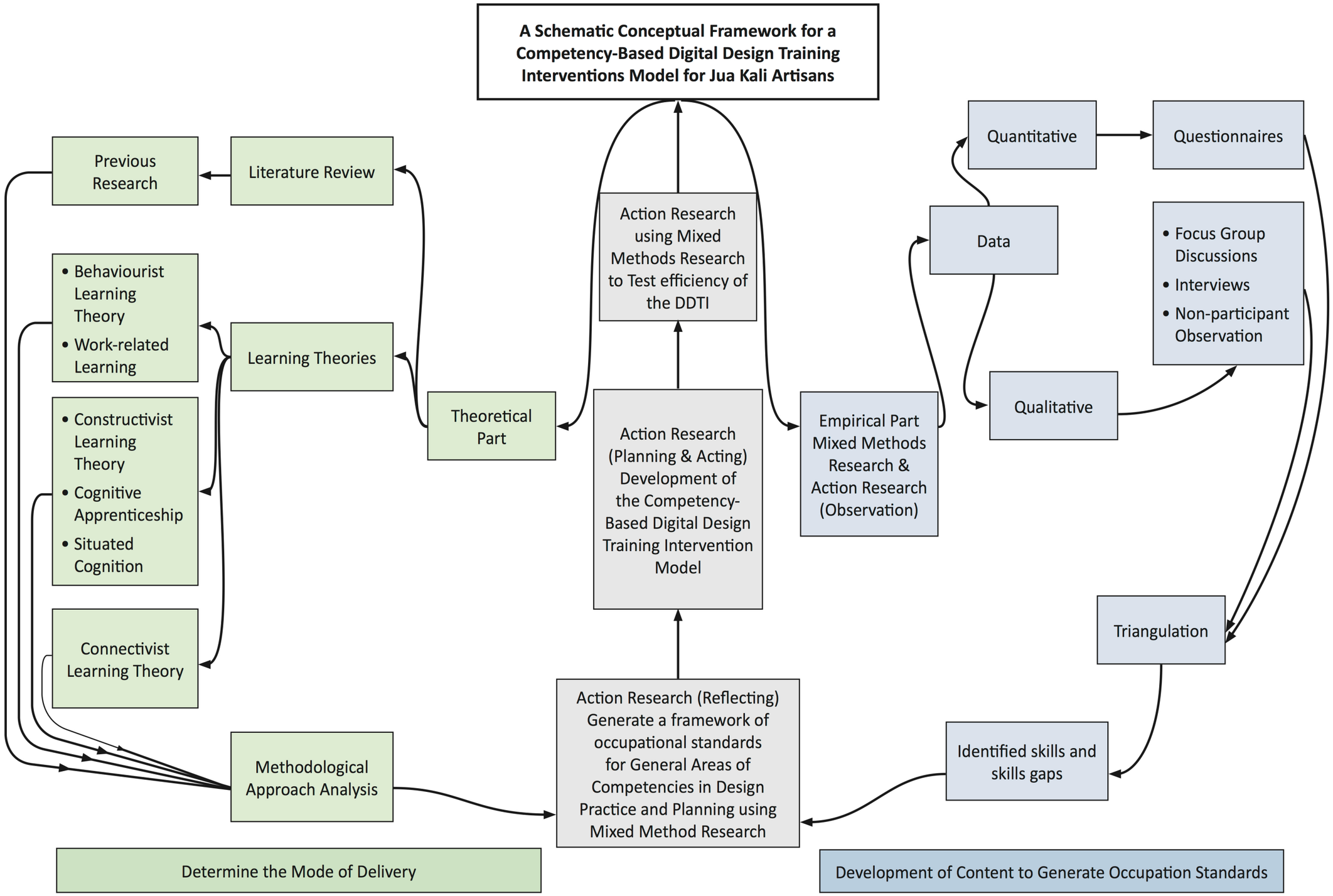


Figure 3.7: A Conceptual Framework for Training *Jua Kali* Artisans in Competency based DDTI

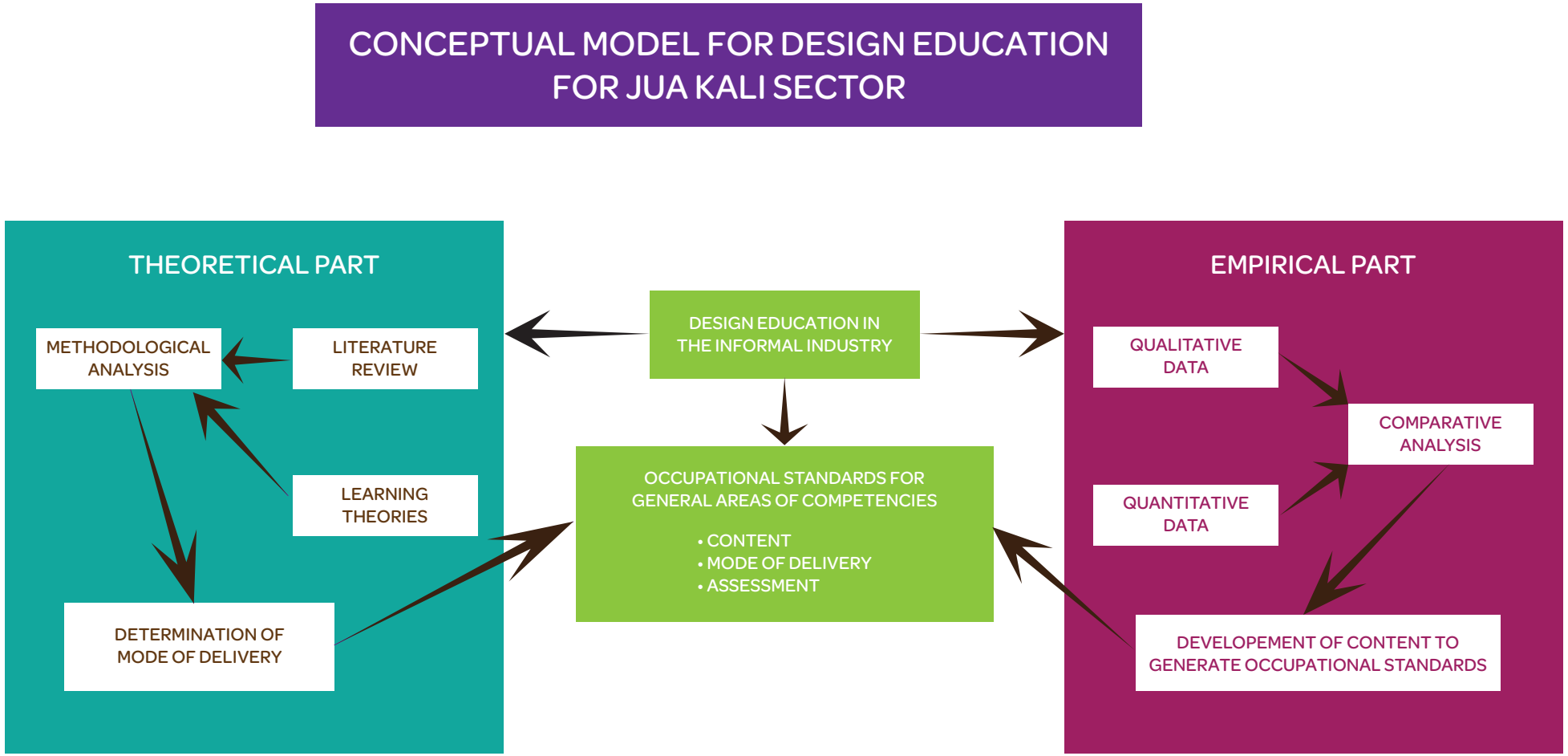


Figure: 3.8 A Conceptual Model for Design Education for Jua Kali Sector in Kenya

Various theories were used in each of the phases of the study. The BLT and WRL theory were adopted for the first phase of the study due to the similarities of their elements. However, BLT was used for the situational analysis, which yielded the identification of existing skills and skill gaps in TA. On the other hand, the CLT and CA were adopted in the second phase of the study. Whereas the CLT helped appreciate the JKS context where in which the MC moderated skills acquisition in TA, the CA was proposed for later incorporation into the DDTI at a more advanced stage because of the literacy level of the artisans. SC was also used to also broaden the understanding the social context of learning in the JKS. Finally, the connectivism learning theory was adopted for the third phase, which helped to conceptualize the formation of VCoPs and VCoLs in the JKS through leveraging on mobile technology.

Chapter Four: Research Methodology

4.0 Introduction

This chapter reviews the research designs that were used in collecting and analysing data during the three different phases of this study. The first phase involved a situational analysis for identifying the skills and skill gaps in design practice and planning during TA. The second phase involved the development of a competency-based design training model (DTM) to be delivered through mobile technology, while the third phase involved the testing of the developed DTM among artisans for functionality and relevance of content. It was also tested among government officials to ascertain its relevance in achieving Vision 2030. The chapter also discusses the research questions, research design, research locations, targeted study population, sampling and sampling procedures, data collection instruments and procedures, ethical considerations analysis, and presentation of data collected from the field.

4.1 Research Questions

These research questions below guided the collection of the qualitative and quantitative data in the study:

I. What are the existing skills and skills gap in design practice and planning in the *Jua Kali* manufacturing sub-sector?

II. How can a competency-based design-training model that is adaptive and responsive to skills gap of the *Jua Kali* artisans be developed?

III. What is the feasibility of implementing the new design-training model among the *Jua Kali* artisans and testing its relevance towards in achieving Vision 2030 with Government ministries, departments and agencies?

4.2 Research Design

This study used a complementary combination of research designs that were conducted in three phases. As proposed by Kothari (2012), the selection of the research designs was determined by the type and availability of data required, the location of the study, data collection techniques, and the methods of analysing the data. This provided the basis on which the data and findings of this study were standardised. In using this criterion, the mixed-methods research design and action research design were adopted for this study. Therefore, the type of data required for the study, the location of the artisans, and the methods of

collection and analysis played a critical role in determining the research designs adopted for the study.

4.2.1 Mixed Methods Research Design

The mixed methods research design was used in the first and third phases of this study for collecting and analysing data. The rationale for this approach was informed by the research questions one and three that these phases were meant to answer. This was based on Keele's (2011) proposal that a research design should be based on the research questions of the study. The first phase of this study was based on the first research question, which set out to identify the existing design skills and skill gaps amongst the artisans in the manufacturing sub-sector in the context of Kenya Vision 2030, and the third question involved testing the appropriateness of the competency-based DTM for capacity building in design practice and planning.

Mixed method research design involves the combination of qualitative and quantitative approaches (Arthur et al., 2012; Sanders et al; 2014). The qualitative and quantitative data was analysed separately and then triangulated. The qualitative data was to be analysed by grouping the responses, which were then coded to examine their similarities and differences. The codes that were generated from similar responses were further arranged into categories, which were used to generate themes. The quantitative data was collected through questionnaires and entered into Statistical Package for Social Sciences (SPSS) for analysis. The analysis yielded descriptive statistics such as percentages and correlation findings. Finally, the deductions made from the themes derived in qualitative analysis were triangulated with the quantitative analysis findings based on the research questions.

The design was appropriate for these two phases, as it allowed for the triangulation – complementarity – of the findings. Sanders et al. (2014) regard triangulation as the use of more than one method in studying the same research question, to achieve convergence of the data collected, thereby, enhancing the credibility of the research findings. This can be done by achieving depth and breadth of the subject matter by generating an accurate and adequate understanding of social phenomena that would not be possible with either approach alone (Creswell and Clark, 2011). Triangulation counterbalances the strengths and weaknesses of qualitative and quantitative data approaches so that a combination of both might be a more fruitful option for this research.

Triangulation also mitigated the artisans' low literacy levels, the convergence of the two methods' evidence strengthening and validating research findings on TA skills acquisition and the DTM's validity. It was also appropriate because the data was collected and analysed to enable the use of findings from one method to inform the other.

In the first phase, the mixed methods research design adopted an embedded approach was used to identify the existing competencies, needs and wants of the JKS during TA, using semi-structured interview guides. The structured question based on the survey instrument the followed up with the unstructured ones to further explain the response. Qualitative data was accorded much more prominence than the quantitative data, even though they were collected simultaneously. This bias was because the artisans are tacit learners with rich qualitative data on their craft processes resident in their minds. Being didactic learners who observe and imitate their masters, JKA practice is accompanied by action, and it involves using or translating prior knowledge into action in the process of making products. This study assumes that the JKA as a CoP would be more comfortable explaining their design processes verbally because they have minimal documentation of their processes. The quantitative data on skills and related gaps collected in the first phase was complemented by the qualitative data in which the artisans elaborated on skills acquisition during TA.

The third phase tested the relevance of the DTM. With the artisans, a convergent design was adopted (Crouch and Pearce, 2012). Questionnaires were used to collect quantitative data that is generalised. The quantitative and qualitative data were collected independently but simultaneously. They were accorded equal prominence even as the results were merged or triangulated. The quantitative methods were chosen on the central premise that it uses quantitative and qualitative approaches in combination to provide better understanding of the research problem than either approach. It also has the capacity to collect information from large numbers of participants, with a view to making inferences about the population. The quantitative data collected in the third phase regarding the DTM's content relevance, appearance, navigability and platform preferences were elaborated on by the quantitative data collected through interviews and Focus Group Discussions (FGD). Using embedded design, interview guides were done to give more prominence to qualitative data from government officials than quantitative data in order to assess DTM's relevance to Vision 2030.

4.2.2 Action Research Design

The Action Research (AR) design began in the first phase of the study with observation and continued in the second phase during the development of the competency-based DTM as a mobile learning tool. Coghlan and Brannick (2014) define action research as an "approach to research that is based on a collaborative problem-solving relationship between the researcher and client, which aims both to solve a problem and generate new knowledge." It therefore required the input of the artisans as the prospective end users of the model. The AR design ensured that the artisans became a better CoP and CoL who can interact with the DTM on their mobile devices to slowly overcome their design problems.

Townsend (2013) regards AR as an interactive process that goes through successive phases, with each building on the previous one. The DTM interactivity aimed at refining the JKS design processes based on learning, testing the most recent interaction of a design with end users, changing and refining as discussed with the end users, and improving quality and functionality. As action is implemented in each of these phases, it generates new understanding, which provides in-depth appreciation of the research issues, leading to refining or changing the focus altogether. The development of the DTM incorporated the four stages of the action research cycle that are proposed by Crouch & Pearce (2012), which are observing, reflecting, planning and acting as shown in Figure 4.1. The end result of this cycle is the development of new practices.

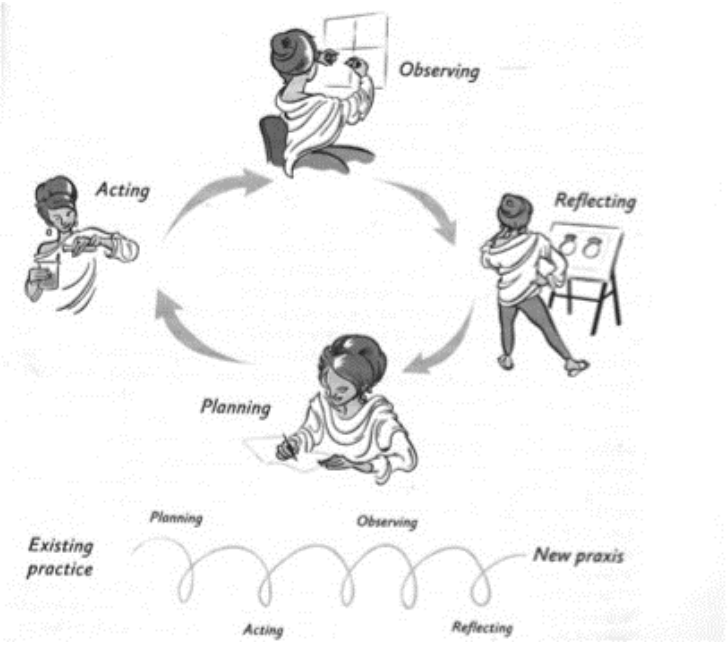


Figure 4.1 The Action Research Cycle Adopted for the Development of the Design Training Model

Source: Crouch and Pearce (2012)

This study went further than the four steps proposed above, and included a fifth step that involved testing whether the model is communicating specific, easily accessible and understood design knowledge and skills to end users. Table 4.1 Outlines the action research cycle developed to create DTM.

Table 4.1 Outline of the DTM's Action Research Cycle

Stage One: Observing	**Observing, taking stock and identifying the skills and skill gaps in design practice and planning during traditional apprenticeship**
Stage Two: Reflecting	Reflected on possible ways forward by developing the content for the competency-based DTM framework through generating the occupational standards for general areas of competencies for design education.
Stage Three: Planning	Digitisation of the content for m-learning. This step involved research and development, designing the interface, creating content, building the database, and integrating the content, testing and deployment.
Stage Four: Acting	Taking action to further develop and try out the model's web-based platform and USSD platform with the involvement of artisan as end-users. Iterative process that involved discussions with artisans, monitoring and observing them as they interact with it. Evaluate what has been discussed and happened and modify the models. Preliminary test to pilot the questionnaire.
Stage Five: Final Testing	Testing of the model with new artisans and government MDAs for efficiency and relevance. Development of new knowledge in design practices and planning OR continue with the cycle and spiral by returning to observe/ reflect/ act circle. Recommendations based on the results there are some modifications that could be done.

AR was relevant because it is a powerful and liberating research method suitable for practising designers (Crouch and Pearce, 2012). In this study, it avails the opportunity for examining and evaluating DTM's development by individuals and in collaboration. As a development process, the research questions asked at each stage of AR reflected the DTM's development stages. As Arthur et al. (2012) note, there is technically no problem in having to implement findings during the iterative process of DTM's development, because it is educative for all.

The AR design was therefore relevant to this study given that the research participants were granted ownership and control of the research process (Crouch and Pearce, 2012). This leads

them to have more control on how they work and consolidate their practice in ways that better reflect what is important in the DTM's development. The AR process alternated between enquiry and action through the various stages because of its cyclic nature, which requires analysis and reflection at each stage (Arthur et al., 2012; Coghlan and Brannick, 2014). This flexibility was appropriate because of the artisans' low education levels, the diversity of their products, and their multiple locations.

4.3 Research Location

This study adopted the Kombo and Tromp (2012) criteria for selecting research locations, which favoured the largest areas within which to access relevant respondents. The location should also best represent the range of variation in the respondents' most important attributes. The JKS is found all over Kenya, but is more concentrated in urban areas. This study's focus on skills development in design practice and planning during TA in the manufacturing sub-sector, led to mainly urban locations.

4.4 Target Population

Kenya's informal sector workers constituted the broad research population of the people of interest to this study, needed to answer the research questions (Yin, 2013). However, the narrower study target was workers in the JKS manufacturing subsector who acquire skills through TA. Such sub-sectors include, but are not limited to woodwork, metalwork, pottery, sculpture and handicrafts. These artisans were of particular interest as their activities involve the creation of both utilitarian and aesthetic products that are consumed primarily by a local market and a small international market.

4.5 Sampling Procedure

A purposive sampling approach was used in selecting of the participants in this study: It is non-probability sampling basis which means the elements were selected from the target population, based on their appropriateness to the purpose of the study and the specific inclusion and exclusion criteria (Yin, 2013). According to Crouch and Pearce (2012), purposive sampling uses small numbers for in-depth focus. Thus, participants were chosen from JKAs because they have significant qualities in common, are best suited for the research intent, and can often provide information about excluded artisans.

There was no reliable data – especially in academia – on, and limited access to, Kenyan *Jua Kali* artisans. The widely dispersed artisans are not very receptive to researchers on their

small-scale, semi-organized, unregistered and largely unregulated businesses lacking proper tools, equipment and accommodation. This undermined the establishment of a sample frame from which to determine the participants in the study. The Ministry of Industrialisation and Enterprise Development, and specifically its Micro and Small Enterprise Authority (MSEA), which works closely with the informal sector was approached for data on skills development in the sector, but only provided anecdotal data, placing the population of the sectors workers at approximately 12 million.

Due to the data constraint, the MSEA helped in identifying initial participants they work closely with countrywide, after which the "snowballing" technique was adopted. Those in leadership positions, such as the Enterprise Development Officers, were approached to assist in identifying individuals who are knowledgeable or well informed about JKS skills development. They provided contacts, physically introducing the researcher and her team to artisans in five Kenyan counties

The heterogeneous sampling criterion was adopted based on the premise that the selection of a wide variety of elements is critical in identifying the most common patterns that run across the variations (Daniel, 2012). Thus, artisans were drawn from 18 *JKAs* from a broad spectrum of the manufacturing sub-sectors across five counties (See Appendix 1: Maps of Counties), as listed by their professional clusters and products in Table 4.1**.**

Table 4.2 Jua Kali associations and the products they make from a broad spectrum of the manufacturing sub-sector across five counties in Kenya

No.	Jua Kali Association	County	Clusters & Products
1	Kamukunji Jua Kali Association	Nairobi	Metalwork
2	Nairobi Handicraft Industrial Co-op Society	Nairobi	Woodwork sculptures and artefacts
3	Shauri Moyo ??	Nairobi	Auto repair
4	Kariokor Kiondo Women	Nairobi	Beadwork; basketry; handbags; leather work; jewellery,
5	Shauri Moyo Furniture Makers	Nairobi	Woodwork
6	Kibuye Jua Kali Association	Kisumu	Woodwork; metalwork; textiles
7	Ber Neno Creations	Kisumu	Woodwork; hyacinth
8	Ong'ayo Women Group	Kisumu	Pottery
9	Nyakach Thur Gem	Kisumu	Basketry; jewellery
10	Nyakach Kano *Jua Kali* Women Association	Kisumu	Basketry
11	Katito Nyakach SDA	Kisumu	Floor mats
12	Homa Bay Farmers Co-operative Society	Homa Bay	Bamboo furniture and ornaments
13	Oriang' Women	Homa Bay	Pottery
14	Shirikiana Women Group	Kisii	Stone sculptures and artefacts
15	Tabaka	Kisii	Sculptures; ornaments
16	Siaya County Women MSE	Siaya	Basketry; handicrafts; jewellery
17	ARO Development Centre	Siaya	Beadwork; jewellery; sculptures
18	Amkeni Young Women Group	Siaya	Beadwork; tapestry

4.6 Data Collection Instruments

An effective data collection instrument helps the researcher to collect data in a concise, reliable and simple manner. According to Kombo and Tromp (2012), a good data collection instrument ensures that the collected data can easily be analysed. The questionnaires were tailored to the needs of this research to collect quantitative data to meet the third research objectives. Semi-structured interview guides and observation schedules were used to collect qualitative data for the three research questions.

4.6.1 Observation-Based Research

Observation-based research was used in this study to guide in the development of a documentary explaining JKS craft processes, more specifically, how artisans acquire skills through TA. The researcher therefore became part of the JKS, engaging them in conversations that made the artisans comfortable enough to provide information, as well as enabling environment for consequent field visits. The conversations with the artisans eventually

transformed from casual dialogues into semi-structured interviews alongside researcher observations.

According to Arthur et al. (2012) and Crouch and Pearce (2012), observation provides the researcher with the opportunity of using their hearing and visual senses in their social contexts, to systematically collect and analyse information about subjects. This study adopted naturalistic observation, with a reactive or non-participant observation approach. The researcher visited the artisans' workshops, identified herself, and explained the nature and purpose of her study. The researcher was not interested in controlling what happened at the research sites (workshops), but merely observed the spontaneous happenings, with an occasional intervention in her role as a social scientist.

The verbal and visual information collected in this first phase of the study yielded the qualitative data used to develop an easy to follow documentary on JKS craft activities, highlighting the challenges regarding design practice and planning in particular. The documentary provided the foundation of the study, elaborating and contextualizing issues, thereby paving the way for the subsequent phases.

Denscombe (2010) notes that observation schedules provide a framework for observation during research. This study's schedule enabled thorough and systematic data recording to generate consistent results (See Appendix 2: Observation Schedule). The observation schedule is made up of a checklist of important research issues to be measured and recorded and their frequency of occurrence.

The observation schedule had a table in whose left column the researcher recorded the observed behaviour and characteristics of the artisans and their environments. In the right column, the researcher recorded the observations related to their design processes in their working environment. The records included the observable skills, and sector challenges over the work environment, design processes, health and safety concerns, and tools and equipment in the design practice. Language also presented a challenge for some artisans during the development of the documentary. The observation schedule was also used in the third phase's testing of the DTM platforms, to record the artisans' interaction with the DTM platforms. Because of their low literacy levels, the artisans were allowed to express themselves in a language of their preference.

4.6.2 Survey Questionnaires

The study questionnaires included specific questions whose answers would generate insights into the third research question (Remenyi, 2013). The statements and questions were brief and direct, to make them easily understood by respondents who would be comfortable providing answers. Arthur et al., (2012) notes that the paper-based questionnaires delivered face-to-face are easy to administer and have been tried and tested. Research has moved to paperless questionnaires that were not used in this research because of the low ICT literacy levels in the JKS. Assistance was provided for respondents needing help to complete the questionnaires because of their low literacy levels, computer illiteracy, or poor working conditions. The paper-based questionnaires may be expensive if used in an expansive geographical location and the participants can never guarantee honest answers. Paperless questionnaires on mobile devices can substitute paper- based ones; but involve a high initial investment. Face-to-face interviews were therefore more efficient than mailed questionnaires.

This study used skilled interviewers who engaged the artisans and assisted where necessary, during the face-to-face interviews, encouraging them to provide responses. The survey had both closed and open-ended questions, with the interviewers taking down additional notes for any relevant information that did not feature in the questionnaire.

A three-section questionnaire was used in the third phase to test the efficacy of the DTM model (See Appendix 3)**.** Its closed questions required the respondents to choose from a list of options provided, and were followed by an open-ended question that sought further elaboration of their responses. Of its three sections, Section A consisted of eight questions, the first seven questions addressing the relevance of the DTM's module content, whereas the eighth question concerned the artisans' preference between the web-based platform and the DTM's Unstructured Supplementary Service Data (USSD) platform. Section B included four questions all of which investigated the artisans' opinion on the web-based platform's functionality, appearance, relevance and clarity of content, presentation and the signing up process. Section C had three questions on the USSD platform's usability, appearance and signing up process.

The questionnaire was piloted prior to the actual study with a group of artisans from Kamukunji *Jua Kali* Association and subsequently refined.. This was because Kamukunji is the largest JKA in the country, making a wide variety of products. MSEA made arrangements for

the piloting because their officials were expected to play an active role in suggesting improvements to the questionnaire.

4.6.3 Semi-structured Interview Guides

Semi-structured interviews were used in this research because they are regarded as in-depth interviews. As Schuh and Lee (2013) argue, semi-structured interviews are suitable for exploring a topic more deeply and also allow the interviewee to freely express their opinions and attitudes. Semi-structured interviews were used because of the interest in interpreting and understanding the experiences of artisans, combined with the focus of allowing their voice to be heard. Strategies to adopt during such interviews include such gentle interventions as nods and smiles, verbal encouragements, checking, understanding and paraphrasing (Crouch and Pearce, 2012). The interviewer planned a general focus for the interview without taking total control of the process, thus shaping the discussion while also giving the participants considerable freedom to direct its progress. This allowed participants to contribute as much information as they wanted to while the interviewer did the listening and asked further questions for clarifications.

The guides for the semi-structured interviews, therefore, provided some form of structure to the interviewing process, leaving room for the interviewer to vary the course of the interview according to the participant's responses. On this premise, semi-structured interviews proved suitable for all the three phases of this study. The semi-structured interview guides were also used for FGDs with the artisans in the three phases to allow them to freely express their opinions and provide deeper understanding of the subject matter.

Different interview guides were used for each phase of the study, given that each phase pursued a distinct objective. The interview guide was used in the first phase to identify the existing design competencies, and to investigate the design challenges that the participants encounter in their craft trade. The interview guide for artisans was used to guide in shooting the documentary; it guided the conversation the video and audio recording was carried out by Vanken Production under the guidance of the research team (See Appendix 4). The protocol, therefore, contained questions on to the participant's business profiles, market research, creation of briefs and idea generation, production processes, selling and marketing, and planning of their craft enterprises. It also contained questions on mobile phone usage, Internet usage, and collaboration between the JKS and formal institutions. The interview

guide was pre-tested or piloted with artisans from Nairobi Handicrafts, and the process facilitated by MSEA.

In the second phase, the interview guides were used in the development of the DTM platforms (See Appendix 5: Interview Guide for Artisans in the Development of the DTM). The first interview guide used in this phase was divided into six areas, helping to generate the artisans' person information, business profile, design, production, marketing, management, and any other challenges that they encounter in their crafts trade. This information was transcribed and edited, and used in the development of competency-based DTM. The DTM was to be developed with the full participation of the artisans as end users.

Finally, in the third phase, interview guides were used to solicit opinions from government officials in various MDAs, on the viability of the DTM as a competency-based mobile learning tool for design training in the manufacturing sub–sector, aligned to Vision 2030 (See Appendix 6: Interview Guide for Government Officials)**.** Interview guides were employed because the high-ranking Government officials targeted by this research might not have had time from their busy schedules to fill questionnaires or look at the DTM. The other reason was because each interview protocol was tailored to particular respondents and/or MDAs. Of its three distinct segments, Section A of the interview guides included questions that explored existing government policies and strategies. Section B examined the successful implementation of the DTM and its relevance in providing design training to *Jua Kali* artisans. Section C questions examined the content, usability and appearance of the DTM on both the web-based platform and the USSD platform.

4.7 Ethical Considerations

4.7.1 Research Ethics Approval

According to Arthur et al. (2012) and Monette et al. (2013), every participant in a research exercise should be fully informed about the nature of the study and how the data that they are providing will be used. Informed consent should not just be a paper exercise and should not subject the target participants to undue pressure to participate. It should, however, give the participant the right to take part, to withdraw at any time, and to retract the data that they have provided.

In this regard, the Medium-High Risk Ethics Approval Checklists for seeking approval to collect data were submitted to Coventry University for each phase of the study and the Medium-High

Risk Ethics Approval forms were received before proceeding to collect data (See Appendix 7 for Phase I; Appendix 8 for Phase II and Appendix 9 for Phase III). This reflected the commitment to uphold all the ethics that pertain to this particular study. A Certificate of Ethics approval was issued by Coventry University (See Appendix 10). Thereafter, the participants were provided with the ethics approval forms and were briefed on the contents of Participants Information Sheet (See Appendix 11: Participants Information Sheet), and later provided with the Informed Consent Forms (See Appendix 12) in Phase I and Phase III and the Studio Ang's Personal Appearance Release Form (See Appendix 13) in Phase II, which they voluntarily completed before they participated in the study. The Participants Information Sheet contained the information on what the study was about, and how the information would be used. It also assured participants of the confidentiality of the information and approval to use the recordings for research purposes.

4.7.2 Confidentiality, Privacy and Anonymity

Anonymity is one of the ways through which the privacy of the participants in a study is protected (Arthur et al., 2012; Monette et al., 2013). This involves de-linking the collected information by not divulging the names and/or phone numbers of study participants. Most of the data collected in this study was de-linked from the participants who provided it. The questionnaires, for example, advised participants not to include their names or other identifiers on the sheets. Confidentiality therefore involves assuring the participants that the information they provide will not be made public.

The prospective participants were provided with adequate information about the nature of this research, how the findings will be reported and used, and how it would benefit them, to enable them to decide whether or not to take part. The importance of observation, and the audio and video recordings were also explained to the participants. They were informed of their right to withdraw themselves or data relating to them from the study anytime.

Even though the participants were assured of the confidentiality of their information, not all participants remained anonymous in this study as they were engaged through interviews, discussions, and audio and video recording. Due to the artisans' low literacy levels, arrangements were made for the translation of instruments into other languages, notably Kiswahili the national language, and Dholuo where necessary. Some of the participants accepted and gave permission that their recordings could be edited and used for this research at no fee. It was important that the participants understood and allowed the recording to be

used for the documentary and proposed website before signing the consent forms (See Appendix 13). The prospective participants therefore, signed the consent forms where they volunteered their participation. They were assured that the information that they provided would be used for no purposes other than the research. This was also based on the Coventry University Code of Ethics for research.

4.8 Data Collection Procedures for Improving JKS Design Practice and Planning

4.8.1 Identifying Existing Skills and Skill Gaps in Traditional Apprenticeship

Of the three phases of data collection, the first phase collected and analysed data on artisans in five Kenyan counties namely: Nairobi City; Kisumu; Kisii; Homa Bay and Siaya, to help understand how they acquired the design practice and planning skills during traditional apprenticeship. The data also enabled production of the documentary highlighting the challenges in the sector, which only targeted the manufacturing sub-sector. The researcher's home university provided a letter of introduction to facilitate data collection (See Appendix 14: Introduction Letter from The Technical University of Kenya).

As previously noted, sector data was poor; so government officials were particularly helpful in providing linkages with sector operators, and in the selection of the JKAs included in the study who were widely distributed geographically, and wary of strangers (See Appendix 15: Visit Schedule of Government officials- to Introduce the research team to the JKA). Based on discussions and consultation with the Governmant officials, a schedule of field visits to *Jua Kali* associations was generated (See Appendix 16: Visit Schedule for Government Officials-to collect data). The visiting schedule for the artisans did not include casual visits that the researcher made to various *Jua Kali* sites, to understand skills acquisition in design processes in the sector. The field study conducted between 2010 and 2011 covered Kibera, Race Course, Komarock, and Outer Ring Road in Nairobi City County, and Wangige and Limuru in Kiambu County.

Focus Group Discussions (FGDs) were used in this phase of the study, with participants drawn from the JKAs, the researcher's moderation guide by interview guides (See Appendix 4). The FGDs provided a greater understanding of the opinions, attitudes and perceptions of the artisans regarding their design competencies and related challenges. As the moderator, the researcher introduced the research issues and facilitated the discussion to ensure that detailed information was generated with regard to the design needs, wishes and challenges.

These discussions were held on premises next to their workshops as the researcher considered this to be a non-threatening environment where the artisans could freely share their opinions and experiences.

Based on the limitations of FGD, such as group dynamics allowing some participants to dominate discussions while others are reluctant to share their experiences (Hennink, 2014), the moderator ensured that all the participants were given an equal chance of expressing their opinions and attitudes. The data in this phase was also collected through reactive observation, as the FGDs, interviews and production processes were recorded on photos, video and audio. This information helped in the production of the documentary, which highlighted the competencies and skills gaps in the JKS.

4.8.2 Data Collection for Developing a Design Training Model

The second phase of the study used Action Research (AR) design to develop the DTM. A consulting firm was hired to collaborate with the researcher in the development of the DTM, due to the designer and educationist researcher's limited familiarity with web and USSD development. A contract was signed with Studio ANG (See Appendix 17: Studio ANG Contract) with whom milestones were discussed (See Appendix 18: The Milestones), and a shooting schedule proposed (See Appendix 19: The Shooting Schedule). They were instrumental in this study because they are Nairobi-based boutique creative studio with handpicked talents from a wide array of disciplines combining all aspects of design, live action, animation, digital news; film and TV production; web development; and design motion. More information about Studio ANG is at www.studioang.tv.

Eight artisans who had been interviewed during the pre-testing, were requested to be part of the website development, including three from Kamukunji *Jua Kali* Association, two from Nairobi Handicrafts, two from Shauri Moyo Furniture, and one from Wangige Pottery. Permission was duly obtained from the artisans as previously reported (Sections 4.8.1 and 4.8.2), to interview them and take video clips for the website (see Appendix 13).The artisans also attended several meetings to particiapte in the DTM development, with all ethical concerns duly complied with.

The data in this phase of the study was collected using FGDs with lead artisans being interviewed using an interview guide (See Appendix 5)**.** The FGDs were relevant to this phase since it has traditionally been used, primarily to develop new product ideas, secure feedback

from potential users, generate suggestions on modifications, and discuss strategies for meeting the needs of the potential user. The eight artisans aforementioned formed the focus group that refined the design based on learning from the user interactions. The prototype was used to test and refine the design whilst improving on its interaction.

At the final testing stage, the same group of artisans was also used to pilot the constructed questionnare after the design model was fully developed. The piloting reviewed the clarity of phrasing and supplied alternative formulations. The artisans were shown how to access the DTM model using tablets and mobile phones before filling in the questionnaires. They were then led through a discussion regarding their opinions on the questionnaires and adjustments were made based on their feedback. During the piloting, because of the artisans' low literacy levels, research assistants were used to explain and sometimes write down the answers for them. Others were allowed to fill the questionnaires in Kiswahili, which were later translated into English.

4.8.3 Procedures to Test the Efficacy of the Design-Training Model

Before going to collect data an introduction letter was acquired from The Technical University of Kenya (See Appendix 20) and schedules for interviewing officials from government MDAs that work with the *JKA* Nairobi County (See Appendix 21) were available. The researcher's personal introduction letters to various MDAs were sent out, each policy maker being asked about issues specific to their respective mandates in relation to the *Jua Kali* sector's context vis a vis Kenya Vision 2030. (See Appendix 22)

In the third phase of the study there was a schedule of field visits to collect data targeting Nairobi County artisans involved in the development of the model, and others who had no knowledge of the model (See Appendix 23). Semi-structured interviews (See Appendix 6), and non-participant observation were also used. Due to high ICT illiteracy levels in the sector, the artisans were to be orientated on how to access information and interact with the DTM. They were then provided with the questionnaires to be completed, with those needing help being assisted in answering the questions.

The semi-structured interviews with government officials were estimated to last for about an hour. They were taken through the DTM orientation, and then through a custom-made interview guide, after which they discussed their opinions on and experience of the JKS. The discussions also explored the respective MDAs plans and strategies for JKS skills development

and their perspectives on the use of the DTM to advance Kenya Vision 2030. The interviews and responses of both the artisans and government officials were recorded through video, audio and still cameras with their consent. The data on the interaction of the *Jua Kali* artisans with the DTM was also recorded in the observation schedule.

4.9 Data Analysis and Presentation

The study yielded data for both quantitative and qualitative analysis. The quantitative analysis of data collected through the questionnaires applied the Statistical Package for Social Sciences (SPSS). As Kothari (2012) notes, SPSS is efficient in handling large amounts of data, given its wide spectrum of statistical procedures that are purposefully designed for social science studies. The statistics used in this case included frequency counts, percentages and inferential analysis.

Quantitative analysis was applied to data collected in the first and the third phases of the study, through interviews and FGDs recorded on video cameras and tape recorders. The qualitative data from the interviews and discussions were transcribed, coded and tallied according to the similarity of the responses. This helped to generate themes, from which deductions were made, and used to triangulate the findings from the quantitative data. Qualitative analysis was used in all the three phases of the study. The next chapter includes the analysis, presentation and discussion of the phase one data collection.

4.10 Conclusion

This chapter has looked at the research designs that were adopted for this study, which included the observation-based research design, mixed methods research design, and the action research design. The research designs were selected based on the kind of data the study required, which regarded the JKS design skills and skills gaps, and the design practices and planning amongst the artisans in the sector. The target population of the study was the JKS artisans in the manufacturing sub-sector, and they were selected using purposive sampling, which was relevant for the study due to the unreliable statistics on the number of artisans in the sector. The data in the study were collected through non-participants observation, questionnaires and semi-structured interviews. The process of data collection was guided by ethical considerations, which took into account elements such as confidentiality, privacy and anonymity. The quantitative data collected was analysed using the SPSS, while the qualitative data was analysed through coding, deduction and triangulation.

Chapter 5: The Documentary of Design Practice and Planning in the Jua Kali Manufacturing Sub-sector in Kenya

5.1 Introduction

A twenty-nine-minute documentary entitled: The Informal Sector in Kenya – *Jua Kali* Perspectives is embedded as Appendix 24. This documentary aims to use observation-based research to provide information on design practice and planning in the JKAs and how that can be used to elaborate and contextualize the research report on the skill and skill gaps in the JKS in their working environment. The documentary demonstrated the JKA craft experiences with emphasis on skill acquisition through TA, identification of target markets, and development of briefs, idea generation, and production, marketing and planning in the JKS. The MC apprentice relationship was keenly observed because it was necessary for this study to enable it address TA and its effect on design processes and end products in the JKS.

The observations in the documentary were well constructed and structured to bring out detailed craft processes from several points of view by constituting and presenting qualitative data on the JKAs. The documentary is a key output of the fieldwork of this study as it highlights extremely rich visual and oral data, thereby providing insights into the craft processes in the JKAs. It was a primer, an early kind of experimental data that was captured to provide information that described the JKAs as a kind of CoP and CoL. The documentary was to aid the reader to engage and connect with the rest of thesis by pointing out the strengths and inconsistencies in the JKA design competencies that lead to the development of the DDTI. It also plays a significant role in elaborating and contextualizing how this study could facilitate achievement of Kenya Vision 2030 if the sector would have accessible affordable training to develop skilled manpower.

For Arthur et al. (2012) and Crouch and Pearce (2012), such a documentary is crucial as a presentation of the observations undertaken. It accounted for the first practical of data collection techniques and the subsequent techniques will be dependent on this basic information in the documentary provided by this initial observation JKA craft process. The documentary was designed to present JKS activities and craft processes in an easily understood manner, especially for persons unfamiliar with the sector.

The development of the documentary also facilitated contact with the players in the sector, including the artisans and government officials. The contact with the artisans was particularly important as observation and dialogue deepened on understanding of their day-to-day activities of the JKA. The resulting bonding heightened trust, and enabled the researcher to get immersed in the *JK* setting in preparation for further data collection and video shooting for the development of the DTM. The opportunity also opened ways to the exchange of phone numbers, which facilitated ease of contacts

5.2 The Process of Developing the Documentary

Arthur et al. (2012) and Crouch and Pearce (2012) argue that wide-angle data collection often starts before an actual research gets underway. In this study the researchers' interest grew out of the informal observations she made in her daily life as she interacted with JKA, bought and used their products. She has often watched the artisans make and display their products in varied places, raising curiosity about the dynamics of the sector.

This research started informally with preliminary observation and a wide focus on the JKS; but acquired some shape especially between 2010 and 2011, when several visits to JK shelters and workshops listed in Table 5.1, accompanied by Nairobi officials of the Kenya National Federation of *Jua Kali* Associations (KNFJKA) which is the umbrella body for the association. Interestingly, the KNFJKA officials were not well known to some of the artisans who apparently did not belong to *Jua Kali* Associations (JKAs), this could be because they operated individually or in small groups. The fact that none of the artisans who were visited (See Table 5.1) belonged to any JKA underscores the earlier assertion that research in the sector faces serious data constraint.

Table: 5.1: Visits to Jua Kali Artisans in Nairobi County

Name of Business	Location	Craft
Masai Mbili	Kibera	Painting, Sculptures, Textile decoration
Metal Workers	Dagoretti Corner, Ngong Road	Utensils, doors, windows and gates
Sculptors	Race Course,Ngong Road	Sculptures, gates
Western Furniture	Komarok	Furniture
Potters	Kangemi/Kawangware	Flower pots
Jabavu Weavers	Limuru	Mats and shirts
Potters	Race Course,Ngong Road	Painting fired pots
Furniture Maker	Kibera	Furniture

These casual preliminary visits to understand sector operations led to several significant observations about the artisans. They:

- Learn tacit skills from MCs during TA, and with the majority not documenting their design processes;
- Worked alone, or in small groups of up to three;
- Did not seem to follow a structured design process;
- Seemed to lack the capacity to fully identify market needs, through research to production of targeted products; and
- They rely heavily on walk in and repeat customers.

It was observed that the artisans learn skills on-the-job (apprenticeship) before moving on to open their own businesses, usually in the same neighbourhood, making similar products, despite having no obvious evidence of market demands. Another general observation was that artisans did not seem to have a clear idea on how to balance functional and aesthetic requirements of the products to make them durable, affordable and safe to use. Their working conditions seemed to affect the quality of their products: the working environment seemed oblivious to health and safety regulations; and the majority of workers did not have proper tools and equipment for quality outputs.

The research intent narrowed down as curiosity translated into a PhD research that started in April 2012. The researcher engaged the KNFJKA's Chief Executive Officer (CEO) on how to identify clusters in various *Jua Kali* Associations (JKAs) that would be willing to

share information. The initial stages involved developing linkages with JKAs through collaborations with government officials. The CEO of KNFJKA linked us to the Micro and Small Enterprise Authority (MSEA) in the Ministry of Labour and Enterprise Development, for JKAs data**.** However, MSEA had no reliable data on the numbers of artisans in the manufacturing sub-sector, their products, or their skills development processes, only estimating the existence of 11 million JKAs in 2012. MSEA appreciated the relevance of the study, and facilitated links to the Provincial Enterprise Development Officers (PEDOs) who identified the most appropriate JKAs for the study.

The documentary was shot between September and October 2012, the participating JKAs eventually drawn from eighteen JKAs across five counties: Nairobi City; Kisumu; Kisii; Siaya and Homa Bay. JKAs selection considered the products made, proximity to the researcher, and the availability of time and finances, with the eventual focus on woodwork, metalwork, pottery and handicraft clusters of the manufacturing sub-sector. The documentary mainly examined skills development, tools and equipment, finished products, sales and marketing of products, and the working environment.

A series of general sensitizing concepts that were already prepared were used to organize the research (Arthur et al., 2012; Crouch and Pearce, 2012) namely: Visit schedule for artisans (See Appendix 16), Introduction Letter (See Appendix 11), and Medium-High Risk Ethics Approval Check lists approved by Coventry University (See Appendix 7), which was received before proceeding to fieldwork. Varken Productions was engaged to partner in documentary production between October and September 2012 to collect oral and pictorial data. The purpose of the study was explained to the artisans using Participants Information Sheet (See Appendix 11) before they were requested to voluntarily sign the Informed Consent forms (See Appendix 12). The JKA voluntarily accepted to be recorded and data used for this study. Data collection employed an interview guide (See Appendix 4) and observation of design activities, which were recorded through photos, videos and the observation schedules (See Appendix 2). The researcher remained conscious of her strengths and limitations as a designer, educationist, and consumer of JKS products.

The initial step was a descriptive observation (Arthur et al., 2012; Crouch and Pearce, 2012) intended to give a broad overview of the JKS' physical and social characteristics. The first visit was a familiarization tour aimed at meeting the JKAs officials to brief them

on the study. With time, the research became more structured and targeted, the relationship going beyond formal data collection into natural interactions in the settings where the artisans were being observed.

The descriptive observation then proceeded to the focusing phase and recognizing patterns in behaviour being observed (Arthur et al., 2012; Crouch and Pearce, 2012). These observations were validated and clarified by data drawn from semi-structured interviews, FGDs, video recordings, writings, and conversations; with listening and discussions used to clarify and validate observations. The interactions with the artisans moved from a casual conversation into a formal methodical way of getting information, building networks and conversations. The methodological question was based on objectivist epistemological paradigm, which suggests reality is eternal to the mind of the individual, and perceptions are gained experientially (Nawaz, 2012).

5.3 Key Learnings from the Documentary on the Jua Kali Manufacturing Sub- Sector in Kenya

The documentary aimed at constituting and presenting qualitative data on the JKAs, based on the collection of both verbal and visual information to facilitate in the development of competency-based DDTI model that will enhance JKA knowledge and skill through m-learning in line with Kenya Vision 2030. This was partially achieved through the documentary during observation which is considered the most comprehensive of all research strategies (Crouch and Pearce, 2012). The documentary captured a brief history of the sector, reaffirming what is in the literature review. It brought out a detailed picture of JKS activities from multiple perspectives, capturing the complexity of experiences, and the variety of skills and products. This was only achieved because there was keen observation of the design process, marketing and planning issues, health and safety, tools and equipment and the working conditions in the sector. It summarised the nature of working conditions in the JKAs to strengthen the thesis and significantly link it to workplace learning. The documentary initiated the achievement on the first two objectives of the study.

The documentary assisted in identifying existing skills and skills gap in design practice and planning in the *Jua Kali* manufacturing sub-sector, which is the first objective of this study. This was achieved through interaction and observation with artisans in the field. It

was established that most JKS trainees had low education and individuals were aged between 15 and 35 years. The artisans indicated that many were high school dropouts often because they could not afford further education. This could have attributed to the reason for mainly communicating in Kiswahili (the national language) or Dholuo (one of the vernacular languages) during the interviews with them. A government official pointed out that artisanal occupations are regarded by society to be for school dropouts; but those with higher levels of education are also joining the sector after failing to get formal sector employment. They indicated that they gained access into the JKS through family ties and friendship.

From the interaction, the JKA use their mobile phones mainly for money transfers and communication purposes. Although they lack ICT skills they seem keen on learning, but only if a suitable tool is developed. They even expressed interest in acquiring skills that can help them market their products online. There is therefore, need for the artisans to be trained in areas of ICT to enable them to advance in the use of technology and be able to use it as a tool for learning and advertising.

A key learning from the documentary in regards to the artisans design process was that a majority of the artisans do not carry out formal market research, depending instead, on walk-in customers who give design specifications, while some have photo albums from which clients pick desired products. Since the artisans only have tacit knowledge acquired through observation and imitation, and shared through clusters or TA, and majority have low literacy levels they are not able to articulate tacit knowledge, or document the process in words, models or sketches. The artisans claimed their tacit knowledge is in their memory and it was noticeable that they found it hard to formalize it. It was noted that JKA tacit knowledge is based on previous experiences, which probably explains the ethicized distribution of craftsmanship across the country. For instance, Kisii soapstone is localized in Tabaka, Kisii County; clay is found in specific parts of Kendu Bay, Homa Bay County; and in Western Kenya, and particular areas in Kiambu and Murang'a counties. The Kamba community mainly does woodcarving.

The artisans claimed that the government had not given them adequate support to open up the market. This affected their businesses because they were not able to create products that perform the jobs that people need to get done at competitive prizes.

However, the government has recently taken specific steps to formulate policies, which affect the market failures and environmental constraints facing *Jua Kali* entrepreneurs. Unfortunately, not much emphasis has been placed on training in design practice and planning, which the KNFJKA CEO feels artisans would be receptive to.

Observation shows the lack of organized production methods, though their labour-intensive processes often lead to wastefulness in terms of time and raw materials. Some of their products do not seem to work well because of their performance, fitness for purpose, human interaction, and ease of use, safety and reliability, whilst other products may be generally strong and durable, such as woodwork and metalwork products. Most artisans do not seem to consider factors that enable product functionality, efficiency, aesthetics, or work safety to meet consumer expectations and requirements like the structure, stability, and ergonomics. These characteristics could be founded in their MC heritage, with its inherent skills limits.

The documentary confirms labour intensive methods bereft of new technologies, tools and equipment for development of products, with an evident capital constraint. For example, a Tabaka women's group source their raw soapstone materials from individual plot owners in their neighborhood; Nairobi Handicraft Industrial Cooperative Society, carvings are made from Jacaranda trees; and Ongayo harvests clay nearby for his pots. The tools and equipment are handmade or improvised, applied on locally sourced materials, with finished products kept in poor stores. The documentary also highlights the small, congested sheds, and open air markets.

As observed in the documentary, the artisans are exposed to health and safety risks given that they work in environments with poor waste disposal and lack of sanitary facilities. They also lack the required protective gear, leading to a high likelihood of accidents and damage to people and property respectively.

It also highlighted the sector's marketing challenges: Many of the handicrafts made in the sector are aesthetically pleasing, but artisans face marketing challenges and they have to wait for walk-in customers, amidst stiff competition. Where middlemen link them to markets, the former undercut profits while providing no feedback from product end users. While KNFJKA provides opportunities for *Jua Kali* artisans in exhibitions where they are able to market their products, gaps remain in their marketing strategies, which are

not customer-driven. Another gap is customer care that was lacking as the team interacted with the artisans, amidst ineffective communication skills.

From the documentary, it was evident that skill acquisition is often outside the formal sector, is labour intensive and conducted under very difficult conditions. Consequently, the apprentice artisans may not have time to focus on career development while at the same time improving their skills, developing understanding and increasing their knowledge. The KNFJA CEO proposes that if JKS could be a CoP and Community of Learning (CoL) that could access training in design, and develop and protect their innovations and standardize their products, then that would be a major milestone in achieving Vision 2030 goals.

The KNFJA CEO also pointed out that the artisans do not go through the processes of research, sketching, development, and production. To the artisans it is all about affordability in the market, largely overlooking standardisation and aesthetics. The low education obstacle hampers development of marketing strategies, use of technology, managerial and accounting skills, and access to credit.

JKA was depicted in the documentary as a CoP since the apprentices join the sector through their social networks, to learn and develop their skills on-the-job through observation and repetition at the feet of the master to equip them to be employers or employees. It was observed that as a CoP, the JKS artisans work alongside each other in clusters like woodwork, metalwork and handicraft; sharing knowledge, skills, tools, and equipment; and sometimes sharing work in response to a large order. The JKS clusters are distinguished by their craft rather than their geographic locations, and the documentary helps to bring out the similarities and differences in these clusters. More specifically, it illustrated the context in which the different communities engage in making various craft products, and how they acquired these skills through TA.

The challenges noted above pointed out to the necessity of developing a cost-effective, design-training model for capacity development through m-learning for the *JKA* that was the second objective of this study. The DTM was developed for competency-based training in design practice and planning in simple framework that is easy to understand. The content was digitized for easy accessibility.

5.4 Conclusion

The aim of this study was to develop a competency-based digital DTM, was partly achieved through the documentary by accumulating data, based on collection of visual information about the JKS. The documentary elaborated the JK sector's activities in a simple manner, and assists in identifying existing skills and skill gaps in the design planning and practices during TA: Artisans were able to verbalize their needs and challenges. The documentary also enabled observation of skills acquisition through TA, under very challenging working conditions. It enabled appreciation of how some artisans develop good products with limited tools and equipment. The majority of artisans used their mobile phones for communications and money transactions.

The practical fieldwork assisted to open communication with the artisans to collaborate in the development of a framework for design education. The dialogue developed in making the documentary was important in the DTM development, an iterative process that required the artisans' participation as its prospective end users.

The documentary contributed to various knowledge issues: Because it was the first practical step in identifying existing JKS competencies and skill gaps; highlighted the significance of the relationship between the MC and the apprentice, which is critical in learning design; elaborated the MC/apprentice relationships based on social networks, as opposed to identifying the skill needs prior to training; showed that the main training approach in the sector involves observation and imitation, with no attention to theory; and significantly helped in pointing out the need for DTM that would be accessed through m-learning to compensate for the lack of time, while enabling access to training for low literacy individuals.

Chapter Six: Data Analysis, Presentation and Discussion on Skills and Skill Gaps in the Jua Kali Manufacturing Sub-sector

6.1 Introduction

This chapter presents the results of the situational analysis of the JKS manufacturing sub-sector, with respect to the artisans' existing design skills and the skill gaps they face. The analysis focused mainly on skills development through traditional apprenticeship (TA). Sampling the estimated 14.9 million artisans which was about 85% of all new jobs in Kenya in 2015 (Kenya National Bureau of Statistics, 2016) was challenging since artisans and their clusters were widely dispersed across the country, with no central database either at the Ministry of Labour, or the Micro and Small Enterprise Authority (MSEA), or indeed, the umbrella Kenyan national Federation of *Jua Kali* Associations (KNFJKA). Further challenges arose from the lack of reliable documentation on the various clusters' products, and from the lacuna in academic research on the skills development in design practice and planning during TA.

Besides their dispersal, many artisans are not JKA members, preferring to run their businesses individually. Previous interaction with artisans before and during the shooting of the documentary reported in Chapter five, had revealed the artisans to be weary of strangers engaging them with no tangible impacts on their crafts trade. Further challenges also arose from the artisans' low literacy levels, placing the additional burden of, for example, translating instruments, for a researcher whose limited resources already conspired against a large study sample.

The selection of artisans' samples and clusters involved the assistance of the Provincial Enterprise Development Officer (PEDO) in the Ministry of Labour. The purposive sampling used included five amongst the 47 counties in Kenya, namely: Nairobi City, Homa Bay, Kisumu, Siaya and Kisii Counties**.** A total of 86 participants, drawn from 18 JKAs were included in the situational analysis, as shown in Table 6.1, which also indicates the data collection tools, and categories and numbers of respondents. The sample basis was the artisans' bespoke products, products for the open market, and the variety of products made within and across the clusters as observed in the in the documentary, and indicated in Table 6.2 and Figures 6.1 to 6.10.

Table 6.1: Data Collection Tools and Respondents

Data collection tool	Category of respondents	No. of respondents/groups
Semi-structured interviews	Artisans ▪ Handicraft (28) ▪ Woodwork (14) ▪ Metalwork (22) ▪ Ceramics (8)	▪ Nairobi City County (29) ▪ Kisumu County (35) ▪ Siaya County (10) ▪ Homa Bay County (14) ▪ Kisii County (5) ▪ Total: 86 respondents ▪ From 18 Jua Kali Associations
Focus group discussion	▪ Artisans ▪ Woodwork	▪ Kibuye Jua Kali Association (12)
	▪ Handicraft ▪ Metalwork	▪ Nairobi Handicraft (8) ▪ Kamkunji Jua Kali Association (7).
Non-participants Observations	▪ Recorded all artisans in their workshops	▪ All

Table 6.2: Characteristics of Jua Kali Clusters

1. Action Resort for Change Kenya (ARO) Development Centre **Training:** …by Norwegian sponsors to produce various products **Bespoke and Mass Produced Items:** Recycled polythene paper bags, season cards, mats, wooden earrings and bead sculptures. **Marketing strategies:** They have a shop where they display their products **Outlet/Market:** Mainly Norwegian market, but also local community
2. Siaya County Women MSE **Training:** Hereditary skills **Bespoke and Mass Produced Items:** Traditional stools and tables curved from logs of mango or oak trees. **Marketing strategies:** Word of mouth; Also display products in their shops at the local market **Outlet/Market:** City Market in Nairobi and Kisumu, and Bomas of Kenya. Also walk-in customers
3. Nyakach Kano Jua Kali Women Association **Training:** The association has got a SACCO that has trained its members on making products and in business management. **Bespoke and Mass Produced Items:** Poultry hatchery and solar driers. **Marketing strategies:** Word of mouth **Outlet/Market:** Nairobi, Mombasa, Kericho, Eldoret, Nakuru and Kisumu. They also target the locals to come and buy from them
4. Nairobi Handicraft Industrial Co-op Society **Training:** The Kamba carvers have hereditary skills that they have learnt from their parents. **Bespoke and Mass Produced Items:** Utility Products: bowls, salad spoons, letter openers, mwiko (cooking stick), pounding mortar. Decorative Products: masks, wall hangings, animal carvings. Leather products – drums, shields, chairs. **Marketing strategies:** The society depends on middlemen to make sales; these middlemen buy products in wholesale scale. **Outlet/Market:** The antic leather products are sold to markets in Central Africa in places such as the DRC. They previously sold their products through an organization called Ten Thousand Village, but currently have to rely on walk-in customers.
5. Friends of the Old (FOTO) **Training:** Trained to make the Cookit by the Solar Cooker International, an organization from California who had once stayed in Nyakach for about ten years. **Bespoke and Mass Produced Items:** Plastic baskets, cook-it sets, hay basket, tissue holders made of plastic waste, water testing kits and plastic offertory bags. **Marketing strategies:** The group markets itself by offering support to the aged women in Lower Nyakach by supplying them with cook-it set. **Outlet/Market:** They supplying 15 old people in each of the 12 locations in Lower Nyakach with the cook-it set, to save them from having to look for firewood, which is scarce in their locality. The sell to other customers in their location.
6. Nyawana Women Group **Training:** **Bespoke and Mass Produced Items:** They use banana fibre to make baskets and money purses. They also make key holders and bottle openers from bones. **Marketing strategies:** Word of mouth **Outlet/Market:** They make baskets on order by tourists from Malindi and Mombasa. They also sell to their local community
7. Ber Neno Creations **Training:** They have trained the women from Obunga slum to make twines from hyacinth. **Bespoke and Mass Produced Items:** Hotel Kit- beds, easy trays, amenity baskets, serviette holders; information holders. Furniture - sofa sets, armchairs and shelves, tables, lampshades. Jewellery and Accessories – handbags, sandals, bracelets & bangles. **Marketing strategies:** They use brochures, catalogues and word of mouth. The group also has a website and participate in exhibitions such as Sarit Centre Exhibition. **Outlet/Market:** A wide range of customers both retail and wholesale. Their products target high-end customers, especially hotels.

8. Homa Bay Bamboo Farmers Co-op Society

Training: The artisans were trained by dons from Maseno University through seminars and workshops in distant towns such as Thika and Kakamega.

While the seminars by the dons focused on production of bamboo products the other workshops focused on book keeping and business management.

Bespoke and Mass Produced Items: Coffee tables, dining tables, sofa sets, tables, arm chairs, stools, shoe racks, corner stand, human face masks, boats, beaded masks, pen holders, human masks, baskets, tooth picks, cooking sticks, combs, walking sticks, cutlery holders, table mats, lamp stand, bulb holders, flower vase, calabash holders, cups, necklaces, earrings, key holders, charcoal, seedlings, sugar dish, pots, flutes, chapatti rollers, ladders and pens.

Marketing strategies: They have a shop at the local shopping centre where they display their products for sale.

Outlet/Market: Their main customers of the society's products are Maseno University, South Eastern University. They also sell their products to the locals

9. Siaya County Women MSE

Training: The basket makers learn from their parents. The jewellery makers have been trained by the association

Bespoke and Mass Produced Items: Bead and bones necklaces; ornaments; bangles; agwata (small decorated calabashes); key holders made of bones; baskets

Marketing strategies: They showcase their products in the Nairobi International Trade Fair and the Dar-es Salaam International Trade Fair.

Outlet/Market: They sell at the local market to walk-in customers

10. Kamukunji Jua Kali Association

Training: The artisans entering the cluster are trained by the senior master craftsmen.

Bespoke and Mass Produced Items: School boxes, jikos, wheelbarrows, water cans, gutters, ovens, fork jembes (hoes), chips fryer, chicken feeders, boxes, metal pots, gutters, wheelbarrows, jikos (cooking stoves), sufuria (pans), buckets, display counters, boilers, food warmers and ovens.

Marketing strategies: They showcase their products at exhibitions such as the Nairobi International Trade Show and Jua Kali Nguvu Kazi. They also display them outside their workshops.

Outlet/Market: They make product such as, food warmers, boilers and oven for institutions such as schools and hotels. They also sell boilers and ovens to the East African countries.

The wait for walk-in customers to come and buy their displayed products

PRODUCTS MADE FOR MASS MARKETS

11. Shirikiana Women Group

Training: Their skills are hereditary; they have learnt them from their parents and grand parents

Products Made for Mass Market and Open Markets: Sculptures (animals and busts); bowls, picture frames, candle holders, flower vases and jewel cases.

Marketing strategies: They have shops at the local shopping center where they display their products. They also display products at the roadside.

Outlet/Market: They used to sell their products abroad but that market ended with the introduction of cheap Chinese substitutes that are also lighter.

12. Kariokor Ciondo Women Jua Kali Association

Training: New entrants learn on the job from the established crafts persons.

Products Made for Mass Market and Open Markets: Ciondo (baskets); beadwork; sculpture; handbags; baskets; jewellery.

Marketing strategies: Through Nairobi International Show, Brokers and Visits to each Province to market products

Outlet/Market: Once exported Ciondos their idea was stolen and patented by the Chinese

Sell to customers who visit their stalls, especially tourists. Sell at Maasai market and other major malls. They sell through middlemen who have connections with markets.

13. Amkeni Young Women Group **Training:** The group was trained to make the mat by a tapestry maker in Kisumu. They have received business training from the Millennium Village Project (MVP) **Products Made for Mass Market and Open Markets:** Table clothes and tapestry mats **Marketing strategies:** They market at functions such funerals **Outlet/Market:** They first make their products and then look for the market; they take them to markets such as Luanda and Yala. Tapestry mat is sold in Kisumu City
14. Kibuye Jua Kali Association **Training:** There are some artisans that have acquired skills through formal training in polytechnics; majority have learnt on the job under a master craftsman. **Products Made for Mass Market and Open Markets:** Woodwork - Sofa sets; tables; chairs; coffins. Metalwork – cutlery, crockery, cooking pans, metal boxes, watering cans, chicken feeders, watering cans. Textile - casual wear and school uniforms **Marketing strategies:** Showing a photo album to prospective customers. They advertise by displaying their products. Rely on word of mouth **Outlet/Market:** They get orders from hospitals, schools, and individuals. They make coffins on order for morgues in Nairobi. The make custom-made coffins such as one made for a man to be buried while seated. The tailors sell at Kibuye Market on the market day; they also make orders for school uniforms for customers in distant towns
15. Katitu Nyakach SDA Church Group **Training:** They learn their skills on the job under a under a master craftsman. **Products Made for Mass Market and Open Markets:** Mats made of papyrus reeds **Marketing strategies:** They rely on word of mouth to market their products. **Outlet/Market:** They sell their products at the local markets
16. Shauri Moyo Furniture Makers Cooperative Society **Training:** They learn their skills on the job under a under a master craftsman. **Products Made for Mass Market and Open Markets:** Cupboard, beds, sofa sets, coffins **Marketing strategies:** They showcase their products at the Nairobi International Fair. They have photo albums of their work, which they show walk-in customers. They display their finished products. **Outlet/Market:** They make coffins on order. Rely on walk-in customers
17. Ong'ayo Women Handcraft Group **Training:** Their skills and the design of their products are hereditary; they have learnt them from their grandparents. **Products Made for Mass Market and Open Markets:** Oswaro (for eating fish); ohigla (ear-pot for cooking fish); tapring'o (also for cooking meat); mbiru (water pot) and agulu mar mafua (flower pot) **Marketing strategies:** The market through word of mouth. **Outlet/Market:** They make products that they think will be accepted by the market and then take them to Jubilee or Kibuye markets in Kisumu.
18. Oriang' Pottery Women Group **Training:** Their skills are hereditary and they are passed down through traditional apprenticeship. **Products Made for Mass Market and Open Markets:** Pottery – Oswaro (bowl for fish); Ohigla (pot for cooking fish); Kwesi (traditional smoking pipe); bead jewellery; Nyaloo (small decorated calabash). Since young girls have shunned pottery the group has resorted to making baskets, jembes, open sandals and flower holders. **Marketing strategies:** The market through word of mouth. **Outlet/Market:** They used to sell their product in Nairobi while their German benefactor was based in Kenya but after they relocated they now have to sell their products to the locals and in the local market.

The data collection involved field visits, where the artisans were briefed on the purpose of the research and their permission was sought in regards to audio and video recordings of their interviews, design processes and their work environments. The briefing was done in a language they understood well. The artisans voluntarily signed Informed Consent Forms (see appendix 12) to allow for their participation and the use of their data in the study. Semi-structured interviews were conducted at the artisans' premises for convenience; participants were invited to share their experiences and challenges on their design processes and skills acquisition. The audiovisual interviews were conducted and then transcribed word for word (See Appendix 25). Semi-structured interviews enabled the artisans to freely share information. The interviews were recorded because of the working environment of the artisans were challenging as shown in the documentary: the majority work in small shelters that have little space to accommodate guests, and many had no furniture and time to comfortably sit and write. The environment is also very noisy with a lot of activities going on. Because of their literacy levels, there was need for translation, and being sensitive to their value of time to make products for sale, it was important to concentrate on getting the relevant information by spending time directing the interview, observing their activities and trying to understand the MC/apprentice relationship.

The embedded mixed methods research design reflected in Table 6.3, provided both the qualitative and quantitative perspectives of design practices and planning across similar clusters in the different JKAs, including woodwork, metalwork, handicraft and pottery clusters. Emphasis was given to the qualitative data because of the important information the artisans have based on their tacit skills, and the fact that they rarely document their craft processes, as indicated in the documentary. The transcripts were read through and relevant information was picked out and used to complete responses in the interview guides. This is because the conversational manner in which the interviews were conducted allowed the interviewer not to strictly follow the order of questions in the guide.

The qualitative and quantitative data were analysed separately. The descriptive analysis of the quantitative data was done using the SPSS (See Appendix 28). The consolidated

responses in the completed interview guides were used in providing the quantitative data for this phase, such as the artisans with the phones, those that can access Internet on their phones and their challenges in terms of design, production, marketing and management aspects (See Appendix 26). The qualitative data was coded and themes were derived from the recurrent codes in the data. The qualitative and quantitative data yielded invaluable results in triangulating the findings of the situational analysis.

Table 6.3: Identification of Skills and Skill Gaps in the Jua Kali Manufacturing Sub-Sector

Embedded Mixed Method Research Design

Method	Analysis	Results	Triangulation
Qualitative	Transcription Coding Themes Generation	▪ 90% of artisans do not conduct market research ▪ 94% of artisans products are customer driven ▪ 40% of artisans copy product ▪ 40% make products from magazines or photo albums ▪ 90% do not document briefs ▪ 80 % do not follow a structured production process ▪ 90% do not make prototypes ▪ 85% have acquired skills through TA ▪ 76% have hereditary skills ▪ 11% have vocational training ▪ 76% market through word-of-mouth ▪ 73% market at trade fairs and exhibitions ▪ 59% sell products at the local market ▪ 90% of the enterprises have no organizational structure ▪ 87% do not partner with formal institutions ▪ 13% partner with formal institutions ▪ 72% of enterprises do not own websites ▪ 13% have inactive websites ▪ 15% have active websites ▪ 97% of artisans own mobile phones ▪ 85% cannot access Internet through their phone ▪ 15 % can access Internet on their phones	▪ Most artisans do not conduct market research due to lack of skills and resources ▪ Most products in the sector are customer-driven, specified by consumers ▪ They duplicate existing product; copy ideas from catalogues photo albums and magazines ▪ They lack technical and drawing skills to document their briefs and sketch their ideas. ▪ Few artisans document briefs to ensure the intended product fits the market's specification ▪ Most artisans have acquired their skills through TA ▪ Most artisans do not make prototypes as they consider them a waste of time and resources ▪ The hereditary skills such as curving that they acquired from their parents ▪ Majority of the artisans lack time and resources to further their studies or join the vocational and training institutions ▪ Most of the artisans market their product through word-of-mouth since they rely on walk-in customers ▪ The artisans working under associations market their products through trade fairs and exhibitions and on market days ▪ Most of the enterprises are started to help the artisans make a living rather than expand the business ▪ Many of the JKS enterprises do not have a website because of the type of phones they have and low ICT literacy level in the sector ▪ Most of the artisans own mobile phones that they use to communicate and for money transfer ▪ Majority cannot access Internet on their phones and therefore cannot use them to access knowledge and market their products
Quantitative	SPSS	▪ Artisans lack skills and resources to conduct market research, those who have lack resources ▪ The customer driven products are based on the markets specifications ▪ The artisans copy and replicate popular products ▪ They do no brief documentation briefs because of lack of drawing skills ▪ The lack of prototyping is due to the cost of producing models; they make prototypes when handling large orders ▪ After TA the apprentices are accepted as artisans in the clusters ▪ The hereditary skills are learnt majorly from parents and relatives ▪ The artisans market their products through word of mouth, trade fares, exhibition and their local market ▪ The lack of organizational structure is characterised by lack of planning and keeping records on how they operate their enterprises ▪ The artisans own mobile phones most of which are low-end and cannot access the Internet	

6.2 Gender Profile of the Jua Kali Sector

Based on the documentary and observations made during the situational analysis, the manufacturing subsector in the JKS is largely male-dominated. The findings of the study showed that 65 % of the participants were men. This could be attributed to the labour intensity and manual operations of the clusters. As observed during fieldwork, the artisans' work without protective gear, exposing themselves to dangerous occupational hazards, such as intensive noise levels, toxic fumes, amongst other risks. There is also a general lack of awareness of environmental issues, which often leads to potentially deadly environmental degradation practices.

Research considered gender bias an important aspect of research in this territory, but this is the first case study, the first real analysis in the field, did not recommend gender-based analysis and recommends that further research be conducted on the gender profile. At this stage, to the study focused on assembling a competency-based framework for both male and female artisans in design practice and planning, and further down the line, would be refined by other researchers through a much more specific gender differentiating research. Gender was not a considered variable in this study and did not therefore determine the selection of the cluster and samples included in the situational analysis. That is why the study is concentrating on skills and skill gaps in design practice and planning in the JKS and products made by the different clusters.

6.3 Business Profile

Categories of Products Sold by Jua Kali Artisans

The findings showed that artisans made a wide variety of products using a similarly wide variety of media. About 35 % of the respondents made their products from mixed media, while 23 % made wood products such as tables, cupboards, chairs and coffins, and 11% made pottery wares. Another 23 % made metalwork products, such as metallic doors, windows, wheelbarrows, gates, water cans and school boxes. A small 4% were handicraft artisans making jewellery, sculptures, stone carvings, basketry, and handbags. (See Figure 6.1 to 6.10)



Figure 6.1: Sandal made from leather and beads by Kariokor Ciondo Women *Jua Kali* Association, Nairobi County, Kenya.

Source: Author's field photographs 2012



Figure 6.2: Chairs, tables and lampshades made from Hyacinth by Ber Neno Creations. Kisumu County, Kenya.

Source: Author's field photographs 2012



Figure 6.3: Handicrafts made from Kisii Soapstone by the Shirikiana Women Group, Tabaka. Kisii County, Kenya.

Source: Author's field photographs 2012



Figure 6.4: Wall Unit made by Shauri Moyo Furniture Makers Co-op Society. Nairobi County, Kenya.

Source: Author's field photographs 2012



Figure 6.5: Handicrafts – Wooden Carvings made by the Nairobi Handcraft Industrial Co-op Society. Nairobi County, Kenya.

Source: Author's field photographs 2012





Figure 6.6: Handicrafts - Metal Sculpture at Figure 6.7 Furniture displayed at Kibuye Market. Kisumu County, Kenya.

Source: Author's field photographs 2012



Figure 6.8: Metal Work – Serving Spoons and Cooking Pot by the Kamakunji *Jua kali* Association. Nairobi County, Kenya.

Source: Author's field photographs 2012



Figure 6.9: Jewellery from Siaya *Jua Kali* Association. Siaya County, Kenya.

Source: Author's field photographs 2012



Figure 6.10: Pottery made by Oriang' Women Group, Kendu Bay. Homa Bay County, Kenya.

Source: Author's field photographs 2012

6.4 Design

6.4.1 Market Research by the Artisans

The findings showed that 90% of the artisans did not conduct market research to identify their customers' needs. Most of them indicated that they do not know how to carry out market research; and the few who do, lack the resources with which to conduct such research. Only about 5% conducted market research, as reflected in Figure 6.11. The artisans thus tend to make products without identifying and defining their market demand first. They do not analyse the market trends and their competition to develop competitive product ideas that would meet the needs of their target market. The participants revealed that they instead depend on informal discussions with walk-in clients, and their experience to create new products. They are essentially in response mode, rather than in a strategic planning mode. This has an interesting connection with design as a planned activity, as the artisans are reactive, and respond to what the client wants, or copy from what is already on the market. The participants admitted that they do not keep the records of their walk-in customers to enable follow up for feedback, which would enable them improve their products while also creating a customer base.



Figure 6.11: Gaps in Design Practice and Planning

6.4.2 Preparation and Documentation of Briefs

Over 90 % of the artisans do not prepare formal briefs based on discussions with their customers. Instead they create products based on their customer specifications and verbal explanation. They rely on inherited and tacit skills acquired on-the-job to conceptualize ideas mentally, and go straight into production. Some copy product ideas from exhibitions and the current market trends. This enables them to systematically define their market needs, trends and consider product requirements. Briefs would enable them generate good ideas and then develop products that clients demand.

The findings showed that slightly over 90% of the artisans do not document their briefs. They indicated they lacked drawing skills to enable them make their own sketches, or even interpret other people's sketches. They indicated that it makes documentation of briefs a complicated process for them, so they prefer to memorize information rather than record it. This is primarily because they have relatively low education levels and TA training, so they prefer to copy and use readily available designs. While this is an effective strategy for them it has disadvantages, in that the artisans may not be able to outline the broad requirements of the products to enable them to have enough information to define the concept and guide its development.

This reflects the weaknesses of didactic learning during TA, where the MC is the exclusive determinant of the knowledge and skills that the artisans acquire as apprentices. Thus, the MCs transmit these limited design competencies to the apprentices since they do not include a systematic design process. Since most artisans do not know how to sketch, they do not document their briefs. A Kibuye JKA artisan said that he did not know how to draw, and therefore, takes photographs of products, which he shows to prospective customers. In some cases, the customers come with photos of the products they want made.

However, 10% of the artisans document their briefs through modelling and sketching, based on their discussions with customers. The chairman of Kibuye JKA said that he writes down the ideas and modifications that the customer comes up with, which he uses to develop product ideas.

The Amkeni Young Women Group makes sketches of the embroidery patterns before they stitch them to produce tapestry. An artisan from Ber Neno Creations explained their production process, beginning with obtaining the specifications of a product from a client, to determining its design, and the material required to make it. 'Ber Neno' signifies the beautiful hyacinth products created by the organization. He then prepares a simple brief based on his discussion with the customer by making some visual notes, as shown in Figure 6.12.

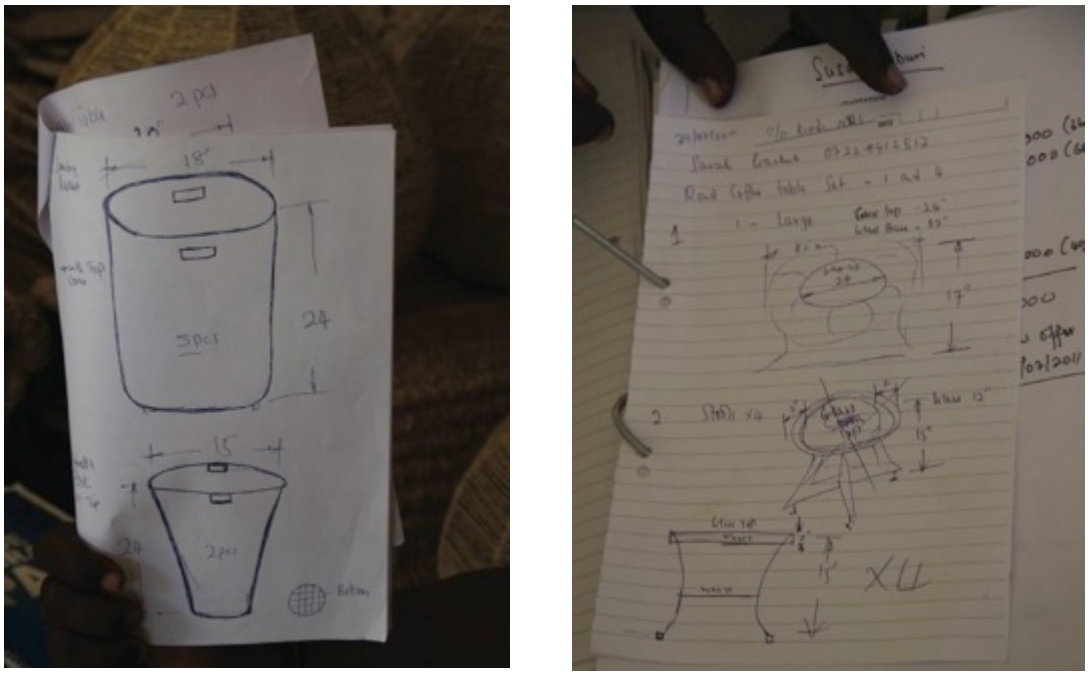


Figure 6.12: Two examples of Sketches by Ber Neno Creations. Kisumu County, Kenya.

Source: Author's field photographs 2012

According to a Labour ministry official, the failure to document briefs is a function of the current education system that does not provide art and design in its curriculum. He further claimed that this lack of documentation of the *Jua Kali* design processes has resulted in the lack of continuity in the sector, with the artisans being unable to come up with home-grown products.

6.4.4 Idea Generation

The findings demonstrated that there are numerous ways in which the JKA come up with design ideas for their products. 95% of the artisans rely on customer specifications, making their products customer-driven. A Kamukunji artisan confirmed the customer role, as did the Amkeni Young Women Group over the patterns and colour of mats. Friends of Old (FOTO) artisans improve their existing basket designs in terms of material and colour based on their customers preferences, while the Nyawana Women Group make baskets based on orders from tourists in Malindi and Mombasa. Culture also influences ideas and products: the design work of the masks at the Nairobi Handicraft Industrial Co-operative Society, are based on Makonde art from Tanzania, adapted by their ancestral kith, the Kamba community. The product ideas are also influenced by natural phenomena, such as the wildebeest migration inducing the sculptures of vultures and targeted carcasses. The Tabaka stone carvers of Kisii county apply hereditary skills to fashion handicraft from the locally available Kisii soapstone.

Less than 65% of the artisans get ideas from existing products, which they study and modify based on customer specifications, using their tacit knowledge and skills. Some artisans displayed photo album catalogues of previous work, which they present to prospective customers. A Kamukunji artisan reported copying peers locally and even regionally: for instance, the energy jiko was copied from Ugandan artisans, and Shirikiana artisans copy sculpture designs from photos. A Kibuye carpenter photographs the latest furniture in supermarket using his smartphone; and a Kibuye tailor copies fashion designs from magazines. 30% of the artisans depend on current market trends, confirmed by a Kamukunji artisan. 40% of the artisans copy product ideas from magazines and exhibitions (See Figure 6.13 and 6.14). A tailor from Kibuye reported copying designs from current magazines**.**



Figure 6.13: Pictures from magazines from Western Furniture and Designs, Komarok. Nairobi County, Kenya.

Source: Author's field photographs 2012



Figure 6.14: Photographs of Furniture by Shauri Moyo Furniture Makers. Nairobi County, Kenya. Customers pick preferred furniture from photographs. Nairobi County.

Source: Author's field photographs 2012

Such copying of design ideas from existing products promotes duplication, which engenders stiff competition in the sector. However, as Mukoche, (2015) notes even though the artisans copy designs, they adopt them for specific reasons and adapt them to suit their local context.

6.5 Production

6.5.1 Prototype Making

According to Haik et al., (2016) prototypes are essential for testing the technical feasibility of the design idea to determine its functionality and visual aspect of the designed product and its relevance to the market. Yet, the findings of the study showed that 90% of the artisans do not make prototypes for discussion with their customers. Some were involved in the repair of customer products, meaning they did not need prototypes. Another reason cited for not making prototypes was the risk of their theft by competitors, as claimed by a Kibuye tailor. Cost was also a factor: making prototypes requires time and other resources (finances and raw materials, and is only viable if the item would eventually sell, or if the order was sufficiently large to defray prototype expenses. However, not all products require prototypes: some orders are not regular, so artisans rely on the samples in their showrooms to serve as prototypes. Viewed against the backdrop of Haik et al. (2016), the low prioritisation of prototypes suggests a knowledge gap in TA training.

6.5.2 Skills Acquisition

The study found that 85% of the artisans acquired their skills through TA, as shown in Figure 6.15. This workplace learning approach leads to tacit knowledge and skills, which, as in didactic learning, involves a passive listener/apprentice observing and imitating. At Kamukunji JKAs, an apprentice takes 9 months to 1 year to make a box, 3 months to make frying pan (karai), and 6 months to 1 year to learn welding. At Shauri Moyo Furniture Makers, membership is acquired after a 6-month to 1 year training.

The study also established that about 76% of the artisans had hereditary skills – as reflected in Figure 6.15, which they learnt by observing their parents or relatives. A Siaya *JKA* artisan learnt the bespoke traditional three-legged stool from his father; the Nairobi Handicraft artisans make bespoke wooden carvings with skills acquired from parents with Makonde roots; and the Ong'ayo Women Handicraft's pottery skills, and mat patterns of the Katitu Nyakach SDA Church Group were also inherited from their grandparents.

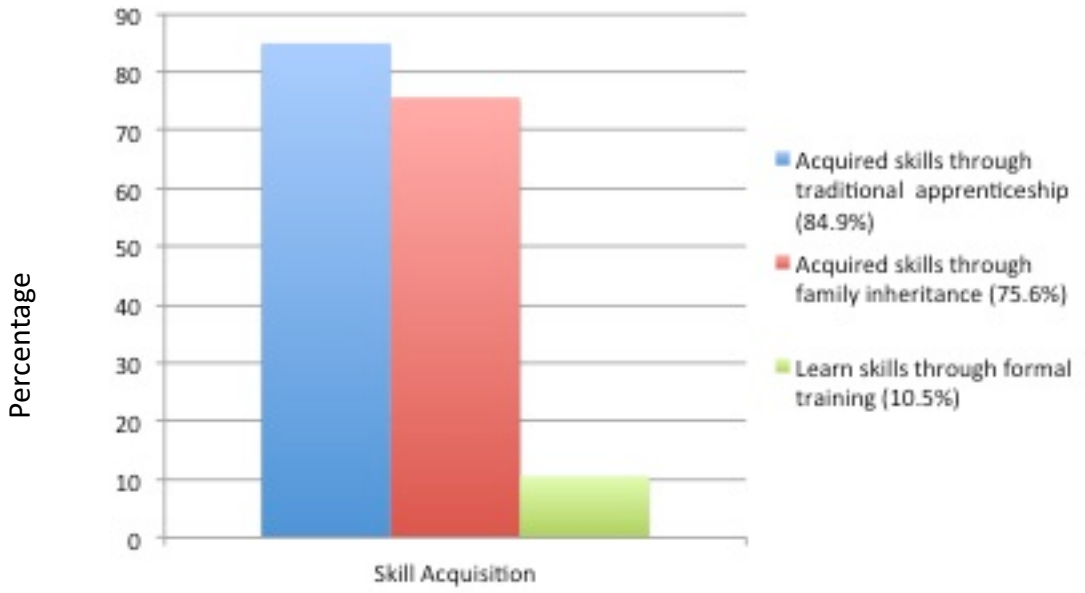


Figure 6.15: Skill Acquisition by the artisans

Further, only 10 % of the artisans had undergone formal institutional training, while some JKAs provided members with capacity building opportunities. The Shauri Moyo *JKAs* offers on-the-job automobile repair training in partnership with the Undugu Society, based on varied, mutually agreed curricula running between 6 months to 2 years, depending on scholarship gained. Individual artisans have also privately accessed vocational training, a Kibuye artisan having attended a two-year crafts certificate course at Mahaya Polytechnic in

Bondo, while a tailor got Grades II and II qualifications through the Maendeleo ya Wanawake organisation, which is the foremost nationwide social welfare organization with branches countrywide.

6.5.3 Production Processes

The study established that 80% of the artisans do not follow structured manufacturing and production processes, a likely heritage of their TA training that involves sourcing material and embarking on production without preliminaries, such as the development of a prototype. The artisans faced challenges in acquiring raw materials: the Katitu Nyakach group had to wade into a swamp for reeds for making mats; and the Shauri Moyo Furniture Makers complained of expensive wood from up-country due to government regulations over the timber trade. Apprenticeship trains learners to draw on their tacit knowledge and skills and take into account their labour processes and its technical support, materials, tools and techniques that allow them to design by doing (Brödner 2014) which is partially lacking in TA. The unstructured processes make them unable to articulate their craft process, demands and wishes in a concrete way in their working environment. This study partially attributed the poor TA training to lack of machinery for manufacturing and the difficulty of material acquisition processes. The observable informal nature of their daily operations is also a contributing factor to unstructured design processes. This leads to wastage of time and raw materials due to the trial and error approach of the production process.

Some Kamukunji and Kibuye artisans could not afford modern tools and equipment to hasten their production and for mass production Homa Bay Bamboo and Oriang' Handicraft clusters. Laure and Pentak (2012) argue that quality finishing also involves making products that are well functioning, safe for use, and aesthetically pleasing in terms of proportion colour, texture and balance for the target market. The JKS working environment is also poor, with semi-permanent workshops whose over-crowding leads to a majority of artisans forced to work in the hot sun, exposed to health and safety risks (Miyandazi, 2013). This inattention to health and safety reflects a knowledge gap in their design process, since these concerns must be observed throughout the development and production.

6.6 Skills and Technology

As depicted in the documentary, most artisans are not able to access relevant skills, tools and technologies to enable them make good products in minimal time. There are also new emerging skills, such as fashion design, product or craft design, graphic and interior design, glass blowing and tinting and, mechanised soapstone curving, which require technological adoption that the artisans cannot exploit at the moment. The lack of tools and equipment leads to work outsourcing, which is expensive and time-consuming. There are also no strategic framework or systematic approach for providing skills to the sector, particularly in the rural areas where artisans have not accessed any prior education on design education. Instead, the artisans mainly use improvised hand-made tools that limit large-scale quality production, as seen in Figures 6.16 and 6.17.



Figure 6.16: Carving at Siaya County Women MSE Association, Kodiaga Gem. Siaya County, Kenya.



Figure 6.17: Papyrus mats – Katito Nyakach SDA Group, Konyuro Central. Homabay County, Kenya.

Source: Author's field photographs 2012

In the field, the Homa Bay Bamboo artisans lacked the training in improved technology and marketing, and end up using out-dated tools such as Koyo (adze) for curving, which are slow to use and do not give a good finish. The Shirikiana Women Group artisans lacked tools and machines for quality cutting and curving of stones, delaying processes. Shauri Moyo artisans' manual methods were slow, in inadequate and hazardous contexts, and the artisans lacked structured training incorporating theory and practice, and semi-literate school dropouts, had infiltrated the sector, undermining the changing technologies. The Oriang' Women Handicraft artisans could not produce their pots on a large scale, used grass for firing, and lacked proper storage facilities. Kibuye metalwork artisans shared their tools and equipment, resulting in losses and faster depreciation and obsoleteness. At Kamukunji, the lack of machines for modelling and production constrained output, and consequently,

sales, even as they worked in poor contexts. The Action Resort for Change Kenya artisan also lacked machines for the production of large volumes.

The artisans' use of new technology would allow improved volumes and quality of their products, which are cheaper and safer. Skills development could motivate the artisans and increase their productivity in safer working environments, upgrading product quality. This could improve incomes, which can only be achieved if well-structured and responsive capacity building programmes are accessible to the artisans.

6.7 Innovation and Capacity Building

Most of the artisans' capacities had stagnated since they were reluctant to leave their businesses to spend hours away from their workshops learning a new skill or upgrading their existing skills. For example, five Kamukunji artisans and three artisans from Kibuye JKAs lacked technical drawing skills to read and interpret sketches. The artisan from across all sectors noted a lack of creativity and innovation because the clusters comprise illiterate and semi-literate artisans, with a Nairobi Handicraft artisan desiring training in fine arts. Institutional linkages for supporting capacity building programs were reportedly weak, and uncoordinated and fragmented in delivery, with weak collaboration between the sector and the training institutions.

It is necessary to create design practice and management courses within higher learning institutions, tailor-made for businesspersons and not necessarily students. This would mitigate the fact that available training that could benefit *Jua Kali* artisans is formal and classroom-based, discouraging their uptake.

6.8 Marketing

The study found that most artisans used various product promotion means, including word-of-mouth, exhibitions, and displays for walk-in customers. Close to 76 % of the artisans market their products through word-of-mouth and referees. About 70% promote their products through trade fairs and exhibitions both locally and regionally, such as at the *Jua Kali* Nguvu Kazi trade fair of the larger East African region. The Siaya County Women Association have previously attended the Nairobi International Trade Fair and the Dar-es Salaam International Trade Fair. Shauri Moyo Furniture Makers has marketed its wood

products at the Nairobi International Trade Fair. Besides the Nairobi fair, the Kariokor Ciondo Women have also attended the Nakuru Trade Fair.

Open-air markets are outlets for close to 60% of the artisans (see Figure 6.18), with Kariokor Ciondo Women using Nairobi's 'Maasai Market', while Ong'ayo Women Handicraft use Kisumu's Jubilee and Kibuye markets. The Amkeni Young Women Group market their mats in functions, such as funerals, and also in the local markets. (See Figure 6.18 below)

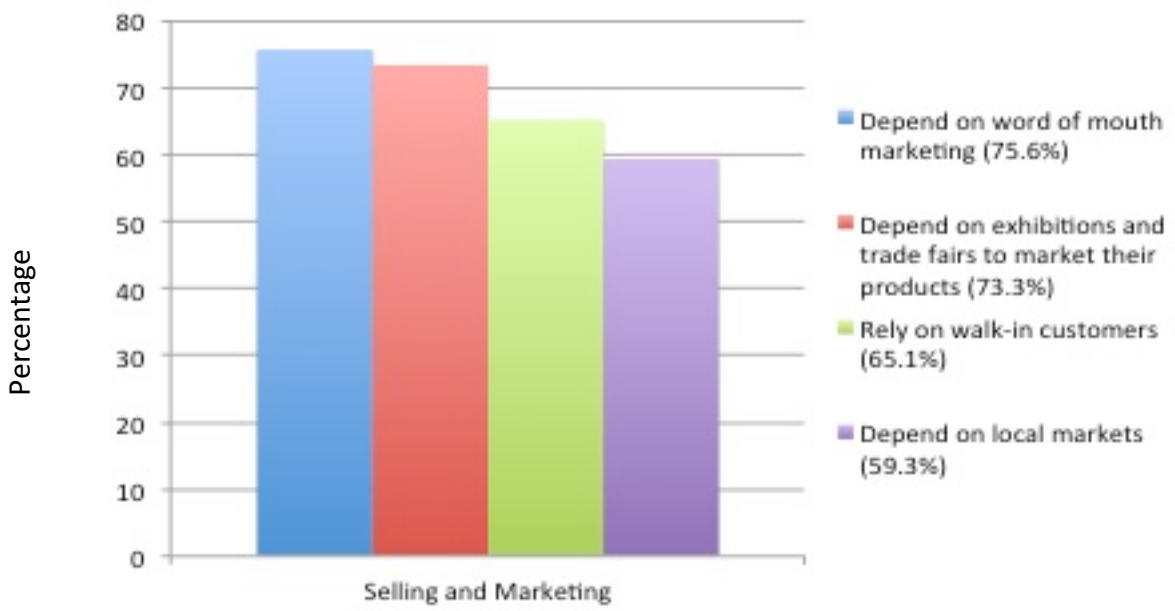


Figure 6.18: Selling and Marketing strategies

Neilsen (2012) contends that through marketing businesses are able to create value for their customers and also establish stronger customer relations. The artisans claimed that they did not market their products in the mainstream media outlets because they lacked the resources for promoting their products. They also lacked the knowhow of promoting their businesses and products.

6.9 Organization Structure

The study established that 90% of the JKS enterprises did not have any organizational structure, which is essential in ensuring their success in undertaking the design management. Majority run their business from day to day, with no proper planning skills. This lack of an organizational structure is attributed to the fact that most are sole-proprietorships with no training in management. The enterprise owners are simultaneously the managers of marketing, finance, productions, employees, and all else. They have no

incentives for coming up with a structure for their businesses. This makes it improbable for them to have time keep records of their business transaction and planning as well as be available for training outside their working stations. For instance, Ong'ayo Women Handicraft artisans said that they have no way of determining the cost of making their pots, and the consequent appropriate prices. Any training that demands absence from the business would spell its collapse. As Ashraph et al. (2013) and Kamunge et al. (2014) conclude, the absence of an organizational structure in the JKS enterprises has translated into high business mortality rates, particularly for start-ups.

6.9.1 Collaboration and Linkages with Public Formal Institutions

90% of the participants do not partner with the formal institutions that provide skills, while 10% do. The Shauri Moyo *Jua Kali* Association lamented the lack of technical support from the formal institutions. Instead their graduates from formal institutions take up managerial posts in the formal sector. A Kamukunji artisan advised that the formal school curriculum incorporate industrial training for students, as this would benefit the JKS and the formal sector. The lack of partnership is characterised by the formal institutions' lack of scope for providing training in JKS-level design processes and management. The institutions are geared towards producing manpower for formal employment, resulting in an oversupply of skills in certain sectors and shortages in others, and in the mismatch between the available skills and the skills required in the job market.

However, 10% have partnered with formal institutions, such as the University of Nairobi, Kenya Change Agent and the Ministry of Labour. Some artisans point to instances where clients have sponsored their colleagues for training so that they learn to make products meeting such a client's specifications, implying that they were willing to take advantage of such collaboration. Some respondents claimed that these partnerships were beneficial in providing training in project and financial management, proposal writing, marketing strategies, book-keeping, resource mobilization, product processing, finishing, and packaging. Some Kibuye artisans partnered with Equity Bank for training on financial literacy, while engaging the UNDP on both financial literacy and government leadership.

6.9.2 Businesses with Websites

The artisans who did not own websites for their businesses were at 70%, compared to just 10% with inactive websites, and 15% with active websites. The lack of ICT skills and the investment cost were major a hindrances to online marketing. Artisans of Shirikiana Women Group and Kamkunji proposed to launch a marketing website; but that of Nairobi Handicraft was inactive due to costs. As Gikenye and Ocholla, (2012) noted ICT is a relatively new concept in the sector and has not been well propagated to enable them to explore and exploit it for capacity building. The artisans not yet adopted technology to enable them access information and market products online, mainly because TA does not usually expose apprentice to new technology. As Ashraph et al., (2013) and Mutai (2011) suggest, the sector's low ICT uptake can be attributed to the artisans' low education levels, which persist since the artisans cannot afford further education and vocational training.

This demonstrated the need for building a sales website for successful digital marketing to promote their products through social media. The backbone of any digital marketing strategy is to have a good web site with a good search engine optimisation. A good website will convert visiting traffic into buyers (Kotler and Armstrong, 2016). The lack of website marketing partially explains why most of the artisans rely on word-of-mouth as a marketing tool for their products. Besides, about 15% cases of inactive websites show the low initiative to ensure consistency in online presence.

6.9.3 Artisan Ownership of Mobile Phones

The study found that nearly 97% of artisans own a mobile phone, as reflected in Figure 6.19. This widespread ownership is attributed to the falling prices and convenience of mobile phones. Generally, low-end mobile phone devices are particularly affordable to many; and the majority of artisans claimed they used them for calling and money transfer alone. About 4% of the artisans who do not own phones, were either in the process of acquiring one, or had recently lost their handsets.

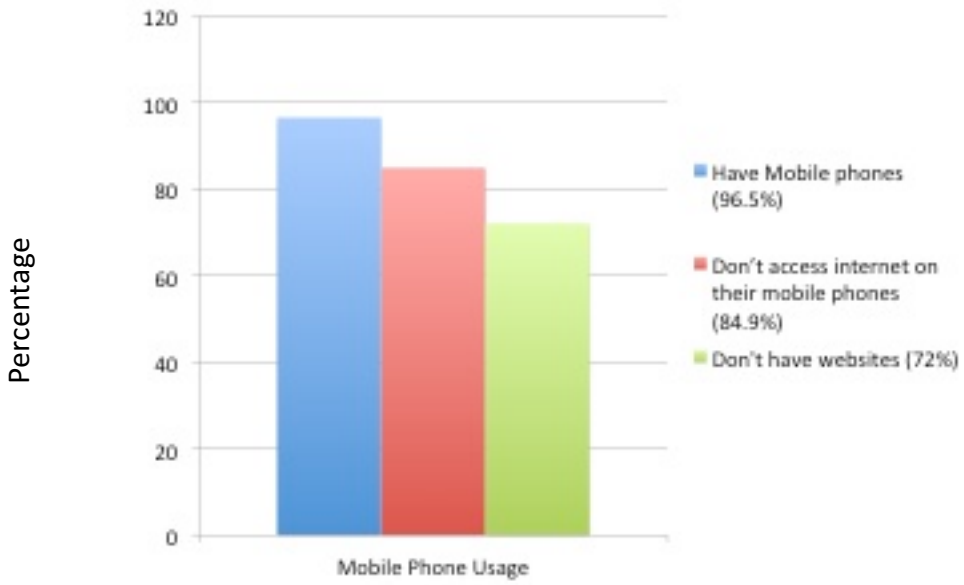


Figure 6.19: Mobile Phone Usage

6.9.4 Internet Accessibility on Mobile Phones

Crandall et al., (2012) notes that the majority of mobile phones used in Kenya are the second-generation (2G) phones, some added services such as music downloading and an inbuilt camera. About 85% of the *JKA* couldn't access the Internet on their mobile phones. Most of the artisans had 2G phones, which they used to communicate, transact business in terms of money transfers, calling customers and suppliers. The Action Resort for Change Kenya noted that they lacked phones with Internet that they could use for marketing.

6.10 Conclusion

The study established that most artisans in the JKS are not adequately trained in design practice and planning because of their lack of qualifications for entry into such courses, as well as the lack of time and resources with which to join formal technical training institutions. They, therefore, resort to acquiring skills through TA whose eligibility is based on social networks, to acquire tacit knowledge and skills not based on any pre-identified skill needs. Shillito (2013) argues that by the end of the TA, the apprentice should be able to create and feed knowledge and information into an active referential loop where the artisans can control the whole craft process from beginning to end by adopting, adapting and improving their tools as the need arises.

The relationship between the apprentices and MCs in terms of skill acquisition is new knowledge given that as a CoP, artisans join the sector through social networks and not

necessarily through identification of skills requirements required prior to starting TA, which could lead to a high drop out as indicated by some participants. Those who finish become MC, yet the scope of their skills are limited to what they learnt from the MC during TA, and could therefore not adequately trained in systematic design processes. This resulted in cycles of poor skills development in the sector, with a pool of artisans with inadequate design skills and knowledge, who are therefore insufficiently prepared for the labour market.

Most of the artisans embark on making products with minimal or no prior knowledge on how identify and define the design problem through market research. This is because they do not have the competencies for complex market research. This is caused by the lack of training, or of resources with which to identify their target market and determine the changes taking place in the market. Cowdray (2012) points out that this invariably affects their businesses because their products are not determined by market demands, functionality, aesthetics, and pricing and technological developments to make them competitive.

If the artisans were able to carry out market research it would according Holston (2011) dictate the brief to help them evaluate and articulate the consumer's problem and specify the requirements to make suitable products. From the results, most of the artisans do not generate or document briefs, and fail to come up with products that meet the requirement of the market. According to Haik et al. (2016), briefs would enable the artisans to generate good ideas and then capture them into accurate briefs weather they are be verbal, written, sketches or models; they will include the requirements of the client about a particular product. As Wangari (2015) notes it is important to have some kind of documentation of ideas, as not doing so is one of the main reasons for the failure in design. This created a knowledge gap because in the absence of briefs the artisans may not generate good ideas through developing concepts, visualizing, clarifying and testing their thoughts.

The study also established that a significant number of artisans do not go through the concept development stage where the research findings are synthesized into a solution by addressing the brief. The findings concur with those of Nelima (2015), who concluded that the *Jua Kali* design process does not include ideation. This was largely attributed to TA, which does not encourage creativity, explanation and discussion of the design process and

potential design solutions through brainstorming, modelling or sketching. According to Holston (2011) and Jonassen (2011), idea generation requires collaborative and divergent thinking for the idea to be wholesome and relevant to the design problem. However, TA does not train the artisans on the importance of coming up with a brief that has sufficient information on which methods will be used for idea generation, and selection of the best material, tools, and techniques that are needed for coming up with the product.

It was established that production process in the sector is largely unstructured, with a lot of trial and error. The artisans do not progressively move through a series of definite manufacturing process. They source for material and go straight into production. For TA, their acquisition of knowledge starts with a casual agreement with the MC, who they observe and imitate to acquire tacit skills and knowledge. That is the production method they also teach. Though some products may not require prototypes, the majority of artisans do not make prototypes because they do not know about it and those who do feel it is wastes time and money. The artisans are often not prepared to systematically implement the solution to the design problem, since they go into production once a product is selected or discussed. According to Cowdray (2012), the designer needs manufacturing skills to manufacture and optimize the design brief to guarantee desired outcomes.

According to Neilsen, (2012) and information from the fieldwork, the majority of JKA have a challenge in creating a solid customer base and to generate revenue because they lack the knowledge to create and build a strong customer relationship and directly connect to their markets. They rely heavily of word-of-mouth, exhibiting and displaying for walk-in customers. They also lack ICT skills to enable them to market their products online. This disconnects with the market and makes it difficult for artisans to get feedback from their customers on how they can improve their products. Their markets are rapidly approaching saturation with very stiff competition, because of the similar products they make and flood onto the market.

According to Stone (2011), management should involves a team made up of the designers, customers, business analysts, marketers, procurement, finance and legal and regulatory requirements and finally the stakeholders. However, the majority of the artisans do not have proper organisational structures that can ensure success in their design management. This is mainly because of lack of training, they run their businesses from hand to mouth, and

they do not have the knowledge to manage their enterprises well to ensure success in design processes.

There is minimal collaboration between the JKS and formal institutions offering training in CBET. This is because some do not qualify, others cannot afford to further their education and they also are not able to leave their working place to go into a formal school setup to be for training.

The *Jua Kali* artisans own mobile phones, which they use to communicate, and for money transactions, with few using them to browse the Internet. It is evident that through the mobile phones, the artisans are able to accomplish many things without having to leave their premises; but they barely use their phones to access information for education purposes, to enhance their design and business skills. This could be attributed to the type of phones they have – primarily 2G phones without Internet connectivity. This causes inequality and access to Kenyan ICT caused by NOFBI which does not take into account the current devolution of resources to the 47 county governments (Ratemo, 2011).

Many artisans have low levels of education, with eight of ten having not finished eight years of basic primary education. Their high rate of school drop-out is due the inability to afford education and vocational training (Adams et al., 2013; Ashraph et al., 2013). Unfamiliarity with technologies, and uncertainty of the ICT benefits in the sector (Onyango, 2013), could also affect their uptake. Other significant barriers contributing to the JKS knowledge gap include ICT incompetency for capacity building, the cost of internet connectivity, and innovation and enterprise development (Republic of Kenya, 2014).

The government has realised the importance of the JKS as a source of employment, with potential to generate income. Currently, the total employment in the entire JKS is approximated at 14.9 million which accounts for 82.5% of the total workforce, up from 80% in 2008 (Kaane, 2014; KIPPRA, 2014). There is no data on the manufacturing sub-sector as employment creator. The value of the sector's output in 2015 was about Ksh. 3 317 billion against the national output of Ksh. 9 971 billion. This represented a contribution of about 34% (Kenya National Bureau of Statistics, 2016).

The Kenya Vision 2030 and Sessional Paper No. 2 of 2015 on Reforming Education and Training in Kenya, places education at the centre of the country's human and economic

development, and is reforming education and training by re-aligning them to the Kenya Vision 2030 and the Constitution. It has recommended a competency-based curriculum to promote individual development and self-fulfilment, so as to provide opportunities for the learners to develop to their fullest potential (Republic of Kenya, 2012). The TVET Act 2013, advocates for the review of the TVET curriculum towards the adoption of competency-based education and training, that will assess, examine and certify the artisan students in TVET institutions (Muoka et al., 2013; Republic of Kenya 2012). ICT training will be integrated into programmes to multiply access and improve training capacity, delivery modes and life-long employability of graduates (Government of the Republic of Kenya, 2013).

This study examined the problem in design practice and planning in the JKS and aimed at delivering a solution in the form of new knowledge to address the needs and challenges of the *JKS*. The *JKA* do present strengths in their vibrancy, flexibility and adaptability to specific customer needs. However, they are not sufficiently trained in design practise and planning, their skills are not optimised, their knowledge base is limited, and from this study's perspective, that narrows down their range of opportunity to develop their competencies and improve their trade by making products that are market driven.

Based on the findings from the documentary and the situational analysis, the study proposed the development of the competency-based, Digital Design Training Intervention (DDTI) model that the artisans could access through their mobile phones to get information and skills on design practice and planning. This would assist in bridging the gap between the JKS and the world of academia, through sharing and transferring knowledge regarding design processes and design management with the informal sector in Kenya. Given that Kenya has a mobile phone penetration of about 93% (Kariuki, 2016), this study hopes to use m-learning for education, and to combat resistance to ICT use.

The competency-based DDTI sought to provide adequate design knowledge to be delivered through mobile technology for accessibility independent of time and space. The content would be digitised to address the current lack of access to design education, training facilities, time and resources, and the unavailability of affordable skilled teachers. It would provide the artisan trainees with an interactive platform availing adequate design knowledge in a CBET format that they could learn from in their suitable environment. It

would prepare the artisans for a future where they can use mobile devices to connect to the Internet and access the information at any time, in any place. The DDTI would also help the artisans to strike the balance between learning and generating income because it would be self-paced.

Chapter Seven

7.1 Introduction

Definition of Digital Design Training Intervention

The competency-based digital design training intervention (DDTI) is an education model that was carefully designed for artisans as mobile learners to accomplish specific design competencies, and allow for virtual sharing of ideas and dialogue between the artisans as learners and trainers. As a community of learners (CoL), this was to be achieved by identifying the *Jua Kali* artisans (JKA) skills and skills gaps and availing relevant information to improve the artisans' knowledge and skills in design practice and planning through m-learning

The review of literature and the results of field study highlighted the need for enhancing the design practice and planning in the *Jua Kali* sector (JKS) because as a CoL, they acquire knowledge and skills mainly through TA which does not incorporate a systematic design processes. This in turn has created a gap in the artisans' design processes. This could be because the apprentices are trained to acquire raw materials and go straight into production.

According to Siadaty et al., (2012) and this study's fieldwork findings, TA adopts a work-place learning approach that is largely teacher-centred. The TA approach is not based on identified learning or skill need; and the master craftsman (MC) does not offer a structured learning environment that motivates the apprentice to learn proactively. Instead the apprentice is a passive learner who watches the MC attentively. According to Lucas and Spencer (2014) work place learning should involve acquiring wider skills for growth that will make them life-long learners and creative thinkers.

The artisans are unable to spend hours away from their workshop in order to develop their competencies (Robb et al., 2014). The field study findings attributed this trend to lack of jobs in the formal sector, lack of resources to seek further training in the available vocational institutions and low literacy levels in the sector. The Kenya National Bureau of Statistics (2016) established a strong correlation between education levels and the growth of enterprises in the JKS. This could have limited artisans ability as a CoL, to upgrade skills, adopt new technologies, collaborate and share ideas, and solve problems in their

knowledge domain, as proposed by Wenger et al., (2013). TA lacks training in variety of skills and does not reinforce the confidence of apprentice by building on their ability to apply learnt knowledge, and this has limits the capacity of the artisans to acquire a broad scope of skills. TA is work place learning that according to Lucas and Spencer (2014) should have involved acquiring wider skills for growth that will make them life-long learners and creative thinkers.

The findings showed that the low ICT literacy levels in the JKS poses a significant impediment for the artisans when it comes to using ICT for capacity building. Notably, TA does not involve any use of technology as a medium for imparting competencies to the apprentices. As a CoL, JKA literacy issues were of utmost importance because they will affect the artisans' ability to receive, process, interpret and apply the information from the messages.

The DDTI shifted the learning approach in the JKS, from a teacher-centred approach to a competency-based training with the content based on the design challenges identified in the field study. The information on design processes on the DDTI was modularised and focused on the performance of the artisans as CoL in their pursuit to find adaptable solutions to design problems in their working environment. The DDTI aimed at supporting JKA as a COL because it was simplified, and the content based on identified needs. It was self-paced to enable artisans to develop attitudes of self-sufficiency, while also providing the opportunity of becoming life-long learners.

The DDTI proposes to build strong intellectual connections in the JKS, which according to Fraser and McGee (2012), would help them reflect and make inquiries about relevant design processes both as learners and teachers. Its modularized framework aimed at prompting the artisans to identify their design needs, and select the relevant modules. Crotty (2012) states that this happens whenever the learner is actively engaged in the learning process through interpretation and interaction. The DDTI was designed to nurture and develop relationships in which learning is a social function facilitated by a teacher. As a CoL, the DDT sought to promote intellectual engagement between the learners and their instructor, thereby enabling learners to acquire necessary content to build on their tacit knowledge. The learning will focus on what skills the learner can demonstrate after completing the sub-unit and what they can do after.

As in a situated learning environment the DDTI aimed at development and nurturing of relationships to allow learning to take place (Fonseca and Garcia-Marques, 2013; McInerney, 2014; Leberman et al.,2016). Learning was to be a social encounter that involved the JKA observation, interaction, immersion, problem solving, and negotiating meaning as they interact with it. As a CoL, the DDTI was modularized to avail coaching and scaffolding of information by the teacher to enables the learner to address design problems.

The DDTI took into account how to develop the visual literacy of the JKA by focusing on their ability to interpret, appreciate, gather and create images, clarify decision-making, enhance learning and strengthen communication. It also adopted semiotics as visual representation to communicate and accurately present specific design knowledge sets that would address the unique needs of the artisans as the end users receiving the content.

The DDTI leveraged on the extensive mobile telephone penetration and the decentralized environment in the JKS to avail a modularized design education to the artisans to through mobile technology. The information will be delivered to the artisans to progressively improve their existing skills and develop new ones at their pace and convenience. The DDTI proposed interactive learning that is not restricted to a particular place or time, as the artisans strive to increase their design competencies. According to Berge and Muilenburg, (2013), technology can enable learning to take place progressively by sharing information and connecting simultaneously between learning experiences and informal learning. The DDTI proposed to use mobile technology to allow artisans to connect with trainers, peers, and other people with the same interests.

Just like in a situated learning environment, the DDTI supports collaborative construction of knowledge through multimedia that is designed to engage higher order thinking and critical reflection. The development of the DDTI was guided by situated cognition because it is practical oriented involving activities like problem solving and carrying out of everyday tasks that enable the learner to experience the intended use of the knowledge and skills being acquired (Leberman et al., 2016; McInerney, 2014). The DDTI therefore proposed that learning would take place when the artisan is involved in solving of the design task within their environment.

The DDTI proposed personalized and spontaneous learning for the JKA to enable them access information by connecting socially in new and unexpected ways on the mobile phones. It proposed interpersonal communications because the DDTI focused on interaction between the sender and receiver, messages and feedback across space. With Internet connection, the artisans will be able to access information from anywhere and anytime. This was achieved by availing specific knowledge sets that address the unique needs of the artisans in step with the pace of the modern world.

Learning 'anytime and anywhere' in the context of this study means that artisans have access to relevant, accurate information across a broad range of media, enabling them to connect, communicate and collaborate with other users virtually, as they create new knowledge. It was based on cognitive apprenticeship and m-learning where the artisans are trained virtually through scaffolding information, coaching and availing information and skills at critical times when the artisans require it. The DDTI acknowledged the mobility of learning through mobile phones, and also leverages on the mobility of the learners in the JKS. Design content will therefore be availed through wireless technology for portable device-centred learning to enable learners share knowledge and skills with a broad audience. The DDTI targeted artisans from diverse education backgrounds, by presenting it in a simple and clear terms, prompting feedback for all actions, and tried to ensure the information accommodates a wide range of literacy levels.

The proposed DDTI sought to provide an authentic context that reflects the way the design knowledge and skills are used in real life, whist preserving the JKS context. As a CoL, the DDTI was designed to invite JKA to learn by exploring and looking for information, and providing a sustainable and simple learning environment that the artisans can explore. The DDTI aimed at providing an alternative environment to the real life setting, by using technology to teach design practice and planning. The artisans would have access to teaching from expert performances and interaction with experts. The DDTI's m-learning techniques should enhance ICT literacy skills in the JKS by connecting the artisans to special sources of design information to connect between ideas, fields and concepts, while interacting with others on the platform on a needs basis.

The DDTI adopted Socratic Learning into the JKS to build on the artisans' tacit skills by asking questions to help them crystallize and express ideas, understand concepts, to promote

critical thinking of the learners, and improve their analytical skills (Wolff and Chan, 2016). This was to be achieved by exposing the artisans to comprehensive design processes on the DDTI that allows them to build on their social networks, and as a CoL, develop their ability to connect, collaborate and interact. It will provide them with the autonomy to determine their own speed of learning that could eventually transform them to design practitioners.

The DDTI suggested expert presentations and information that the artisans can observe before they replicate. To achieve this the DDTI was designed to allow for easy functionality, the interfaces were to be kept simple – almost invisible to the user, by avoiding unnecessary elements and using clear language. To create consistency, common user interface (UI) elements used to create good site navigation, to help users find the relevant content, and keep navigation consistent from page to page to avoid any confusion (Brown, 2014). That was to allow the elements of the DDTI to work seamlessly, ensuring ease of use for the learner-artisans. The page layout was purposefully designed to help draw attention to the most important pieces of information on the DDTI. Colour and texture were used strategically to direct attention as desired. The typography was carefully selected to reflect hierarchy and clarity of content.

7.3 The Focus of the Development of the DDTI

This study was focused on the development of a framework for a competency-based DDTI, and an appropriate delivery system that would create a pleasurable, educative, and useful experience for the JKA. It also focused on the TA skills development for the JKS and, the MCs/apprentices relationship in line with design practice and planning. The mastercraftsman, apprentice relationship was given prominence because it helped to identify how craft skills were acquired, products made and needs fulfilled. The DDTI's functionality, usability, and aesthetics were also areas of concern to enable comfortable viewing, downloading, and navigation. Marketing and management of the JK enterprises proved important areas to look at because they affect overall trade. This study also looked at the mode of delivering the developed training content, taking into consideration the artisans' low education levels, and their lack of time and resources for skills acquisition. The DDTI sought to provide a page for visitors to contact and interact with the trainer, this being a new concept of design education in the JKS.

The DDTI was important because content was developed into a framework for design training based on the design gaps established during the field study and through Literature Review. The DDTI was focused and structured way of learning as compared to TA, because the content is built on a CBET concept where it is modularized, learner-centred and practice-oriented. Learner centred in the context of this study means giving prominence to the learners' needs in order to equip them with skills that are applicable to their real life situations. As a Communities of Learning (CoL), the DDTI should put artisans at the centre of the learning activity. Equal opportunities will be availed to enable JKA direct their own learning and demonstrate concepts and competencies in their working environment. The learner-artisans will be involved in asking questions, experimenting, investigating, providing solutions to problems and creating meaning. When the artisans interact with the proposed DDTI they should be actively engaged in the learning by integrating new knowledge with existing knowledge, to elaborate on their existing competencies.

The DDTI was designed to enable the teacher to play a facilitative role in building on the artisans' existing competencies to enhance their craft enterprises. The development of the content appreciated that some of the artisans already had some skills that need enhancement. The DDTI was structured to minimize the trial and error approach used in learning design skills in TA, thereby, enhancing the control and structure of the artisans' design process. As a COL, the DDTI proposed to teach them new ways that transform artisans as CoL to follow progressive, structured processes, as opposed to the unstructured TA. A situated learning environment was availed to promote articulation of the artisans' tacit knowledge. The DDTI intended to develop the JKS into a more authentic CoP, where the artisans share design knowledge, and learners are given the autonomy to direct their learning in a way that boosts their self-esteem and self-confidence. Their engagement was therefore intellectual, emotional, social and physical. This aims at greatly improving the motivation of the learners and their engagement in the learning process both physically and virtually.

The delivery system of the content was another significant area of focus during the DDTI's development, as it was seen to be an extension of knowledge acquisition coming out of the JKA mobile phones. The field study findings demonstrated that most of the artisans have mobile phones, which they largely use to make calls, conduct money transaction and send

SMS, as opposed to learning. These findings indicated the potential of using the mobile phone as a design-learning device in the sector due to its current penetration. The content was therefore packaged in nuggets consisting of the skills and sub-skills in each module, which direct the artisans on the order through which they should acquire the design competencies, even though they are at liberty to choose the competencies to learn based on their learning needs. The DDTI was to be developed using the action research cycle.

7.4 The Aims of the DDTI

The aim of the DDTI was to create a competency based DDTI model for enhancing JKA knowledge and skills through m-learning in line with Kenya's Vision 2030. The study acknowledged that the design learning process for the artisans required a shift from a straightjacket, didactic learning process, to embrace a collaborative, learner-centred approach, devoid of the constraints and weaknesses attendant on formal classroom teaching, such as time-based, teacher-centred learning. The DDTI should change teaching from didactic to the teachers facilitating the learning while being co-learners with the artisan-learner. The DDTI proposed to have theoretical explanations of the design processes. The DDTI was founded on knowing the craft processes of the JKA as the users, including understanding their goals, skills, preferences, and tendencies to help in designing the interface.

In availing the design knowledge and skills to the JKS artisans, the DDTI seeks to influence change in the sector's culture of replicating design ideas acquired under TA training. This would be achieved by training the platform users on structured design processes that identify, define and meet the needs of their markets. The ideas would then be developed into products for sale. The DDTI aimed at creating a situated learning environment that would provide the learner with the opportunity to investigate multiple ways of acquiring skills, and the autonomy to adopt them to make a variety of products based on market research.

Aspects of the JK culture that the DDTI sought to change are the total reliance on the MC as the source of knowledge and skills. The DDTI intends to train the MC to make learning student-centred and collaborative, by building on existing strong informal social relations or community bonds, to introduce a more structured design process. The DDTI focused on

what the artisans can do at their workplace, and on how they can continue to develop their skills at their convenience without losing their strong informal relations, beliefs and practices. The DDTI aimed at providing theoretical explanations of design processes, which are absent in the TA approach. The DDTI sought to alleviate the apprentices' total dependency on the MC through the establishment a VCoP that guides artisans to identify their knowledge gaps and choose relevant information and skills from the model to build their existing skills.

The DDTI also aimed to expand the artisans' access to design education, by connecting them online, to deliver design information on the go, enabling the artisans to access the rudiments of design planning, production, marketing and management, on the go and eventually change the working culture in the sector from dependent to independent learners.

The DDTI sought to transform the way in which the JKA view, interpret and understand the design process through introducing new ways of thinking about design practice and planning. Its modularized content introduces various levels of transformative threshold concepts through challenging the JKA to assert independent thinking within their CoPs. In this way, it sought to introduce conceptual shifts related to the artisans' encounter in their design education, marking an important initiation into structured learning of design processes. It does this by bringing together what initially seemed desperate design processes, to one logical relationship from market research to production, sales, marketing, and management.

Learning thresholds are often difficult points at which the artisans will be expected to experience difficult and troublesome moments, as they let go of some customary ways of making craft and embark on an unknown destination. When they get to threshold of the DDTI sub-units, it should take them into a liminal space where potential learning, experimentation and growth are maximized. It will require a shift in thinking to help the artisans understand design capabilities through conceptual shifts in learning by triggering a shift in the artisans' personal interpretation of design processes

In order to effect attitudinal change amongst the artisans the DDTI sought to bridge the gap between the JKA and the academic world. This was achieved through the iterative process

that was used in the development of the DDTI. With the acquisition of the relevant skills, the DDTI sought to enhance the self-sufficiency and independence of the artisans so that they can direct and pace their learning based on their individual needs as opposed to fully depending on the MC.

The DDTI sought to augment the teaching roles of MC rather than eliminate them. The DDTI proposes to facilitate collaboration between MCs and apprentices through adopting elements of cognitive apprenticeship in which the MCs observe and provide guidance as learner carry out their tasks. The DDTI adopted the reflective practice concept used by the MCs where apprentices learn skills through continuous circles of observations and imitation. The adopted reflective practice aimed at enhancing the tacit skills they learn from the MCs and improve their apprenticeship program through upgrading their design knowledge and skills. In acknowledgement of their integral role, the DDTI will train them to take up a facilitative role in which they allow the learners to direct their learning through virtual guidance of trainers who could be MC or subject specialists.

The virtual trainers on the DDTI are content developers or subject experts. They develop learning material and upload it on the platform. The virtual trainers develop interactive content and facilitate collaboration with the learner-artisans to refine the content. The collaboration is a form of research for generating feedback on the relevance of the content. The virtual trainers switched the interaction in the study from face-to-face to the gradual adoption of mobile technology. They focused on the problems relevant to the artisans, facilitated access to information on the platform, and provided feedback to artisans' questions.

7.4.5 The DDTI and the Daily Routine of Craftsmen

The DDTI appreciated the artisans' social life and their workplace learning in which learning is situated in their work environment. Its modularised content that is accessible through the mobile phone, was aimed at addressing the artisans' literacy, time and resource constraints. The DDTI acknowledged the artisans' design experiences and should enhance them through encouraging practical decision making, applying personal experience in problem solving and performing other tasks. Furthermore, in acknowledging the JKA as a CoP, the DDTI sought to provide a learning environment that would encourage eloquent articulation of the artisans'

tacit knowledge as they navigate and build networks on the platform in the process of creating and consuming design knowledge whenever and wherever they require it.

7.4.7 How the DDTI develops a Community of Practice/Learners

The development of the DDTI considered the JKA as a CoP, particularly those operating within Jua Kali Associations. According to Wenger et al. (2013), a CoP shares vision, goals, interests, and also collaborates in sharing ideas and solving problems. The artisans share interest in learning skills through TA, creating employment and, making products that they sell to make a living. The domain knowledge of the artisans as a CoP is characterized by the artisans' skills, required for one be a competent crafts persons. Wenger et al. note that the domain knowledge affirms their values and purpose to work together as a CoP.

The community aspect of the JKS is reflected in the joint activities the artisans engage in, such as collaborating to deliver large orders and sharing of tools and equipment during the production stages. The CoP in the JKS could be enhanced through the use of new technologies, such as the Internet and mobile learning technologies, which according to Wenger et al. (2013), have extended the reach of our interactions beyond geographical limitations of traditional communities and increased information flow, without eliminating the need for community. The DTTI sought to develop a CoP and CoL by connecting artisans with common domain interests through networks of individuals where they can communicate primarily online. The model sought to expand expanded possibilities of communities based on their shared domain by developing skills carefully and appropriately with the aim of improving on their performance.

The DDTI sought to develop a CoP and CoL in the sector by providing specifically designed programs and availing training content through mobile technology to upgrade the artisans' skill and improving the TA apprenticeship program. The modularized content in the VCoP was designed to increase the level of responsiveness and flexibility of the artisans and enable them to learn at their own pace. The development of the DDTI recognized the social connections in TA, which occurs in JKS clusters with the apprentices joining the sector as relatives or friends. The DDTI furthered this social dimension through strengthening the sector's CoL through enabling the learners develop and nurture relationships with learning as a social function facilitated by a virtual instructor. The social interaction through the

DDTI's VCoL was aimed at integrating the artisans' personal learning environment to enhance the exchange of knowledge.

The collaborative learning on the DDTI is a structured peer-interactive process where the teacher mediates learning irrespective of distance and time. This structure would to enable the artisans in the VCoL to learn through intellectual discussions with peers and experts; exchange ideas, question conventions, provide feedback and create new knowledge through the Frequently Asked Question (FAQ) on the DDTI's Help Page. This enables the JKA to both learn and teach as they collaborate with others on the platform.

7.4.9 How The DDTI Content is Tailor-made for the Learners Needs

The content of the DDTI was based on the JKS documentary, which identified the sector's concerns through the review of the literature and the field study. The documentary depicted the knowledge gaps in design practice and planning that characterize the TA learning approach. The analysis was used to develop a framework for the competency-based DDTI for enhancing JKA knowledge and skills. In this way, the DDTI content was tailor-made for the artisans' as it sought to address their learning needs.

The DDTI content development was also based on the CBET framework. aimed at broadening the scope of accessible design training for enhancing apprenticeship efficiency and improving the artisans' products value. Through CBET approach, the DDTI presumed that given autonomy, adequate time and sustainable training methods learners could master the required competencies. Besides, the learner-centeredness of the DDTI was achieved through the adoption of the Socratic, and facilitative methods to enable the artisans direct their learning, make inquiries and aid their decision-making. This way, the platform gave the MCs the role of facilitating rather than dictating the learning process. The reflective practice approach also influenced DDTI content development since majority of artisans were already practising their craft trade.

In making the DDTI content accessible anywhere and anytime through digitization, the artisan-learner was set to benefit from the increased in information flow. Besides the web-based DDTI being accessed through smartphones, the USSD platform was also developed for the 2G phones to reach most of the artisans. This was aimed at addressing challenges such as the lack of accessible and affordable design training programs, qualified trainers and time

constraints. The content was also simplified to accommodate the low literacy level of majority of the artisans.

The addition of content by users on the DDTI was achieved through the Help Web Page through which artisans may ask question, collaborate and interact, hence facilitating continuous learning. The page uses a series of view controllers to keep functionality clear and enable users to quickly access information (Brown, 2014). Besides, the DDTI pages were designed to direct the learners' attention to the key design issues and assist their navigation for easy interaction and communication. The artisans' low education levels may also disinterest them from reading and some artisans do not have time to read. The DDTI's content was thus developed to include video and audio aids that are meant to enable artisans recognize the required information, and use their skills to find evaluate, analyse and effectively use that information anytime and anywhere.

7.4.10 How the DDTI Scaffolds and Assimilates with what the Artisans have already learnt

The DDTI was designed to scaffold and assimilate the artisans existing knowledge through identifying their competencies and skills gaps and the development of the modularized framework. The scaffolds in the DDTI are the design practice and planning information meant for creating different thresholds for taking the artisan-learner into a liminal space where they can build on their existing tacit skills as they move into the next threshold. The virtual trainer facilitates scaffolding and enhances critical reflection to broaden and deepen the understanding of the design process. Transformative learning, thus, occurs at the different levels of the DDTI in order to shift the artisans thinking towards seeking new design opportunities and uncovering the hidden connections and opportunities in design education.

Scaffolding and assimilation was achieved through adopting situated and facilitative learning to provide virtual coaching for the artisans and help them complete tasks at every level. The breakings down of the DTTI content to fasten learning and mixing of practical demonstrations with theoretical explanations of the design process are also hallmarks of scaffolding on the platform. The fieldwork and literature established that artisans already have strong social networks and TA-derived tacit skills, even if the latter context is unstructured and lacked theoretical explanations of the craft processes. Consequently, the

first step was for the artisans to acknowledge a training need, which necessitated the development of the modularized DDTI.

The next step was to develop Occupational Standards (OS) content for a cost-effective, research-driven framework for design education. Occupational Standards are the performance benchmarks for individuals carrying out functions at the workplace (Clutterbuck et al., 2017; Kiehl et al., 2016). In this study, OS applied to design practice and planning competencies, alongside the underpinning knowledge and understanding learners needed to possess. Individuals are expected to demonstrate their understanding for competencies in order to be considered as competent. The performance standards outline the standards to be achieved in performing particular design practices and planning tasks. They indicate to the worker how well they have to do a particular task. The effective performance must incorporate best practices, and benchmark OS with international best practices. In the DDTI the performance standards were set by the TVETA. (Great Britain, 2016)

The process of developing OS begins with the identification of all the occupations in a particular sector. In the JKS it started with the profiling or outlining of occupations like woodwork, metalwork and handicrafts. The OS are normally applied across a broad spectrum of roles, levels of responsibility, contexts and settings. The documentary and other evaluations highlighted a lack of OS in JKS, and CBET provided the framework through which to instil such standards. The OS of DDTI adopted a CBET framework in describing the best practice, principles and values to be achieved at different levels of design practice and planning. The OS upheld the work-related learning approach, whereby the design practice and planning competencies and needs in the various JKS were identified and turned into a framework for training.

The OS guided in the generation of the General Areas of Competencies (GACs) or modules. General Areas of Competencies (GACs**)** are the key competencies that the artisans require to learn to become accomplished craftsmen. The inclusion of the GACs in the DDTI seeks to inculcate work-related learning through which modularized content is provided for learning in the workplace of the JKA. The GACs in the DDTI proposes to enhance workplace learning by building on TA, to educate the apprentices on how to build on their knowledge and skills

through understanding theoretical concepts, and systematically demonstrating design process.

Each module contains a broad scope of knowledge that incorporates the application of varied skills acquired, activities to help the learner understand the design concepts, and make the learning process simpler and interesting. The GACs specify their thresholds because the design knowledge is relatively new to the JKS and can be troublesome to the artisans since it is conceptual, difficult, unfamiliar, inert and tacit.

The areas were further broken down to determine the functional units or thresholds. Functional units or skills have learning unit specifications, where the artisans are expected to demonstrate knowledge and skills, after which they are taken to the liminal space. The functional units were further divided into sub–skills or elements with learning outcomes that required artisans to demonstrate that they have reached the required threshold. The units and sub-units serve as ladders, or miniature catalysts for change.

DDTI learning is facilitated through mobile technology to accomplish the role where scaffolding is highly situation-specific and related to problems that arise as the artisans attempt to integrate design skills and knowledge on the DDTI. This aims at allowing artisans to offer feedback and scaffolds as part of the learning process. The virtual trainer supports the artisans by facilitating learning, to offer scaffolding until the artisans are able to transit to the next skill.

7.5 The Action Research Cycle as a Contribution to Knowledge and a Framework That Others Could Use

The Action Research (AR) learning cycle that was used to understand the needs of artisans and to develop their skills is a contribution to knowledge, and a framework that others could use. This is because it the first time in Kenya that AR cycle has been used to develop a design training tool that the JKA can use to acquire knowledge and skill through m-learning. This iterative design process involved the identification of the unique characteristics of skills development during TA, and provided insight on the MC/apprentices relationship. This led to the proposition of the solution to the design challenges facing JKA in terms of skills development, which generated new knowledge by developing a framework for the competency based DDTI model.

The DDTI development followed Crouch and Pearce's (2012) four AR phases – observing, reflecting, planning and acting; but a testing phase was added to verify the DDTI's relevance, as captured in Figure 7.2 below. The AR cycle enabled the artisans to focus on design problems that were most relevant to them, its iterative process allowed successive phases to build on previous ones through asking questions, shooting videos and audio recording, and any other necessary refinements. The processes improved the understanding of the TA skills development process, and the MC/apprentice relationship in the manufacturing sub-sector. In consonance with Arthur et al. (2012), the AR stages were educative for all, and the approach was pertinent because it granted ownership and control to the JKS research participants.

The DDTI was designed to be a collaborative problem solving process for the JKA, addressing affordability, accessibility, literacy and education constraints through enhancing the CoPs and CoLs in the sector using mobile technology that surpasses the geographic limitations of the JK communities. It is also set to increase the flow of information through the face-to-face or online networks of artisans and other users with a common interest, to eventually eradicate their design problems.



Stage One: Observation

Taking stock and identifying a concern (Crouche and Pearce 2012, p. 148): this is the intention, purpose, goal or aim. This stage involved the identification of the challenges, needs, wants and wishes of the jua kali artisans as observed and recorded in the first phase of the study.

Source: Author's field photographs 2012



Stage Two: Reflecting

This step consists of reflecting on some possible ways forward and beginning to plan a solution (Crouche and Pearce 2012, p. 148). This stage involved thinking through the challenges. This resulted in the development of the content for the platform as an online flexible competency- based learning model with four modules namely design, production, marketing and management.

Source: Author's field photographs 2012



Stage Three: Planning

This step consists of plans, strategy, tactics, schemes (Coghlan and Brannick2014, p.14). This stage involved the digitization of the content for the intervention. This step also involved research and development, designing the layout and digitization of the content.

Source: Author's field photographs 2012



Stage Four: Acting

This step consists of taking action to try out a solution (Crouche and Pearce 2012, p. 148). In this step the content, mode of delivery and the various features of the intervention were tested with various groups of the jua kali artisans who are the end users.The stage involved monitoring, observing and discussing the model with the artisans. From the discussion with the artisans, consultant (Studio ANG) &Supervisor; the recommended changes were used to modify model.



Stage Five: Final Testing

This step involved the presentation and testing of the modified online platform model. The model was presented to the presented and tested with the Jua Kali artisans that had never been seen the model before and those that had helped in making the intervention. The model was presented the to government officials for suggestions and recommendations.

Figure 7.1 Development of the Competency-based Digital Design Training Model

7.3 How the Action Research cycle have been improved

Given that the action research design process is iterative and cyclic in nature, it could have been improved with the inclusion of the more participatory design and co-design for greater refinement. This would grant the artisans the more ownership and control of the research process to make it more relevant, and lead them to manage how they worked and consolidated their design practice. Crouch and Pearce, (2012) notes that participatory design mainly focuses on empowering individuals through democratic design processes and aims at a broader social and systematic change. AR cycle was not be fully implemented on the DDTI development because it would have involved a lot more of thought, action and a wider range of research strategies and involvement of the artisans at each stage depending on the artisans needs. Such flexibility would have been appropriate because of the artisans' education level and the diversity of the products they make and their location. It would have improved the process but it would have been time consuming and expensive for limited time for this study.

A participatory design would have involved more artisans than those involved in the DDTI development. A full AR cycle will require the development of the entire DDTI content in a spiral process that has the potential for further dissemination to other artisans and designers to make it more relevant. As part of the DDTI development process, more research questions will be asked at each stage of AR cycle. This was not fully utilised throughout the development of the DDTI because this initial stage involved face-to-face transaction, time was a constraints, lack of resources, and the wide geographical spread of the JKS clusters and the low literacy levels of the artisans.

The co-design approach is a part of participatory design that attempts to actively involve all the stakeholders such as customers, partners and users (Arthur et al., 2012). Its inclusion in the AR would also be effective in the DDTI's further development, because it will bring together more human thinking, practices, machines systems and the development of which has greatly increased as digital technologies advance(Crouch and Pearce, 2012). The AR cycle brought on board more JKA from other sectors and different levels of education, educationists who are subject experts, and ICT professionals, and further improved on the DDTI regardless of the phase. This gave

design practitioners the opportunity for examining and evaluating their practice, both individually and collaboratively in the process of developing solutions to problems.

7.4 The Development Stages of the Competency-based Digital Design Training Intervention Model

7.41 Stage One: Observation.

In first stage – observation, involved taking stock and identifying a concern (Crouch and Pearce, 2012). The documentary described in Chapter Five, and the fieldwork of Chapter Six, generated the following observations: artisans have existing skills, but also had skill gaps in design practice and planning; ICT competency and literacy levels were low; the artisans did not have the time and resources with which to further their education; most artisans had 2G phones; and artisans worked in challenging environments. The artisans joined in the DDTI development by volunteering information and allowing the researcher to observe them at work, and to video and audio record interviews and work sessions.

7.4.2 Stage Two: Reflecting. Development of the Content for the Design Training Model

The second stage of the AR cycle consists of reflecting on how to address the challenges the artisans face, and on ways of enhancing their existing skills. A framework for a competency-based DDTI model was developed through the AR cycle to build on the existing skills, and to teach them how to acquire new skills through reflective, facilitative and Socratic learning, in order to make them innovative and competitive craftsmen. It involved thinking through the identified challenges as an academician, resulting in the development of content to generate OS for the GAC for the DDTI model, in order to teach design knowledge and skills through mobile learning. The modules or GACs were: Design; Production; Marketing and Management.

The DDTI platform was developed using the CBET's functional analysis methodology. Functional analysis is a target-oriented and deductive method of curriculum development, in which the key tasks of an occupation are identified and its complex functions are derived. The complex functions are further broken down into smaller components and functions to define the outcomes of an activity, without necessarily specifying the context of the activity (Haralambie, 2016). These results into basic or

simple tasks that are derived from the complex functions, making up the design of the competence standard.. The nine steps of the functional analysis methodology used in this study were modified to suit the DDTI development, as shown in Table 7.1

Table 7.1: The Major Steps of the Modified Functional Analysis to Develop Occupational Standards for the Design Training Model

No	Steps of a Functional Analysis	Steps for Developing a Competency-based DDTI model
1	Orientate panel of experts	Develop a flow chart based on the challenges, needs, wants and wishes of the artisans identified in Chapter 6
2	Determine key purpose (Key task)	Develop a framework for a competency-based DDTI model for enhancing JKA knowledge and skills of design through m learning
3	Determine key areas by generating GACs or modules (Complex functions)	Design-concept development; Production; Marketing; and Management
4	Determine key roles	To identify, define and meet the needs of the market; make competitive products; persuade and satisfy their customers; manage their business well
5	Determine functional units of competencies (Basic or simple tasks)	Skills or units:
6	Determine elements of competencies	Sub skills or Learning Outcomes
7	Determine performance criteria	Recommended for further research
8	Validate functional map	Recommended for further research
9	Develop standards	Recommended for further research

(Source: Haralambie, 2016)

The first step of functional analysis involves orientating the panel of experts, mainly through brainstorming techniques, which enhances discussion and the development of a functional map (Dadi, 2014; Haralambie, 2016). This step involved the development of the flowchart seen in Table 7.1, based on the design challenges of the artisans. The

chart was later used for generating the framework and brainstorming with consultants to develop the DDTI model.

The second step of functional analysis involves the determination of the key purpose, which should describe the characteristics of the specific learners that are targeted (Gould and Roffey-Barentsen, 2014; Haralambie, 2016). The key purpose for this study was to develop a competency based DDTI for enhancing JKA skills through m-learning to increase the sector's access to design education.

The third step involve the determination of the key areas (Gould and Roffey-Barentsen, 2014; Haralambie, 2016), referred to as the GACs or modules. The key areas in the development of the DDTI included four modules, namely: Design; Production; Marketing and Management. The fourth step involves the determination of the key roles (Gould and Roffey-Barentsen, 2014; Haralambie, 2016), further breaking down each of the key areas into the activities to be undertaken to achieve the key areas or modules. In the DDTI development, the design needs were identified and defined through the development of a brief; and meeting market needs by designing solutions. The others activities are to make competitive products, to persuade and satisfy the customer and to manage business well.

The fifth step involves the determination of the functional units of competencies (Gould and Roffey-Barentsen, 2014; Haralambie, 2016). The functional analysis determined the thresholds of the units that were divided into several sub-units. Each of the sub-units aimed at taking the artisans to a liminal space. It provided the fundamental details of the expected outcomes of each of the functional units or skills under GACs. For example, the functional units in the design module are market strategy and analysis, creating a brief, and generation of ideas.

The sixth step involves determining the elements or units of competences (Gould and Roffey-Barentsen, 2014; Haralambie, 2016), further breaking down the basics skills into sub-skills or the learning outcomes. For instance, on the Design module (key area), the learning outcomes under Market Research (a functional unit) were identifying the market, identifying the customer, and targeting the identified customers.

The seventh step of functional analysis involves determining performance criteria of the units. The eight step the validation of the functional map by the experts and workers outside the discussion group, while the ninth step is further development of the standards based on the results of the validation (Gould and Roffey-Barentsen, 2014; Haralambie, 2016). The DTTI development of this study did not include the last three steps due to the constraints of time and funds. The next section has a framework that had been developed from the flow chart using functional analysis methodology.

7.4.3 Framework for the development of Competency-Based DDTI Model

Title: Jua Kali: Digital Design Training Interventions

The aim of this curriculum was to develop a competency-based digital design training intervention model that when populated would enhance the *Jua Kali* artisans' knowledge of design practice and planning through m-learning.

Objective of the DDTI framework: To develop a relevant and responsive competency-based digital design training intervention model that contributes to the country's human resource development by linking design education and training to the skills needed in the informal sector in Kenya.

The DDTI would enhance *Jua Kali* trade in Kenya by:

I. Teaching the artisans how to identify customer needs through market research and then develop ideas.
II. Demonstrating how to make competitive products
III. Teaching artisans how to persuade and satisfy their customers
IV. Teaching artisans how to plan and manage their business

Orientation of Experts

A flow chart was developed based on the data that was collected from the artisans and analysed and categorized to guide in the development of the content for the competency-based DDTI model, as shown in Figure 7.2.

CONTENT FOR A COMPETENCY BASED DIGITAL DESIGN TRAINING INTERVENTIONS MODEL FOR JUA KALI ARTISANS' IN KENYA

OBJECTIVE

To develop a Competency- based Digital Design Training Intervention model that will be responsive and relevant to the country's human resource required by linking design education and training to skills needed in the informal sector in Kenya

Challenges

- Market Research
- Preparation of Brief
- Documentation of Briefs
- Idea Generation
- Design Specifications
- Making Prototypes for Customers
- Pre- production or Development Structures
- Production or Manufacturing Structures.
- Finishing
- Working Conditions or operations
- Local Cultural Products
- Skills Transfer and use of Technology
- Tools
- Innovation and Capacity Building
- Marketing
- Organisational Skills
- Collaboration and Linkages with Public Formal Institutions
- Information Communication Technology Infrastructure as a Mode of Training and marketing

General Areas of Competencies

- DESIGN- Concept Development Interventions
- PRODUCTION – Making Interventions
- MARKETING- Selling Intervetions
- MANAGEMENT- Management Interventions

GENERAL AREAS OF COMPETENCIES

DESIGN-Concept Development Interventions

Identify , define and meet the needs, wants or wishes of their target market

UNITS

- Identify the needs, wishes & wants of their target market through market strategies and Analysis
- Defining their target market through creation of brief
- Meet the needs of their target market through generation of ideas

PRODUCTION – Making Interventions

Product development, Manufacturing Operations

UNITS

- product Design Specifications
- Prototyping
- product Development/Pre-production
- Manufacturing/Production
- Finishing
- Operations/Working condition
- Skills Transfer
- Local Cultural Products

MARKETING- Marketing Intervetions

Persuation and satisfying customer needs

UNITS

- Understand the marketplace and customer needs and wants.
- Design a customer- driven marketing startegy
- Construct a marketing program that delivers superior value
- Build profitable relationships and create customer delight.
- Capture value form customerss to create profit and customer quality
- Preparing to sell – Liability, Knowledge & Intellectual Property Rights,
- Sales - Marketing
- The Marketing Mix: Product, Price, Place and Promotions
- Packaging and Branding

MANAGEMENT- Management Interventions

Organization of their business

UNITS

- Management
- Entrepreneurship Skills
- Business Analysis
- Planning
- Finances
- Procurement Processes
- Customer Care

SKILLS/UNITS

MARKET STRATEGIES AND ANALYSIS

Identify the needs, wants or wishes of their target market

SUB SKILL/UNITS

- Opportunity Analysis
- Competitve Analysis
- Target Market Selection

CREATION OF BRIEFS

Defining the needs their target market

SUB SKILL/UNITS

- Explore and define the needs, functions and effectiveness of the product
- Aesthetic Consideration
- Economic Viability of the Product
- Product Effects on the Environment
- Understand Current Market Trends
- Product Requirements
- Come up with Brief using Visual Representation, Sketches or Models

GENERATION OF IDEAS

Meet the needs of their target market

SUB SKILL/UNITS

- product Design Solution or Ideation
- Concept Development – Brainstorming, Visual Notes, Copying, Hereditary Skills, Research
- Consider Functionality of the product

Market Strategies and Analysis

UNIT: Market Strategy and Analysis

SUB UNITS

Opportunity analysis

Identify your Market

What are you selling?

Furniture, Ceramics/Pottery, Metal work, Glass, Jewellery, Sculptures, Textiles, Fashion, Artifacts, Tableware, Basketry, Plastics, Leatherwork and others

What makes your product unique/ Special ?

Aesthetics, Function , Economics, Environmental concerns and Design for Sustainability
Dose it offer anything other artisans dont?

To whom would you want to sell
How do you identify your cutomer segment in the JK sector?
do they have similar needs and and desires?

Target market- 5 segments
identify the stakeholders- list them/ prioritize
Potential buyers will have three things in common:

- Interest/ needss•
  Income
- Access

how do ypu evaluate them: measurability; accesibilty;

Why should people buy the product from you?

i. Accessible to the consumer to buy.
ii. Well positioned in the market.
iii. It is useful to the user.
iv. It is unobstructive.
v. Easy to use and maintain.
vi. Improves the quality of life of the user.
vii. Improved performance.
viii. Provide the user with a status.
ix. Creates a new or better aesthetics.
x. It is functioning well.
xi. Affordable and Durable
xii. Environmentally friendly.
xiii. Ergonomics.
xiv. Safety

Competitive analysis

Introduction

Determining market segmentation

Introduction

	Research Design	Research Instrument
Geographic – divides the market into different geographical units such as nations, regions, states, counties, cities	Descriptive	Interviews, Surveys, Focus Groups, Field Study
	Participatory Action	Focus Groups, Interviews
	Participatory Action	Focus Groups, Interviews

	Research Design	Research Instrument
Demographic: divides the market into groups based on variables such as age, gender, family size, family life cycle, income, occupation, education, religion, race, generation, and nationality	Descriptive	Interviews, Surveys, Focus Groups, Field Study
	Cool Hunting	Interviews, Field Study
	Crowd Searching	Interviews, Survey

	Research Design	Research Instrument
Psychographic: divides buyers into dierent groups based on social class, lifestyle, or personality characteristics,	Ethnographic	Interviews, Focus Groups, Survey, Field Study, Video, Audio, Photographs, Observations
	Narrative,	Focus Groups, Interviews
	Observation	Interviews, Field Study

	Research Design	Research Instrument
Behavioristic: divides buyers into groups based on their knowledge, attitudes, uses, or responses to a product	Ethnography;	Interviews, Focus Groups, Survey, Field Study, Video, Audio, Photography, Observation
	User Centered	Questionnaires, Interviews, Focus Groups
	Psychology and Sociology	Interviews, Focus Groups, Field Study

	Research Design	Research Instrument
Benefit: Based on products that provide specific benefits	Ethnography	Interviews, Focus Groups, Field Study, Questionaire, Video, Audio, Observation
	Narrative	Focus Groups, Interviews, Field study
	Participtory Action	Focus Groups, Interviews
	User- center Design	Questionnaires, Interviews

Target Marketing Selection/ opportunity mapping/ identification

Introduction

Selecting a market to target/Target Marketing/ define your target market

Introduction

	Research Design	Research Instrument
Undifferentiated Marketing: focuses on what is common in the needs of consumers rather than on what is different	Descriptive	Interviews, Surveys, Focus Groups, Field Study
	Ethnographic	Interviews, Focus Groups, Survey, Field Study
	Narrative	Interviews, Focus Groups, Field Study
	Exploratory	Focus Groups, Field Study

	Research Design	Research Instrument
Differentiated Marketing: focus on targeting several market segments and designs separate offers for each	Market Trends	Focus Groups, Survey, Field Study, Photographs, Video, Observation
	User-Centered Design	Surveys; Interviews; Field Studies; Focus Groups
	Crowd Searching	Interviews Survey

	Research Design	Research Instrument
Concentrated or niche Marketing focuses on a large share of one or a few smaller segments or niches	User-centered Design	Questionnaires Interviews Focus Groups
	Psychology and Sociology	Interviews, Focus Groups, Field Study
	Participatory Action	Focus Groups, Interviews
	Case Study	Focus Groups, Field Study, Interviews

Positioning products through marketing strategies/Market Positioning

Introduction

	Research Design	Research Instrument
Identify the relevant set of competitive products	Market Trends	Surveys, Interviews, Focus groups, Field studies
	Data Collection	Questionnaires, Interviews, Field Studies
	Crowd Searching	Interviews, Focus Groups

	Research Design	Research Instrument
Identify the set of determinant attributes that define the product	User-centered Design	Surveys; Interviews; Field Studies; Focus Groups

	Research Design	Research Instrument
Collect information from a sample of existing and potential customers concerning their ratings of each product on the determinant attributes	Crowd Searching	Questionnaires, Focus groups, Field Study
	Data Collection	Questionnaires, Interviews, Field Study
	Ethnography	Focus Groups, Interviews, Field study, Questionaires, Video, Photography, Observation
	Psychology, and Sociology	Interviews, Field Study, Focus Groups
	Narrative	Interviews, Focus Groups

SUB UNITS

Target Marketing Selection

Identify Needs, Wants & Wishes of the target Market

How and why – this is the wants and needs analysis

	Research Design	Research Instrument
What product features would they like to see?	User-Centered Design	Questionnaires Interviews Focus Groups
	Data Collection	Interviewing;
	Learning from Market Trends	Questionnaires, Interviews, Focus Groups, Field Study
	Participatory Action	Interviews, Focus Groups, Field Study
	Ethnography	Questionnaires, Interviews, Focus Groups, Field Study, Video, Audio, Photographs, Observation
How do the customers currently operate?	Narrative	Interviews, Focus Groups, Field Study
	Ethnography	Questionnaires, Interviews, Focus Groups, Field Study, Video, Audio, Photographs, Observation
	Participatory Action	Interviews, Focus Groups, Field Study
Why do the customers operate like that?	Narrative	Interviews, Focus Groups, Field Study
	Ethnography	Questionnaires, Interviews, Focus Groups, Field Study, Video, Audio, Photographs, Observation
	Participatory Action	Interviews, Focus Groups, Field Study

Core Values

	Research Design	Research Instrument
What would make the consumers life easier? Function, Form, Aesthetics, Ergonomics, Safety, Materials & Environment	User-centered Design	Questionnaires, Interviews, Focus Groups, Field Study
	Data Collection	Questionnaires, Interviews, Survey, Field Study
	Narrative	Interviews, Focus Groups, Survey, Field Study

Competition through your customers' eyes

	Research Design	Research Instrument
Understand the competitive landscape from the expert – your potential customer How do they measure sucess?	Market Trends	Interviews, Focus Groups, Survey, Field Study
	Observation	Interviews
	Searching	Questionnaires, Interviews, Focus Groups
Discover the strengths and weaknesses of the competitors and what customers would like you to change	User-centered	Questionnaires, Interviews, Focus Groups
	Data Collection	Questionnaires, Interviews, Focus Groups, Field Study
	Narrative	Interviews, Focus Groups
	Observation	Interviews, Focus Groups, Field Study
	Exploration	Survey, Field Study

Positioning products through marketing strategies

	Research Design	Research Instrument
Determine the Product's current position versus the offerings for each market segment	Data Collection	Interviews, Focus Groups, Questionnaires, Field Study
	Market trends	Surveys, Focus groups, Field Study
	Crowd Searching	Questionnaires, Interviews, Field Study
	Psychology, and Sociology	Interviews, Field Study, Focus Groups
	Narrative	Interviews, Focus Groups

	Research Design	Research Instrument
Determine the target market's preferred combination of attributes (referred to an ideal vector)		

	Research Design	Research Instrument
Examine the fit between: the position of competing products, the position of your product and the position of the ideal vector	Market Trends	Surveys, Field Study, Focus Groups
	Data Collection	Questionnaires, Interviews, Field Study, Interviews, Questionnaires
	Psychology and Sociology	Focus Groups, Interviews, Field Study

	Research Design	Research Instrument
Select optimum position or reposition Strategic	Learning from Market Trend	Survey, Forcus Groups

	Research Design	Research Instrument
Boil your idea down to a brief: few appropriate words or visual notes that will define the need, wants and wishes of the customer		

Figure 7.2: Flowchart of the content of a competency based Digital Design Training Intervention Model for *Jua Kali* Artisans' in Kenya

The next stage involved a needs analysis was carried out to guide in the development of DDTI content for enhancing *JKA* knowledge of, and skills in, design, through m-learning, as seen in Table 7.3. The functional analysis then determined the key purpose, which was to develop the DDTI. Subsequently, the GAC or complex functions or modules were established to determine the key roles and functional units of competencies. Finally elements of competencies were developed for a tailor-made framework for the *JKA* as shown in Table 7.2

Table 7.2: Framework with General Areas of Competencies for the DDTI Model

(See Table 7.3 below)

NO	General Areas of Competencies (GAC)	Functional Skills or Units	Sub-Skill or Elements of Competencies (Learning Outcomes)
1.0	Design	1.1 Market Strategy and Analysis	1.1.1.Opportunity Analysis – Finding your market
			1.1.2 Competitive Analysis - Identify your customers
			1.1.3 Target market selection- Target those customers
		1.2 Creation of Briefs	1.2.1 Functionality
			1.2.2 Aesthetic Consideration
			1.2.3 Economic Viability of the Product
			1.2.4 Product Effects on the Environment
			1.2.5 Understand Current Market Trends
			1.2.6 Product Requirements
		1.3 Generation of Ideas	1.3.1 Design Solution
			1.3.2 Concept Development
			1.3.3 Functionality- chose right materials
2.0	Production	2.1 Product Design Specifications	2.1.1 Choose material
			2.1.2 Machines for manufacture
			2.1.3 Transportation
		2.2 Prototyping	2.2.1 Visual notes / sketches / models
			2.2.2 Functionality
			2.2.3 Aesthetics
			2.2.4 Materials
			2.2.5 Safe for use
			2.2.6.Economics
			2.2.7 Environment
		2.3Manufacturing/Production	2.3.1 Occupational Health & Safety Act
			2.3.2 Machinery & tools
			2.3.3 Workshop
		2.4 Finishing	2.4.1 Aesthetics
			2.4.2 Packaging & Branding
		2.5 Operations/Working condition	2.5.1 Skilled workers
			2.5.2 Environment
3.0	Marketing	3.1 Packaging and Branding	3.1.1 Define product identity
			3.1.2 Provide product information
			3.1.3 Express product benefits & features
			3.1.4 Ensure product safe for use

NO	General Areas of Competencies (GAC)	Functional Skills or Units	Sub-Skill or Elements of Competencies (Learning Outcomes)
		3.2 Influencing the demand for the product. The Marketing Mix:	3.2.1 Product variety 3.2.2 Product price 3.2.3 Place – good advertising 3.2.4 Promotions- distribution of the product
		3.3 Sales and Marketing	3.3.1 Know your market
			3.3.2 Know your competition
			3.3.3 Distribution and supply chains
		3.4 Customer Care	3.4.1 Accessibility
			3.4.2 Effective Communication
			3.4.3 Assurance
4.0	Management	4.1 Management	4.1.1 Planning
			4.1.2 Organization
			4.1.3.Directing/Controlling
			4.1.4 Monitoring
		4.2 Planning Finances	4.2.1 Setting Financial Goals
			4.2.2 Budgeting
			4.2.3 Investing
			4.2.4 Insurance Cover
			4.2.5 Income Tax Consideration
			4.2.6 Estate Planning
		4.3 Business Analysis	4.3.1 People
			4.3.2 Processes
		4.4 Entrepreneurship Skills	4.4.1 Capital
			4.4.2 Labour
			4.4.3 Resources
		4.5 Procurement Processes	4.5.1 Buying through Imprest
			4.5.2 Buying through Quotation
			4.5.3 Buying through Tenders
			4.5.4 Financial Limits
		4.6 Legal and Regulatory Requirements	4.6.1 Procedures and Requirements for Establishing a Business

Table 7.3: Framework with Occupational Standards for the Digital Design Training Intervention Model

Prototype of a Functional Unit or Skills

Learning Unit Specification

1.0 **Unit Title**: Design- Identify, define and meet needs of clients

Commencement Date: Open

Expiry Date: Open

Level: Recommended for further research

Credit Value: Not applicable

Access Statement: Access is for *Jua Kali* Artisans and TVET institution teaching Design, Art and Craft

Unit Introduction: On completion of this unit the artisans need to be able to identify, define and meet the needs of their customers by developing suitable design concepts for their customers.

Learning Outcomes:

By the end of the unit the artisans are required to demonstrate knowledge and skills on how to:

1. Carry out market research to identify and fulfil customer needs
2. Outline the general nature of the task to be solved by creating briefs that define the customers' needs.
3. Generate ideas by coming up with design solutions that meet the needs of the market

Elements of Competencies

Unit Title: Design- Identify Needs

Learning Outcome 1: Demonstrate knowledge on how to carrying out market research to identify and fulfil customers' needs.

Performance Criteria:

a) Understand how to carry out a survey of opportunities by exploring, identifying and analysing the marketplace to find market opportunities for existing products and new products.

b) Carry out a competitive analysis to determine their market segments through the identification of customers; competitors and markets, to enable artisans develop strategies for new and existing products and markets.
c) Know how to select one or various market segments as a target market to become the focus of the marketing effort, so that the design solutions are set to meet the needs and wants of that target market.

Range Statement:

Developing design concepts involves carrying out market research to identify the needs of the customer; define their needs by creating brief to describe the general nature of the task to be solved and generate new ideas by coming up with a design solutions to meet the needs.

Instructions

To find your market

- Identify the products are you selling
- Identify the material the products are made from
- Describe what makes your products special
- Identify current and potential customers
- Explain why people should buy your product?

Evidence Requirements:

'Performance evidence' is the artisans' ability to find their market through market strategy and strategic planning.

(See Detailed Curriculum for a Competency-based Design Training Intervention Model in Appendix 29)

7.4.4 Stage Three – Planning

The third step is the planning step, consisting of developing plans, strategies, tactics, schemes (Coghlan and Brannick, 2014). This involved digitising the content of the model to develop the two versions of the DDTI: a web based platform and Unstructured Supplementary Service Data (USSD) App. Both platforms target all JKA regardless of the type of mobile phone they own. The USSD application runs on 2G phones, making it available for all artisans regardless of the type of mobile phone owned.

Steps Followed to Develop the Web-based DDTI Model

To design the DDTI prototype or model, we worked with the artisans and web developers during concept development. Studio ANG was identified to assist in the App and film development of the web-based DDTI model.

Brief for the DDTI Model

Brief: To develop a web-based platform for a competency-based DDTI model of which the populated one would enhance JKA knowledge in design through m-learning.

Title: *Jua Kali*: Digital Design Training Interventions

We had a detailed discussion of the brief that outlined the general nature of the challenge to be resolved by the DDTI. We defined the background information about the JKS skills development, how the proposed model would look and work. Created content for the platform would be simple, meaningful, specific, and relevant to the artisans' design and planning needs and challenges. The information would be set in a way that is easy to absorb, valuable and meaningful to the artisans. The content or information would be well organized in a simple and easy to understand format, and would be user-friendly because of the mobility of both the artisans and learning. These characteristics would also address the artisans' low education levels, as well as the challenges of ICT literacy.

Emphasis was placed on interaction with, and participation of, the artisans to create design solutions during the development and production of the model. The web-based model was to be developed through an iterative design process using the AR cycle to propose, prototype, test, analyse and improve the features and performance of the DDTI model, by determining the best possible solutions to JK design challenges.

The basic functionality of the platform was critical in relation to need to address the JKA training needs, to enable them learn anywhere anytime. It was to be learner-centred and personalized, giving the artisans autonomy, and encouraging their self-confidence by enabling them to take control and responsibility for the relevance of their learning.

The platform was to be outcome-based, modularized and interactive, to allow artisans to construct new knowledge on a needs basis by exploring, evaluating and integrating the relevant design knowledge to solve their design challenges. Learning would entail forming networks by connecting to special information sources The artisans would navigate from one screen to another, report errors and notifications, receive understandable error prompts, and

generally interact with the system without difficulty. The icons were to be clear and easy to interpret. Information to be easily accessible to facilitate and arbitrate learning through a virtual instructor who would provide modularized targeted information that the artisans can interact with from anywhere if given enough time and suitable teaching methods.

The look and feel of the platform was to adopt friendly colour themes, font types, texture, weight and scale (Farkas, 2013). Grouping or clustering information, imagery, pictures, sound, motion, and design layout was to agree with other elements of the system, such as buttons, text boxes, and menus. Visual consistency should be felt throughout the system. Contrast on the elements on the page was to be emphasized to make them look different and make the page visually attractive. Some visual elements could be repeated throughout the web pages to develop the organization and strengthen the unity of elements on the DDTI model. For proper alignment, all elements were to have some visual connection with other elements on the same web page, to create a clean, sophisticated fresh look. Items on the DDTI that are related to one another were to be grouped close together so that they become one visual unit, rather that several separate units.

Hierarchies of colour would be established to reflect different types of content. The colours were to be highly visible to attract attention, create visual interest, and enhance the perception of visual messages from which the artisans can learn. The textures making the objects were to appear smooth or rough, heavy or light, cold or warm, sharp or flat to create visual interest. The patterns could be simple, intricate or bold, to create order and variety, or similarities and differences in the patterns on the platform.

The styling of type was to differentiate types of information and establish a sense of hierarchy (Gareth Williams, 2015). The type would be easy to read, hold the artisans attention so that they benefit from the content. The changes in weight and scales of artwork and typographic elements in the model could signal that scanning pattern and differences had prioritized certain information. A combination of colour and type styling could be used to clarify complex hierarchies, and to emphasise focal points. The model was to be carefully structured with planned grids and white spaces, to help the artisans navigate through complex information. The information on the web pages was to be clustered in groups to enable quick location by learners. Multiple entry points would allow the artisans to absorb information as visual sound bites. Grouping of information could also signal hierarchies of importance, particularly when used in conjunction with changes in colour, weight and scale.

The graphic elements on the web-based model's platform were to help artisans navigate easily through content (Brown, 2014). Lines, bullets, icons and other devices are tools the designer was to use to purposefully attract the eyes of the artisans. They could provide direction, punctuation and arouse interest or stimulate attention, enticing the artisans to look at the pictures and read the text. There was to be a marriage between the imagery and text to help the artisans distil and retain information. The images were to clearly communicate design information and processes, be appealing to the eye, and thereby motivate the learner-artisans to review the text. The image and text ought to explain and illustrate relevant content and to provide an overview and understanding of the model.

Sound, motion and graphics were to be combined to have a powerful effect in connecting the artisans to special sources of information, and to promote the acquisition of current knowledge in design processes. This is because motion draws an audience's attention and creates a sense of narrative that leaves a memorable impression (Brown, 2014). The motion pictures should provide entertainment and positively reinforce the artisans' previous experiences, because it is building on their existing skills.

The JKA learn skills outside the formal school environment in complex environments with numerous activities going on around them. The model on a mobile platform was to use a multimedia interface for teaching on their mobile phones to try and overcome these barriers. The model would be interactive, and would augment various teaching styles and activities, such as audio, video demonstrations, and hands-on activities that are interactive and self-paced. The artisans would be learning by doing, with structured written, auditory or verbal theoretical explanations of processes. Appendix 30 shows the steps that were followed in the development of the model.

Development of a Web-based Competency-based DDTI Model

To guide the digitization, the flow chart of Figure 7.2 and the framework for the competency-based DDTI in Table 7.3 were also discussed before signing a contract with Studio ANG. For the contract, see Appendix 15. Milestones were agreed on to guide the development of the App for, and documentary on, the DDTI, See Appendix 16. These development activities included pre-production arrangements, recce, filming media management, editing, feedback, signoffs and final delivery. As noted in Chapter 4, the four JK clusters involved in the documentary included: Kamukunji JKAs – mainly metal products; Nairobi Handicraft Co-operative Society; Shauri Moyo Furniture; and Wangige Pottery.

Previous interactions during the shooting of the documentary made it easy to work with the artisans from same clusters to develop the four three-minute documentaries for the web-based DDTI. It covered four JK clusters, namely: woodwork, metalwork, pottery and handicraft. There followed a two-minute general video clips with interviews from different people including institutions (author interview), and JKA, to explain the project and provide insights on the industry and its potential.

The homepage would introduce the *Jua Kali* industry, highlight the challenges facing it, and explain the purpose of the intervention. The video clips introducing the JKS and the purpose of the DDTI highlighted the main DDTI modules, namely Design, Production, Marketing, and Organization. Filming and interviews were carried out as per attached schedule, (See Appendix 17) using interview guides (See Appendix7) to collect information from the artisans after they duly signed the consent forms (See Appendix 10). Media management, pickups, and editing were done in consultations with Studio ANG.

The homepage would be accessible to the public, and have an overview of JKS and GAC or modules: Design, Production, Marketing, and Management. The rest of the website would host detailed information on the four modules broken down into functional units or skills, and the elements of competencies or sub-skills. The pilot concentrated on broadly developing the design module, market strategy and analysis functional skills, and further developed the sub-skill opportunity analysis to the end.

The web developer also embarked on system building, including Hyper Text Mark-up Language (HTML) Production, Content Integration, and Testing and finishing. The designs and sketches for the wireframes were developed based on the brief, as seen in Figure 7.3.

LOG IN SIGN UP

Jua Kali

HOME ABOUT HELP/FAQs CONTACT

Video

What is Jua Kali?

- Definition
- Purpose of this App

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more

Introduction to the Modules and their General Objectives

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Below are the various modules.

Design

In this module, you will learn all about Concept Development, Creative Intervention, and Identifying your target market.

Learn more

Production

Learn about Making Interventions in Product development and Manufacturing Operations

Learn more

Marketing

This module covers topics in Customer Persuasion and satisfying their needs

Learn more

Organization

Gain skills in Management Interventions and Organization of your business

Learn more

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DESIGN PRODUCTION MARKETING ORGANIZATION LOG OUT

Jua Kali

HOME ABOUT HELP/FAQs CONTACT

Design

DESIGN / Ideas / Concept
Development Interventions

Identify , define and meet the needs, wants or wishes of their target market

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Market Strategy and Analysis

Introduction to Marketing Strategy

Identify the needs, wants or wishes of their target market and come up with a creative intervention

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Opportunity Analysis
Identifying your Market

Competitve Analysis
Determining market segmentation

Target Market Selection
Selecting a market to target and Positioning products through marketing strategies

Design Brief

Defining the needs of your target market

UNITS
- Explore and define the needs, functions and effectiveness of the product
- Aesthetic Consideration
- Economic Viability of the Product
- Product Effects on the Environment
- Understand Current Market Trends
- Product Requirements
- Come up with Brief using Visual Representation, Sketches or Models

Idea Generation

Meet the needs of your target market

UNITS
- Product Design Solution or Ideation
- Concept Development – Brainstorming, Visual Notes, Copying, Hereditary Skills, Research
- Consider Functionality of the product

DESIGN PRODUCTION MARKETING ORGANIZATION LOG OUT

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HOME ABOUT HELP/FAQs CONTACT

Opportunity Analysis

Identifying your Market

Identify , define and meet the needs, wants or wishes of their target market

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What are you selling?

Identify your Product

What makes your product unique/Special ?

Aesthetics, Function , Economics, Environmental concerns and Design for Sustainability
Does it offer anything other artisans don't?

Why should people buy the product from you?

i. Accessible to the consumer to buy.
ii. Well positioned in the market.
iii. It is useful to the user.
iv. It is unobstructive.
v. Easy to use and maintain.
vi. Improves the quality of life of the user.
vii. Improved performance.
viii. Provide the user with a status.
ix. Creates a new or better aesthetics.
x. It is functioning well.
xi. Affordable and Durable
xii. Environmentally friendly.
xiii. Ergonomics.
xiv. Safety

Conclusion:

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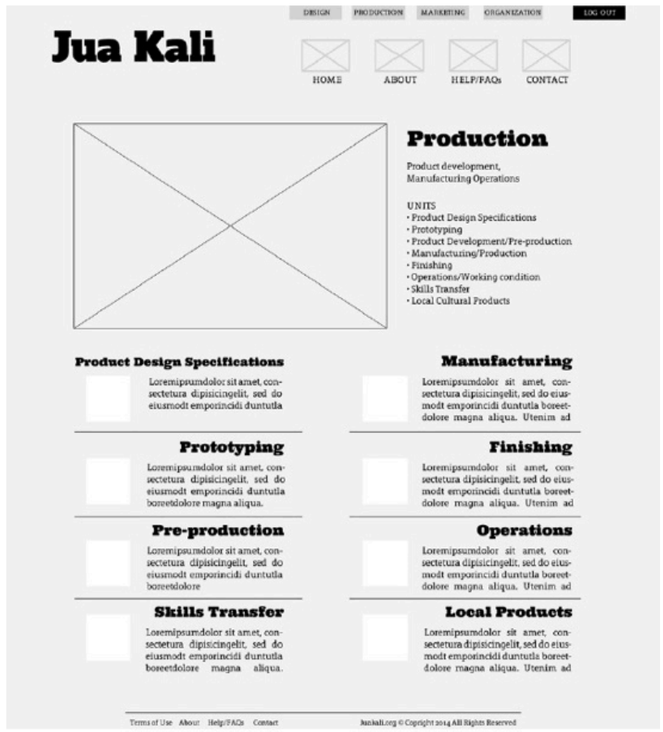








Figure 7.3: The Wireframes of the Development of the Web-based Competency-Based DDTI Model

7.4.5 Stage Four – Acting

The fourth stage is 'acting', which involved taking action to try out a solution (Crouche and Pearce 2012). Another group of eight representatives from Kamukunji JKAs Nairobi Handicrafts, Kayole Basketry, Shauri Moyo Furniture were invited to participate in the development to the DDTI website. It was an iterative and cyclic process where improvements were made to the DDTI at each stage based on the artisans' feedback.

The design layouts presented in Figure 7.4 were discussed with the artisans as the prospective DDTI end-users. The discussions covered visual communication tools for the site, such as iconography, colour themes, imagery, and arrangement of visual elements on the web pages with an overall aesthetic scheme. The content, readability and legibility, and layout of the information on the web pages, were also discussed.

The artisans recommended that the website's background photos should change continually to showcase the variety of their products. They liked the *Jua Kali* logo and suggested that it should remain prominent. They noted that the yellow sun signified their hard working conditions under the "hot sun" or "*Jua Kali*". The artisans were able to interpret the meaning of the icons used in the layout on the pages, and were happy with grass-thatched house icon, which they adjudged symbolic of the Kenyan culture. They suggested inclusion of a modern house to reflect artisans' aspirations. They requested the use of simpler English words, complaining over 'module', which was however, retained with a brief explanation of it on the website.

The artisans suggested the inclusion in the Design module of a hand and pencil drawing to signify documentation of ideas. The Production module's icon would be a hammer, while the Marketing one would be a hand holding money and a product being sold. For the fourth module, 'Organizational Skills' was changed to 'Management', with invoices and a calculator as icons. The AR session resolved that the 'Opportunity Analysis' page be interactive, enabling users the answers questions and submit answers to direct their learning and for self-evaluation. A Frequently Asked Question (FAQ) page would facilitate collaboration and interaction with peers and facilitators; and an email and contact page would be included.



Figure 7.4a: The Design Layout of the Homepage

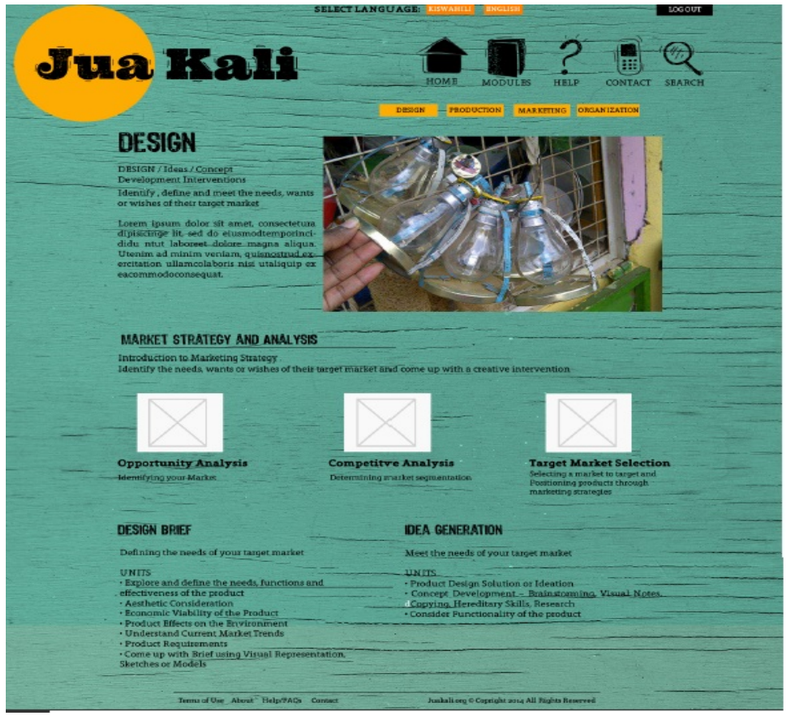


Figure 7.4 b: Page Design Layout for the Design Page



Figure 7.4 c: Design Layout of Opportunity Analysis



Figure 7.4 d: Design Layout of Contact Page

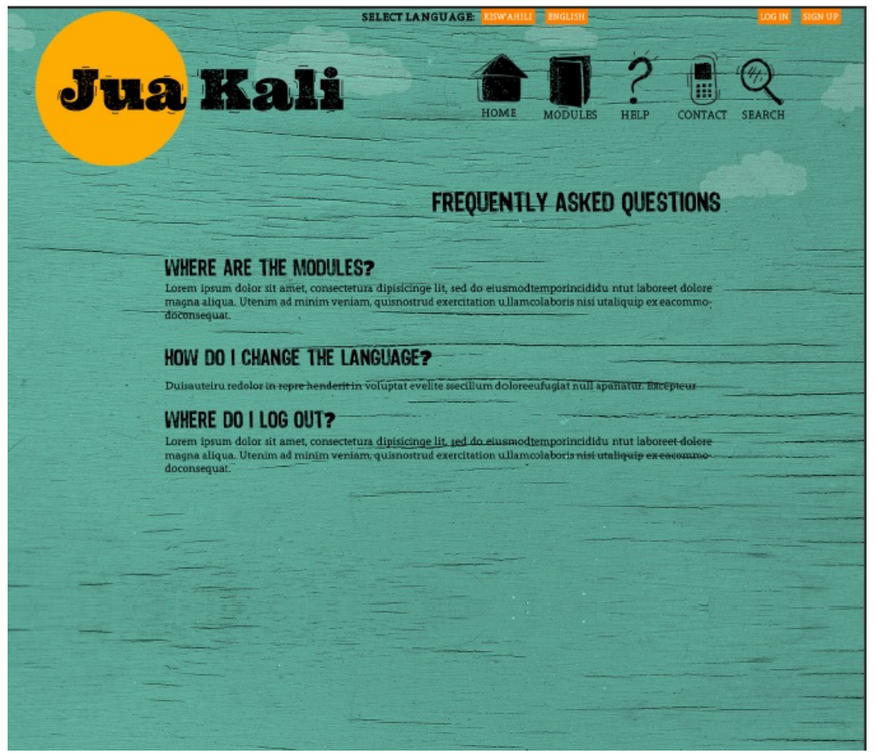


Figure 7.4e: Design Layout of Frequently Asked Question Page

The preliminary web pages are on Figures 7.4 (a) to (e), with the homepage design interface including an introductory video clip and content of the four modules of design practice and planning. The AR meeting agreed that the design interface on the Home Page (Figure 7.4 a) was aesthetically pleasing and easy to understand, with modules broken up into relevant areas namely: Design, Production, Marketing and Management. However, the yellow background was preferred to the previous green one. The artisans were generally happy with the video clips.

On the Design page (Figure 7.4 g), the artisans disliked the word ‘Design’, and after explaining the idea of identifying, defining and meeting the needs of their markets, the meeting settled on ‘DESIGN/ IDEAS’. The page’s information was well clustered for ease of readability, but bullets were proposed to show the unit content.

'Market Strategy and Analysis' was simplified to ‘Learn How To Do Market Research To Identify Your Customers’. ‘Design Brief’ was changed to ‘Design Your Ideas’ and ‘Idea Generation’ to ‘Generate Your Ideas’. Under ‘Market Needs’, ‘Opportunity Analysis’ became ‘Find Your Market’, and ‘Competitive Analysis' became ‘Identify Your Customer’; and ‘Target Market Selection’ changed to ‘Target Your Market’.

The Opportunity Analysis page (Figure 7.4 h) is interactive, and the graphic elements allowed the artisans to navigate the content and answer questions. However, decongesting the page and reducing its information would make it attractive and easier to read. The consultation also recommended changing the selection method on 'What Makes Your Product Special?” from the radio button to check box, adding a text-input option, and increasing the imagery and photos to make the page more visually attractive and easy to understand.

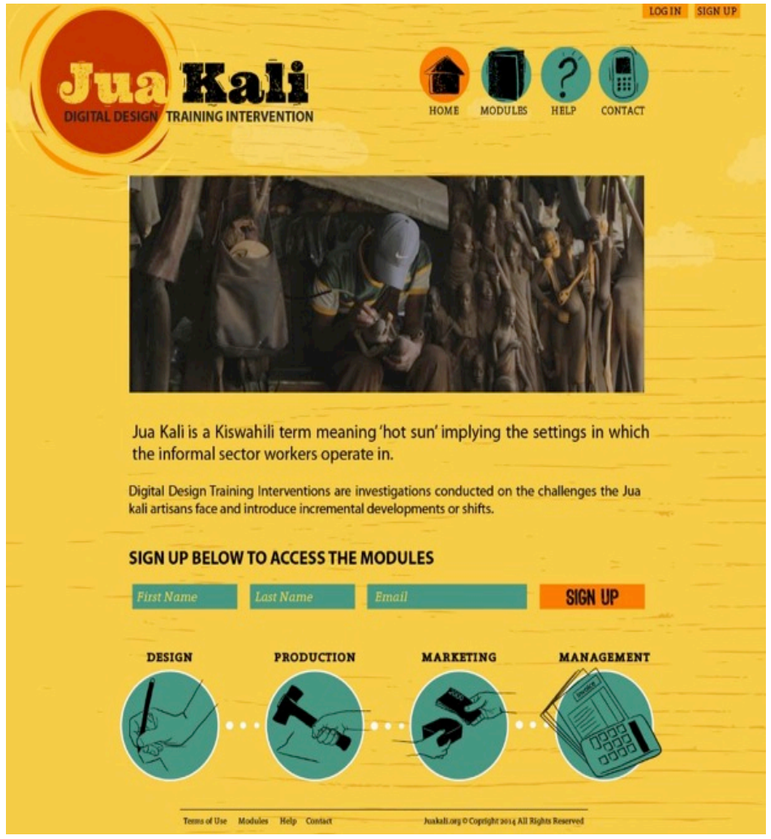


Figure 7.5a: Design Layout for the Home Page



Figure 7.5b: Design Lauout for Design Page



7.5c: Design Layout for Opportunity Analysis



7.5d: Design Layout for Production



7.5e: Design Layout for Marketing



7.5f: Design Layout for Management

The Production module page (Figure 7.5 d) was difficult to read because it had too much text for the typically small mobile phone screen. The Production module would be defined simply as 'Learn How You Make Competitive Products'. The artisans liked the hand-holding-hammer icon, which signifies a common tool among artisans. The artisans preferred the word 'Sample' to 'Prototype', resulting in 'Make Your Samples'. 'Pre-production' changed to 'Before Production' and 'Skill Transfer' to 'Learning skills'. The units were further simplified, and descriptions shortened while bullet points list unit contents.

On the Marketing module page (Figure 7.5e the definition was simplified to 'Learn How To Persuade And Satisfy Your Customers', and the unit's description was also simplified and shortened. Bullets were used to list the unit contents.

On the Management page (Figure 7.5f), the definition was simplified to 'Learn How To Run Your Business', and the unit's description shortened with bullet points showing unit contents. Due to the constraints of costs and time, we agreed with the consultant to have videos on the initial three pages and photos on the Marketing and Management pages.

The recommended changes were implemented and the DDTI model modified to ensure it is functional and accessible. Figure 7.6 shows the final pages of the DDTI. With the partial development of the DDTI web-based platform the researcher acquired a certificate of Registration of a Copyright Work (See Appendix 30).



7.6 (a): The Final Home Page



7.6 (b): The Final Design Module Page



7.6(c): The Final Find Your Market Page



7.6 (d): The Final Production Module



7.6(e): The Final Marketing Module Page



7.6 (f): The Final Management Module



7.6(g): Final Introduction Page Module



7.6 (h): The Final Contact Us Page

7.4.6 Step Five –Testing

The fifth stage was 'Testing'. This step was added to the traditional AR cycle, and provides an opportunity to further develop the DDTI because it involves an on going learning that allows additional inputs from the artisans, content developers and IT experts. The DDTI was tested for efficiency in content, delivery and aesthetics with the various JKS artisans, and with stakeholders from various MDAs to assess it relevance in achieving Kenya Vision 2030.

7.5 Development Process of the Unstructured Supplementary Service Data Platform of the DDTI Model

In this section the Unstructured Supplementary Service Data (USSD) platform was developed to enable JKA that have 2G phones to access the DDTI. The proposed USSD was designed to focus on the large number of JKA with 2G phones. The USSD is regarded as the technology used to send text messages across the Global Systems for Mobile Communication (GSM) networks (Nyamtiga et al., 2013; Wikedzi et al., 2014). It involves two nodes: the mobile phone, and the application servers. Though similar to the short message service (SMS) platform, USSD is interactive and session-based. Since it does not store data on the device, this reduces the turnaround time, making it faster and cheaper than an SMS transaction.

USSD is free and works with both the GSM and Wireless Application Protocol (WAP) technology, and therefore works on any phone that has either technology. Furthermore, it is more accessible and logical since data or messages are sent directly over network signalling channels (Kaushik, 2013; OECD, 2011). This study settled on the USSD because it has been applied in various aspects of development like mobile chatting, mobile banking, pre-paid balance checking, m-commerce, and mobile money transfer (Karimova, 2011; Thiga et al., 2013). USSD-based applications run on very low-end phones, like those most artisans have. USSD is the basis of the very popular mobile money transfer services in Kenya and other countries.

7.6 Development Process of the USSD of the DDTI model

A group of technicians partnered in the development of the USSD DDTI model. The brief, flowchart, framework and the wed-based platform were discussed with them. The next step in the development was to get access to a USSD server. This was done through a mobile service provider, Safaricom, from whom the domain name

www.juakalidesigns.co.ke was purchased. We then took the Provider Account from them and configured Universal Resource Locator (URL) of our service: when the user dials the relevant codes, the USSD server directs them to the application.

Consequently, the technicians developed the USSD content from the flow charts and frameworks. Figure 7.6 provides the description of how it would appear in the application based on the study's requirements. Technicians then went into the development that involved the coding and programming stage. The development of the application was done to analyse the requests sent by the users and generate menus by taking data from the database and sending it back to the USSD server, which then directs the response to an artisan's handset. In each reply, we have to insert the functions to each list of options selected by the artisans.

For the artisan to access the information on the USSD version of the DDTI, an artisan selects Option 1 from the menu, which gives the description of the JKS Option 2 requires the artisan to register to view the modules of the DDTI intervention. In this option, the artisan is given a random password to use when logging into the application.

After registering, the artisans can access the contents of their preferred module. Option 4 gives guidance on how to navigate through the application, including where to find help in case of difficulty.

The last option is 5, allows an artisan to interact with the content developer.

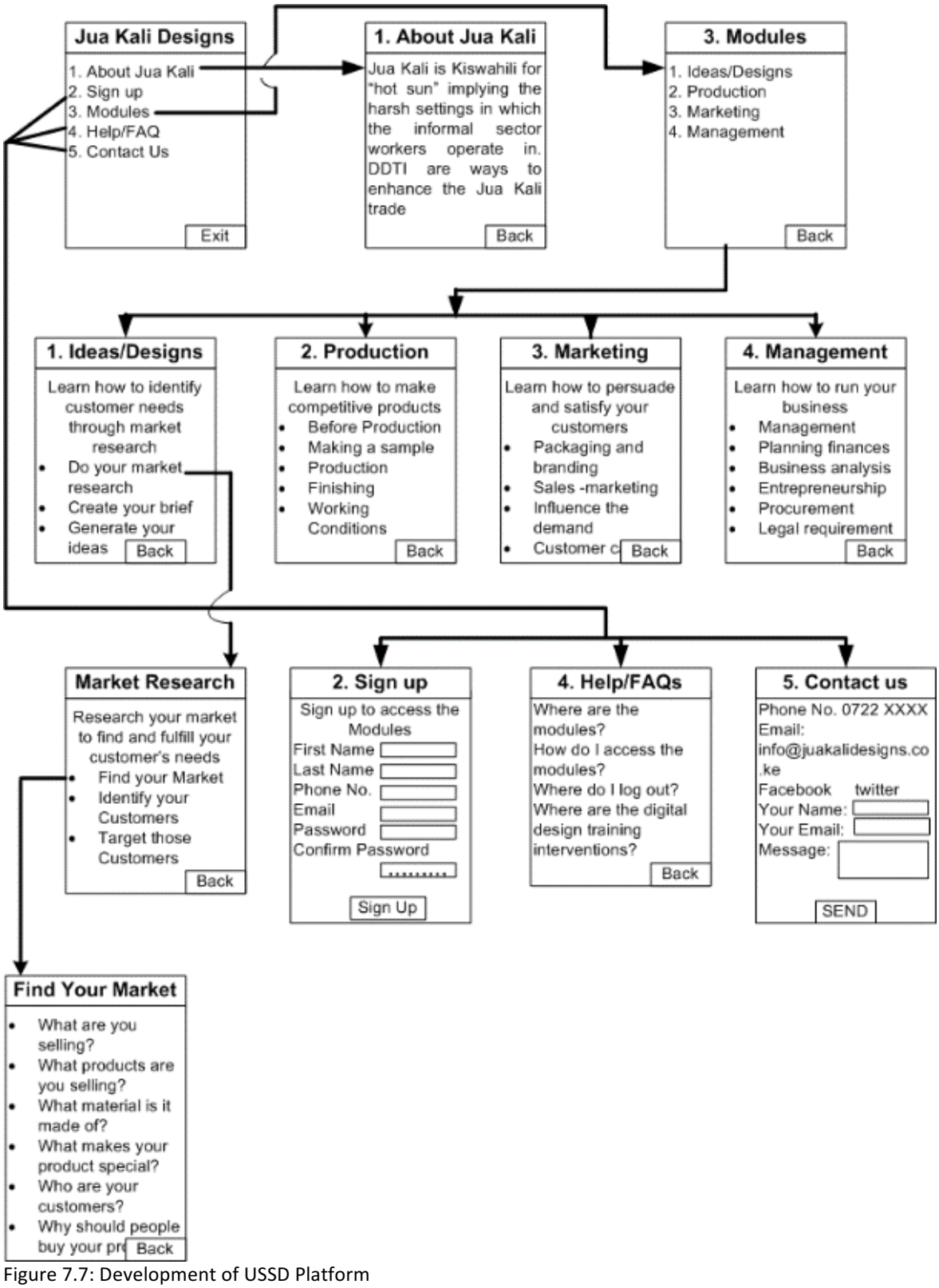


Figure 7.7: Development of USSD Platform

Access to a Gateway to deploy a real working USSD application was too expensive for an academic researcher. Instead, we opted to use a Gateway simulator and a mobile simulator, as seen in Figure 7.7 to merely demonstrate how it would work in a real-world environment.

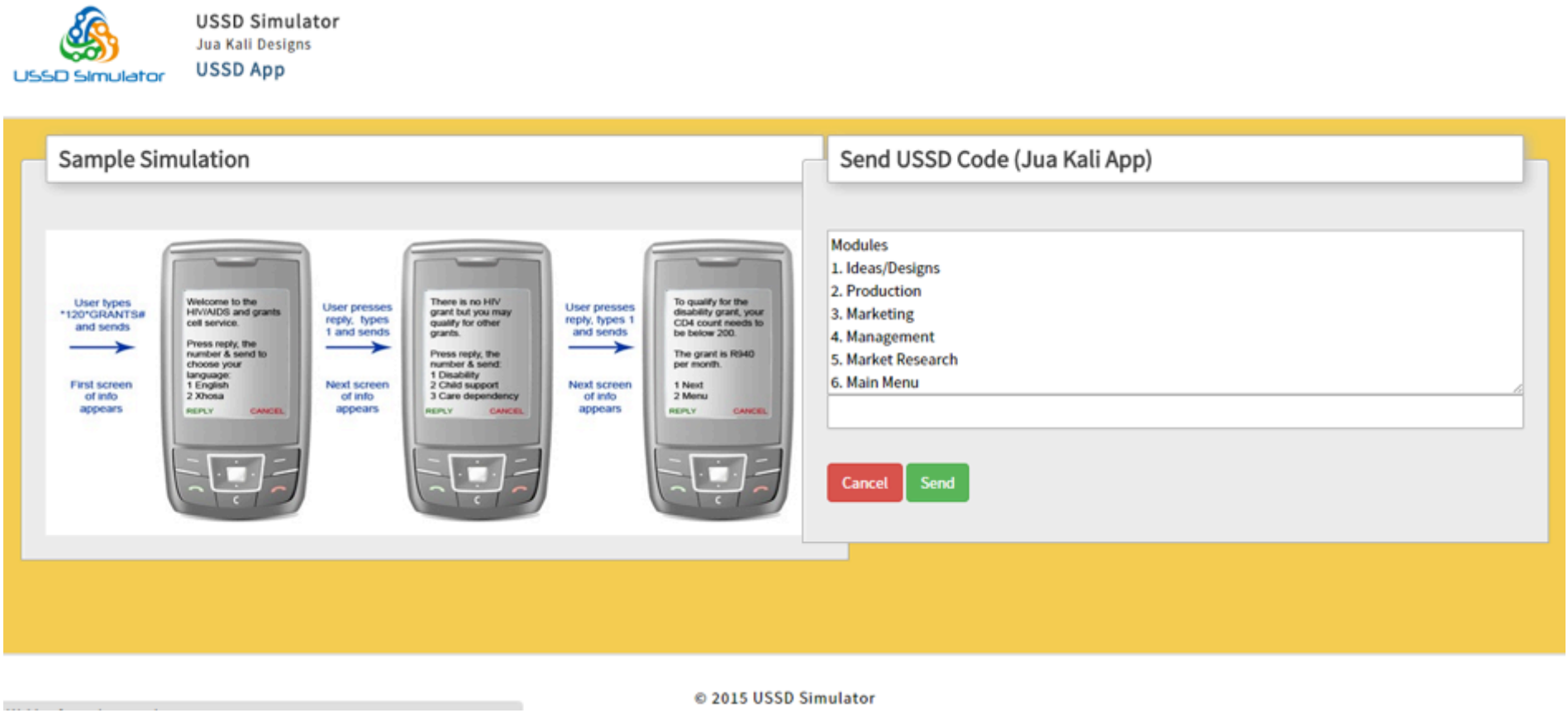


Figure 7.8: The USSD Platform of the Model

7.7 Conclusion

This chapter discusses the development of the web-based and USSD DDTI platforms to enable the artisan's access to information on design practice and planning through mobile technology. The action research cycle was used to develop the DDTI because it is an iterative and collaborative problem-solving process that involved the research team, the consultants and the JKA as the end-users to solve design problem or to generate new knowledge. This was made possible due to the intense process followed during the development of the platforms, such as research and meetings with the end users to agree on what was ideal for the artisans. The feedback was used to further customise the development of the platforms, thus producing modern and effective platforms that meet the needs of Kenyan JKA in the manufacturing sub-sector. Having the platforms accessible online would increase the accessibility of the services being offered by the platforms and at a cheaper rate.

The web-based platform and the USSD-based mobile application developed by this study, was deemed better than other e-learning platforms because it has local, tailor-made content for the JK manufacturing sub-sector in Kenya. The DDTTI was designed to be interactive, locally implemented, based on constant feedback with the JKA, which makes it more relevant to the needs of the artisans, unlike the international platforms that may not specifically address the design and business needs of the local *JKA*. The web-based and USSD platforms were later tested with JKA and Government MDAs in Nairobi.

CHAPTER EIGHT

8.0 Introduction

This chapter discusses the quantitative and the qualitative findings from testing the competency-based DDTI model delivered on a mobile platform. The objective was to determine whether the DDTI enhanced *Jua Kali* artisans' (JKA) knowledge and skills through m-learning in line with Kenya Vision 2030. The artisans provided insights on the relevance of the model's modularized content in Design, Production, Marketing and Management. The artisans concurred that the aim of DDTI was achieved because it improved their existing design practice and planning skills originally acquired through TA. The DDTI enabled them to construct new knowledge by sharing their ideas through collaboration, interaction and dialogue among fellow artisans and facilitators. The model would modernized their learning infrastructure by enabling education to be available anywhere and anytime on their mobile devices. Government officials engaged on the DDTI provided insight on its relevance in advancing existing and prospective plans and strategies. They confirmed that the JKS is an important resource in the economy of Kenya, whose empowerment through relevant, accessible, capacity building programs would be an invaluable resource in achieving the Kenya Vision 2030.

This study focused on availing design skills and knowledge to the JKA, which they could access through mobile devices in order to influence changes in their attitudes and culture regarding design practice and planning as a community of practice (CoP) and community of learning (CoL). The study also built on the artisans' existing craft skills and strong informal social relations with special emphasis on the master craftsman (MC)/apprentice relationship during TA. The study also highlighted training of the artisans to become creators of their own design skills and knowledge, using the DDTI through facilitative and Socratic learning.

8.1 Procedure Followed in Data Collection

The convergent mixed methods research design was used in collecting data from 109 artisans (See Appendix 23) and 18 government officials from Nairobi City County (See Appendix 21). As discussed in previous chapters, there is no plausible national database on JK artisans; so the study adopted purposive samples at various stages.

This meant that inferences could not have been drawn for the national JK population. But allowed purposive samples approach creating a need for improved data collection for this important sector, and for subsequent further research. The 109 artisans were drawn from Kamukunji JKAs, Nairobi Handicraft, and woodwork and metal work clusters along Outer ring Road, and around Donholm estate in Nairobi City County.

Ethical considerations was the first step in data collection, with the formalization of the ethical approvals through the Coventry University research ethics system: Medium to High Risk Ethics Review Feedback Form (See Appendix 9); Certificate of Ethical Approval (See Appendix 10); Participants Information Sheet (See Appendix 11); was used to explain the to the artisans the nature of research. They voluntarily signed the Informed Consent Form (See Appendix 12). Questionnaires (See Appendix 3) were used at the testing stage of the action research cycle to assess the functionality, aesthetics and relevance of the DDTI for design education in the JKA. The participants included artisans who had been involved in the DDTI development, and others who had not interacted with the DDTI. After explaining and demonstrating the signing-up and signing-in processes, navigation of the DDTI to access information, the participants were provided with tablets in pairs and later with smartphones individually to familiarize themselves and access the DDTI. The LG Duo-core smartphones were considered suitable for the study, as it cost at £ 40, which was arguably affordable for the artisans.

The introduction of the model to the individual woodwork and metalwork artisans alongside Outer Ring Road was conducted using the tablets and smartphones. The artisans from Nairobi Handicraft and Kamukunji *Jua Kali* Association were assembled in halls within their clusters, but away from their workshops to minimize interruption. A projector was used introduce them to the web based and USSD DDTI models, then using the provided tablets the artisans were taught how to access and interact with the DDTI. Once they were familiar with it, they were each provided with a smartphone to access the design knowledge on their own as they were recorded on camera, as seen in Figure 8.1 (a) to Figure 8.1 (c). Given the low literacy levels and limited ICT skills among the artisans, some were assisted to navigate through the model when necessary.

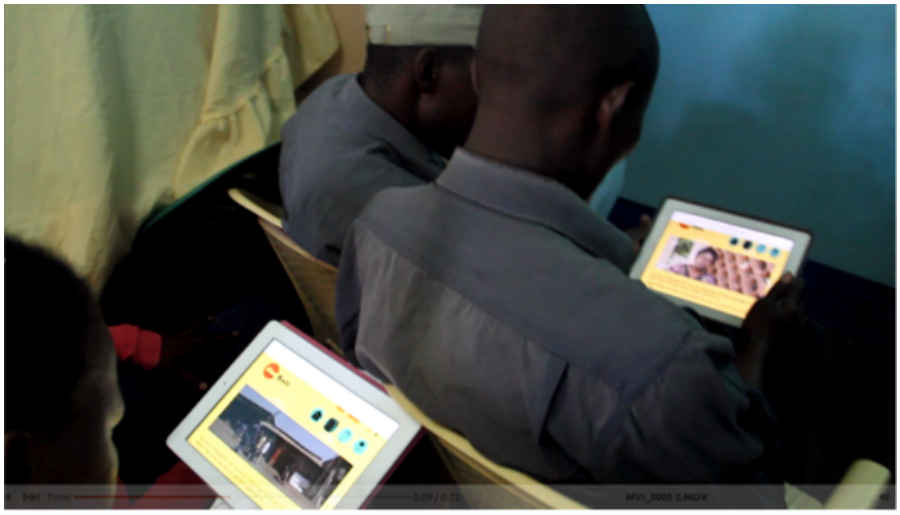


Figure 8.1 (a): *Jua Kali* artisans trying out the DTM on their own after a brief orientation

Source: Author's field photographs 2014

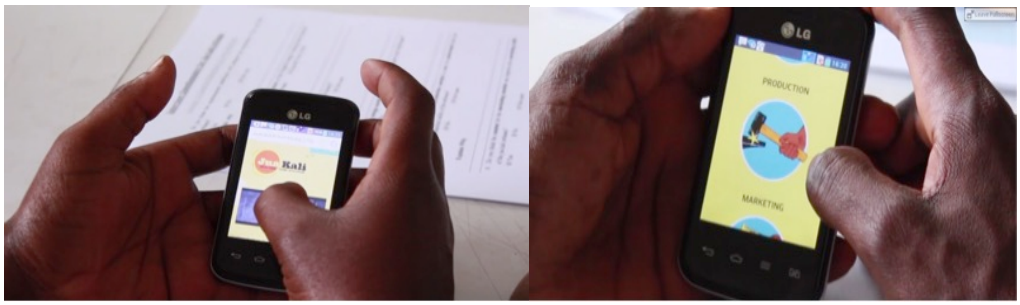


Figure8.1 (b): A *Jua Kali* artisan attempting to access the introductory and production web pages of the platform.

Source: Author's field photographs 2014

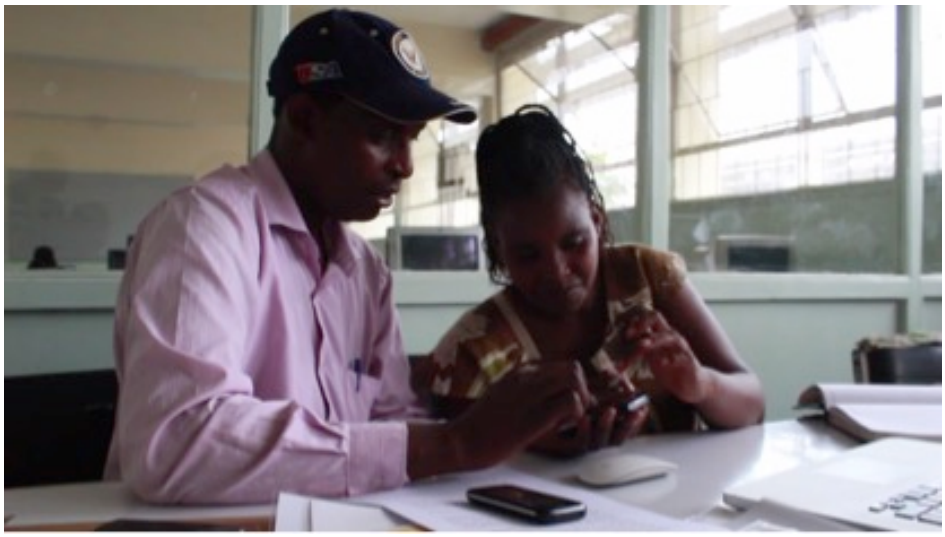


Figure 8.1 (c) : *Jua Kali* artisans assisting one another to access the DDTI

Source: Author's field photographs 2014

Upon acquainting themselves with the DDTI, the artisans were engaged in a discussion to clarify the features and contents of the DDTI, before they filled the questionnaire. Some

questionnaires were not self-administered given that some artisans could not fill them without assistance because of their low literacy levels. A total of 109 questionnaires were returned for analysis.

8.2 Data Analysis

The data was collected from 109 participants using questionnaires. See Table 8.1 details the participants and data collection tools used. The questionnaires were first cleaned to remove the incomplete and irrelevant responses. The qualitative data was then grouped based on the research questions, and coded to examine the similarities and differences in the responses (See Appendix 32). The codes generated from the similar responses were used to generate themes (See Appendix 33). The quantitative data collected through the questionnaires were entered into the Statistical Package for Social Sciences (SPSS) worksheet. The descriptive statistics included frequencies and percentages (See Appendix 34). Quantitative and qualitative data of JKA responses was triangulated (See Appendix 35) .The recordings of interviews with government officials were transcribed and the data coded (See Appendices 36 and 37). The codes were then arranged into categories, which were used to generate themes based on the research questions (See Appendix 38) and was then triangulated. Figure 8.2 (a) and Figure 8.2 (b) summarize the methods, analysis and results of DDTI testing,

Table 8.1: Data Collection Tools and Respondents

Data Collection Tool	Category Of Respondents	No. Of Respondents/Groups	Key Issues Addressed about the DDTI
Questionnaire	**Artisans from:** ▪ Donholm ▪ Outer Ring Road ▪ Shauri Moyo Furniture ▪ Kamukunji Jua Kali Association ▪ Nairobi Handicraft	109 Artisans from Nairobi City County	▪ Relevance of the content ▪ Functionality- performance ▪ Usability- fitness for purpose ▪ Accessibility- screen-based experience ▪ Aesthetics- appeal of the design/ information architecture
Semi-Structured Interviews	**Government officials MDAs** ▪ Education Science and Technology (6) ▪ Labour Social Security and Services (4) ▪ Devolution and Planning (3) ▪ ICT (2) ▪ Industrialization and Enterprise Development (3) ▪ Kenya National Federation of Jua Kali Associations (1)	18 Officials from Government MDAs based in Nairobi City County	Relevance of DDTI to facilitate achievement of Kenya Vision 2030
	Commerce, Tourism and East Africa Region (1)		
Focus Group Discussion	Artisans from: ▪ Shauri Moyo Furniture (7) ▪ Kamkunji Jua Kali Association (8) ▪ Nairobi Handicraft (6)		▪ Relevance of the content ▪ Functionality- performance ▪ Usability- fitness for purpose ▪ Accessibility- screen-based experience ▪ Aesthetics- appeal of the design/ information architecture
Non-Participants Observation	All	109 Artisans from Nairobi City County	Interaction with DDTI

MIXED RESEARCH METHODS, ANALYSIS AND RESULTS FOR *JUA KALI* ARTISANS AND GOVERNMENT OFFICIALS

	METHODS	ANALYSIS	RESULTS	TRIANGULATION
Jua Kali Artisans	**QUALITATIVE DATA COLLECTION** **Focus Group Discussions: I conducted FGD with respective jua kali associations in which I introduced them to the DDTI and let them use the tool; then together we discussed its merits and demerits in terms of building their designs skills and improving their businesses.** **Non-participant Observation: I used this method to collect data about how the artisans used the DDTI and what visible challenges they encountered.**	**CONTENT ANALYSIS:** • **Transcription of the Interviews and FGDs.** • **Coding** • **Generation of themes**	• **DDTI will enhance business in terms of product marketing; enhance design, production, marketing and management skills** • **The information on the platforms is grouped correctly due to its coherence, accessibility and relevance** • **The web-based platform is preferable due to its accessibility, content relevance and comprehensibility** • **The USSD platform is preferable due to its affordability and accessibility.**	• The DDTI s is relevant for the jua kali sector. Most artisans indicated that the DDTI will enhance their businesses. • The design, production, marketing and management module address the challenges the Jua kali artisans undergo in these respective areas • The platform will also promote access, relevance, equality and equity of education and training in the jua kali sector. • Most artisans preferred the appearance of the web-based platform than the USSD platform because it is more detailed including photos and videos. • Most of the artisans preferred the usability of the USSD platform than that of the web-based platform because of its similarity to M-pesa (mobile money transfer service) that they use daily. • The DDTI will enhance the achievement of Vision 2030. • The jua kali artisans are a resource to the economy: they make affordable products and create employment. • Based on the Vision 2030 there are government policies and strategies set in place to support education and training of artisans. • The rigid artisans' attitudes, lack of qualified trainers and lack of documentation impact on government policy implementation. • The DDTI can help promote the access, quality and equity of informal education and training. • The DDTI is relevant for the jua kali sector. Most artisans indicated that the DDTI would enhance their businesses.
	QUANTITATIVE DATA COLLECTION **Questionnaires: I used them to inquire about the artisans' various opinions of the participants about the DDTI, including content relevance; platform preferences etc.**	**QUANTITATIVE DATA ANALYSIS** • **SPSS**	• DDT will enhance business (95.4 %) • Relevance of the modules: design (95.4 %); production (86.2%); marketing (92.6 %); management (22.4 %) • Preference of web-based platform (63.6 %); USSD platform (36. 4 %). • USSD platform signup 27.2% (very good); web-based platform signup 28.2 % (very good). • USSD platform good appearance (46.7 %); web-based platform good appearance (29.5 %)	
Government Officials	**QUALITATIVE DATA COLLECTION** **Semi-structured Interviews: With the use of an interview guide I interviewed the government officials in the various agencies about their policies and strategies on the jua kali sector and also solicited their views on the feasibility of the DDTIs. The interviews were tape-recorded.**	**CONTENT ANALYSIS:** • **Transcription of the Interviews and FGDs.** • **Coding** • **Generation of themes**	• **The DDTIs will enhance the achievement of Vision 2030.** • **The jua kali artisans are a resource to the economy: they make affordable products and create employment.** • **Based on the Vision 2030 there are government policies and strategies set in place to support education and training of artisans.** • **The rigid artisans' attitudes, lack of qualified trainers and lack of documentation impact on government policy implementation.** • **The DDTIs can help promote the access, quality and equity of informal education and training.** • **The DDTIs is relevant for the jua kali sector. Most artisans indicated that the DDTIs would enhance their businesses.**	

Figure 8.2 (b): Mixed Methods Research Analysis

8.3 Descriptive Analysis Data Presentation and Discussions

8.3.1 The Relevance of the DDTI Platform to the Jua Kali Artisans' Businesses

Among the artisans, 95% agreed that the model would enhance their businesses by addressing numerous design challenges they encountered. This included the identification of customers' needs, development and documentation of briefs and ideas, learning selling and marketing strategies, and the management of enterprises.

For example a Kamukunji JKAs artisan said the model would teach him how to identify, define and meet customers' needs through market research, and to prepare briefs. An artisan based in Donholm said the DDTI would help him generate ideas through visual representations, sketches or models, thereby creating design solutions that meet the needs of the market. A handicraft artisan said the platform would enable him to learn selling and marketing strategies, improving access to markets, and selling more products. The platform would also enable access to marketing information and knowledge globally. Another artisan from the Outer Ring Road wood cluster indicated that the model would help her to organize and manage her enterprises more efficiently. Another pointed out that the model addressed their time and resources constraint that would enable them enhance his skills in formal institutions. A Nairobi Handicraft artisan claimed that the DDTI would help them identify their customers' needs, develop and document their briefs, learn selling and marketing strategies, and manage their enterprises.

Some artisans were concerned about adopting a model that requires computer literacy, yet theirs was an economic sector with low literacy levels. This concern could however be countered by the availability of the model on the artisan's mobile phones, which they were already familiar with.

The results concurred with Kwanusu (2013) who found that *JKA* lacked awareness of markets for their products. The results were also in agreement with Afande (2015) who found that poor management skills in the sector had resulted in a high mortality rate among enterprises. The results showed that the DDTI was helpful in addressing the challenges that the artisans faced in their trade, thereby enhancing their enterprises. The quality and relevance of the contents of DDTI were based on the competencies that the artisans require in their design practice and planning. Quality and relevance were also assured by the CBET component of the DDTI, through which the artisans had the autonomy to determine how

they acquired competencies of their choice. The DDTI also provided various multi-media methodologies for design training, from which the artisans choose those that suited their needs. Furthermore, the model promoted equity since regarded all learners as equals, and did not demand any prerequisites for accessing the design training. Notably, with education and training trends gravitating towards CBET, these results tend to strengthen the case that the DDTI is a viable tool for design training in the informal sector.

However, the artisans that were not sure if the model would enhance their businesses were 3%, while 2% claimed it would not. For example a woodwork artisan from Outer Ring Road, said the lack of information on new technology would limit their use of the model to enhance their businesses, and they were therefore not able to improve their sales. An artisan from Nairobi Handicraft was not sure – and even suspected, that the model would make them lose their businesses; but he did not elaborate.

8.3.2 The Content of the Digital Design Training Intervention Model

The artisans acknowledged that the DDTI content was very good were at 50%, while 20% rated it as good. They concurred that the content was relevant, well organized and easy to understand. The information on design processes was explicit and well expressed in terms of words, images and concepts. For example a Kamukunji JKAs artisan said the content comprehensively addressed the challenges they face in developing design concepts, production processes, sales and marketing, and management of their enterprises. An Outer Ring Road artisan said the content was simple, meaningful, specific, and relevant for interpreting and addressing their needs and challenges. According to a Nairobi Handicraft artisan, the content was good because of its simplicity and comprehensibility. A Kamukunji JKAs artisan said the content was good since it sought to address their design needs regarding new products ideas, improvement of production standards, product marketing, and connecting them to markets. However, an Outer Ring Road artisan noted that the platform needed further development regarding putting additional content in the modules.

While 20% rated the DDTI content as average, 5% rated the content as fair and 1% rated it poor. A carpenter at Shauri Moyo furniture said the content was average though they were not certain it would help them improve on their design knowledge and business skills. A Kamukunji artisan said it was average since it was accessible offline through the USSD

platform, which essentially provides an inadequate alternative for accessing the modules especially for the artisans that do not have smartphones.

The content of GAC or modules on the DDTI was relevant because they were developed based on the understanding of the design problems that were identified during the fieldwork, and the constraints the artisans encountered. In CBET the learner is given freedom to determine how they acquire the design competencies (Takahashi and Hodges, 2011; Weise, 2014). That was why the DDTI addresses the artisans design education needs thereby making the content relevant.

8.3.3 The Grouping of Information on the DDTI Model

80% of the participants that approved the grouping of the information on the DDTI into the four modules: Design/Ideas; Production; Marketing; and Management. They concurred that there was harmony because integral information was well grouped and presented. The information was consistent and there was agreement between the elements on the DDTI. This was because there were several items in close proximity to each other, which brought visual connection. An Outer Ring Road metalwork artisan said the content was arranged in a simple and clear way, and was easily accessible, legible and visually consistent throughout the website. A handicraft artisan said the information was well structured and enabled him to effectively interact with the platforms, and also captures all the units required in enhancing TA. A Kamukunji artisan noted that the arrangement of the modules was significant and clear, as it proposed the design processes that they required to learn.

The artisans who did not approve the grouping of information on the DDTI for various reasons were at 5%. An Outer Ring Road metalwork artisan did not like the arrangement, which he adjudged difficult to understand. 10 % indicated that they were not sure of the arrangement. A Kamukunji artisan was not sure of the arrangement because he did not understand it in the first place.

8.3.4 Relevance of the Design Module

95% of the participants indicated that the Design module content was relevant, and would engage them towards producing viable design solutions in a way that is controlled and directed by the process, to meet the stated aims of the briefs. They acknowledged the importance of having precise understanding of the problem and its constraints, to allow exact solutions to be developed. They appreciated the fact that they can use different

methods and sources of inspiration to generate creative solutions to the briefs. These included sketching, brainstorming and modelling.

Two artisans from Nairobi Handicraft said the content would teach them to conduct market research, enabling them to define the design problem and the target audience. They would then develop appropriate design briefs. A Kamukunji artisan noted that the module would help them document their design concepts and solutions. An Outer Ring Road metalwork artisan said the module would help them expand their knowledge of their market, and thus solve their problems. A Donholm artisan said the module addresses the challenges they face in identifying design problems by understanding the history of their clients. However, 3 % of the artisans did not find the design content relevant, while 2 % were not sure if it was relevant. The artisans were not sure whether to attribute their indecisiveness to their lack of understanding the module.

In essence, the Design module addresses the key challenges of identifying, defining and meeting the needs of the markets that are obstructing growth in the sector. According to Gikenye (2012) and Kwanusu (2013), the artisans make products without investigating and understanding the unique needs of their markets. The relevance of this Design module on the model is, therefore, based on the fact that its content would help the artisans to identify their markets by establishing the problem and collecting information to help them generate design ideas.

8.3.5 Relevance of the Production Module

The participants that claimed that the Production module was relevant were 90%. They indicated that it would teach them to make competitive products because it helped them to look at how the general design concept can be refined, presented, articulated and implemented, by bringing it to life through production. It also helped them to ensure that design details are put into effect and the client is happy with the final product.

An artisan from Outer Ring Road noted that the module had content that was well broken down, clear, and simple to understand, and that it would help them improve and make products that would penetrate the market and capture a bigger market. Another Outer Ring Road artisan claimed that the module would help them to learn how to cost their products, use various production methods, choose materials, and operate. A Donholm artisan said the module helped them diversify and improve on the quality of their finished products to make

them aesthetically pleasing. A Kamukunji artisan said that the quality of their finished products could improve because the model content is comprehensive and would teach them how to make products with attention to detail.

However, 5% of the artisans did not find the module relevant. While a Kamukunji artisan found the module difficult to understand, a Nairobi Handicraft artisan said the digital presentation was hard to follow. 5% of artisans were not sure whether the content on this module is relevant, with a Kamukunji artisan doubting that it would improve his production skills, and an Outer Ring Road artisan requiring more time to understand it due to their low ICT literacy. TA involves observing, imitating and repeating what the MC is doing (Akoojee et al. 2013), which the DDTI would build on by introducing a systematic production process that would minimize the time and cost, diversify their products and improve on their quality.

8.3.6 Marketing Module

The participants that acknowledged the relevance of the Marketing module on the platform, generally claiming that it would improve on their selling and marketing skills were at 90%. They felt that the Marketing module would help them establish, maintain and expand their online presence and reputation. When completed it would possibly enhance the word-of-mouth marketing by teaching them to build a relationship with their target audience through a media conversation. The content was engaging and informative, well written and valuable, and would teach them to further involve their clients to improve customer experience, and increase sales and revenues. The participants acknowledged that branding and packaging was relatively new, but was an important unit that would teach them to create a visible brand and deliver packages that convey the brand message to consumers directly.

Three Kamukunji artisans concurred that the module would train them on sales and marketing skills, and enable them to access markets. An Outer Ring Road artisan said the module would help her to interact directly with customers, collect information and tailor their offers according to market requirements. A Donholm artisan said the module would help them sell their products since it teaches them how to handle their customers. Another Donholm artisans said the module would help them pay attention to the selling process, and teach them how to persuade consumers to buy products. A Nairobi Handicraft artisan noted that the module will help them contact their customers even beyond their locality, and create avenues for them to compete on a wider market.

According to Neilsen (2012), the *JKA* experience challenges when it comes to accessing markets for their products, which Gikenye (2012) and Muiruri (2014) attribute to the artisans' lack of training on selling and marketing. They, therefore, lacked the knowhow of promoting their products in the marketplace by persuading and satisfying their customers. They were also unaware of how to tap into new markets, and identify new customers, especially online.

8.3.7 Management Module

A good 20% of the artisans rated the Management module as very good, with 40% rating it as good. The participants felt the content was essential to ensuring the successful management of their craft trade. They would build strong focused management teams in, business analysis, procurement procedures, management, and finance, legal and regulatory requirements, to run their businesses smoothly.

A Nairobi Handicraft artisan said that the module demonstrated the correct aspects of business management, and reflected the current trends of doing business and managing relationships. A Nairobi Handicraft artisan said that the module would enhance their business planning and help them evaluate viability of their enterprises. A Kamukunji artisan said the module was relevant given that they are managers, accountants and artisans at the same time, and thus will teach them how to better control and administer their businesses. An Outer Ring Road artisan acknowledged that the module would guide them on how to set up a more recognized commercial enterprise to provide goods and services to customers. A Nairobi handicraft artisan said the module would help them improve the management of their craft trades, improve their profits and generate improved financial return. A Kamukunji artisan said the module's content identified with their business management challenges, and would enlighten them regarding the management of their enterprises. A Kamukunji artisan said that the content on the module was easy to understand, applicable for their businesses, and would enable them to organize their businesses.

Another 25% rated the content average, with a Nairobi handicraft artisan arguing that it required further development. A Kamukunji artisan said the module proposed lengthy processes of business management that discouraged him from its use. While 10 % rated the module as fair, 2% indicated that it was poor. A Donholm artisan, who said the module was

fair, acknowledged that it would enable them monitor and manage finances. An Outer Ring Road artisan said the module was poor because the content was not yet fully developed.

The majority approval of the module reflected the findings of Yoshino (2011), that the *JKA* experienced serious challenges when it came to the management of their enterprises. The artisans cannot track the growth dynamics of their businesses, since they do not keep records of their transactions; therefore, they can barely ascertain whether they are making a profit or loss. Afande (2015) and Gikenye (2014) note that this is one of the major reasons most of the enterprises end up collapsing. Wanambisi and Bwisa (2013) further note that these enterprises did not hold up because they operated as small-scale survivalist entities with their lack of registration denying them to access credit for expansion. That makes this module relevant because management of design enterprises is essential in ensuring success.

8.4 Preference between the Web-based and USSD Platforms

Table 8.2: Comparison between the Web-based and USSD Platforms

	USSD PLATFORM					WEB-BASED PLATFORM				
	Very Good	Good	Average	Fair	Poor	Very Good	Good	Average	Fair	Poor
Navigation/ Ease of Use	50%	30%	10%	5%		20%	50%	20%	10%	
Visual Appearance	10%	50%	10%	10%		30%,	50 %	10%	10%	
Content and Clarity of the Video Clips						35%	50%	5%	8%	3%
Sign-up and Signing-in Process	30%	40%	30%			30%	30%	10%	10%	5%

Most of the artisans (65%) preferred the web-based platform, while 35% preferred the USSD platform. The web-based platform was preferred for varied reasons to be discussed with following sections. A Nairobi Handicraft artisan favoured its simplicity and clarity, with well-arranged and visually appealing contents. An Outer Ring Road artisan said the web-based platform is accessible online and contains videos and images that provide more information. Another Outer Ring Road artisan said the elements on the web-based platform were properly aligned, showing visual connections that create a clean, sophisticated look for the model. A Kamukunji artisan said that the content on the platform is meaningful, since it correctly interprets their challenges in a manner that is easier for them to assimilate.

Another Kamukunji artisan said that the platform offers practical instructions with theoretical explanations that illustrate the design process; thereby enabling learning new skills. He also appreciated the Marketing module, which would help in selling and marketing online. A Nairobi Handicraft artisan said the platform captured products from the sector and would help in their product advertising.

However, the artisans were concerned about the affordability of the web-based platform, with regards to Internet connectivity: slow uploading and downloading of media content increases costs. These findings concur with Elias (2011) and Franklin (2011) on the effects of low download speeds on access.

A Kamukunji artisan was amongst those who preferred the USSD platform, citing access to the modules even without Internet on her phone. A Nairobi Handicraft artisan also lauded the availability of the platform on feature phones, which favours artisans. An Outer Ring Road artisan said she understood the platform and could use it with ease. The artisans, however, noted that this text-based platform was not as comprehensive in content as the web-based platform, making the former less attractive.

8.4.1 Navigation of the Web-based Platform

The artisans that rated the navigation of the web-based platform as very good, were 20% with 50% adjudging the navigation good. The participants claimed that the functionality was clear because the interface design was well done, as it allowed them to interact with and explore the DDTI. The content was well organized and the pages had simple and useful touch applications. The modularized information on the design processes was divided into several screens, allowing the artisans to access information quickly and easily.

The participants pointed out that it was an intuitive and fluid experience that allowed them to complete tasks or functions in an easy way, because they were able to see and navigate through the web pages to access information on modules, units and sub units. Information was well presented from the homepage, with icons that were clear and easy to interpret. It gave the participants the impression that all the information they require in their design practice and planning would eventually be available on the DDTI.

An Outer Ring Road artisan said the web-based platform was very good since it was easy to use: instructions were clear and easy to understand. A Kamukunji artisan said it was very good because the modules were well structured to guide them on how and where to find

information. A Nairobi Handicraft artisan commended its interactivity, while a Donholm artisan said the platform's user experience was good as he could follow through the modules. Another handicraft artisan indicated that the platform was good because it was easy to reach and follow the information in the modules. Another Kamukunji artisan said the platform was good, but raised concern on the costs of access in terms of data bundles and network availability.

The DDTI also adopted a variation of learning activities as advocated for by the CBET approach, which include audio and video lectures, writing instruction and hands-on activities (Ayonmike et al., 2014). While the text-based mode of the USSD platform cannot provide multi-media content, their service is basically a text-based alternative to the web-based platform that has got multi-media content. The use of multimedia and CBET took into account the learning needs of the artisans, thereby making the DDTI content relevant to the artisans.

However, 20% of the artisans adjudged the platform's navigability as average. An Outer Ring Road artisan said that this was because of their lack of ICT literacy and their inability to read and write, and called for more time to familiarize with the platform and learn how to use the Internet. However, 10% of the artisans rated the platform as fair, with one Nairobi handicraft artisan claiming it was not easy to use, while another indicated that navigation took too long. Another 5% described the navigability of the platform as poor, but did not explain why.

8.4.2 The Web-based Platform: Visual Appearance

The share of artisans who rated the appearance of the web-based platform as very good was at 30%, while just 50 % said that the appearance was good. The participants liked the look and feel of the web-based platform, because of the clustering of information, imagery, pictures, sound, motion, and the design layout auger with all the other elements on the web site. As visual or tacit learners, they preferred imagery and videos when encountering new information, which were more likely to imprint in the mind than simple text. The elements were appealing to their eyes, attracted their attention, and created interest in the DDTI, due to the visual consistency. The pictures and videos provided a much better overview and understanding of the design processes than words.

A Kamukunji artisan attributed the good visual appearance to the good quality of the videos and photos on the platform, which would enhance their education as a CoL. An Outer Ring Road artisan said the platform was good because information was well clustered and visible, with icons that he could easily interpret. A Kamukunji artisan said the platform was well designed with understandable content that was systematically arranged. Another Kamukunji artisan said its colors are eye-catching and clear. 10% of the artisans rated the platforms appearance as average, with a Nairobi Handicraft artisan recommending further development of its content. An Outer Ring Road artisan said that if fully developed, the platform could to be very good. Those that rated the platform as fair stood at 10%, while 1% said the platform's appearance was poor, but did not explain why.

8.4.3 The Web-based Platform: Content and Clarity of the Video Clips.

While 35% of the participants said the content and clarity of the videos on the platform was very good, 50% indicated it was good. The participants agreed that the video clips were informative, educative and ably conveyed information on the design challenges they were facing, while holding the users' attention, reinforcing text. They were short and clear, and left memorable impressions.

A Kamukunji artisan attributed the content and clarity of videos to the combination of text, photos and videos making the platform interesting and easy to understand. A Donholm artisan said the content was good because it was well arranged and educative. A Nairobi handicraft artisan noted that the JK sub-sectors were well represented in the content, reflecting the challenges they face. A Kamukunji artisan said web-based platform was good because the videos were attractive and audible, while a Nairobi Handicraft artisan said the modules are well clustered, legible and easy to understand. An Outer Ring Road artisan said the content and video clarity are very good because the images, text and videos are comprehensible and reflect their working environment.

However, 5% stated that the content and video clarity of the platform was average, with a Nairobi Handicraft artisan claiming that although the pictures were good, the video content was not clear enough, and the text was too small. Eight percent of the artisans rated it fair, with a handicraft artisan arguing that that there was a need for improvement in its clarity, whereas only 3% rated it as poor. A Nairobi Handicraft artisan claimed it is not clear, and that it does not represent all the sub-sector across the country.

The high approval rate of the content on the web-based platform indicated a potential shift in design training in the sector, from TA to m-learning. The DDTI therefore, advanced m-learning pedagogies, since it sought to converge the multimedia component of design training in a bid to facilitate the personalized learning of the artisans. This was highly critical in customizing the design training for use by all JKA. According to Kaur and Bhullar (2013), m-learning involves the incorporation of new technology into existing pedagogies, and goes further to enhance an instructional paradigm shift that will fundamentally change learning.

8.4.4 The Web-based Platform: Signing-up Process

The signing-up process of the web-based platform was very good according to 30% of the participants, with a similar percentage saying it was good. A Nairobi handicraft artisan found it simple, and with clear instructions, while a Kamukunji artisan declared he could sign-up with no help. A Donholm artisan explained that the process is short and easy, while a Kamukunji artisan noted that it provides security for their personal information.

10% rated the processes average, with a Kamukunji artisan saying it takes time, and requires more time to understand. An Outer Ring Road artisan feared they would probably forget the password. Another 10% rated the process fair, whereas 5% rated it as poor, mainly because they are ICT illiterate and were reluctant to access the DDTI.

8.4.5 USSD Mobile-based Platform: Ease of Use

Most of the artisans rated the usability as very good at 50%, while 30% rated the platform as good. An Outer Ring Road artisan said the platform usability is very good because it can be accessed from any kind of phone. A Kamukunji artisan claimed that it was easy to use because it was like m-pesa. A Nairobi Handicraft artisan said the platform is easy to move from page to page whereas some said that it doesn't require the Internet, and is therefore accessible on their simple feature phones anywhere at any time. An Outer Ring Road artisan said that unlike the web-based platform, it did not require access to the Internet. Another from Nairobi Handicraft said it was good because he could access it on his feature phone.

However, 10% rated its usability as average. An Outer Ring Road artisan said she had difficulty in accessing the information on the platform. Additionally, 5% rated it fair. A Kamukunji artisan attributed it to low ICT literacy on their part. At least 5% rated it poor, with an artisan from Outer Ring Road claiming that it is not easy to understand and use, and that it lacks videos and images.

Availing the design training through the mobile phones may reduce computer illiteracy amongst the artisans. According to Kaur and Bhullar (2013), mobile learning is critical in bridging the gap between mobile phone literacy and ICT literacy. In addition, as Lai et al. (2013) argue, the use of mobile platforms in an informal environment enhances communication, collaboration, and the gathering and sharing of information. In this case, the mobile platforms will avail relevant and timely design information to the artisans.

That most of the artisans found the USSD platform easy to use was largely attributed to their familiarity with the USSD-based mobile money transfer service, notably Safaricom's M-pesa, which almost all of the artisans use to send and receive money. The DDTI's USSD mobile platform uses similar operational instructions to that of M-pesa, whereby the artisans key in numbers that direct them to the information that they need. This familiarity with the platform led to a higher usability rating at 80%, compared to the web-based platform's rate of 70%.

Thus, the USSD mobile platform promotes the access of design training through its availability on simple feature phones that cannot access the Internet. However, it denies access to the rich dimensions that the multimedia content on the web-based platform provides. Arguably, this explains the low 70% rating of the USSD platform for appearance, compared to 75% score of the web-based platform.

8.4.6 USSD Mobile-based Platform: Sign-up and Signing-in Process

The USSD signing-up process was rated as very good by 30% of the participants. A Donholm artisan attributed it to easy signing in and up process, while a Kamukunji artisan pointed to its simple procedures with clear instructions. Another Kamukunji artisan said that he could sign-up on his own, as it is similar to the M-pesa mobile money service. Another 40% rated it as good, with a handicraft artisan claiming that the process is short, easy and provides security for personal information.

However, 30% rated the process average, with an Outer Ring Road artisan claiming it takes much time, and requires patience to understand in the beginning. Another Outer Ring Road artisan argued that they might forget the PIN and the password, while a Nairobi Handicraft artisan requested training, as the concept was advanced. Nearly 10% rated the signing-up process as average with a Kamukunji artisan saying that it was time-consuming and difficult

to understand. The process was rated as poor by 5%, with two Nairobi Handicraft artisans claiming that the process was laborious, with the risk of forgetting the PIN.

8.4.7 USSD Mobile Based Platform: Appearance

The USSD platform's appearance was rated very good by 20% of the participants, while 50% adjudging it good. The participants reported that the text was well organized and well clustered, making it legible and readable. A Donholm artisan said the black-and-white colour of the USSD was very good because of its clarity. A Nairobi handicraft artisan also said that its appearance appealed to the eyes, and the content was arranged in an easy to understand manner. A Kamukunji artisan attributed the good appearance to its well distributed visual elements, clarity and good colours and a Donholm artisan found it clear and attractive, while an Outer Ring Road artisan lauded its simplicity, ease of understanding, and its accommodation in their phones.

The platform's appearance as average by 10% of the participants, a Nairobi Handicraft artisan attributing this score to the low appeal of the platform's white-and-black screen, and its lack of any videos. A Donholm artisan pointed to the need for more content. While 10% rated the platform as fair, a handicraft artisan pointed it to the lack of videos and photos. An Outer Ring Road artisan recommended the addition of features, colours and textures, and that the letters should be bold to enhance visibility.

8.5 Interviews with Government Officials

Qualitative data was collected from government officials in fifteen MDAs based in Nairobi City County, using interviews guides (See Appendix 6) for the interview guide). While forty-three government officials were contacted for interviewing, only eighteen semi-structured interviews were realized (See Appendix 20). Some of the government officials were unavailable for interviews, and delegated to their juniors, while the rest were not available for various reasons. The interviews involved introducing the officials to the DDTI before engaging them in a discussion based on the interview guide. The government officials were thereafter served with the Participants Information Sheet (See Appendix 11) and Informed Consent Form (See Appendix 12), which they voluntarily signed before the interviews commenced. The interviews lasted one hour on average, and were recorded using a camera and audio recorder because of their busy schedule.

8.5.1 The Relevance of the DDTI in Achieving Kenya Vision 2030

All government officials interviewed affirmed the relevance of the DDTI to generate skilled manpower to make Kenya a middle-income country by 2030. A Technical and Vocational Education Authority (TVETA) official claimed the model was a relevant and timely innovation that would promote access, quality, relevance and equity of design education for the artisans, and facilitate the achievement of Kenya Vision 2030. Another TVETA official noted that the model addresses the time and resource constraints that stop the artisans from accessing formal training in the mainstream programs. A Vision 2030 Secretariat official observed that since the modules are available on mobile phones, they would enable the artisans to combine their work with training. Another TVETA official concurred that the mobile telephony penetration in Kenya would make the modules accessible to most of the artisans.

A TVETA official noted that the DDTI was inclusive since it does not require any academic qualifications for users to access information. The model would be useful for formal and informal learning or training, and could help moderate formal e-learning platforms since it promotes equity. A Technology Development Centre (TDC) official claimed that the DDTI would also link the artisans with the TVET institutions given that it is developed based on a CBET curriculum. He acknowledged that the various multi-media methodologies for design training, would allow the artisans to choose the modules that suit their learning needs. With the trends in education and training gravitating towards CBET, these results strengthen the case for the DDTI as a viable tool for design training in the JKS.

An ICT Authority official acknowledged that the DDTI would encourage device-centred learning to enable the JKA access design knowledge. A TDC official noted that the model would encourage ICT use in the sector in the marketing and development of competitive products. A TVETA official concurred that the content on the DDTI was well organized, simple, clear and interactive for artisans to plan and organize their businesses. The module would enable the artisans to develop demand-driven products and, enhance product diversification in the sector. An ICT official cautioned that even with its relevance, the artisans would require to protect their designs ideas and products that they share on the platforms using legal instruments, such as intellectual property laws.

The National Industrial Training Authority (NITA) official argued the DDTI would prompt artisans to consider conducting market research, preparing briefs, and developing solutions,

areas that have been missing in the JKS. It will enable artisans to consider following a structured design process to improve their practice and planning skills, and develop competitive products that they could market and sell through the DDTI. A MSEA official noted that the content would help the artisans market their products locally and internationally. A TVETA official indicated the relevance of the marketing module since access to markets is essential for the artisans' enterprises to sell their products. A ministry of Commerce, Tourism and East African Region official also proposed showcasing the artisans' products on the DDTI to attract high-end buyers.

A MSEA official proposed linking the DDTI to relevant government agencies, such as the Public Procurement Oversight Authority, so that the MDAs can be aware of the available *Jua Kali* merchandise. The Vision 2030 Secretariat official noted that the management module would prompt the artisans to implement aspects that are currently missing in their enterprises, making them less profitable, such as competitive costing of their products, and organizing accounts and finances. A KNFJA official acknowledged that the management module would enable the artisans to acquire sound business management practices, given that their apprenticeship training does not include business management. A TVETA official noted that the management module would teach the artisans about tendering processes, enabling them to competitively vie for business opportunities in the government**.**

8.5.2 Jua Kali Artisans as a Resource

The MDA officials concurred that JKA are a crucial resource for the Kenyan economy. A TVET official noted that the JKA are an important resource because they make products for a specific section of the population. He cautioned, however, that they could become a problem if they are not empowered to join mainstream industrial production. His views were seconded by a TVETA official working at Kenya Institute of Curriculum Development (KICD), who argued that the artisans are an invaluable resource for driving the transition of the Kenyan economy to middle-income status in line with the objectives of Vision 2030. He further claimed that they are also a resource considering the sector absorbs the unemployed people in the economy. A TDC officer shared the view of his counterparts from the Vision 2030 secretariat and TVETA, of the importance of the sector in creating jobs in the economy, hence the need to provide it with the knowledge and skills to develop products that can match international standards.

Another official from the Vision 2030 Secretariat also acknowledged that the artisans are the drivers of the economy, as they create jobs and produce goods for the local market. He noted that many Kenyans depend on the sector for their livelihoods, and it also feeds into the mainstream economy, determining its growth. His views were consistent with those of the TDC official who argued that the sector is a resource to the country since it reduces unemployment.

In sum, the interviews revealed that the JKA are a resource in terms of creating employment, and developing products for Kenyans, thus contributing to the national economy, which drives towards the objectives of Vision 2030. Therefore, there is need to enhance their design skills and knowledge, so that they develop more products that are relevant to the local and international consumers.

8.5.3 The Existing Government Policies for the Jua Kali Sector

The interviews with the government officials revealed an expanded focus on the *JKS* through policy formulation. The importance of the sector to the social and economic development of the country is a driving force behind the increasingly favorable policy environment. The new policy environment is cognizant of the JKS' importance to the economy and seeks to provide modalities for strengthening it. According to TVETA officials, the country is far from achieving the skills ratio needed to industrialize. For example, every engineer should be backed by three technologists, 12 technicians and 60 artisans; calling for deliberate efforts to train these cadres.

The KICD official noted that the Sessional Paper No. 14 of 2012 that advocates for the reformation of Kenya's education and training sectors, meaning that the artisans will benefit from changes that seek to introduce CBET in the TVET institutions. A TVETA official confirmed that the sessional paper radically shifts education and training in the TVET institutions in three significant ways: curriculum development shifts from the subject-based, supply-driven, time-bound courses to CBET; diversified programs and courses designed for flexible delivery through a modularized system; and curriculum delivery modes that are diversified. The officials noted that these programs would be developed in consultation with the industry for every sector.

An official from the Vision 2030 Secretariat noted that the curriculum review focused on the incorporation of talent development into the schooling system. This would allow for

education and training to shift from being purely academic, to also take into account the other unique potentials of every learner. According to the TVETA officials, they are mandated to provide structured training for both the formal and informal sectors. The authority therefore, seeks to ensure that the JKA are formally trained through CBET, and that they acquire certification for their skills.

The TVETA official noted that the DDTI would be relevant for training JKA given that the economy requires hands-on labour to transition into a middle-income status. The DDTI will be linked to the mainstream education system, and would be rolled out to all vocational training centres in the constituencies, technical institutions in the counties, and national polytechnics in the regions. The DDTI would also open up training opportunities through the Kenya Universities and Colleges Central Placement Service (KUCCPS).

A TVETA official further explained that the authority is in charge of post basic education training, and is undertaking key reforms to implement the stipulated by the Sessional Paper No. 14 of 2012 on Reforming Education and Training Sector in Kenya. Among the reforms is the diversification of curriculum delivery, and the curriculum shift to CBET with the learner choosing among diverse courses and programmes. The training courses will be based on occupational standards developed in collaboration with industry. The new education system will therefore provide the learners with the opportunity for multi-skilling at their own pace, based on their learning needs. He further noted that the directorate is establishing a TVET Curriculum Development Assessment and Certification Council, which will guide and structure the implementation of CBET curriculum in TVET institutions. The DDTI reinforces this because it is modularized, learner-centred and outcome-based to build on the confidence of the artisans and allow them to take charge of their learning as they progress in building their competencies.

A Vision 2030 Secretariat official said that the government had started up various flagship programs, some of which are aimed at enhancing capacity in the country. He acknowledged that the government was in the process of reforming the system of education and training in Kenya, focusing on CBET. Another Vision 2030 Delivery Secretariat official claimed that the government has established MSEA, which is specifically mandated to promote JKS capacity building.

A KNFJA official noted that the Vision 2030 seeks to modernize the MSE sector by building their capacity for innovation, design and product development, and standardization. In line with this, a NITA official indicated that their authority certifies skills that artisans have acquired outside formal training institutions, and noted the increase in the number of artisans currently seeking certification. The official saw the need for a legal framework, and for a curriculum that compels artisans to seek certification of their craft skills. He felt that JKA required certification by NITA to allow them practice. He was convinced that the DDTI could train many artisans with relevant knowledge and skills in preparation for NITA certification.

8.5.4 The Challenges of Government Policy Implementation

The implementation of the various government JKS policies and regulations face various challenges. For instance, a former TVETA official claimed that Vision 2030 aims at making local manufacturers compete internationally, but this has not been fully achieved because of the low quality of local products. He also pointed out that there is a slow uptake of technology in the JKS, yet the sector needs to embrace new technologies in order to improve the quality of its products.

He further noted that the artisans have an attitude problem that is manifest in a dependency syndrome, where majority expect the government to address their needs, instead of being proactive and innovative. He said that even though the government is providing some funding to the sector, it is doing little in terms of structuring the processes for supporting the artisans training especially in the manufacturing sub-sector. The TVETA views were consistent with those of a Vision 2030 Secretariat official and of the Ministry of ICT, who also blamed the lack of JKS progress on the rigid attitudes of artisans, some government bottlenecks, and the lack of the political good will to upgrade the sector. These observations echo Muiruri (2014) who established that the JKS legal and regulatory environment suffers because they operate in the shadow, avoiding all the legal requirements expected of micro and small enterprises.

For a TVETA official, the realization of Kenya Vision 2030 will continue to be challenged by the personnel and skills constraints, illustrated above for engineers and related personnel. His colleagues also pointed to the shortage of technical teachers in the institutions that train artisans; and while the output from the technical training institutions grows, the industry

base is stagnated by a skills-mismatch. In sum, the government officials emphasized that some of the *Jua Kali* related policies are ideal for the sector since they are benchmarked with international standards. Such policies reflect the increasing recognition of the sector's potential role in the economy.

8.5.5 Resource Availability for Supporting the Jua Kali Sector

The government has set aside resources with which to exploit JKS' known potential. A TVETA official claimed that resources are being channelled into the sector, but there are inadequate structures for the funding process to make the sector self-sufficient. A TVETA official said that the devolved government had ensured that resources were decentralized to benefit youth training in polytechnics and technical training institutions. The Vision 2030 Secretariat official also concurred that there was enough financial funding for the sector, channelled towards reviewing the curriculum and funding for vocational training in various institutions. This is aimed at creating the link between industry and the education system.

However, the TDC official claimed the government has not provided enough resources for skills development, leading to stagnation. The government is, however, limited regarding funding as the challenges in the JKS faces are multifaceted and numerous. The TDC official noted that JKA themselves do not provide the government with the incentive to help out because their rigid attitudes have rooted their businesses to informality, where they do not pay taxes and never keep records. This cannot qualify them for funding to train and improve their enterprises.

8.6 Conclusion

This chapter has presented the results, findings and discussion on testing the relevance DDTI in developing design practice and planning skill in the JKS and its facilitation in the achievement of Vision 2030 The quantitative analysis from the artisans' questionnaires and the qualitative analysis from the questionnaires and the government officials' interviews demonstrated that the developed DDTI could be used as a tool for training in the JKS. The chapter explored the features, content, delivery platforms, and the relevance of the DDTI in not just enhancing design competencies in the sector, but also in leveraging the realization of the Vision 2030 through linking the training with the TVET institutions.

CHAPTER NINE

9.0 Introduction

This chapter reviews the aims and objectives of the study and how they were achieved. It explains the research limitations of the study and how they were overcome. The chapter also discusses the study's contribution to knowledge, and how its findings could be carried forward. It also makes recommendations for further studies.

9.1 Aim of the Study

The aim of this study was to create a competency-based Digital Design Training Intervention (DDTI) model for enhancing *Jua Kali* Artisans (JKA) knowledge and skills through m-learning in line with Kenya Vision 2030. The research was conducted in three phases based on each of the objective of the study namely:

I. To identify existing skills and skills gap in design practice and planning in the *Jua Kali* manufacturing sub-sector;
II. To develop a cost-effective design training model (DTM) for capacity building through m-learning for the *Jua Kali* artisans; and
III. Test the relevance and feasibility of the design-training model with the JKA and Government officials from relevant ministries, departments and agencies

Therefore, the first phase involved carrying out a needs analysis to identify the existing JK skills and the consequent skill gaps in design practice and planning in the manufacturing sub-sector. In the second phase of the study, the identified skills and skill gaps in design practice and planning led to the development of a framework for a competency-based DDTI model that would be delivered through m-learning. In the third phase of the study, the DDTI was tested with artisans to see if it enhanced their existing competencies, and addressed their challenges in design practice and planning. It was also the tested with officials from various government ministries, departments and agencies (MDAs) to verify if it can contribute to the achievement of Vision 2030.

9.2 How the Objectives Were Achieved

The onset of the mixed methods research approach involved a comprehensive review of the local and global literature on various issues in the context of the small and medium enterprises. This review provided the background to the study, helping to firm up its

objectives and methodology. Action Research (AR) was used to achieve the three objectives of this study, cognizant of Coghlan and Brannick's (2014) definition of AR as a research approach based on a collaborative problem-solving relationship between the researcher and client, to solve a problem and generate new knowledge. Thus, the study adopted Crouch and Pearce, (2012) four stages cycle of observation, reflection, planning and acting stages, to which was added a testing stage.

To address the study's first objective, the observation stage of the study involved a practical identification and discussion of the existing design skills presumably acquired through TA, and the challenges faced by the JKS artisans of the manufacturing sub-sector. At the observation stage of AR cycle, a documentary was produced that captured extremely rich visual and oral data on JKS activities from multiple perspectives. This included the complexity of artisans' experiences, and the variety of skills and products in their working environment. Semi-structured interview guides were used to collect data that was analysed using mixed method research to identify the skills and skill gaps in the JKS. The outputs of semi-structured interviews was triangulated with the output from focus group discussion and non-participant observation, to enhance the credibility of data obtained, and to get in-depth information from the artisans who are tacit learners with rich qualitative information.

The second objective was to develop a cost-effective DTM for capacity building through m-learning for the *JKA*. This objective was achieved through the adoption of the next three stages of AR cycle, namely reflection, planning and acting to develop the competency-based DDTI model. At the reflection stage, the JKA's skills and skill gaps identified during the observation stage were developed into a framework for a DDTI using of the competency-based education and training's (CBET) functional analysis methodology. The complex design processes were broken into the four General Areas of Competencies (GAC) or modules: Design; Production; Marketing; and Management. Each of these modules was divided into smaller components, or skills and sub-skills that including specific tasks that the artisans can perform to demonstrate command of competencies.

At the planning stage consultants and technicians, artisans and the research team collaborated in the research and development, designing the layout and digitization on the content of the web-based and USSD platforms. The content framework that was developed

at the reflection stage was used to generate the wireframes and design layout for the DDTI. Semi-structured interview guides and video recording were used to seek the artisans' input into the development of the DDTI.

The acting stage was more iterative because it involved going through successive phases of discussions and refining the DDTI, with each step building on the previous one, to improve the quality and functionality of the DDTI. The artisans provided insights on the relevance of the DDTI's content, its functionality, and the suitability of the multimedia content. The navigation through the content on the platform using graphic elements was discussed. The layout and styling of type to differentiate types of information and establish a sense of hierarchy and moderation was also discussed. Changes were implemented at each stage.

The web-based and USSD platforms were finalised to facilitate the delivery of the design content through the mobile phones and mobile devices, to empower the artisans to take charge of their learning independently or communally, to create new knowledge. The web-based platform was developed, targeting artisans with smart phones, whereas the USSD platform was developed targeting artisans with 2G phones. All the stages except the reflecting stage were iterative because they aimed at refining and implementing changes to ensure the DDTI works effectively on their mobile phones. That is why the artisans, researcher, Studio ANG consultants and the technicians were actively involved at each stage, to generate new understanding and provide in-depth appreciation of the functionality and appearance of the DDTI. M-learning was adopted in the delivery of the content on the platform, leveraging on the widespread adoption of the mobile telephony among the artisans who can neither afford to stay away from work, nor attend formal school.

The competency-based DDTI is learner–centred, with the learning process facilitated by virtual teachers. The content was modularized to give prominence to the artisans' individual design practice and planning needs, and learning is self-paced and customised. Learners thus have equal opportunities and autonomy to direct their own learning, and demonstrate competencies. The DDTI processes are modularized in new ways that should transform the artisans as a community of learning (CoL) to follow a structured design process that is progressive, practically oriented, and accompanied by theory. The artisans

are expected to demonstrate knowledge and skills learnt by showing their learning outcomes at the end of units or sub-units.

As a community of practice (CoP), the artisans require no academic qualifications to access the DDTI. This overcomes the typical roadblocks to accessing formal and non-formal training institutions, where progression is determined through assessment. As stipulated in the DDTI, as a community of learning (CoL), the artisans choose the competencies to learn, and in what order, and may even choose to refresh their learning at their convenience. They also have the freedom to choose the mode of learning provided through various multimedia options, including text, photos, audio, video and later on animation. As a CoL, the multimedia options of the DDTI facilitates interaction between the artisans and the instructor through situated learning, to develop higher order thinking. In this way, the artisans become the creators of knowledge, as they interact and form networks by connecting to special sources of information. This made the DDTI accessible, convenient and cost-effective to the artisans, in contrast to the available training programmes. The artisans do not also need to leave their workshop to attend training sessions. The more they use their mobile phones to access design knowledge, the more adept they will become at navigating the Internet in search of information, improving their ICT literacy.

The third objective of the study was to test the relevance and feasibility of the DDTI among the artisans, and to have officials from relevant MDAs assess its significance in facilitating the achievement of Vision 2030. Due to their busy schedules, semi-structured interviews were used with the government officials. Embedded mixed method research was adopted to analyse data. Non-participants observation was used to observe how the artisans interacted with the DDTI. Questionnaires were administered and convergent mixed method research was used determine the efficiency of the DDTI with the artisans. Testing stage of the AR cycle opens ways further modification at a later stage.

9.3 Limitations of the Study

This study set out to fill the gap in academic research on skills development in the JK manufacturing sub-sector, especially in regards to design-training under TA, and on the MC/apprentice relationship. The gap has resulted in a limited understanding of the design practice and planning skills in the JKS. The methodology for data collection involved

conducting a needs analysis in the first phase of the study, seeking to understand how JKA acquired their competencies. The researcher found little or no documentation on the JKS artisans' enterprise numbers and their skill sets, either at any ministry, or the Medium and Small Enterprise Authority (MSEA), or the Kenya National Federation of *Jua Kali* Associations (KNFJKA). This undermined the intention to generate a study sample using a probability sampling method. Consequently, the researcher turned to the Provincial Enterprise Development Officers (PEDOs) to assist in mapping the *Jua Kali* manufacturing sub-sector activities, focusing on the major clusters, namely woodwork, metalwork, pottery, and handicrafts.

The reliance on third parties was also a limitation because there was some difficulty in accessing the artisans who are widely dispersed geographically, with many of them not belonging to any specific JKAs, and their businesses were not registered by government authorities, and often having no registered permanent reliable working space. That is why purposive sampling was selected. The PEDOs' presence also elicited trust of the researcher by JKA who are often reluctant to be interviewed by strangers. The PEDOs helped in the research sample selection, and were present during data collection, facilitated the shooting of a documentary in four counties the study was restricted to due to resource constraints.

The study took longer than anticipated because ICT literacy levels are low in the JKS and most JKA have 2G phones. To overcome this during fieldwork we got rooms, where the DDTI was projected and its use demonstrated to the artisans before proceeding to collect data. iPads and LG Duo Core smartphones were availed for artisans to access information on the USSD and web-based version of DDTI before filling the questionnaires.

The senior government officials interviewed did not have time to scrutinize at the DDTI and fill in the interview guides. That is why interviews were recorded to get as much in-depth information as possible in the short time they provided. The interview guides were later transcribed. Two people were recruited to transcribe the interviews because the work was time consuming.

The low literacy levels of the *Jua Kali* artisans restricted the researcher to communicate in English, Kiswahili or Dholuo instead of English only. Translating the interviews guides and questionnaires into a convenient language was an option but was not adopted because the language barrier was not anticipated. This was a limitation because to get reliable

information more time was used since majority of artisans were more comfortable communicating in Kiswahili than English. Few artisans communicated Dholuo as they could neither express themselves well in Kiswahili or English. When the samples were picked it was not anticipated that some might not be able to read, write and communicate in English or Kiswahili. Participants who could speak Dholuo were assisted to fill the questionnaires because the researcher can speak and write Dholuo. Some could read English but were not able to confidently write it. Others were allowed to answer the questions in Kiswahili. Those who could not use any of the two languages and were assisted to fill the questionnaires to save on time and to get accurate information.

The mixed method research design used in all phases of the study. It was demanding on time and resources to implement this research design because it combined different data, data different data-collection methods and data analysis within two phases of the same study. This made it complex, time consuming and expensive as it involved the collection of both qualitative and quantitative data in each field visit. The data was analysed separately through their respective processes before triangulation to seek convergence and corroboration of results from the two different methods. This was made easier by recruiting two researchers assistant to help in the collection, recording and transcription of quantitative data.

The Action Research (AR) design that was used in the all the phases of the study was costly and took a lot of time because it was iterative process between the artisans, consultants who participated at each stage except the reflection stage. The findings were being implemented at each stage because it was educative for all involved, learning and change occurred within the AR process. It was also was collaborative process with artisans whose education level were low, ICT skill had limited time to spare away from their business. This was also created a challenge because developing the DDTI meant understanding and appreciating meaning of skills development in the JKS and how the artisans or JKAs construct their trade. This was made easier by allowing the artisans to express himself or herself in English, Kiswahili or Dholuo. The interaction at each stage except reflection stage was recorded in both audio and video and photographs taken to allow the research team to spend more time observing and listening to the artisans' contributions at each stage, build and archive photos for the research, and edit and create videos for the DDTI. It also

allowed for time to analyse and reflect on the data collected away from the artisans at each stage of the AR cycle because it was used to inform the subsequent stage and practical step in the research process. To save on time, consultant and technicians were engaged to be part of the team that developed the DDTI.

The constraints of time and funds meant the study was not able to fully develop the web-based platform; so only a portion of the design module was developed and tested as a prototype. Having access to a Gateway to deploy a real working USSD application was extremely expensive; therefore a Gateway or USSD simulator was adopted for purposes of demonstrating how the USSD platform would work when fully developed.

9.5 Contributions to Knowledge

TA is a common pre-employment training scheme in the Kenya's JKS, which targets the youth from poor households, mainly those with low education attainment (Robb et al. 2014). JKS accounts for about 14.9 million jobs which was about 85% of all new jobs in Kenya in 2015 (Kenya National Bureau of Statistics, 2016). Despite JKS' importance to the economy, there is no readily accessible database on the same in ministries, MSEA, or KNFJKA especially on the number of artisans, their competencies, training needs and the products they make in the manufacturing sub-sector. This sector is expected to continue creating employment, but there has been limited academic research on skills development in the manufacturing sub-sector and TA in Kenya to fully understand how the artisans acquire knowledge and skills, their craft processes, marketing and selling of their products, operations of their business, their strengths, and what their real design education needs and challenges are. This study has brought new knowledge by practically investigating and identifying the existing skills and skill gaps in design practice and planning in the context of Kenya Vision 2030, and developed a solution to fill this knowledge gap.

The development of the DDTI model is a contribution to knowledge because it is the first in-depth, evidence-based, epistemological research in the domain. The study is a ground breaking exercise that investigated, developed, tested, communicated and distributed the relevant design knowledge and skills through m-learning, by gathering evidence that indicate sustainable future developments in design, education and technology. It is the first time that a DDTI has been used enhance the *JKA* knowledge and skills in design practice and planning, and improve their control of their design through m-learning. The research

has conclusively shown that the JKA would benefit from the USSD and web-based learning through smart phones. This is because probably in the next twenty years the richness and reality of technology, the smartphones will be more sophisticated, and the JKA will be in a virtual world, where they could access top masters in craft globally. There then is a possibility that face-to-face apprenticeship would be less critical, because artisans would be able to interact with the DDTI- programmes to acquire and enhance new knowledge and skills.

The AR cycle used in developing the DDTI, which was used to understand the needs and develop the skill-sets, is a contribution to knowledge that others can use. Each of the AR cycle stages filled a knowledge gap that was identified in skill development in the JKS. The identification of the existing skills and gaps in design practice and planning in the *JK* manufacturing sub-sector through needs analysis is a contribution to knowledge. This is because at the observation stage of the AR cycle, a situational analysis revealed a gap in the TA graduates' training, where it lacked a systematic design process, which affects the quality of the end product. TA does not include comprehensive theoretical explanations of the design process. AR process was used to bridge the theory-practice gap in skills development in the JKS. The social connections in TA do not usually translate into an interactive learning process facilitated by the MC. The identified design skills and skills gaps in TA in the manufacturing sub-sector of the JKS was an area that minimal research has previously been carried out. This research led to the development of literature on skills development design practice and planning in the JKS in Kenya.

Majority of the participants admitted they have inadequate design skills because of the lack of time and financial resources to join formal technical training institutions to further their education. That is why they resort to acquiring skills through TA, which they join based on their social networks to experientially acquire tacit knowledge and skills, which is not founded on theory. The major challenge in TA is normally the credibility of the MCs whose skills may be limited in scope, since they likely also learnt their skills through TA.

The study has resulted in a greater understanding of the MC/apprenticeship relationship because it was established that there are significant gaps in the JKS design practice and planning during TA. This could be because the relationship between the MC and apprentice is normally based on social networks, as opposed to identification of the skill needs prior to

starting TA. The MC's teaching will be augmented by the DDTI to enhance the acquisition of design knowledge and skills through enabling the artisans to initiate or upgrade their learning by first identifying individual skills needs before commencing training.

In the Design module, the DDTI teaches the artisans how to do a detailed assessment of the current market situation and develop an understanding of it and the various opportunities it offers, helping the artisans to isolate their target market. They would achieve this by carrying out market research and precisely identifying the design problem and its constraints, to enable them come up with an exact solution by identifying the people's needs and how to fulfil them. This knowledge gap is being filled because majority of the participants admitted that they do not know how to carry out market research. Those who do lack resources to enable them conduct research. Majority of the JKA are, therefore, not able to analyse the market trends and their competition to guide them in developing competitive product ideas that would meet the needs of their target market.

Some artisans had declared ignorance of how to create and document briefs for their products; so the DDTI fills this knowledge gap by teaching this to them. Such briefs would incorporate accurate write-ups or sketches with which to generate good ideas. This shortfall arises from TA graduates' reliance on customer specifications, mere replication or modification of existing products or ideas from magazines and exhibitions. They, therefore, generate ideas by observing, copying, sharing and imitation as they develop tacit knowledge and skills.

TA does not encourage creativity, so the artisans do not see the necessity of generating ideas. This reflects a knowledge gap because time, money and effort will inevitably get wasted to make products since the brief, concept and product may not outline their target market needs. The DDTI fills this gap by teaching the artisans to develop potential market-driven design solutions through brainstorming, modelling or sketching into an idea based on the design brief. It enables them to identify the ideal methods, material, tools, and techniques necessary for production.

TA does not usually follow a structured production process. There is a lot of trial and error, which leads to wastage of material and time. The majority of artisans do not make prototypes because they feel it is a waste of time and money. The Production module of the DDTI fills this gap by teaching them how to follow a structured design process, to

eradicate working randomly and failing to fully address design issues. The artisans learn to work out costs, available budgets and the time required for production, and make products that best meet the needs and goals of the design brief, and address the requirements of the target audience.

In regards to marketing, the study established that most of the artisans are not trained on selling and marketing skills, and depend on word of mouth, exhibitions, trade fairs, and walk-in customers. The DDTI Marketing module creates new knowledge by teaching the artisans how to improve their sales and marketing strategies. This is achieved through teaching artisans how to further persuade and satisfy their customers by creating and capturing customer value by fully understanding of the market place and customer needs. They learn how to improve on customer care, and also influence the demand for their products by providing a wider variety and better quality products. The DDTI teaches the JKA good advertising, packaging and branding, to define their products' identity, provide product information, benefits and features. It also educates the JKA on why distributing their products widely could also influence the selling and marketing of their products.

Additionally, the study found that most artisans lack business organization skills, while only a few have some management skills. The majority of JK enterprises did not have any organizational structures. This knowledge gap is filled by the Management module of the DDTI where the artisans will be taught business organization skills to help them have a management overview, regarding accounting and financing, legal requirements, procurement processes, amongst other topics.

The DDTI has a web-based and USSD platforms that is professionally designed to address low literacy levels, lack of ICT skills, lack of qualified trainers, accessible, affordable design training programs, and time constraints to further education. The majority of the artisans had 2G mobile phones that they used mainly for communication and money transfers, and not for learning. Since the network speeds of such phones are low, downloads would be unaffordable for people from such poor backgrounds; so a USSD platform was designed as a more affordable alternative.

The next stages of the DDTI model was developed through reflection, planning and acting stage of the AR cycle to fill the identified skill gaps in design practice and planning. The second objective was achieved by contributing knowledge in several stages.

The DDTI framework for design education is a contribution to knowledge because the information about the JKA design training needs was used to develop specialised content for a competency-based DDTI at the reflection stage of AR cycle. The DDTI content was thus modularised, including four modules namely: design, production, marketing and management. Each of these modules or (GAC) was made up of skills and sub-skills that target the needs of the artisans in their respective crafts framework. It provides a new comprehensive CBET approach for training in the JKS, which inculcates concepts such as the CoP, CoL, facilitative and reflective practice, workplace learning and Socratic learning. This encourages artisans to acquire design knowledge and skills by asking questions, collaborating and stimulating discussions to guide their decision-making processes. CBET is thus introduced in the JKS through the DDTI to ensure there is relevant transformative learning, by having a demand driven framework based on competencies that the artisans require to be an effective CoP and CoL. The DDTI sought to help the artisans to more explicitly articulate, negotiate and defend their tacit knowledge.

As a CoP, the DDTI introduced facilitative learning to the JKS, which emphasize on the role of teachers and students as collaborative partners. The DDTI's virtual instructors are scaffold builders and critical reflection enhancers through passing modularized design information to JKA, and building support through scaffolding the knowledge to create a broader and deeper understanding of the design process. Additionally, the threshold concept in the DDTI bridged the knowledge gap in TA and brought out the design knowledge and skills that are key to artisans design practice and planning.

Digitising the content for the framework of the competency based DDTI, and availing it in the web-based and USSD platforms at the planning stage, is a contribution to knowledge since it overcomes the constraint arising from the lack of time to go into formal classroom training and lack of qualified trainers. The DDTI introduced device-centred learning by availing relevant modularized contents for training artisans to acquire knowledge by simultaneously connecting their experiences and informal learning.

The DDTI provides its members with a virtual space, where they interact irrespective of geographical, cultural or language barriers. There are no requirements to belong to any particular JKA: access depends only on having the required devices for mobile technology. In this way, they acquire a wholesome understanding of the design process through the

knowledge shared, rather than being limited by the MC's scope under TA. The DDTI sought to develop the artisans' ability to connect, communicate and collaborate using their mobile phones to strengthen their CoL and CoP concept. This is a departure for the conventional education guided by specific curricula that are examined and are time-bound.

The DDTI hopes to bridge the training gap as well as compliment the analogue TA training by introducing the artisans to design knowledge and skills in digital world. This provides a training framework that integrate CBET into apprenticeship thereby improving their training capacity and increasing access to design education for life-long employability of the artisans. It is the first time the JKS can access information and knowledge on design practice and planning as an open educational resource delivered on mobile phones.

The DDTI development involved an iterative process especially at the acting stage because it was a problem-solving relationship of discussion, refinement, modification and learning at each stage, with one step building on its predecessor. The DDTI provides personalised learning and give the artisans as a CoL more autonomy that help build their self-esteem by enabling them to take charge and direct their learning through communicating, gathering and sharing information to transform the JKS into a Virtual Community of Practice (VCoP) and Virtual Community of Learners (VCoL).

The DDTI contributed to knowledge by using the converging media of video and voice recording, mobile technology, and Internet access to facilitate personalised learning and customizing it to JKA low literacy and low education status. Consequently, the DDTI has simple, legible text, clear videos with relevant content for design practice and planning, allowing real time collaboration and access anytime anywhere. It also combats resistance to ICT use and literacy, and should lead to higher quality workmanship and more professional approaches to design practice and planning.

The DDTI bridges the gap between the world of academia and the informal sector, which are especially apart in design education. This gap will be filled by the DDTI because when fully developed, the seventh step of functional analysis teaching method of CBET is determining the performance criteria, the eighth is validating the functional map and the ninth steps where standards are developed. The study proposed further research in these areas. The three steps above would enable the assessment of artisans for opportunities to

join the mainstream technical and vocational education (TVET) institutions for upward mobility of training in design practice and planning.

The DDTI is a contribution to knowledge because JKAs and government officials from relevant MDAs confirmed its relevance and feasibility at the testing stage. The testing established that the DDTI addressed the gaps in design practice and planning in the JKS manufacturing subsector through capacity building and enhancing design knowledge and skills using m-learning, and would facilitate the attainment of the Kenya Vision 2030. The model promotes access, quality, relevance and equity in relation to design training for artisans, addresses the constraints that artisans face over formal training in the TVET institutions.

According to the government officials, the DDTI is a relevant and timely innovation that would promote the access, quality, relevance and equity of design training for the JKS artisans, thereby contributing to facilitate the achievement of Kenya Vision 2030. This is because there is a general shift in terms of government policy towards the JKS, which reflects the government's acknowledges the sector's contribution to the country's social and economic development.

9.5 Recommendations

I. Further development of the GACs on the competency-based DDTI: each skill and sub-skill should be furnished with additional multimedia content, which will detail out the design processes for the variety of products that are manufactured in the sub-sector.

II. The DDTI should include information on the government procedures and processes that will enable the artisans to engage with government in business. It should increase the focus on the JKA through a more iterative policy formulation process, availing relevant accessible training in line with Vision 2030.

III. The DDTI interactivity should be enhanced to enable the artisans construct new design knowledge and share it as a VCoL and VCoP on the platform.

IV. The DDTI content should also be developed in various local ethnic languages, at county level that have a constitutional mandate to preserve culture and traditions. This will help bridge the low literacy levels of the artisans not conversant with English or Kiswahili. The pages may include oral headings prompting the readers on

how to navigate the platform for the information that they require.

V. Further development of the DDTI should include animations instead of video clips, particularly in the demonstration of the design processes. The videos should instead be accessed through links on the platform that will lead the artisans to a YouTube channel.

VI. The development of A DDTI version for people with disabilities, e.g. hearing difficulties.

VII. The *Jua Kali* artisans should be provided with basic ICT training to enable them to use the model with ease and effectiveness by interaction, and participating to create a solution through knowledge development and creation.

VIII. The skills training provided amongst the TVET institutions and TTIs should also include design processes and not just focus on marketing and management skills.

IX. There is need for intellectual property training, legal support and training the artisans on the need for registering cooperatives to help them sell their products at local and international trade fairs.

X. Include on the model information about government procurement procedures and processes to enable the artisans to engage in business with the government.

XI. The government should develop a policy regarding skills development in the informal sector.

XII. The government should develop a comprehensive national and county level database on the JKS through conducting a JKS census. There also should be collaborations between ministries, county governments, MSEA and KNFJKA over the management of such database to enable the recognition of available skills in the sector and the skills gaps. Such statistics may also be helpful regarding national planning in the sector.

9.5.1 Recommendations For Further Studies

I. Further research on the effectiveness of the DDTI in enhancing the design skills of the JKA after the modules on the DTM have been fully developed to include all the targeted skills and sub-skills.

II. Further research should be conducted on a *Jua Kali* learning theory.

III. Greater in-depth research on TA/MC relationship in skills development.

IV. Due to the cyclic nature of the AR further research on the DDTI should be conducted to include detailed analysis and reflection of the data collected at each stage, which should involve a wider sample of artisans drawn from a broader scope of the subsectors in order to generate a wider variety of shared problems given that the AR method allows for learning as change is implemented.

V. Further research on the improvement of the DDTI with the use of more co-design and participatory design that will cover more design activities that include more participants such as designers, educators and IT specialists to initiate and share problem solving activities that will enhance the JKS design practices.

VI. Further research on the implementation of the seventh, eighth and ninth steps of functional analysis, which involves the determination of the performance criteria, validation of the functional map and the development of standards to enable the assessment of the artisans for opportunities to join the mainstream TVET institution for upward mobility of training in design practice and planning.

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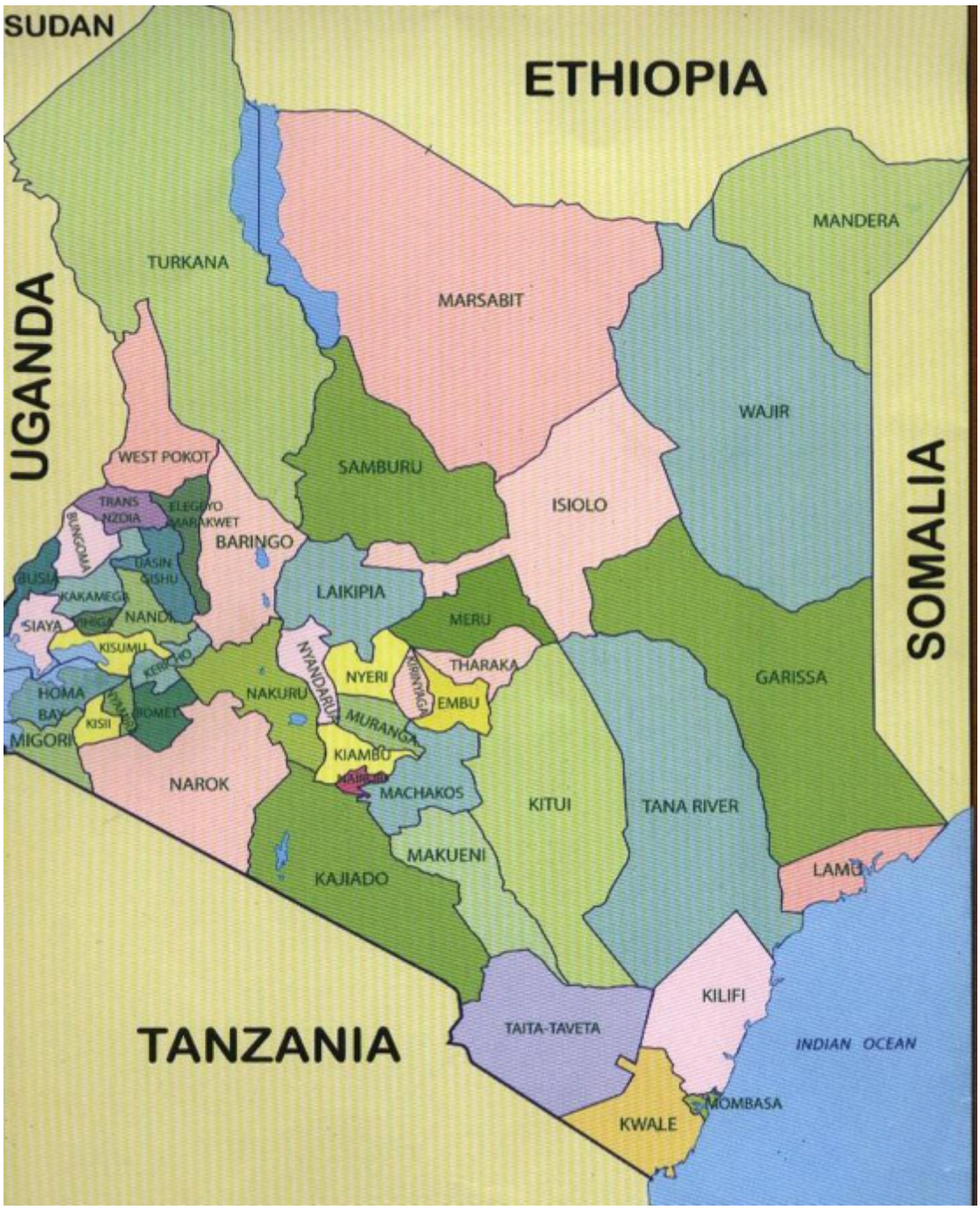
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APPENDICES

Appendix 1: Maps of Counties



Appendix 2: Observation Schedule

Observation Schedule	
Name of Cluster:	*Date:*
Time:	*Duration:*

DESIGN • **Brief Preparation and Documentation** • **Idea Generation**	***Observation/comments***
PRODUCTION • **Prototyping** • **Production Processes** • **Working Conditions** • **Tools and Equipment** • **Local Cultural Products** • **Skills and Technologies**	
MARKETING • **Marketing strategies**	
MANAGEMENT • **Business Organization**	

Key points discussed:	***Strengths identified:***	***Agreed areas for development:***
Signed (Observer) ***Date***		***Signed (Artisan)*** ***Date***

Appendix 3: Questionnaire for Testing Efficacy of the DDTI

Section A: General Questions on both platforms

1. Do you think the implemented platforms will enhance the businesses of the *Jua Kali* artisans?

   O Yes **O** No **O** Not sure

   Explain Why

_____

_____

2. How would you rate overall the **content** of the Digital Design Training Interventions?

   O Poor **O** Fair **O** Average **O** Good **O** Very Good

   Why

_____

_____

3. Has the information been **grouped** clearly?

   O Yes **O** No **O** Not sure

   Explain

_____

_____

4. Is the **content** for the design **module relevant** and does it interpret their challenges?

   O Yes **O** No **O** Not sure

   Explain

   _____

5. Do you think the **content** for the **production module** is **easy to understand** and can **improve** the production skills of the artisans?

   O Yes **O** No **O** Not sure

   Explain Why

   _____

_____

6. Do you think the **content** for the **marketing module** can improve the **marketing skills** of the *Jua Kali* artisans?

   O Yes **O** No **O** Not sure

   Explain Why

_____

_____

7. How would you rate the **content** for the **management module** on the platforms?

   O Poor **O** Fair **O** Average **O** Good **O** Very Good

   Explain Why

_____

_____

8. Which of the two platforms do you like most, and would prefer to use?

   O The Web Based Platform **O** The USSD mobile Based Platform

   Explain Why

_____

_____

Section B: Web based platform

1. Is the platform easy to use (navigability)?

   O Poor **O** Fair **O** Average **O** Good **O** Very Good

   Explain Why

_____

_____

2. How do you rate the **look, feel** and **color** of the web based platform?

   O Poor **O** Fair **O** Average **O** Good **O** Very Good

   Explain Why

_____

_____

3. How would you rate the content and clarity of the videos?

O Poor **O** Fair **O** Average **O** Good **O** Very Good

Explain Why

_____

_____

_____

_____

Section C: USSD Mobile based platform

4. Is the platform easy to use?

O Poor **O** Fair **O** Average **O** Good **O** Very Good

Why

_____

_____

5. How do you rate the **look, feel** and **color** of the **USSD** platform?

O Poor **O** Fair **O** Average **O** Good **O** Very Good

Why

_____

_____

Appendix 4: Interview Guide to carry out a Situational Analysis of the Skills Acqusition during Traditional Apprenticeship in the Jua Kali Manufacturing Sub-sector in Kenya

No	Notes	Discussion Guide
1	**Personal Background Information** Entrepreneur's name Family Background Effect on the business May have their family that is part of the business.	Name Where do you come from? How many children are you in your family? Where do you fall? How old are you? Are you married**?** How many children do you have? Boys…Girls What activities did you do in the family (vernacular term for home) and has it helped you.
2	**Background Information** Types of Business: Individual, Society, Cooperative, Association or others.	What the business name? What time do you open and when do you close? How many people are employed here? How long have you been running it? Does this place belong to you or is it rented? How much rent do you pay? Electricity; water; telephone; salaries/Wages and any loan repayments Do you intend to continue running it? For how long? Making the same products?Apart from you who else works with you and what do they do?
	Business Profile	Address & Telephone number? Tell me about the name of the business? Do people know about your business? How do your customers know about your business and where you are located? What product do you sell? Do you have a website?
3	**Market Strategy and Analysis** How do you identify your customers?	• Walk in • Market driven • Hereditary skills • Respond to what comes in. • Tourists, • Locals • Brokers, wholesalers • Regular customer, • Passerby's, • Occasional customers
3	**How do you come up with Product Ideas**?	**How you generate new ideas?** Do you look at the people or market needs? Who is your target market? Race, Category- (brokers, wholesalers, retailers, tourists, locals), Economic Status, Gender, Age, Frequency (regular customer, passer-by's, occasional customers)?

	Do you Identify the needs or wants of your market?	Can they easily find where you are located physically or electronically? They re-produce without looking at what is already out in the marketplace to guide them on key design features. Do you consider how well the product function? Who will use the product and who is the target consumer of your products are? What about the visual appearance of the products? Enhancing their cultural products and inability to undertake quality mass production and standard specifications When do you sell most of your products? Which ones?
4	**Do prepare and document your brief**?	**Defining the needs?** Do you explore and define the needs, functions and effectiveness of your products? How do you identify your customer wants, needs and demands from the initial vague customer statement to establishing clear craft specifications? Do you make any briefs after talking to your customers? If so how? • Informal brainstorming, • Imitation of existing designs, • Ideas from customers, • Word of mouth, • Family lineage, • Copying form magazines and books or • From products that are already in the market, • By looking and copying then producing from memory, • Visual briefs notes • Modeling • Through apprenticeship, • Coming up with new ideas, • Spontaneous • A solution approach to life. • Sketches I. Do you document the briefs? II. If no, why not?
5	**Design Solutions or idea generation**	**Are you meeting the needs of the market**? I. Are you meeting the needs of the market? II. How do you generate ideas? • Imagination • Informal apprenticeship, • Brainstorming, • Memory, • Copying • Sketches • Modeling • Inherited skills • Research III. Do you consider how well the product will function? IV. The visual appearance of the end product? V. What it will cost to make it?

		VI. The effect of your product on the environment? VII. Do you get your ideas down into some pictorial representation or model to help clarify your thoughts?
6	**Product Design Specifications**	**Have a detailed design specification**. Key design features like functions, safety materials, cost, ergonomics and aesthetics. How well will if function? How will it be used? What is its fitness purpose? Do you consider environmental effects of your products?
7	**Prototyping:**	I. Do you make prototypes for customers to look at before starting production? **II.** If no why
8	**Production or Manufacturing Structure**	**I.** Describe your production/ manufacturing process in detail. **II.** Do you follow key design features to guide you during production? **III.** Are you able to experiment, perfect and produce using the available techniques like machining, fabricating, molding or forming? **IV.** Where do you get your materials? **V.** Where do you get your tools? **I.** Where do you store your finished products **Tools and equipment.** I. Do you have appropriate equipment and tools? II. If no why? III. How then do you make your products? **Local Cultural Products** I. Are you able to keep the good standards of your local cultural products? II. If no why? **III.** Can you mass-produce your products? **Skills Transfer and use of Technology** I. How did you learn how to make your products? II. Have you gone through some training? III. If so where? IV. Up to what level? V. Would like to go through training? VI. If so in your workshop or in a formal institutions VII. Explain how do you develop your skills? VIII. What about if we propose to train you online
9	**The Market Place/ Selling.** Marketing and Branding in creating commercial success.	**Preparing to sell.** I. Do you asses the customers needs, carry out market research, develop superior value and offer the consumer benefits before starting to work on their products. II. Do you know and understand your customer demands, quality of product and consumer benefits so well that the product sells easily? III. What is the Customer profile for each of your products? IV. Do you have competitors? How do hope to sell your product to compete with them? **Marketing:**

		Do you market your products? I. If so how? II. How do your customers know about your business and where you are located? III. Marketing mix: 4Ps) as marketing tools. • Product- does your product meet the consumer's need/ wants? Did you consider the product range, standards, style, features, guarantee, packaging, branding & service? • Price- is your product affordable and competitive? Did you work out product prize, reductions, allowances, payment terms & credit agreements? • Place – is your product accessible to the customer to buy? Trade fares, exhibitions, retail shops, market breath, transportation Promotion- product should appeal to the consumer? Should have a visual presence that makes the potential buyer take more than a passing interest. By good advertising, promotion strategy, selling strategy and public image. **IV.** Would like to market your products? Online Face to face Word of mouth Print **1. Feedback** **I.** Do you look for feedback from your customers? **II.** Is yes, how do you do it.
10	**Organization Management/ entrepreneurial skills for their businesses**	How do you organize the running of your business on a day-to-day basis? Have you gone through Business Management training? Have you trained in: I. Business Management II. Business analysis and planning skills III. Entrepreneurship Skills IV. Bookkeeping V. Business analysis and planning skills, VI. Record keeping VII. Financing VIII. Customer care IX. Procurement processes- Tender documents X. Legal and regulatory environment XI. Insurance Cover
11	**Collaboration and Linkages with Public**	I. Do you have collaborations and linkages with formal institutions providing training skills and technology? • Village polytechnics (tertiary institutions) • Universities • Non governmental organizations II. If no, do you think it would be important to have the linkages? III. If so why? IV. Would you have time to attend classes at the institution? V. Would like them to train you in your workshop? VI. If we develop o course to train you on your mobile phone would have time to learn from it?

		VII. What would be the best time for you?
12	**Information Communication Technology Infrastructure as a Mode of Training and marketing**	I. Have you had any training in ICT- computers? II. If no would you like to be trained? III. Can you use the Internet comfortably? IV. Do you have a mobile phone? V. Does it have intranet? VI. Do you have an active website?
13	**Any challenges**	What are challenges and how can solve them? Do you have Collaborations and linkages with formal institutions providing skills Skills and technology **Thank you for your time**

Appendix 5: Interview Guide for Artisans in the Development of the DDTI (Studio ANG)



Q: Could you tell us your name and what you do?

A:

Q: Can you tell us the history of handicraft in the country and also in the region?

A:

Q: **What are the challenges you face in your work?**

A:

Q: **What challenges do you face when coming up with new ideas and designs?**

A:

Q: **When it comes to designs do you keep a record of the items you make or do you use your imagination to make your crafts?**

A:

Q: **What about teaching others the craft, do you pass down the crafts from the people who started out until the people who are doing it now?**

A:

Q: **And what about in the production of your goods, what challenges do you face when it comes to the tools you use?**

A:

Q: **The space you use to conduct your business, is it permanent or do you have different place to do your work?**

A:

Q: **So what are the challenges when it comes to finding a good market for all the items that you make?**

A:

Q: **Can you tell us about your customers, is it the local residents or do you sell them to different kinds of people out there?**

A:

Q: **Do you have different specifications for the different products you make?**

A:

Q: Do you have different classifications for the goods you make?

A:

Q: The raw material you use which is wood comes from trees, which we should preserve, so how do you make you products without destroying the environment and how do you recycle the wasted parts?

A:

Q: How do you determine a client's purchasing power when they come to buy products from you?

A:

Q: How do you classify the different products you make so as so satisfy people of different gender and different age groups?

A:

Q: Take us through the process of making an item out of wood from when you cut the tree to when it is ready for sale.

A:

Q: Do you have some, which require special designing and modifications?

A:

Q: How much time do you take to create the different types of items you make?

A:

Q: Do you have a training process for the crafts men especially those who are new to the craft?

A:

Q: Do you do collaborations with different training institute when it comes to learning the aspects that come in to making handicrafts?

A:

Q; There are goods that come from abroad especially from China, how do you compete with these products in the market?

A:

Q: What about safety and insurance in the business, what challenges do you face while protecting yourself and your goods?

Q: How would you use the new digital platform to get new information and learn new designs and also to advertise your products through the Internet?

Q: What other challenge do you face generally in this business?

Appendix 6: Interview Guide for Government Officials

Title: A *Digital Design Training Model for Jua Kali Artisans' in Kenya*

Interview Guide for Government Officials

Ministry/Department and/Agency:

Title:

Gender:

Date:

Section: A General Questions on Government Policies and Strategies

1. Could you tell me your general views on the *Jua Kali* artisans? Do you consider them as a problem or a resource?
2. What are the existing Government policies for the *Jua Kali* sector in Kenya now and in the next five years?
   How do they relate to the Kenya Vision 2030?
3. Could you please share with me are the existing Government strategies for the *Jua Kali* sector in Kenya currently and in the next five years?
   How are they aligned with Kenya Vision 2030?
4. What challenges if any are you experiencing in achieving the above named strategies and policies?
   If none tell me about a few of your main achievements.
5. What is your view in terms of achieving the aims for the *Jua Kali* sector as expressed in Kenya Vision 2030?
6. Are there enough resources currently allocated to support the *Jua Kali* artisans in Kenya?
   If no, what is the Government planning to do to provide appropriate resources to the *Jua Kali* artisans?

(If you allow me I could take about 10 minutes to present to you my proposed Digital Design Training Interventions designed for the *Jua Kali* artisans)

7. What is your opinion of the Digital Design Training Interventions you have just seen?
8. Do you think the Digital Design Training Interventions would enhance the implementation of the relevant policies you have developed for the *Jua Kali* artisan? If yes please explain how. If no please explain why.

9. In your opinion do you think the Digital Design Training Intervention are addressing the need to align Technical Vocational Education and Training curriculum to the demands of Vision 2030? If yes please explain how. If no please explain why.
10. TVET promotes demand driven competency based education and training. Do you think the Digital Design Training Interventions can contribute towards achieving flexible competency based training utilizing modular course? Please explain your response.
11. In your opinion can the modules in the Digital Design Training Interventions ensure the maintenance of standards, quality and relevance of training the *Jua Kali* artisans in preparation for upward mobility to TVET institutions? Please explain your response.
12. Do you think the Digital Design Training Interventions can enhance structured training opportunities and outputs to achieve ideal workforce of three associate professionals to 60 skilled workers for every graduate professional?
13. In your own personal opinion, what is your view about this Digital Design Training Intervention? Do you think it is relevant? To what extent? (Feel free to openly discuss any aspect of this)
14. What are your views on the current Government plans for the *Jua Kali* artisans?
15. How important are the *Jua Kali* artisans politically in Kenya?

    Thank you for your participation.

If you have a little time it could be extremely helpful if I could capture your opinion on the content of the Digital Design Training Interventions.

Section: B Discussion on Implemented Platforms

1. What is your opinion of the overall content of the Digital Design Training Interventions?
2. In particular, is the content for the design module relevant and do you think it meets some of the challenges of the *Jua Kali* artisans? Please briefly explain your response.
3. Do you think the content for the production module would be easily understood by the artisans and can improve their production skills of the artisans? Briefly explain your response.

4. What is your opinion of the content of the marketing module?
   Do you think it can improve the marketing potential of the *Jua Kali* artisans? Please Explain why
5. How would you rate the content of the management module on the platforms? Please explain why.
6. What is your opinion of the look, feel and colour of each of the platforms?
7. In your opinion which of the two platforms do you think the artisans are most likely to prefer and why? The web based platform or the USSD mobile-based platform?
8. What is your opinion of the content and clarity of the videos?

   Thank you for your participation.

Appendix 7: Medium- High Risk Ethics Approval from Coventry University (15/04/2013)

Coventry University ETHICS

Medium - High Risk Research Ethics Approval

Where human participants involved in the research and/or when using primary data - Staff (Academic, Research, Consultancy, Honorary & External), Students (Research & Professional degrees) and Undergraduate or taught Postgraduates directed to complete this category of risk.

Project Title

Developing the jua kali craft trade in Kenya through digitally communicated design and production training

Record of Approval

Principal Investigator

I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Name: Mary Kidenda.....

Date: 25/03/2013.....

Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Martin Woolley.....

Date: 27/03/2013.....

Reviewer

Date of approval by anonymous reviewer: 14/04/2013

Appendix 8: Medium- High Risk Ethics Approval from Coventry University (11/11/2014)

Medium - High Risk Research Ethics Approval

Where human participants involved in the research and/or when using primary data - Staff (Academic, Research, Consultancy, Honorary & External), Students (Research & Professional degrees) and Undergraduate or taught Postgraduates directed to complete this category of risk.

Project Title

Enhancing Jua Kali Trade in Kenya Through Digital DesignTraining Intervention

Record of Approval

Principal Investigator

I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Name: Mary Kidenda .....

Date: 03/12/2013.....

Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Martin Woolley.....

Date: 24/06/2014.....

Reviewer

Date of approval by anonymous reviewer: 11/11/2014

Appendix 9: Medium- High Risk Ethics Approval from Coventry University (12/09/2014)

Coventry University ETHICS

Medium - High Risk Research Ethics Approval

Where human participants involved in the research and/or when using primary data - Staff (Academic, Research, Consultancy, Honorary & External), Students (Research & Professional degrees) and Undergraduate or taught Postgraduates directed to complete this category of risk.

Project Title

Enhancing Jua Kali Trade in Kenya Through Digital Design Training Interventions

Record of Approval

Principal Investigator

I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Name: Mary Kidenda.....

Date: 26/08/2014.....

Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Martin Woolley.....

Date: 12/09/2014.....

Reviewer

Date of approval by anonymous reviewer: 12/09/2014

Appendix 10: Certificate of Ethical Approval

Certificate of Ethical Approval

Applicant:

Mary Kidenda

Project Title:

Enhancing Jua Kali Trade in Kenya Through Digital Design Training Interventions

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:

12 September 2014

Project Reference Number:

P26527

Appendix 11: Participants Information Sheet

Participant Information Sheet

Study title: Enhancing *Jua Kali* trade in Kenya through digital design training interventions

Purpose of the Study: As part of the requirements for PhD in Design and Visual Arts, I have to carry out a research study. The study is concerned with Enhancing *Jua Kali* Trade in Kenya Through Digital Design Training Interventions

What is the purpose of the study? The study will involve collecting data from the *Jua Kali* sector population, on the challenges they face and any possible solutions to the pointed out challenges, the current state of the industry with regards to design, production, marketing and management skills. The study will also involve the targeted population doing a testing of the implemented platforms and giving feedback to me.

Why have you been asked to take part? You have been asked because you are part of the informal sector in Kenya, popularly known as the *Jua Kali*.

Do you have to take part? No. Participation is voluntary. You'll sign a consent form. And you have to withdraw from the study before it commences even if you have agreed to participate. If you change your mind about taking part in the study you can withdraw at any point during the sessions and at any time in the two weeks following that session.

You can withdraw by contacting me on email and providing me with your participant information number.

If you decide to withdraw all your data will be destroyed and will not be used in the study. There are no consequences to deciding that you no longer wish to participate in the study.

Will your participation in the study be kept confidential? Yes. You will remain anonymous in the whole process of the study. Any extracts from what you say that are quoted in the thesis will be entirely anonymous.

What will happen to the information which you give? The data will be kept confidential for the duration of the study. On completion of the thesis, they will be retained for a further six months and then destroyed.

What will happen to the results? The results will be presented in the thesis. They will be seen by my supervisor, a second marker and the external examiner. The thesis may be read by future students on the course. The study may be published in a research journal.

What are the possible disadvantages and risks of taking part?

They will take up part of your business time. it is a long and tiring process that requires your full attention so it maybe a good idea to keep half the day open.

What are the possible benefits of taking part?

You contribution will help me generate content for the digital design interventions. It may be a learning process for you. You will one of the first people to have the digital design training interventions tested on.

What if there is a problem? At the end of the interview, I will discuss with you how you found the experience and how you are feeling.

Who has reviewed this study? School of Art and Design, Coventry University in conjunction with The Technical University of Kenya, School of Creative Arts and Technology

Who is organising and funding the research?

The research is organized by Mary Clare Kidenda who is a second year student Ph.D. student at Coventry University and The Technical University of Kenya on Split-site attendance. The project is not externally funded.

Who has reviewed the study?

Any further queries? If you need any further information, you can contact me: Mary Clare Akinyi KIdenda

kidendam@uni.coventry.ac.uk

If you agree to take part in the study, please sign the consent form.

Appendix 12: Informed Consent Form

The Informed Consent Form

I……agree to participate in Mary's research study.

I have read and understand the attached participant information sheet and by signing below I consent to participate in this study.

I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.

I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded in 2016.

I am participating voluntarily.

I …….. give permission for my interview with to be tape-recorded

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that I can withdraw permission to use the data within two weeks of the interview, in which case the material will be deleted.

I understand that anonymity will be ensured in the write-up by disguising my identity.

I understand that disguised extracts from my interview may be quoted in the thesis and any subsequent publications if I give permission below:

(Please tick one box:)

I agree to quotation/publication of extracts from my interview ( )

I do not agree to quotation/publication of extracts from my interview ( )

……..

Signed…….. Date……..

ID No. ……

Witness by …….. Date ……

ID No……..

Researcher's Signature……..

Appendix 13: Personal Appearance Release Form (Includes Informed Consent Form)

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Personal Appearance Release Form

Production Dates(s): _____

Program Title (Working title): _____

Participant's Name: _____

Producer/Production House: _____

Production/Location: _____

I hereby authorize the Producer rights to record and edit into the program and other related materials my name, likeness, image, voice and participation in a performance on film, tape or otherwise for use in the above Program or parts of the recording. I agree that the Program may be edited and otherwise altered at the sole discretion of the Producer and be used in the whole or part of any and all broadcasting, non-broadcasting, internet, audio/Visual, or and exhibition purposes in any manner, in perpetuity, throughout the world.

I have agreed to accept no fee for the use of my contribution.

Producer may use and authorize others to use all or part of the recordings. Producer, its successor(s) and assigns shall own all rights, title and interest, including copyright, in and to the Program to be used and disposed of without limitation as Producer shall in its sole discretion determine.

My contribution has, to the best of my knowledge, been truthful and honest. I have not deliberately sought out to conceal any relevant facts from the makers of this film.

Agreed and Accepted:

Name: _____

Signature: _____

Date: _____/_____/_____

I.D or Pass No: _____

Phone: _____

Email: _____

Address: _____

Witnessed:

Name: _____

Signature: _____

Date: _____/_____/_____

I.D or Pass No: _____

Phone: _____

Email: _____

Address: _____

Appendix 14: Introduction Letter from The Technical University of Kenya, School of Creative Arts and Technologies

THE TECHNICAL UNIVERSITY OF KENYA
Haile Selassie Avenue, P. O. Box 52428, Nairobi, 00200, Tel: +254 (020) 343672, 2249974, 2251300, 341639,
Fax: 2219689, E-mail:vc@kenpoly.ac.ke,Website:www.tukenya.ac.ke

Office of the Director, School of Creative Arts and Technologies

10th August, 2013

To Whom It May Concern

Dear Sir/Madam,

RE: MARY CLARE KIDENDA: FIELD WORK

The above named is a PhD student of The Technical University of Kenya/Coventry University studying Design and Visual Arts. The title of her work is "Digital Design Interventions for Jua Kali Trade in Kenya" I write asking you to allow her to collect data, from your establishments and help facilitate her study.

I will appreciate your indulgence in this matter

Yours sincerely,

DEAN, SCHOOL OF CREATIVE ARTS AND TECHNOLOGY

Prof. Odoch Pido
Director, School of Creative Arts and Technologies

OP/dao

Appendix 15: Schedule for Visiting Government Officials

No	Government Official from Ministry of Labour	Designation	Date, Place & Time of Visit
1		Director, Department of Micro and Small Enterprise Development, Ministry of Labour Kenya	21st August 2013 Utalii Hse at Noon Nairobi Kenya
2		Nairobi County Enterprise officer Department of Micro and Small Enterprise Development, Ministry of Labour Kenya	August 23rd 2013 at Utali Hse at Noon Nairobi Kenya
		Provincial Enterprises Officer Kisumu County Kenya	August 26, 2013 in Kisumu City at 11 am Kisumu Kenya
3		Provincial Enterprise Development Officer Nairobi Kenya	11th Sept 2013 Nyayo Hse at 2pm Nairobi Kenya
4		CEO National Federation of *Jua Kali* Kenya	4th October 2013 at Top Plaza Kinderuma Rd Nairobi Kenya at 8pm

Appendix 16: Schedule to Collect Data from *Jua Kali* Artisans

No.	Venue	Date	Products
Western Circuit Organized by Mr Fanuel Mango, Provincial Enterprises Officer, Kisumu County Ministry of Labour, Department of Micro and Small Enterprise Development		**4th – 8th September 2013**	
1	Ber Neno/ Women In the Fishing Industry project (WIFI) – Kisumu County	September 4, 2013 - Morning	Lampshades, paper, office furniture, general household items.
	Ong'ayo Women Handicraft Group, Kodiaga (Kisumu County) Date: September 4, 2012	September 4, 2013 - Morning	*oswaro* (for eating fish); *ohigla* (ear-pot for cooking fish); *tao* and *agulu matin* (small pot for cooking vegetables); tapring'o (also for cooking vegetables); *aguchi nyoyo* (designed with a narrow mouth to retain heat during cooking); *mbiru* (water pot); *agulu mar mafua* (flower pot).
	Amkeni Young Women Group - Siaya County	September 4, 2013 – Afternoon	Table clothes and mats; Tapestry mat
	Siaya County Women MSE Association, Kodiaga Gem (Siaya County)	September 4, 2013 – Afternoon	Bead and bones necklaces; Ornaments; Bangles; *Agwata* (small decorated calabashes); Key holders made of bones
	Action Resort for Change Kenya (ARO) Development Centre - Siaya County	September 4, 2013 – Afternoon	Bags made of recycled polythene papers; Season Cards; Mats; Wooden Earrings
	Nyakach Kano *Jua Kali* Women Association, (Kisumu County) Nyakach Thur-Gem	September 5, 2013 – Morning	Baskets; doormats; hatchery
	Katito Nyakach SDA Church Group, Konyuro Central (Kisumu County)	September 5, 2013 – Morning	Mats
	Oriang' Pottery Women Group - Kendu Bay (Homa Bay County)	September 5, 2013	Pots (used for milking and storing drinking water);*Oswaro* (bowl for fish); *Ohigla* (pot for cooking fish)
	Kibuye *Jua Kali* Association (Kisumu County)	September 6, 2013 – Morning	Furniture, coffins, textile
5	Shirikiana Women Group, Tabaka , Kisii (Kisii County)	September 7, 2013 – Morning	Kisii soapstone

Nairobi County Organized by Mr Kariuki, Nairobi County Enterprise officer, Ministry of Labour, Department of Micro and Small Enterprise Development		**10th- 14th September 2013**	
7	Kamukunji *Jua Kali* Association (Nairobi County)	September 11, 2013	Metal work
	Shauri Moyo Furniture Makers Co-op Society (Nairobi County)	September 13, 2013	Cupboards; Beds; Coffins; sofa sets
	Nairobi Handicraft Industrial Co-op Society (Pumwani-Majengo Division) – Nairobi County	September 13, 2013	Utility Products: bowls, salad spoons, letter openers, mwiko Decorative Products: masks, wall hangings
	Shauri Moyo *Jua Kali* Association (automobile repair)	September 14, 2013	
	Kariokor Ciondo Women *Jua Kali* Association	September 14, 2013	Products; Kiondo; Beadwork; Sculpture; Handbags

Appendix 17: Contract with Studio ANG



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08.11.2013

CONTRACT

DIGITIZATION OF CURRICULUM

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+254 (0) 736 107 570

08.11.2013

CONTRACT

1. The Purpose of this document is to establish a contract between **MUCHIRI NJENGA** of Studio Ang, hereinafter referred to as PRODUCER, and **MARY CLARE KIDENDA,** a Full-Time PhD student at The Technical University of Kenya and Coventry University on Spilt-Site attendance studying PhD in Design and Visual Arts, hereinafter referred to as CLIENT for the digitization of a curriculum for the Juakali sector in Kenya hereinafter referred to as the PROJECT.

2. PRODUCER offers to produce the PROJECT for CLIENT in exchange for valuable consideration as specified in Paragraph 5 below.

3. PRODUCER shall, subsequent to proposal approval, exercise sole discretion in the hiring and firing of crew and other production staff. The producer assures the highest possible standards of production for the specified budget.

4. PRODUCER warrants that the production shall cost no more than the grand total listed on said budget without prior written consent of the CLIENT. CLIENT reserves the right to increase, not decrease said budget at any time after budget approval.

5. The grand total of the production budget for PROJECT approved by the CLIENT is **KSH 1, 500,000** [One million, five hundred thousand Kenyan shillings] :

This total is payable as follows:
Producer Bank Details:
STUDIO ANG
DIAMOND TRUST BANK
A/C NO. 0090170001

Payment terms;
- 50%, or KSH 750,000 deposit to confirm project
- 25%, or KSH 375,000 upon approval of final rough draft and design.
- Balance of final 25% plus any agreed-upon additions, or KSH 375, 000 upon final delivery to CLIENT.

Duplication services are not included in this agreement.

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08.11.2013

CONTRACT

6. There are no other agreements or codicils relative to this PROJECT between either of the parties hereto either verbally or in writing, and this document constitutes the entirety of the contract.

I have read, understand and agree with every provision of this contract and by my signature, hereby certify that I accept and agree to abide by them and that I am competent and legally qualified to enter in to such a contract.

Signed and executed on this 08th Day of November 2013, in the city of Nairobi, located in Kenya by:

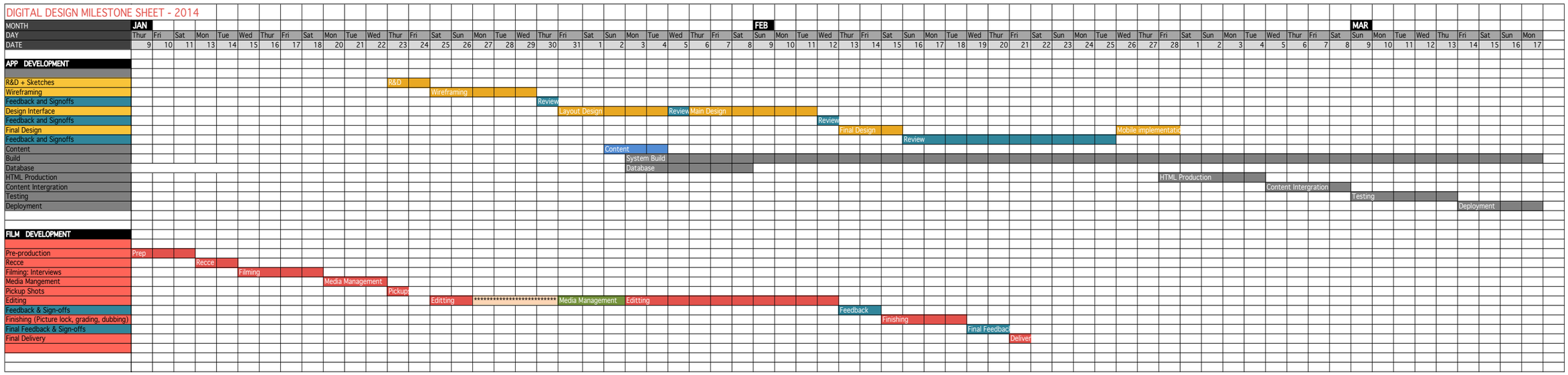
CLIENT
MARY CLARE KIDENDA
THE TECHNICAL UNIVERSITY OF KENYA
STUDENT ID: 4112475
COURSE CODE: ADR019

Signature

PRODUCER
BOB MUCHIRI NJENGA
STUDIO ANG

Signature

Appendix 18: Milestones for the Development of the Design Training Model



Appendix 19: Shooting Schedule for the Development of the Web-Site

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Shooting Schedule

JUAKALI INTERVENTION SHOOT – 17TH JAN 2014		
EST. DURATION	ACTIVITY	CREW
06.30am – 7.00am	Breakfast – Chelsea Hotel Kamukunji	- Muchiri, Mbarathi, Audi, Timothy
08:10am – 08:45am	WOODWORK: Dawa Interview	- Muchiri, Mbarathi, Audi, Timothy
09:00am – 09:30am	METALWORK: Artisan's Interview	- Muchiri, Mbarathi, Audi, Timothy
10:30am – 11:50pm	METALWORK General Views	- Muchiri, Mbarathi, Audi, Timothy
12:00pm – 01:00pm	LUNCH (Chelsea Hotel – Kamukunji)	- Muchiri, Mbarathi, Audi, Timothy
02:00pm – 02:30pm	WOODWORK: Ochiech Interview	- Muchiri, Mbarathi, Audi, Timothy
03:00pm – 03:30pm	WOODWORK: Artisan's Interview	- Muchiri, Mbarathi, Audi, Timothy
04:00pm – 05:30pm	WOODWORK: General views	- Muchiri, Mbarathi, Audi, Timothy
06:00pm	WRAP!!!!!	- Muchiri, Mbarathi, Audi, Timothy

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Shooting Schedule

JUAKALI INTERVENTION SHOOT – 15TH JAN 2014		
EST. DURATION	ACTIVITY	CREW
06.30am 7.00am	Breakfast Chelsea Hotel Kamukunji	Muchiri, Mbarathi, Audi, Timothy
07:30am – 08:30am	HANDICRAFTS: Kilonzo Interview	- Muchiri, Mbarathi, Audi, Timothy
09:00am – 10:00am	METAL WORK: GVs	- Muchiri, Mbarathi, Audi, Timothy
10:30am – 11:50pm	HANDICRAFTS: Artisan's interview	- Muchiri, Mbarathi, Audi, Timothy
12:00pm – 01:00pm	LUNCH (Chelsea Hotel – Kamukunji)	- Muchiri, Mbarathi, Audi, Timothy
01:20pm – 01:50pm	WOODWORK: Gikomba – pick up shot	- Muchiri, Mbarathi, Audi, Timothy
02:00pm – 02:45pm	CHANGE LOCATION (Kamukunji to Gachie)	- Muchiri, Mbarathi, Audi, Timothy
03:00pm – 03:30pm	CERAMIC WORK: Interview	- Muchiri, Mbarathi, Audi, Timothy
03:00pm – 04:00pm	CERAMIC WORK: Making a Pot	- Muchiri, Mbarathi, Audi, Timothy
05:00pm	WRAP!!!!!	

Appendix 20: Introduction Letter from Supervisor at The Technical University of Kenya

THE TECHNICAL UNIVERSITY OF KENYA

Haile Selassie Avenue, P. O. Box 52428, Nairobi, 00200, Tel: +254 (020) 343672, 2249974, 2251300, 341639,
Fax: 2219689, E-mail: vc@kenpoly.ac.ke, Website: www.tukenya.ac.ke

OFFICE OF THE DEPUTY VICE CHANCELLOR
TECHNOLOGY, INNOVATION AND PARTNERSHIPS (TIP)

To .....

3rd July, 2014

Dear Sir,

Re: Introduction Letter: Mary Clare Akinyi Kidenda

Mary Clare is a lecturer at the Technical University of Kenya, School of Creative Arts and Technologies, Department of Design and Creative Media. She is currently pursuing a Ph.D. on Split-site basis between Coventry University, United Kingdom and the Technical University of Kenya.

Her research is entitled "**Enhancing Jua Kali Trade in Kenya through Digital Training Interventions.**"The study is partly defined by her field investigations and observation of the jua kali artisan in Kenya. She has come up with a prototype of a ***Digital Design Training Intervention,*** which is aimed at addressing the challenges in four key areas: design, production, marketing and management.

The four hypothetical modules for the proposed intervention have been developed with the intent to disseminate the prototype through two ICT platforms, one being web based, whilst the other SMS based. The overriding objective is to ensure increased access for Jua Kali artisans to a Digital Design Training Intervention at their convenience

The overarching ambition is to initiate a process to transfer new knowledge and skill development to this important sector, and build an economically sustainable, wealthier and ultimately a greater healthier competitive environment to benefit Kenya and the Region at large.

It would be my humble request as both, her local supervisor and Manager of the Technical University of Kenya, to support and facilitate her research in whatever way possible.

I would appreciate your indulgence in this matter.

Yours Sincerely

Professor Suki K. K. Mwendwa
Supervisor

DEPUTY VICE CHANCELLOR (TIP)
TECHNICAL UNIVERSITY
OF KENYA

Appendix 21: Interview Schedule for Government Officials

No	NAME	TITLE	REMARKS
Ministry of Education Science and Technology			
1. **1**	1. Prof. Collette A. Suda, Ph.D., FKNAS, EBS	Principal Secretary-Education Science and Technology	Was not Possible get an appointment
	2. Dr. Richard Belio Kipsang.	Principal Secretary- Education	Was not Possible get an appointment
	3. Prof Kiambaa (Prof Suki)	World Bank Consultant in Technical Education -Immediate former PS Education	Monday 14th July 2014
	4. Prof. Peter Erastus Kinyanjui	Kenya Institute of Curriculum Development (KICD) Council Chairman	Was not Possible get an appointment
	5. Ms. Mercy Karogo *OGW*	Acting Chief Executive Officer Kenya Institute of Curriculum Development	Thursday 31st July 2014.
	6. Mr Stephen Ogenga	Deputy Director Technical Vocational Education and Training, Kenya Institute of Curriculum Development	Thursday 31st July 2014 at 8.30am
	7. Dr. Lydia Nkuene Nzomo,	Former Kenya Institute of Curriculum Development Chief Executive Officer	Was not Possible get an appointment.
	8. Prof. Wilson O. Ogola	Chairman Technical Vocational Education and Training Authority	Thursday 3-7-2014 9am
	9. *Mr. Samuel Wanyonyi*	Acting Director of Technical Vocational Education and Training	Friday 4-7-2014 11am
	10. Mr. Owate Wambayi	Consultant with Multi and Bi lateral NGO's- Immediate former Director Technical Vocational Education and Training	Thursday 17-7-14 4pm
	11. Mr. C. T. Awuor	Director Technical Vocational Education Training Technical University of Kenya	Thursday 3-7-2014 11am
	12. Mr Rashid	Chairman- Kenya Association of Technical Institutes	Was not Possible get an appointment
Ministry of Labour Social Security and Services			
2.	13. Ali Noor Ismail MSc, BA, LLB	Principal Secretary- Ministry of Labour Social Security and Services	Was not Possible get an appointment
	14. Mr. Paul Kosgei Kipsang	Director General National Industrial Training Authority (NITA)	Monday 14 -7- 14 at 10:00am

	15. Mr. Francis M. Gitaka	Director - Industrial Training National Industrial Training Authority (NITA)	Thursday 31st July 2014 at 11.00am
	16. Mr. William O. Mwanza	Manager Technology Development Centre National Industrial Training Authority (NITA)	Tuesday 15-7-14 2pm
	17. Mr David Ogenya	Head of Certification- Trade Test- National Industrial Training Authority (NITA)	Wednesday 23-7-14 3pm
Ministry of Devolution and Planning			
3.	18. Eng. Peter Oganga Mugiti	Principal Secretary - Ministry of Devolution and Planning: Planning Directorate	Was not Possible get an appointment.
	19. Prof. Wainaina Gituro	AG. Director General - Vision 2030 Delivery Secretariat	Was not Possible get an appointment
	20. Eng. Mugo Kibati	Immediate former Director General- Vision 2030 Delivery Secretariat	Was not Possible get an appointment
	21. Mohamed Omar	Director Economic Pillar- Vision 2030 Delivery Secretariat	Tuesday 8-7-14
	22. Mr John Karuiki	Deputy Director Economic Pillar- Vision 2030 Delivery Secretariat	Tuesday 8-7-2014 11am
	22. Mrs Ada Mwangola-Owiti	Deputy Director Social Pillar- Vision 2030 Delivery Secretariat	Tuesday 21-7-2014 11am.
Ministry of Information & Communication Technology			
4.	23. Hon. Joseph Tiambati	Principal Secretary- Ministry of Information & Communication Technology	Was not Possible get an appointment
	24. Eng. Victor Kyalo	Chief Executive Officer- Information Communication & Technology Authority	Was not Possible get an appointment
	25. Mr. Antony Mugambi	Kenya Information Communication & Technology Authority Programme Manager, E-Government Applications	Thursday 17-7-2014 9am
	26. Dr Bitange Ndemo	Former Principal Secretary- Ministry of Information & Communication Technology	Was not Possible get an appointment
Ministry of Industrialization & Enterprise Development			
5.	27. Dr. Wilson Songa OWG, MBS	Principal Secretary- Ministry of Industrialization & Enterprise Development	Was not Possible get an appointment
	28. Mr. Patrick Mwangi	Chief Executive Officer- Micro & Small Enterprise Authority	Wednesday 9-7-2014 at 9.30am

Kenya Private Sector Alliance Board (KEPSA)			
6.	29. Mr. Vimal Shah	Chairperson Kenya Private Sector Alliance Board (KEPSA)	Was not Possible get an appointment
	30. Mr. Richard N. Muteti	Board Member at Kenya Private Sector Alliance (KEPSA) And Chief Executive Officer- Kenya National Federation of *Jua Kali* Associations	Was not Possible get an appointment
		Kenya National Federation of Jua Kali Associations	
7.	31. Mr. Richard N. Muteti	Chief Executive Officer- Kenya National Federation of *Jua Kali* Associations	Was not Possible get an appointment
8.	32. Eng Charles Kaloamba	Secretary General - Kenya National Federation of *Jua Kali* Associations (KNFJA)	Saturday 5-7-2014 8pm
Ministry of Commerce, Tourism and East Africa Region			
9.	33. Dr. Ibrahim Mohammed	Principal Secretary, Commerce and Tourism and East Africa Region Ministry of Commerce, Tourism and East Africa Region	Was not Possible get an appointment
	34. Mr. Charles Mutuma Mbogori	Chief Executive Officer, Kenya National Chamber of Commerce & Industry	Was not Possible get an appointment
	35. Mr. Kiprono Kittony	National Chairman Kenya National chamber of Commerce & Industry	Was not Possible get an appointment
	36. Ms Prisca Ogundo	Ministry of Commerce, Tourism and East Africa Region	12th August 2014
10.	37. Mr. Charles Mutuma Mbogori, Chief Executive Officer, or Mr. Kiprono Kittony National Chairman	Kenya National Chamber of Commerce and Industry Small and Medium Enterprises (*Jua Kali*) Committee	Was not Possible get an appointment
Others			
11.		National Youth Service (Emerging Policy- to do training)	
12.	38. Ms Monica Okoth KICD	Kenya Bureau of Standards ITLET Committee	Was not Possible get an appointment
13.	39. Mr Ogenga KICD	National Council of Science and Technology	13th August 2014.

14.	40.	Kenya Industrial Research and Development Institute (KIRDI)	Was not Possible get an appointment
15.	41.	Federation of Kenya Employees	Was not Possible get an appointment
16.	42. *Jua Kali* Artisans	Those who were part of developing the DDTIs (FGDs)	Monday 14-7-2014 3pm.
17.	43.	Kenya Association of Manufacturers	Was not Possible get an appointment

Appendix 22: Personal Introduction Letter for the Researcher

Mary Clare Kidenda

P. O. Box 75630 – 00200, Nairobi,

Kenya.

Email: kidendam@uni.coventry.co.uk

June

To:

Dear Sir,

Re: Introductory Letter: Enhancing Jua Kali Trade in Kenya through Digital Training Intervention

I am a lecturer at the Technical University of Kenya in the School of Creative Arts and Technologies. I am currently pursuing a Ph.D. on a split-site attendance at the Coventry University, United Kingdom in collaboration with the Technical University of Kenya.

My research is entitled "Enhancing *Jua Kali* Trade in Kenya through Digital Training Interventions." It entails an analysis of the *Jua Kali* artisans' challenges after conducting several field visits. Based on this analysis I have developed a prototype of the Digital Design Training Interventions (DDTIs), which is aimed at addressing the challenges in four key areas: design, production, marketing and management. The overarching ambition is to transfer new knowledge and skills to this important sector, in order to make it more competitive, economically sustainable, wealthier and ultimately of greater benefit to Kenya.

The DDTI will be made accessible to the artisans on their hand held mobile devices in the workplace, through a web-based platform and/or the Unstructured Supplementary Service Data (USSD) which is an Short Message Service (SMS based) platform. This approach is important because *Jua Kali* artisans in their informal environments are unable leave their work for prolonged periods for a conventional training.

It is my conviction that the DDTIs I highly relevant to (*enter details for each ministry that I would visit and why it was important to get their opinions about the DDTI in relation to Vision 2030)*

For example

National Industrial Training Authority to enhance promotion of the highest standards in the quality and efficiency of industrial training in Kenya and to ensure an adequate supply of properly trained manpower at all levels in industry

In order to finalize this intervention it is would be extremely helpful if I could capture the opinions of relevant policy makers within the various government Ministries, Departments and Agencies concerned. It is my conviction that this proposed Intervention if informed by such policies, will help the country achieve its Vision 2030 as relates to the *Jua Kali* sector.

Based on the above, I would be very grateful for an appointment with your office at your convenience, to carry out an interview to help me refine the tools that I am using to develop the Digital Design Training Interventions. If it is fine with you I would kindly request you to allow me to record my interview with you.

Yours Sincerely



Mary Clare Kidenda

Encl.

- The home pages of the Web based and USSD mobile based platforms
- A set of question for our discussion
- Letter of introduction from the Technical University of Kenya
- Information Consent form for Research Participants
- Personal Appearance Release Form

Appendix 23: Schedule for Visiting Artisans to Collect Data on the Efficacy of the DDTI

Workshop/ Group/ Individual	Artisan(s) / Resource Person & Contact	Products	Date	Time	Place
Kenya National Federation of *Jua Kali* association	Mr. Richard Muteti (CEO)		17/04/2014	10/11 am	
Quality Furniture	0725 605 955	Wood Furniture			Donholm
Otis de Furniture	B.O.Ouko 0722 363 442/0722 278 804	Wood Furniture	22/04/2014	10am	Donholm
George de Furniture	George Mwangi Gatimu 0725 785 236	Wood Furniture	22/04/2014	11am	Donholm
Ben Furniture	Benard Odhiambo 0727 905 594	Wood Furniture	22/04/2014	Noon	Donholm
Mama Tender Good Quality	Patrick 0731 755 310	Wood Furniture	22/04/2014	1 pm	Donholm
RICA Furniture, Donholm	Richard Musyoki 0727 629 213	Wood Furniture	22/04/2014	2 pm	Donholm
Tender Wood Graphics, Donholm	Boniface Odhiambo 0724 458 601 (other interviewees available)	Wood Furniture	22/04/2014		Donholm
Brima de Furniture	Brian Malove 0721 650 556	Wood Furniture	22/04/2014	3-4 pm	Donholm
MOP Furniture	Stephen Onyango 0718 281 564	Wood Furniture	22/04/2014		Donholm
JA KOMALLA	Tom 0721 247 962	Wood Furniture			Donholm, Nairobi County
PAWA Furniture	Augustine Oduor 0716 405 123 (5 other interviewees)	Wood Furniture	23/04/2014	10 am	Donholm, Nairobi County
Kisoi Timber	Wambua Munyao 0700 180 510 Pius Irungu Wanyoike 0721 368 696	Wood Furniture	23/04/2014	11 am	Donholm, Nairobi County

Workshop/ Group/ Individual	Artisan(s) / Resource Person & Contact	Products	Date	Time	Place
PAWA TWO, Outering Road	Patrick Kabogo 0720 874 298	Metal Furniture	23/04/2014	3 pm	Outering Rd., Nairobi County
FANUM Engineering	Nahum 0727 074 886	Metal Furniture	23/04/2014	4pm	Outering Rd., Nairobi County
	Mark George 0726 654 427 Daniel Oluoch	Metal Furniture	23/04/2014	4pm	Outering Rd., Nairobi County
	Thomas Munyao 0716 119 597	Metal Furniture	24/04/2014	9am	Outering Rd., Nairobi County
	Brayo 0705 946 984	Metal Furniture	24/04/2014	10am	Outering Rd., Nairobi County
UPLOOK	Evans Wachira 0724 496 340 (three others available)	Metal Furniture	24/04/2014	11am	Outering Rd., Nairobi County
DECENT Furniture	Gideon Nzioki 0727 255 750	Wood Furniture	24/04/2014	12noon	Outering Rd., Nairobi County
	Milkah Juma 0710 524 835	Metal Furniture	24/04/2014	2pm	Outering Rd., Nairobi County
KARTECH Engineering	Antony Riri 0722 664 216	Metal Furniture	24/04/2014	3pm	Outering Rd., Nairobi County
Kamukunji *Jua Kali* Association	Fredrick Dawa 0724 709 887 (Focus Group Discussion)	Metal Products	28/04/2014	2pm	Kamukunji, Nairobi County
Nairobi Handicraft Industrial Co-op Society	David Mwanzia 0722 918 277 (Focus Group Discussion)	Wood Artifacts	29/04/2014	10-12 am	Shauri Moyo, Nairobi
Shauri Moyo Furniture Makers Co-op Society	Jamine Malende	Wood Furniture	29/04/2014	2 – 4 pm	Shauri Moyo, Nairobi
Kibuye *Jua Kali* Association	Omingo Ragot	Wood Furniture; Metal Work; Textile	29/05/2014 – 30/05/2014		Kibuye, Kisumu County

Appendix 24: Documentary

(Please see next page)

Appendix 25: Transcribed Focus Group Discussion for Jua Kali artisans in Phase One (The rest in Appendix B (I)

NAIROBI HANDICRAFT INDUSTRIAL COOPERATIVE SOCIETY 811_0051 24 September 2012

MC: Mrs. Mary Claire Kidenda

Respondent 1

MC: Just wait for Ken to come then we can start. Now we'll start by requesting you to tell us your name, your Address here, if you have an email, if you have a website, the name of the place and the history – when it started, how many members were there, how old it is, what were they making, etc

Mwanzia: I am David Mwanzia Kilonzo and I'm the Secretary of this Society. This is my seventh year in the Society. This is the Nairobi Handicraft Industrial Cooperative Society. We are located in Majengo area, Pumwani Division along Lamu Road. This Cooperative started in 1970 with very few members who came together with a common goal of coming together to face the challenges that were there at that time. They wanted to form a group, as it was easy to get Government help in a group. They also wanted to get a common market and get help from the Government in terms of materials because at that time, once you registered as a society you were allocated 12 trees per year and this could not given to an individual.

MC: How many members were there when it started?

Mwanzia: I can't tell the exact number but it started with a few members who grew to almost 1000 and because there were not real artisans they were people picked without a method. The society could not continue like this because some members who were registered as members were unavailable i.e. they were not people coming here daily, some worked in offices others were businessmen elsewhere. Because they were Akamba people, they were given membership. A time came when the society could not cater for its expenses because of shortage of revenues etc. So they came up with the idea to register members again as it had about 9 something members but active members were less than 200. So they formed a new register and today we have 334 active members. We have others (non-members) who are part of us. We train them and when they qualify they become members.

MC: How long do you train them?

Mwanzia: It takes time and depends on which area you want to specialize in.

MC: So what areas take what amounts of time maybe give us 3 examples.

Mwanzia: Like now handicraft takes times – it can take a year, it can take 3 months. I spent half a month and I was through.

MC: How come you took half a month and the rest are taking one year?

R1: Because my father was a carver. Way back when I was young I would watch how he did his craft and conceived it in my mind. So when I finished school, I started doing what I saw my father do and it was very easy for me. So those who come from a background of a carver take less time learning but when you get somebody outside of this carving community then it takes a longer time.

MC: Which is this carving community?

Mwanzia: Like now we have a Kikuyu here and he took a long time before he eventually became a carver.

MC: So the Kambas are one community and they all carve?

Mwanzia: Yes most of them know carving.

MC: Out of these 334, what is the age group?

Mwanzia: The older people are just retiring and once they retire they bring their own nominees who are young people. When you go round you will find 25 – 40 year olds are the majority. Older people are rare because they are weak, unable to cope with competition so they retire and leave.

MC: These majority have they gone to school up to some level?

Mwanzia: Not really. Initially this kind of work was perceived as being for those who could not complete their education due to lack of fees or any other reason causing one to drop out of school. They took this as an option. Nowadays you find those that have Form IV education plus attended college are coming here to be part of us.

MC: So majority are literate?

Mwanzia: Yes majority are literate.

MC: Do you have a phone? What's your phone number?

Mwanzia: Yes its 0722 918277

MC: So out of these 334 how many have mobile phones?

Mwanzia: Almost all of them.

MC: What do you use your mobile phone for?

Mwanzia: Many ways – to contact our customers and also social activities.

MC: Just tell us how the mobile helps you in your business.

Mwanzia:: Today technology has advanced. When a customer comes here, he asks you if you have a phone and how they can contact you and also for money instead of coming here. In most cases mobiles have become a tool in business.

MC: Where do you market your products?

Mwanzia: We have various markets for example, here this is a showroom and it appears like there's no activity here. We depend on individuals known as middlemen; they go to penetrate the market so we sell our products to them then they take them outside. Others go overseas to world exhibitions we also sell to them. Others go to town to sell to customers that have offices fitted with Internet, they come and we sell to them.

MC: So you people actually just produce here but other people come and take and go and sell? You don't sell directly to the market.

Mwanzia: Yes and there are many challenges with regards to penetrating the market. Like now we intended to have a website and we engaged a technician somewhere and had an agreement that he finishes by January. Up to this point he hasn't officially presented his work to us for reasons unknown to us. But we took a step to have him create a website so that we could have access to the market. Nowadays the market is competitive. Many young guys are coming out of school with skills and we find ourselves sandwiched there. On one side you're unable to penetrate the market and on another competing with people that have experience.

MC: Did you say you have challenges with the skills?

Mwanzia: Yes

MC: What kind of challenges?

Mwanzia: Like access of Internet for example if we had one among us with that skill we would have given him the job he would have done better because we interact with him daily but an outsider…you call and he says I'm doing this and this and when you go to cybercafé you cannot access the work he's done. For instance he can tell you 'ok there's this domain name' but when you go to the cybercafé its hard to know

whether he has booked that domain name or its available for anyone to take. This is one challenge that we have as we have limited knowledge

MC: What about in terms of your carving skills are there any challenges?

R1: Not really. Like now once you create something that you've not seen here and bring it as a picture we will make it into something tangible. So in terms of interpretation we are ok. Challenges – decorating like putting patterns, advanced decorations for instance carving a leopard. There's a difference between a leopard and a cheetah. The skill requires painting a carving to look like a cheetah and not a leopard is a challenge. If you carve a bird, a dove, it may be hard to paint a dove differently from a duck, we haven't that knowledge. We just paint if it's a leopard we put dots I don't know where it has a pattern.

MC: Do you think if you had some training it would improve on the quality and finish of your products? What kind of training do you think you would like?

R1: Like now Fine Art if we can be trained that would be good. We just do the best way that we know how; we don't do it professionally.

MC: How do you come up with some of these carvings, where do you get the ideas?

Mwanzia: Like now of late consumers are shifting from decorative products to utility products. A manufacturer comes here then creates a 'bakuli' (metal or enamel) then says he wants this 'bakuli' made of wood. That's a new product right? Also if you see an item in the media or some other place, one determines that if they make this product it will be unique and goes ahead to make it. So designs and products depend on what you come across.

MC: Do you get your designs from what customers ask i.e. are your designs market driven? It's the market that tells you what they want?

Mwanzia: Yes

MC: And at the same time your market is actually dominated by middlemen?

Mwanzia: Yes

MC: So how do you get in touch with your market to know what they want?

Mwanzia: We interact freely. They tell you ok once I buy this and this, customers like a certain type of goods for example, so we capitalize on that kind of product. At times they just come and say we want to see the origin of this product like an organization abroad comes and says that they want to see these people. Once they come, we

send them with a message that we are here but unable to reach you in their offices abroad yet unable to penetrate their market due to challenges.

MC: But you know with a website you don't need to leave this place?

R1: Yes I should be working in my office.

MC: Yes with a website you will sell to somebody in Washington here. So you should push for the website as much as you can. If this person isn't doing it get somebody else to do it for you.

R1: Yes we are working on that

MC: How many kinds of products do you have?

R1: So many I can't count them

MC: Is there somewhere you have written them? All the things you make this is the first, second, third list

R1: List yenyewe hatuna saa hii but it's on our minds but we have categorized in 2 categories – Utility and Decorative Products. Anything hung on a wall like a Giraffe those are decorative. Once you get spoons, 'bakulis' those are classified as Utility goods.

MC: So how does someone decide what to make are you under one umbrella or are you categorized in small groups i.e. these 324 people how do you organize yourselves in terms of production?

R1: There's no organization; everyone sits and designs one's own product depending on the fast moving products. There isn't any order to it.

MC: So who takes word back to tell them now this is a moving product make it?

R1: For example when you come here we treat you like a broker or rather a middleman. Once you buy we use you to test the market. On your return without realizing it, you will tell us which are the fast moving products. Once we have that in mind, we capitalize on that. There isn't any other system to determine the fast moving goods or other. Some time back we worked with a Canadian Union called Ten Thousand Villages. They were working with units like us as a Cooperative. They wanted the producer to benefit but unfortunately it collapsed and it's no more. They had individuals from every society working with them because it proved to be hard.

MC: Ok so who finances your…

R1: Nobody. Individuals. Ourselves.

MC: So you sit in your shed and finance your products then how does the middleman come and take them from you? Does he come into the workshop here or does he come to an individual and pick then go?

R1: There are many ways. You can come to my workshop or to my store and find products that will interest you. Then you buy and go. You can also come with your own samples, we make for you and when we you approve of the sample, you pay a deposit and it now becomes an order. On completion you collect your products and go.

MC: Are all your products made from wood?

R1: Yes

MC: Please walk us through the process i.e. where does the wood come from until you bring it here, the entire process.

R1: For example Jacaranda Wood noting that Mahogany is now illegal and disallowed by the Government though it is still available as it gets cleared from shamba, we are normally called to collect. Like recently we collected some from the showground as they prepared for the show. They called us and we went and collected. Now Jacaranda wood is a tree planted by individuals and when they want to clear they just call us. We have our agents; we organize with them to collect this wood for us. Once we have the material it's a block a big piece and say you want to make an item. You cut it according to the measurements you want then work from there. STEPS Ngomo – its like a 'jembe' as many times we don't use chisels and such like tools this is the original tool. Now you carve the way you want it. To us this is the Production Stage where you produce whatever you want, the real thing, until it looks like what you want to make. Finishing – involves sandpaper and polishing. If it's a decorative product like a giraffe you have to put the patterns then polish, the final step, to make it durable, protects from wearing out, weathering and creates a pleasant look. From there, it's ready for the market you can either bring it here or take it to you customer.

MC: Now when you get this piece of wood this one like this. You said you get the piece of wood, and then cut it to size you want and you start carving. How do I know like if I want to make a giraffe, do you just take the wood and start, is it drawn somewhere, is it in a picture in a book…how do you come up with that giraffe or that lion or that

bakuli? How do you get the measurements right, how do you say if it's a giraffe I should cut this size or this size. If it's a lion I should do this, how do you come up with the design of the product that you are going to make?

R1: For example you want to make a lion 3-inch height. In our minds we know if you want to make a 3-inch lion it has a certain length. In one's mind you know that it will be 3 x 6 inches. 3 inches and we call it SMALL size, 4 inches is MEDIUM, which is 4 x 8 inches. It is different from the medium of a giraffe, which is 1 foot, and it will have a width of 2 – 3 cm

MC: Is there any wastage?

R1: A lot of it

MC: Because now you're training me how to make a lion. I am a new person are there mistakes I make, and does it cost, is there wastage, do you find the mistakes are too expensive, do you go through those kinds of things?

R1: Wastage is there but minimal because it will be hard for you to utilize the remaining pieces. For instance if you want to make a giraffe like that one – in between there's a place where you can use a machine to remove carefully to enable you utilize the piece between the legs. Because you haven't that machine, you take an axe to chop everything. The material from in – between we sell them filed because that material cannot be used again. If you have a machine you can remove that middle part carefully then use the removed piece to carve out a smaller animal.

MC: Why I am asking this is because for example I could be looking at this then I carve it, like if I am getting my design from a magazine of a lion, I know my measurements. Now if I told you to carve a lion for me without a picture, how would you go about it?

R1: Its' there naturally in our minds. I would like you to go round and see how these guys are drawing; they haven't any drawing or anything else. That's why I said that it's very hard for you to become an expert. But once you become an expert you just do it. Go and see the old men doing this job you will not be able to do the same. They look at it when you take it and they say oh it's a lion then he makes it from his mind.

MC: But a lot of it is hereditary.

R1: Yes

MC: Thank you unless somebody else has a question

QTN: You said it was re-registered, which year was that?

R1: It was 1989.

MC: So there's no banks or nothing that finances you, you don't even borrow money from anywhere?

R1: No we have not unless we start.

QTN: So you have standard measurements for products?

R1: Yes

QTN: What you are saying is 3 x 6, 4 x 8 and large will be what by what?

R1: Like now we have EXTRA MEDIUM which is 5 inches and its 5 x 10, then we have LARGE 6 x12 inches, EXTRA LARGE will be 7 inches and above

MC: Maybe you can give us 3 or 4 examples of utility products and decorative products, just a few examples

R1: Utility products – like bowls, bakulis, salad spoons, letter openers, mwiko Decorative – like masks and wall hangings. That's also decorative (sounds like he's pointing at a gourd. But sometimes customers place orders for them to use abroad.

MC: Do you have any history why you make like masks of animals? Are they portraying anything?

R1: Like now those masks we borrowed that culture from Makonde people from Tanzania you see they look like Makonde people.

MC: What do you have in common with Makonde?

R1: Tuko jamii moja and they also trained us we took the art from them because Kamba people migrated from that area and Nyamwezi. Even in Zaire, Congolese know this art because we came from the same area.

MC: So Makonde and Kambas are from the same ancestors because I know Makonde are very good in carving and they carve a lot of masks. What about the animals?

R1: These came about from tourists.

MC: That was market driven?

R1: Yes when you go to the parks and see a lion, they want to buy a lion so that they see it abroad on return to their countries.

MC: We went to a place called Kisii mahali inaitwa Tabaka where they are carving Kisii stones. And we found the Kambas have moved to Kisii and are carving beautiful animals using Kisii stones.

R1: There's a time we were using it here.

MC: The Kisii stone?

R1: Yes

MC: So now you said you have exported people there?

R1: Actually there are my brothers from Ukambani, those who do wood carving who have gone to Kisii

MC: We found them in Kendu Bay (Francis advises correct name as Tabaka) many of them in quarries actually carving beautiful animals for the Kisiis to export. Because they said there's no more wood to carve in Ukambani sasa wameenda kucarve Kisii stones.

QTN: How does this Cooperative Society benefit from members? As in are there monthly contributions?

R1: For our Society the only way one benefits as a member is once they display their stuff here and customer buys, there's a commission of 15%. We use that commission to run the activities/expenses of the Cooperative.

MC: So that 15% remains in the kitty of the society?

R1: Yes

MC: Ok thank you very much now we can go and see. 26 September 2012 32.21

QTN: You said that now you have the benefit of having people from school and those who are not or rather haven't had so much education in their careers. How do you combine those two groups of people maybe to come up with a handbook that people can read other than practical so that they can have a book they are reading then have the measurements, so that it can be a point of reference incase the instructor is not there or those in the industry have left.

R1: We haven't reached that stage but are slowly influencing the old people because they had their own ideas but now we have another generation that's gone to school and therefore doing things in an advanced way. It's just like at our place, we have oxen pulling the plough. The animal that doesn't know how to pull is tied in between others, inachukuliwa na hizo zingine mbaka ijue. Sasa tunawabeba tu hivyo. There isn't a system similar to what you've asked. There was a mzungu who came trying to implement that idea of putting information in writing - information on measurements etc. Even if it's done we cannot follow it because a Mzee here knows

that a zebra is 6 x 3 inches and he will make it that way, finding no reason to refer to a book. We know that we can put this information in a book but the Wazees may be reluctant.

QTN: How do you think you will benefit from modern technology? Do have challenges in this area?

R1: We have challenges but we can benefit from technology. If you go round you will find people having machines to put details, which turn out smarter than hand – carved ones. With knowledge, I think the final product will be smarter than the ordinary one, making it fast moving. Today, for you to have a fast – moving product, install a machine. A customer will compare a machine made and hand made and will prefer the machine made as it is neater.

MC: And also the finishing is a big challenge as you are talking about?

R1: Yes

MC: Because you already have that artistic hand, it's very easy to teach you Art and Design isn't it. So you would be willing to sit in a class to be taught?

R1: Yes I have waited for that opportunity but sometimes we weigh options i.e. shall I go to class or my child will go to class? That's another challenge.

MC: For example if we are to put it for you on your phone i.e. that lesson, then you don't have to sit in a class you can learn it from here. Unakaa hapa na unajifundisha. For example, this is something that you want to make for Africans. It will show you how to so you wont have to go to a class. You get on your refer phone and you refer and say 'what do I need to do to be able to mix my paint' 'how do I get for example green? I mix yellow and blue'. So I can go back and say 'ok yellow and blue'. Then 'what brush do I need to come up with the details?' Maybe its brush number 2 and incase I forget I go back here (demonstrates physically on phone) and look at my message. What tool do I need to do this? So we are saying you don't have to literally sit in class for a month. Like he is asking about technology. Unakaanga kwa simu hata ukienda nyumbani unafanya reference namna hii. So that's what we're saying would you be willing to embrace this kind of thing, you see this one is being taught? Sasa tunatengeneza yetu ya Kenya hapa. Or if you say once a month we come here and teach you for one morning. What you would like us to teach you is Art and Design?

R1: Yes

MC: If not you have one computer unakaa inafundisha hivi.

R1: It's a good idea.

MC: So with phones everything is possible with Technology.

R1: Lakini nikuulize hii phone kuitoa kwa duka don't you think its also a challenge?

MC: The Government now is working towards phasing out certain phones…

R1: Hii yangu ni nini?

MC: Sasa hizi…

R1: Naskia niko kwa mtandao kwa sababu nikitumiwa message nasoma, natumiwa pesa, its as if nimefika

MC: Now you want to say you have not arrived. The Government is trying to make phones…these ones are now going to be phased out. These ones the prices will come down. So the price you're using to buy this you should be able to get a phone that has Internet and you will be able to access it in the next few years. So it's now us, if you're willing to you can embrace technology. It's not the price of the phone prices are coming down. So you'll have a phone like this that can do this in a very short while. So if you're willing you can do some of these things and you can access them from wherever you are.

QTN: Two questions – when you have guys who come from school to this Industry and they tell their family, and they say they are coming to some kind of work where they are perhaps bringing in new knowledge that they can teach you. You may also have a Std 8 drop out with the advantage of coming from a background of carvers therefore may have the skills. Is there a conflict of knowledge or competence where guys coming from school feel I have something to teach you vis-à-vis yourselves that have been here longer.

R1: Yes to some extent because like now when you go round you find a guy that's painted a chair like a leopard. Trying to educate the older carvers to embrace these new skills is challenging. Young people are taking advantage of that because the world is changing. Take for example a simple thing like this chair. Instead of painting it all black, he puts some decorations on top and once you take it to the market, that one which they spent a lot of time and skills doing will be bought first. I'm referring

to 20 – 35 – 40 years that's the youngest group here. The oldest – we have people approaching 70 years

QTN: Where do you see this industry 25 years from now?

R1: Unless we embrace new technology we will have a crisis. At the moment we are making wood products but you don't know what will happen 5 years to come. Maybe the Jacaranda that we say is easily available may not be available. We have to focus on the future and see what else we can do to maintain our market. We could look at re-cycling some items and making others for instance we have that (a warthog) and these are sandals, the slippers that you know. Huyu jamaa alienda akabind together then came up with that sculpture so we may need to look in that direction.

QTN: When you come up with a design do you have the copyright so that somebody else cannot copy it because when you look at the products here and go to other handicraft shops they are always the same. Would you be having a challenge that someone is afraid to come up with a new design because it could be stolen?

R1: Yes for example now there are people here who claim to make things not seen elsewhere. When a customer comes the carvers pretend that this is new and gets the customer to buy it. Without knowing its like finding a new sample in the market he goes and registers it like his own. We have that challenge. If we had a system whereby once you make a product it's yours and nobody else can copy that we would benefit. Like recently Asians, have copied the Kiondo and it is initially African. Even with the 'sanamus' it's the same case – you think so much, come up with a design, somebody else picks it and goes away with it and benefits.

MC: Thank you very much for your time. (Someone speaks in the background – sounds like Francis) The process…lets write it down then we go around

MC: Sorry the process he's taking us there. I thought he already walked us through. We talked about the Jacaranda tree then it's a piece of wood then after that he carves it, smoothens it then paints it. He already did it for us so now we go and see the practical. Thank you.

811_0052

R1: We buy Jacaranda wood of different sizes and lengths. It's bought then taken to one's individual stall, cut to the size you want then start the process of making the product. Like the man you see there breaking that wood, he wants to cut into small pieces to make a kitchen 'mwiko'.

QTN: Generally can you tell us apart from Jacaranda, I understand there are different types of woods. Can you tell us all the types of woods that you can use.

R1: We have hard wood like Ebony, which is black; we have Mahogany, Rosewood, Olivewood and other indigenous trees regarded as hardwoods. Cedar, Red Oak, I cant remember them all but once you find the above those are good. 811_0053

R1: After sand paper they decorate then polishing is the last stage. (Lots of polishing heard)

QTN: With this one (physically showing the item) how much time does the carver need to make this kind of product?

R1: It takes less than an hour, has a simple design with few details. We will show you a product that can take a month. This one cannot take you an hour because once you see it its simple to make and has not much details. 811_0054

QTN: Babako alikuwa?

R: Alikuwa mchongaji

QTN: Sasa kutoka shule ulikuja tu straight ama? R: Nilikaa tu nyumbani sijaendelea na masomo sana kwa ajili ya shida za hapa na pale. Lakini namna tu nikaona bahati ya kuendelea

QTN: Sasa hivi waweza kuchonga vitu vya aina ngapi? R: Ile sichongi ni wanyama lakini watu hakuna yeyote inaweza kunishinda sababu natumia kitabu saa zingine.

QTN: Ukitoa picha kama yangu hivi utaitoa? R: Sawa nitaitoa bora niwe na picha

QTN: Tunakutakia mema R: Asante 811_0055 R: Kwa hivyo Jacaranda ni nzuri kwa sababu ina absorb maji, its friendly to weather na haipasuki haraka. Unaelewa?

MC: Hiyo ni decorative? R: Ndio. Decorative inatumia hardwood na utility softwood R: Si tuwapeleke kwa sector ya painting. (Points at something physically while answering a question – unable to hear the question lots of background noise) This is a vulture. 811_0056

QTN: What other sources inspire you to come up with new designs? R: New designs…well I just think of a design and decide to make a different style from this.

Like now I may think of making another type of bird like an Ostrich or an Eagle especially with me I specialize in birds even animals but mostly I like to make different types of birds. I can think of making one that's running, standing or doing something else. When a customer like you looks at it they become interested and if you want to buy it I gain.

QTN: How long does it take to make one of these? R: I take long because I take time to produce something to look real. You see all the details being put here – this can take more than 2 weeks. If I want to make more, more still come.

MC: (Speaks but unable to pick out her question due to background noise) In order to produce something nice, you have to be slow, think through it and eventually you'll find that you've produced a good product. You can't rush through and produce something.

QTN: (First part unclear lots of noise) Have you made something else that the original… R: No I don't think NB: There was lots of noise in this recording and sentences are incomplete even after re-plays. 811_0057 R: Hii ni ya Sudan Nb: Recording was 4 seconds long 811_0059

MC: (Sounds like something was omitted at the beginning of this recording) … University College hapa karibu. Tunafundisha wanafunzi Design na departments zingine kama Journalism, Printing na kadhalika. Katika Department ya Design na Printing tunafunza mambo ya Electrical, Mechanical, hizo zote zinawekwa pamoja. Ukitaka kutengeneza kitu kama gari, lazima ufanye kazi na hao watu wote – Designer, Electrical, Mechanical hawa wote. Tungependa kama Polytechnic tuwe na njia ya kufanya kazi nanyi ili wanafunzi tukiwafunza kwa darasa wananaweza kuja huku nje na mfanye kazi pamoja. Watajifunza kutoka kwenyu nanyi mjifunze kutoka kwao. Kwa saa hii tunafanya kazi na Ministry of Labour na watu wa *Jua Kali*. Tumetembea Western, wiki hii yote tumetembea Nairobi na tulikutana na Mr. Mugambi. Jana tulikuwa Shauri Moyo - Shauri Moyo Furniture, Handicrafts na leo tuko hapa. Ile kitu tungependa kujua ni kwamba mnafanya kazi gani hasa. Hii Association yenu ilianza lini na mko na members wangapi? Ndio mtu awe member ni nini anatakikana awe nacho? Na hawa members wana umri wa miaka mingapi wengi wao? Ni youth ama ni watu wazee kama mimi? Mnafanya kazi ya aina gani na hii kazi munayofanya mtueleze kwamba inaanzia hapa mbaka gari itoke kwa gate. Departments tofauti

tofauti kama ziko na kila Department inafanya nini? Kama mko na challenges zozote tungependa kuzijua. Mtazitaja mkisema 'Changamoto zilizoko ni 1,2,3…' na tunaweza kukusaidia namna gani through Ministry of Labour. In a nutshell that's what it is. And I hope you don't mind tukifanya recording. Tuko na camera na hii na yeye pia anaandika ili tunuku mahojiano haya yote R: Tuko na challenges nyingi hapa na nilivyowaeleza kila mtu ana skills zake hapa. Kuna Panel Beater, Electrician, Mechanic, Glass Welding na watu wa Radiator. Hawa wote wana changamoto nyingi – tumeomba fedha za CDF, tumeuliza tuwekewe sheds ndio tuweze kufanya kazi kwa njia ya usafi. Hatujafua dafu. Tulikuja hapa mapema 1996 na tangu tuje tumejaribu maneno 1, 2, 3, na Serekali maanake lazima tupatane na watu kama akina Mugambi. Kwa hio ofisi tumekuwa tukienda wakubwa wakitoka wakienda kupeleka malalamishi yetu. Ni mambo mengi ambayo hayajatimizwa hapa. Badala ya sisi kuinuliwa unapata tunafinyika kwa mfano, nikiwa hapa *Jua Kali* naweza stukia badala ya hii kazi yangu kuinuka ni kuisha itaisha. Badala ya Serikali iweze kunipromote because I have something in mind which if I had somebody we can help each other. *Jua Kali* sana sana husememekana ati ni ya watu ambao hawajasoma ati amefika Std 8, Form 4. Labda mtoto amefuza kujiunga na chuo kikuu lakini mzazi akashindwa kumlipia mtoto. Watoto wengine wamefunzwa na Undugu na tuneletewa hapa na waweza pata hawa watoto wamifika Std 8, yote haya yakilingana na uwezo wa mzazi. Undugu pia inasaidia na hufunza watoto kulingana na skills kwa mfano Mechanic ni kama wao huchukua mtu kulingana na training anayotaka kama puncture, handicraft.. inalingana na ile ambayo mwanafunzi anataka. Undugu wanafanya kazi aina nyingi. Akija hapa nilivyokuelezawe are supposed to have class here ambayo mtoto akitoka kwa theory kuingia practical anafundishwa zaidi kulingana na vile ameona yaani kile amesoma kwa kitabu ndicho anaona kwa practical ama ndivyo anaona kwa gari sasa. We are supposed to have a class here ambaye akiona kwa practical anaweza kuapply theory aliyoisoma darasani. Kwa sasa waweza funza mtoto akae hapa miaka mingi lakini hana njia ya kuinua skills. Kama mimi kwa mfano, niko na miaka 46 na nimejaribu kuenda workshop hata niko na Certificate tele ambayo nimepewa kutoka hizo workshop za Ministry of Labour. Lakini unaweza kuta after that workshop bado ntarudi hapa na sitapata atakayenielekeza kulingana na masomo niliyopokea kwenye hiyo

workshop. Kwa upande mwingine ningependa kuwashukuru kwa kujitolea kuja mbaka on the ground muweze kuona yale matatizo ambayo *Jua Kali* huwa nayo. Tuna mapenzi ya kutaka kuinuka na ndio uliskia nikilalamika ya kwamba utapata mtu ni Professor. Professor anaenda kufanya kazi ya Manager ilhali anafaa kuwa akija hapa aone vile ninavyo fanya mambo yangu yaani practical anaweza niinua aje? Waweza kuwa Professor wa ndege nami natengeneza ndege in practical na nimesoma kidogo lakini kuna kitu nimebakisha ambayo Professor ndiye anaweza nisaidia. Lakini badala ya Professor awe mahali kama hapa on the ground aweze kujua mata

Appendix 26: Codes for Transcribed Interviews of Artisans (Phase I)

NAIROBI HANDICRAFT INDUSTRIAL COOPERATIVE SOCIETY 811_0051

24 September 2012

MC: Mrs. Mary Claire Kidenda

Respondent 1 (R1)

MC: Just wait for Ken to come then we can start. Now we'll start by requesting you to tell us your name, your Address here, if you have an email, if you have a website, the name of the place and the history – when it started, how many members were there, how old it is, what were they making, etc

Respondent 1: I'm the Secretary of this Society. This is my seventh year in the Society. This is the Nairobi Handicraft Industrial Cooperative Society. We are located in Majengo area, Pumwani Division along Lamu Road. This Cooperative started in 1970 with very few members who came together with a common goal of coming together to face the challenges that were there at that time.

They wanted to form a group, as it was easy to get Government help in a group. They also wanted to get a common market and get help from the Government in terms of materials because at that time, once you registered as a society you were allocated 12 trees per year and this could not given to an individual.

MC: How many members were there when it started?

R1: I can't tell the exact number but it started with a few members who grew to almost 1000 and because there were not real artisans they were people picked without a method. The society could not continue like this because some members who were registered as members were unavailable i.e. they were not people coming here daily, some worked in offices others were businessmen elsewhere. Because they were Akamba people, they were given membership.

A time came when the society could not cater for its expenses because of shortage of revenues etc. So they came up with the idea to register members again as it had about 9 something members but active members were less than 200.

So they formed a new register and today we have 334 active members. We have others (non-members) who are part of us. We train them and when they qualify they become members.

MC: How long do you train them?

R1: It takes time and depends on which area you want to specialize in.

MC: So what areas take what amounts of time maybe give us 3 examples.

R1: Like now handicraft takes times – it can take a year, it can take 3 months. I spent half a month and I was through.

MC: How come you took half a month and the rest are taking one year?

R1: Because my father was a carver. Way back when I was young I would watch how he did his craft and conceived it in my mind. So when I finished school, I started doing what I saw my father do and it was very easy for me. So those who come from a background of a carver take less time learning but when you get somebody outside of this carving community then it takes a longer time.

MC: Which is this carving community?

R1: Like now we have a Kikuyu here and he took a long time before he eventually became a carver.

MC: So the Kambas are one community and they all carve?

R1: Yes most of them know carving.

MC: Out of these 334, what is the age group?

R1: The older people are just retiring and once they retire they bring their own nominees who are young people. When you go round you will find 25 – 40 year olds are the majority. Older people are rare because they are weak, unable to cope with competition so they retire and leave.

MC: These majority have they gone to school up to some level?

R1: Not really. Initially this kind of work was perceived as being for those who could not complete their education due to lack of fees or any other reason causing one to drop out of school. They took this as an option.

Nowadays you find those that have Form IV education plus attended college are coming here to be part of us.

MC: So majority are literate?

R1: Yes majority are literate.

MC: Do you have a phone? What's your phone number?

R1: Yes its 0722 918277

MC: So out of these 334 how many have mobile phones?

R1: Almost all of them.

MC: What do you use your mobile phone for?

R1: Many ways – to contact our customers and also social activities.

MC: Just tell us how the mobile helps you in your business.

R1: Today technology has advanced. When a customer comes here, he asks you if you have a phone and how they can contact you and also for money instead of coming here. In most cases mobiles have become a tool in business.

MC: Where do you market your products?

R1: We have various markets for example, here this is a showroom and it appears like there's no activity here. We depend on individuals known as middlemen; they go to penetrate the market so we sell our products to them then they take them outside (MARKETING). Others go overseas to world exhibitions we also sell to them. Others go to town to sell to customers that have offices fitted with Internet, they come and we sell to them.

MC: So you people actually just produce here but other people come and take and go and sell? You don't sell directly to the market.

R1: Yes and there are many challenges with regards to penetrating the market. Like now we intended to have a website and we engaged a technician somewhere and had an agreement that he finishes by January. Up to this point he hasn't officially presented his work to us for reasons unknown to us. But we took a step to have him create a website so that we could have access to the market. (MARKETING)

Nowadays the market is competitive. Many young guys are coming out of school with skills and we find ourselves sandwiched there. On one side you're unable to penetrate the market and on another competing with people that have experience.

MC: Did you say you have challenges with the skills?

R1: Yes

MC: What kind of challenges?

R1: Like access of Internet for example if we had one among us with that skill we would have given him the job he would have done better because we interact with him daily but an outsider…you call and he says I'm doing this and this and when you go to cybercafé you cannot access the work he's done. For instance he can tell you 'ok there's this domain name' but when you go to the cybercafé its hard to know whether he has booked that domain name or its available for anyone to take.

This is one challenge that we have as we have limited knowledge

MC: What about in terms of your carving skills are there any challenges?

R1: Not really. Like now once you create something that you've not seen here and bring it as a picture we will make it into something tangible. So in terms of interpretation we are ok.

Challenges – decorating like putting patterns, advanced decorations for instance carving a leopard. There's a difference between a leopard and a cheetah. The skill requires painting a carving to look like a cheetah and not a leopard is a challenge.

If you carve a bird, a dove, it may be hard to paint a dove differently from a duck, we haven't that knowledge. We just paint if it's a leopard we put dots I don't know where it has a pattern.

MC: Do you think if you had some training it would improve on the quality and finish of your products? What kind of training do you think you would like?

R1: Like now Fine Art if we can be trained that would be good. We just do the best way that we know how; we don't do it professionally.

MC: How do you come up with some of these carvings, where do you get the ideas?

R1: Like now of late consumers are shifting from decorative products to utility products. A manufacturer comes here then creates a 'bakuli' (metal or enamel) then says he wants this 'bakuli' made of wood. That's a new product right?

Also if you see an item in the media or some other place, one determines that if they make this product it will be unique and goes ahead to make it. So designs and products depend on what you come across.

(MARKETING)

MC: Do you get your designs from what customers ask i.e. are your designs market driven? It's the market that tells you what they want?

R1: Yes

MC: And at the same time your market is actually dominated by middlemen?

R1: Yes

MC: So how do you get in touch with your market to know what they want?

R1: We interact freely. They tell you ok once I buy this and this, customers like a certain type of goods for example, so we capitalize on that kind of product. At times they just come and say we want to see the origin of this product like an organization abroad comes and says that they want to see these people. Once they come, we send them with

a message that we are here but unable to reach you in their offices abroad yet unable to penetrate their market due to challenges. (MARKETING)

MC: But you know with a website you don't need to leave this place?
R1: Yes I should be working in my office.
MC: Yes with a website you will sell to somebody in Washington here. So you should push for the website as much as you can. If this person isn't doing it get somebody else to do it for you.
R1: Yes we are working on that
MC: How many kinds of products do you have?
R1: So many I can't count them
MC: Is there somewhere you have written them? All the things you make this is the first, second, third list
R1: List yenyewe hatuna saa hii but it's on our minds but we have categorized in 2 categories – Utility and Decorative Products. Anything hung on a wall like a Giraffe those are decorative. Once you get spoons, 'bakulis' those are classified as Utility goods.
MC: So how does someone decide what to make are you under one umbrella or are you categorized in small groups i.e. these 324 people how do you organize yourselves in terms of production?
R1: There's no organization; everyone sits and designs one's own product depending on the fast moving products. There isn't any order to it.
(DESIGN)

MC: So who takes word back to tell them now this is a moving product make it?
R1: For example when you come here we treat you like a broker or rather a middleman. Once you buy we use you to test the market. On your return without realizing it, you will tell us which are the fast moving products. Once we have that in mind, we capitalize on that. There isn't any other system to determine the fast moving goods or other.
Some time back we worked with a Canadian Union called Ten Thousand Villages. They were working with units like us as a Cooperative. They wanted the producer to benefit but unfortunately it collapsed and it's no more. They had individuals from every society working with them because it proved to be hard.
MC: Ok so who finances your…
R1: Nobody. Individuals. Ourselves.

MC: So you sit in your shed and finance your products then how does the middleman come and take them from you? Does he come into the workshop here or does he come to an individual and pick then go?

R1: There are many ways. You can come to my workshop or to my store and find products that will interest you. Then you buy and go. You can also come with your own samples, we make for you and when we you approve of the sample, you pay a deposit and it now becomes an order. On completion you collect your products and go.

MC: Are all your products made from wood?

R1: Yes

MC: Please walk us through the process i.e. where does the wood come from until you bring it here, the entire process.

R1: For example Jacaranda Wood noting that Mahogany is now illegal and disallowed by the Government though it is still available as it gets cleared from shamba, we are normally called to collect. Like recently we collected some from the showground as they prepared for the show. They called us and we went and collected. Now Jacaranda wood is a tree planted by individuals and when they want to clear they just call us. We have our agents; we organize with them to collect this wood for us. Once we have the material it's a block a big piece and say you want to make an item. You cut it according to the measurements you want then work from there.

STEPS: Ngomo – its like a 'jembe' as many times we don't use chisels and such like tools this is the original tool. Now you carve the way you want it. To us this is the Production Stage where you produce whatever you want, the real thing, until it looks like what you want to make.

Finishing – involves sandpaper and polishing. If it's a decorative product like a giraffe you have to put the patterns then polish, the final step, to make it durable, protects from wearing out, weathering and creates a pleasant look. From there, it's ready for the market you can either bring it here or take it to you customer. (MARKETING)

MC: Now when you get this piece of wood this one like this. You said you get the piece of wood, and then cut it to size you want and you start carving. How do I know like if I want to make a giraffe, do you just take the wood and start, is it drawn somewhere, is it in a picture in a book…how do you come up with that giraffe or that lion or that bakuli? How

do you get the measurements right, how do you say if it's a giraffe I should cut this size or this size. If it's a lion I should do this, how do you come up with the design of the product that you are going to make?

R1: For example you want to make a lion 3-inch height. In our minds we know if you want to make a 3-inch lion it has a certain length. In one's mind you know that it will be 3 x 6 inches. 3 inches and we call it SMALL size, 4 inches is MEDIUM, which is 4 x 8 inches. It is different from the medium of a giraffe, which is 1 foot, and it will have a width of 2 – 3 cm. (DESIGN)

MC: Is there any wastage?

R1: A lot of it

MC: Because now you're training me how to make a lion. I am a new person are there mistakes I make, and does it cost, is there wastage, do you find the mistakes are too expensive, do you go through those kinds of things?

R1: Wastage is there but minimal because it will be hard for you to utilize the remaining pieces. For instance if you want to make a giraffe like that one – in between there's a place where you can use a machine to remove carefully to enable you utilize the piece between the legs. Because you haven't that machine, you take an axe to chop everything. The material from in – between we sell them filed because that material cannot be used again. If you have a machine you can remove that middle part carefully then use the removed piece to carve out a smaller animal.

MC: Why I am asking this is because for example I could be looking at this then I carve it, like if I am getting my design from a magazine of a lion, I know my measurements. Now if I told you to carve a lion for me without a picture, how would you go about it?

R1: Its' there naturally in our minds. I would like you to go round and see how these guys are drawing; they haven't any drawing or anything else. That's why I said that it's very hard for you to become an expert. But once you become an expert you just do it. Go and see the old men doing this job you will not be able to do the same. They look at it when you take it and they say oh it's a lion then he makes it from his mind.

MC: But a lot of it is hereditary.

R1: Yes

MC: Thank you unless somebody else has a question

QTN: You said it was re-registered, which year was that?

R1: It was 1989.

MC: So there's no banks or nothing that finances you, you don't even borrow money from anywhere?

R1: No we have not unless we start.

QTN: So you have standard measurements for products?

R1: Yes

QTN: What you are saying is 3 x 6, 4 x 8 and large will be what by what?

R1: Like now we have EXTRA MEDIUM which is 5 inches and its 5 x 10, then we have LARGE 6 x12 inches, EXTRA LARGE will be 7 inches and above

MC: Maybe you can give us 3 or 4 examples of utility products and decorative products, just a few examples

R1: Utility products – like bowls, bakulis, salad spoons, letter openers, mwiko

Decorative products – like masks and wall hangings. That's also decorative (sounds like he's pointing at a gourd. But sometimes customers place orders for them to use abroad.

MC: Do you have any history why you make like masks of animals? Are they portraying anything?

R1: Like now those masks we borrowed that culture from Makonde people from Tanzania you see they look like Makonde people.

MC: What do you have in common with Makonde?

R1: Tuko jamii moja and they also trained us we took the art from them because Kamba people migrated from that area and Nyamwezi. Even in Zaire, Congolese know this art because we came from the same area.

MC: So Makonde and Kambas are from the same ancestors because I know Makonde are very good in carving and they carve a lot of masks. What about the animals?

R1: These came about from tourists.

MC: That was market driven?

R1: Yes when you go to the parks and see a lion, they want to buy a lion so that they see it abroad on return to their countries.

MC: We went to a place called Kisii mahali inaitwa Tabaka where they are carving Kisii stones. And we found the Kambas have moved to Kisii and are carving beautiful animals using Kisii stones.

R1: There's a time we were using it here.

MC: The Kisii stone?

R1: Yes

MC: So now you said you have exported people there?

R1: Actually there are my brothers from Ukambani, those who do wood carving who have gone to Kisii

MC: We found them in Kendu Bay (*Francis advises correct name as* Tabaka) many of them in quarries actually carving beautiful animals for the Kisiis to export. Because they said there's no more wood to carve in Ukambani sasa wameenda kucarve Kisii stones.

QTN: How does this Cooperative Society benefit from members? As in are there monthly contributions?

R1: For our Society the only way one benefits as a member is once they display their stuff here and customer buys, there's a commission of 15%. We use that commission to run the activities/expenses of the Cooperative.

MC: So that 15% remains in the kitty of the society?

R1: Yes

MC: Ok thank you very much now we can go and see.

26 September 2012: You said that now you have the benefit of having people from school and those who are not or rather haven't had so much education in their careers. How do you combine those two groups of people maybe to come up with a handbook that people can read other than practical so that they can have a book they are reading then have the measurements, so that it can be a point of reference incase the instructor is not there or those in the industry have left.

R1: We haven't reached that stage but are slowly influencing the old people because they had their own ideas but now we have another generation that's gone to school and therefore doing things in an advanced way. It's just like at our place, we have oxen pulling the plough. The animal that doesn't know how to pull is tied in between others, inachukuliwa na hizo zingine mbaka ijue. Sasa tunawabeba tu hivyo.

There isn't a system similar to what you've asked. There was a mzungu who came trying to implement that idea of putting information in writing - information on measurements etc. Even if it's done we cannot follow it because a Mzee here knows that a zebra is 6 x 3 inches and he will make it that way, finding no reason to refer to a book. We know that we can put this information in a book but the Wazees may be reluctant.

QTN: How do you think you will benefit from modern technology? Do have challenges in this area?

R1: We have challenges but we can benefit from technology. If you go round you will

find people having machines to put details, which turn out smarter than hand – carved ones. With knowledge, I think the final product will be smarter than the ordinary one, making it fast moving.

Today, for you to have a fast – moving product, install a machine. A customer will compare a machine made and hand made and will prefer the machine made as it is neater.

MC: And also the finishing is a big challenge as you are talking about?

R1: Yes

MC: Because you already have that artistic hand, it's very easy to teach you Art and Design isn't it. So you would be willing to sit in a class to be taught?

R1: Yes I have waited for that opportunity but sometimes we weigh options i.e. shall I go to class or my child will go to class? That's another challenge.

(DESIGN)

MC: For example if we are to put it for you on your phone i.e. that lesson, then you don't have to sit in a class you can learn it from here. Unakaa hapa na unajifundisha.

For example, this is something that you want to make for Africans. It will show you how to so you wont have to go to a class. You get on your refer phone and you refer and say 'what do I need to do to be able to mix my paint' 'how do I get for example green? I mix yellow and blue'. So I can go back and say 'ok yellow and blue'. Then 'what brush do I need to come up with the details?' Maybe its brush number 2 and incase I forget I go back here (demonstrates physically on phone) and look at my message. What tool do I need to do this? So we are saying you don't have to literally sit in class for a month. Like he is asking about technology. Unakaanga kwa simu hata ukienda nyumbani unafanya reference namna hii. So that's what we're saying would you be willing to embrace this kind of thing, you see this one is being taught? Sasa tunatengeneza yetu ya Kenya hapa. Or if you say once a month we come here and teach you for one morning. What you would like us to teach you is Art and Design?

R1: Yes

MC: If not you have one computer unakaa inafundisha hivi.

R1: It's a good idea.

MC: So with phones everything is possible with Technology.

R1: Lakini nikuulize hii phone kuitoa kwa duka don't you think its also a challenge?

MC: The Government now is working towards phasing out certain phones…

R1: Hii yangu ni nini?

MC: Sasa hizi…

R1: Naskia niko kwa mtandao kwa sababu nikitumiwa message nasoma, natumiwa pesa, its as if nimefika

MC: Now you want to say you have not arrived. The Government is trying to make phones…these ones are now going to be phased out. These ones the prices will come down. So the price you're using to buy this you should be able to get a phone that has Internet and you will be able to access it in the next few years. So it's now us, if you're willing to you can embrace technology. It's not the price of the phone prices are coming down. So you'll have a phone like this that can do this in a very short while. So if you're willing you can do some of these things and you can access them from wherever you are.

QTN: Two questions – when you have guys who come from school to this Industry and they tell their family, and they say they are coming to some kind of work where they are perhaps bringing in new knowledge that they can teach you. You may also have a Std 8 drop out with the advantage of coming from a background of carvers therefore may have the skills. Is there a conflict of knowledge or competence where guys coming from school feel I have something to teach you vis-à-vis yourselves that have been here longer.

R1: Yes to some extent because like now when you go round you find a guy that's painted a chair like a leopard. Trying to educate the older carvers to embrace these new skills is challenging. Young people are taking advantage of that because the world is changing. Take for example a simple thing like this chair. Instead of painting it all black, he puts some decorations on top and once you take it to the market, that one which they spent a lot of time and skills doing will be bought first. I'm referring to 20 – 35 – 40 years that's the youngest group here. The oldest – we have people approaching 70 years

QTN: Where do you see this industry 25 years from now?

R1: Unless we embrace new technology we will have a crisis. At the moment we are making wood products but you don't know what will happen 5 years to come. Maybe the Jacaranda that we say is easily available may not be available. We have to focus on the future and see what else we can do to maintain our market. We could look at re-cycling some items and making others for instance we have that (a warthog) and these

are sandals, the slippers that you know. Huyu jamaa alienda akabind together then came up with that sculpture so we may need to look in that direction. (MARKETING)

QTN: When you come up with a design do you have the copyright so that somebody else cannot copy it because when you look at the products here and go to other handicraft shops they are always the same. Would you be having a challenge that someone is afraid to come up with a new design because it could be stolen?

R1: Yes for example now there are people here who claim to make things not seen elsewhere. When a customer comes the carvers pretend that this is new and gets the customer to buy it. Without knowing its like finding a new sample in the market he goes and registers it like his own. We have that challenge. If we had a system whereby once you make a product it's yours and nobody else can copy that we would benefit. Like recently Asians, have copied the Kiondo and it is initially African. Even with the 'sanamus' it's the same case – you think so much, come up with a design, somebody else picks it and goes away with it and benefits. (DESIGN)

MC: Thank you very much for your time. (Someone speaks in the background – sounds like Francis) The process…lets write it down then we go around

MC: Sorry the process he's taking us there. I thought he already walked us through. We talked about the Jacaranda tree then it's a piece of wood then after that he carves it, smoothens it then paints it. He already did it for us so now we go and see the practical. Thank you

811_0052

R1: We buy Jacaranda wood of different sizes and lengths. It's bought then taken to one's individual stall, cut to the size you want then start the process of making the product. Like the man you see there breaking that wood, he wants to cut into small pieces to make a kitchen 'mwiko'.

QTN: Generally can you tell us apart from Jacaranda, I understand there are different types of woods. Can you tell us all the types of woods that you can use.

R1: We have hard wood like Ebony, which is black; we have Mahogany, Rosewood, Olivewood and other indigenous trees regarded as hardwoods. Cedar, Red Oak, I cant remember them all but once you find the above those are good.

811_0053

R1: After sand paper they decorate then polishing is the last stage. (Lots of polishing heard)

QTN: With this one (physically showing the item) how much time does the carver need to make this kind of product?

R1: It takes less than an hour, has a simple design with few details. We will show you a product that can take a month. This one cannot take you an hour because once you see it its simple to make and has not much details.

(DESIGN)

811_0054

QTN: Babako alikuwa?

R: Alikuwa mchongaji

QTN: Sasa kutoka shule ulikuja tu straight ama?

R: Nilikaa tu nyumbani sijaendelea na masomo sana kwa ajili ya shida za hapa na pale. Lakini namna tu nikaona bahati ya kuendelea

QTN: Sasa hivi waweza kuchonga vitu vya aina ngapi?

R: Ile sichongi ni wanyama lakini watu hakuna yeyote inaweza kunishinda sababu natumia kitabu saa zingine.

QTN: Ukitoa picha kama yangu hivi utaitoa?

R: Sawa nitaitoa bora niwe na picha

QTN: Tunakutakia mema

R: Asante

811_0055

R: Kwa hivyo Jacaranda ni nzuri kwa sababu ina absorb maji, its friendly to weather na haipasuki haraka. Unaelewa?

MC: Hiyo ni decorative?

R: Ndio. Decorative inatumia hardwood na utility softwood

R: Si tuwapeleke kwa sector ya painting. (Points at something physically while answering a question – unable to hear the question lots of background noise) This is a vulture.

811_0056

QTN: What other sources inspire you to come up with new designs?

R: New designs…well I just think of a design and decide to make a different style from this. Like now I may think of making another type of bird like an Ostrich or an Eagle

especially with me I specialize in birds even animals but mostly I like to make different types of birds.
(DESIGN)

I can think of making one that's running, standing or doing something else. When a customer like you looks at it they become interested and if you want to buy it I gain.
QTN: How long does it take to make one of these?
R: I take long because I take time to produce something to look real. You see all the details being put here – this can take more than 2 weeks. If I want to make more, more still come.
MC: (Speaks but unable to pick out her question due to background noise)
In order to produce something nice, you have to be slow, think through it and eventually you'll find that you've produced a good product. You can't rush through and produce something.
QTN: (First part unclear lots of noise) Have you made something else that the original…
R: No I don't think
NB: There was lots of noise in this recording and sentences are incomplete even after re-plays.

811_0057

R: Hii ni ya Sudan
Nb: Recording was 4 seconds long

811_0059

MC: (Sounds like something was omitted at the beginning of this recording) … University College hapa karibu. Tunafundisha wanafunzi Design na departments zingine kama Journalism, Printing na kadhalika. Katika Department ya Design na Printing tunafunza mambo ya Electrical, Mechanical, hizo zote zinawekwa pamoja. Ukitaka kutengeneza kitu kama gari, lazima ufanye kazi na hao watu wote – Designer, Electrical, Mechanical hawa wote. (DESIGN) Tungependa kama Polytechnic tuwe na njia ya kufanya kazi nanyi ili wanafunzi tukiwafunza kwa darasa wananaweza kuja huku nje na mfanye kazi pamoja. Watajifunza kutoka kwenyu nanyi mjifunze kutoka kwao. Kwa saa hii tunafanya kazi na Ministry of Labour na watu wa *Jua Kali*. Tumetembea Western, wiki hii yote tumetembea Nairobi na tulikutana na Mr. Mugambi. Jana tulikuwa Shauri Moyo - Shauri Moyo Furniture, Handicrafts na leo tuko hapa. Ile kitu tungependa kujua ni kwamba mnafanya

kazi gani hasa. Hii Association yenu ilianza lini na mko na members wangapi? Ndio mtu awe member ni nini anatakikana awe nacho? Na hawa members wana umri wa miaka mingapi wengi wao? Ni youth ama ni watu wazee kama mimi? Mnafanya kazi ya aina gani na hii kazi munayofanya mtueleze kwamba inaanzia hapa mbaka gari itoke kwa gate. Departments tofauti tofauti kama ziko na kila Department inafanya nini? Kama mko na challenges zozote tungependa kuzijua. Mtazitaja mkisema 'Changamoto zilizoko ni 1,2,3…' na tunaweza kukusaidia namna gani through Ministry of Labour. In a nutshell that's what it is. And I hope you don't mind tukifanya recording. Tuko na camera na hii na yeye pia anaandika ili tunuku mahojiano haya yote

R: Tuko na challenges nyingi hapa na nilivyowaeleza kila mtu ana skills zake hapa. Kuna Panel Beater, Electrician, Mechanic, Glass Welding na watu wa Radiator. Hawa wote wana changamoto nyingi – tumeomba fedha za CDF, tumeuliza tuwekewe sheds ndio tuweze kufanya kazi kwa njia ya usafi. Hatujafua dafu.Tulikuja hapa mapema 1996 na tangu tuje tumejaribu maneno 1, 2, 3, na Serekali maanake lazima tupatane na watu kama akina Mugambi. Kwa hio ofisi tumekuwa tukienda wakubwa wakitoka wakienda kupeleka malalamishi yetu. Ni mambo mengi ambayo hayajatimizwa hapa.

Badala ya sisi kuinuliwa unapata tunafinyika kwa mfano, nikiwa hapa *Jua Kali* naweza stukia badala ya hii kazi yangu kuinuka ni kuisha itaisha. Badala ya Serikali iweze kunipromote because I have something in mind which if I had somebody we can help each other. *Jua Kali* sana sana husememekana ati ni ya watu ambao hawajasoma ati amefika Std 8, Form 4. Labda mtoto amefuza kujiunga na chuo kikuu lakini mzazi akashindwa kumlipia mtoto. Watoto wengine wamefunzwa na Undugu na tuneletewa hapa na waweza pata hawa watoto wamifika Std 8, yote haya yakilingana na uwezo wa mzazi. Undugu pia inasaidia na hufunza watoto kulingana na skills kwa mfano Mechanic ni kama wao huchukua mtu kulingana na training anayotaka kama puncture, handicraft.. inalingana na ile ambayo mwanafunzi anataka. Undugu wanafanya kazi aina nyingi.

Akija hapa nilivyokuelezawe are supposed to have class here ambayo mtoto akitoka kwa theory kuingia practical anafundishwa zaidi kulingana na vile ameona yaani kile amesoma kwa kitabu ndicho anaona kwa practical ama ndivyo anaona kwa gari sasa.

We are supposed to have a class here ambaye akiona kwa practical anaweza kuapply theory aliyoisoma darasani. Kwa sasa waweza funza mtoto akae hapa miaka mingi lakini hana njia ya kuinua skills. Kama mimi kwa mfano, niko na miaka 46 na nimejaribu kuenda workshop hata niko na Certificate tele ambayo nimepewa kutoka hizo workshop za

Ministry of Labour. Lakini unaweza kuta after that workshop bado ntarudi hapa na sitapata atakayenielekeza kulingana na masomo niliyopokea kwenye hiyo workshop.

Kwa upande mwingine ningependa kuwashukuru kwa kujitolea kuja mbaka on the ground muweze kuona yale matatizo ambayo *Jua Kali* huwa nayo. Tuna mapenzi ya kutaka kuinuka na ndio uliskia nikilalamika ya kwamba utapata mtu ni Professor. Professor anaenda kufanya kazi ya Manager ilhali anafaa kuwa akija hapa aone vile ninavyo fanya mambo yangu yaani practical anaweza niinua aje? Waweza kuwa Professor wa ndege nami natengeneza ndege in practical na nimesoma kidogo lakini kuna kitu nimebakisha ambayo Professor ndiye anaweza nisaidia. Lakini badala ya Professor awe mahali kama hapa on the ground aweze kujua matatizo yetu, unapata anaenda kukaa kwa ofisi. Sasa masomo yake hayatusaidii na anafaa kusaidia..wajua unasoma usaidie watu and without.. END

Appendix 27: Filled Interview Guide (The rest in Appendix B (ii))

Personal Information

1. ***What is your name?*** Respondent 1
2. ***What is your phone number?***
3. ***What is your background (education and family)*** His father was a carver and after school he joined the association; he had by then learnt the skill from his father.

Business Profile

4. ***What is the name of your business?*** Nairobi Handicraft Industrial Co-op Society
5. ***What is your phone number?***
6. ***What is your address?*** Nairobi Handicraft Industrial Co-op Society
7. ***Do you have a website?*** They do not have an active website.
8. ***What products do you sell?*** We have different classes of the goods we make for example there are the decorative items that are mainly for adding a touch of class at an office or at home then there is the utility kind, this are products mainly used in the home mainly the kitchen then there is also the cultural kind which is mainly made to preserve the tradition of different tribes.

Utility Products: bowls, salad spoons, letter openers, mwiko. Decorative Products: masks, wall hangings

9. ***Do you own or rent the premises your work in?*** This is our own we bought this, constructed it and here we are

Design Interventions/ Concept Development

10. ***Do you conduct market research? NO***

If YES above, how do you conduct market research?

If NO above, why don't you conduct market research?

The society has a show room where products by artisans are on display. The products bought in the showroom generate income for the society in the sense, which 15% of their sales are remitted to the society's kitty. The society depends on middlemen to make sales; these middlemen buy products in wholesale scale. (Are you experiencing any challenges.)

11. (Do you prepare briefs based on discussion with your customers ?)

If YES, how do you make your briefs? The sketches of the products are in their minds. They make a sketch on paper; they then translate the sketch on to the wood. They use pictures to develop products. Designs are customer driven; consumers are shifting from decorative products to utility products.

Most of the artisans have learnt the craft from their parents.They use pictures to develop products. Their designs are also customer driven; their consumers are shifting from decorative products to utility products.

If NO, why don't you make briefs for your products? (What challenges do you face?)

12. Do you document your briefs?

If YES, how do you document your briefs? - visual representations or models. Mostly we fist conceive an idea in our minds then we curve it out on the wood. As for keeping records we do not, so we just use our imagination. We do not keep records of the items we make because we might not sell our products everyday so we just do our business as it comes, you might sell an item and buy another one.

If NO, why don't you document your briefs? (Do you experience any challenges in documentation?)

13. How do you generate the ideas of your products?- Customers determine the design of their products. Some of the design on the mask is borrowed from the Makonde people of Tanzania: this has a cultural significance as most of the carvers in the society are Kambas, who share an ancestral heritage with the Makonde people. The Kenya natural resources also influence the design of some products. An example is the wildebeest migration Japheth Muasya Ngila has curved out a sculpture of vultures waiting to devour carcasses of dead wildebeests.

What challenges do you encounter in generating your ideas?

PRODUCTION- MAKING INTERVENTIONS

14. (Do you consider the use, prize and function of your product when designing?

15. ***Yes we do, our clients have also helped us a lot to modify our designs specifications*** when they go abroad and get new designs fro the products.

If no explain why)

16. Do you make prototypes for your customers to see? NO

If YES, how do you make the prototypes?

If YES, when do you make the prototypes?

If NO, why don't you make prototypes of your products?

Other competing artisans normally steal the prototypes that are generated by the artisans.

17. (Does you production follow a structured process?) NO

If YES, how do you plan for the production of your products?

If NO, why don't you plan for the production of your products?

Based on the designs they have inherited, copied from exhibitions or learnt on the job, the go straight into production without considering the functionality and price of the product.

18. What is the production process of your product? Woodwork Process: The woods are bought in blocks (logs). The woods are then measured out according to the required size of the products Ngomo (adze) is used to curve (chop out) the products; the curved out product is then passed through sanding. Any decorations are then etched on the product. The product is then polished to give it a pleasant look and to also prevent weathering.

Leatherwork Process: the goat or cowhide is stretched out and then pegged to dry in the sun for at least two days. Fat is then peeled out of the dried hide. The hide is then immersed in water before it is used to make hide products such as drums, nyatiti, pencils etc. (Are you facing any challenges in your production processes?)

19. (Are you happy with the finish your products?)

What are the challenges that you encounter in finishing your products?

No. The lack of modern tools affects the finish of their products

20. Are you satisfied with your working conditions?

If no: explain why?

Their working environment is not satisfactory.

21. What tools and equipment do you use?

We still use the traditional tools to curve our sculptures.

What are the challenges you have in terms of tools and equipment?

The other modern tools are very hard to come by use of the cost.

The artisans need machines to improve the quality of products and also sales: machined products are selling more than those created manually. Unless new technology is embraced the production is headed to a crisis. This is because, wood is a resource that is becoming increasingly scarce and there is need to invest other ways of making products using different material such as recycled plastic.

22. Do you make any local cultural products? YES

If YES above what challenges do you encounter in making the local cultural products? The artisans need machines to improve the quality of products and also sales: machined products are selling more than those created manually. Unless new technology is embraced the production is headed to a crisis. This is because, wood is a resource that is becoming increasingly scarce and there is need to invest other ways of making products using different material such as recycled plastic.

23. How did you learn your skills?

We started out with watching our grandfathers do the handicrafts and learn piece by piece till you get to learn how to make your own, but nowadays not very many people come to learn the trade.

What challenges did you face while learning your skills? We do try to use the new technology to advance our art but not many people are into it because it is expensive so the few who have access to the technology try to use it, those who have gone to school are the ones who mainly use it. Not many people know that you can use your phone to do business.

They lack training in fine art, which would help improve on the quality of products. There is friction between old skilled artisans and the new skilled artisans: the old ones feel they have nothing to learn from the new ones and this has led to lack of transfer of skills and knowledge between the two divides.

24. Have you undergone any further training to improve on your skills?

If YES, how have you improved on your skills?

(If NO, explain why)

25. How do you market your products? Market penetration is a challenge due to lack of Internet website. Prior to this the Ten Thousand Villages (an organization) promoted the society by marketing it.

What challenges are you facing in marketing your products?

27. What is the structure of your organization? Members join the society by first training as apprentices. The membership age group ranges from 25-40 years. Initially the members were almost exclusively illiterate but currently most are literate.

28. Do you have any partnerships with any public formal institutions? NO

If YES, which are those formal organizations?

If YES, how are you benefiting from those partnerships?

If NO, why don't you have any partnerships with formal organizations? We have not done any collaborations with training institutes but if there is a client who wants a specific kind of product they can choose to take someone from here to school so as to learn and make products according to their specifications but not going to school does not mean we do not want to learn. If we had the opportunity we would.

(Would you like to partner with the formal institutions to upgrade your skills?

29. Do you have a cell phone? Yes (What do you use it for?)

Can your phone access the internet? Most of the members have mobile phones and can access the Internet. How do you use your phone in your business? Most members have cell phones, which they use to contact their customers and also Mpesa.

30. Do you have any other challenges? There is friction between old skilled artisans and the new skilled artisans: the old ones feel they have nothing to learn from the new ones and this has led to lack of transfer of skills and knowledge between the two divides. The biggest challenge is with the products we make, we have not known that you can copyright your product so as to protect it from being imitated. So once we learn that we

can all have our own design it would really give us a chance to grow. Market penetration is a challenge due to lack of Internet website. Other competing artisans normally steal the prototypes that are generated by the artisans. They lack training in fine art, which would help improve on the quality of products. The artisans need machines to improve the quality of products and also sales: machined products are selling more than those created manually. Unless new technology is embraced the production is headed to a crisis. This is because, wood is a resource that is becoming increasingly scarce and there is need to invest other ways of making products using different material such as recycled plastic. . There is also friction between old skilled artisans and the new skilled artisans: the old ones feel they have nothing to learn from the new ones and this has led to lack of transfer of skills and knowledge between the two divides.

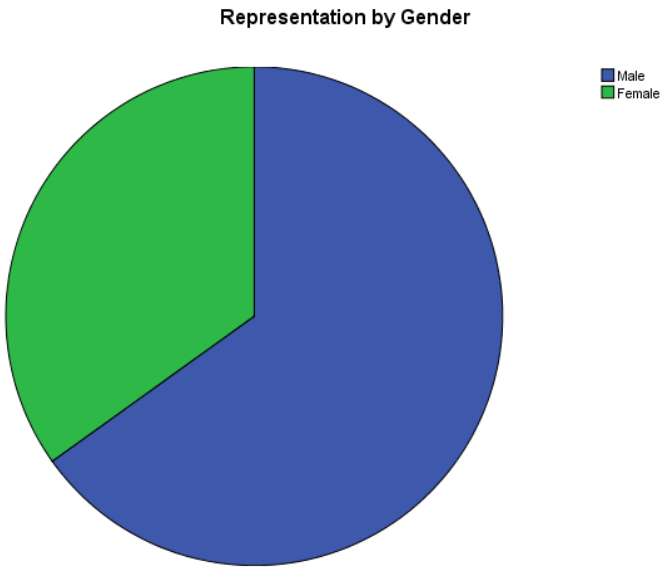
Appendix 28: SPSS Quantitative Analysis

RESULTS: FIRST DATA COLLECTION

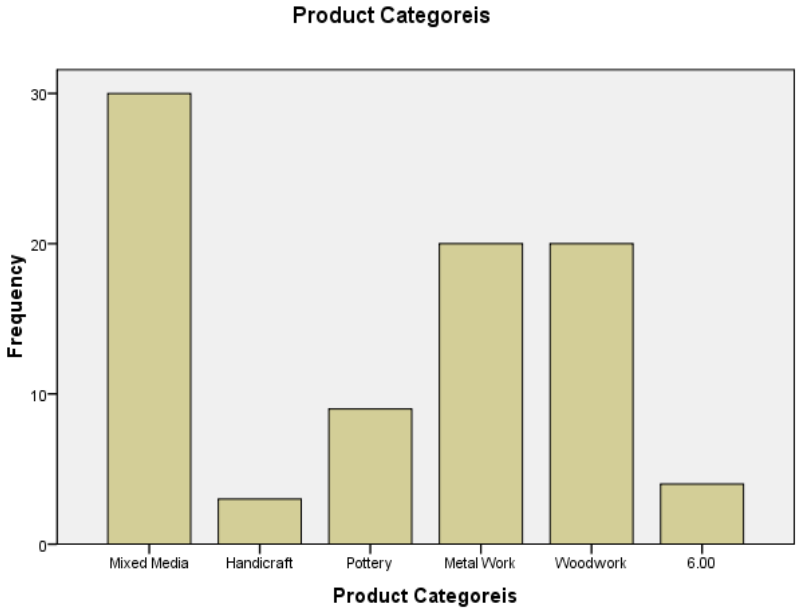
Representation by Gender

Representation by Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	56	65.1	65.1	65.1
	Female	30	34.9	34.9	100.0
	Total	86	100.0	100.0	



PRODUCT CATEGORIES



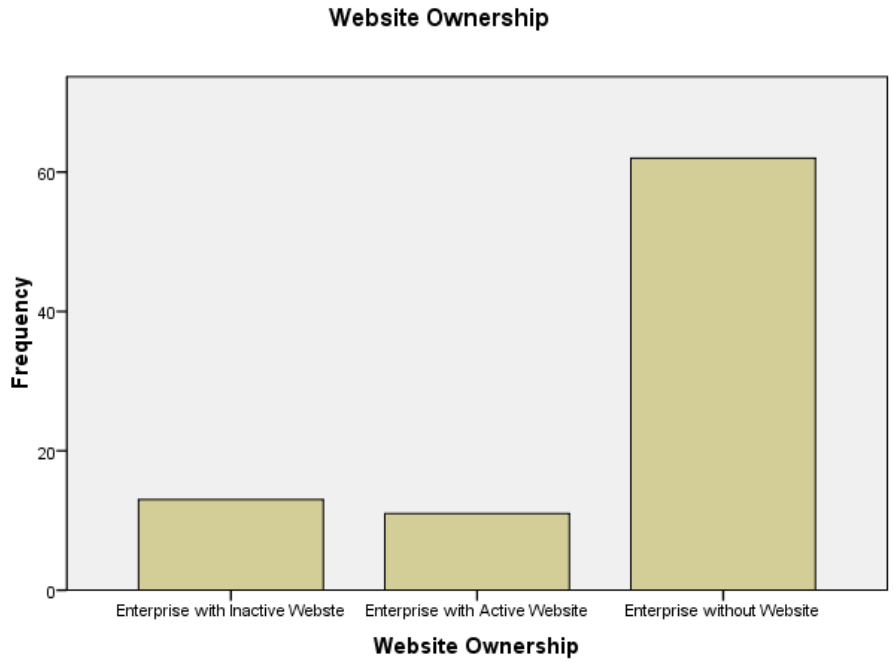
Product Categories

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mixed Media	30	34.9	34.9	34.9
	Handicraft	3	3.5	3.5	38.4
	Pottery	9	10.5	10.5	48.8
	Metal Work	20	23.3	23.3	72.1
	Woodwork	20	23.3	23.3	95.3
	6	4	4.7	4.7	100.0
	Total	86	100.0	100.0	

WEBSITE OWNERSHIP

Website Ownership

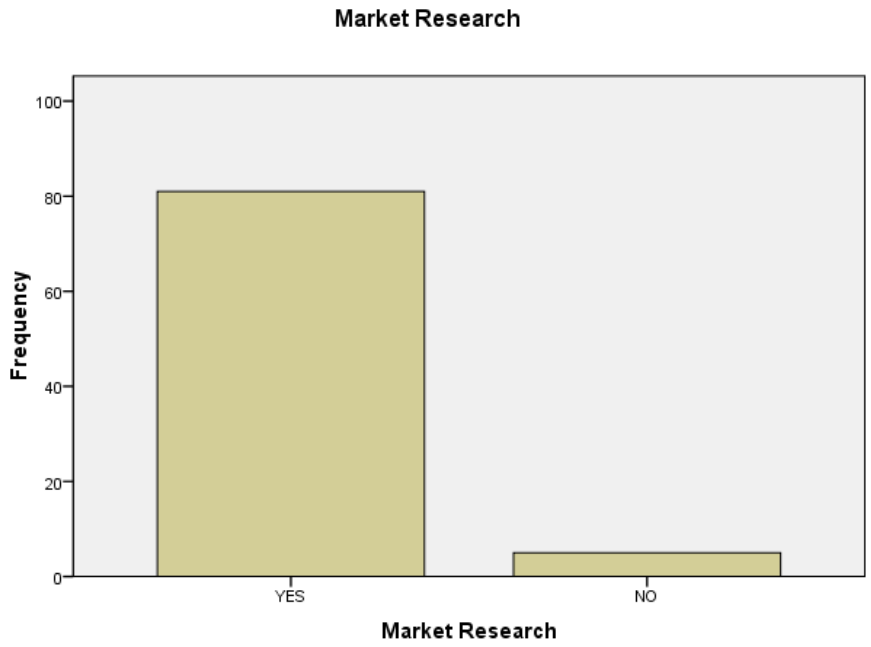
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Enterprise with Inactive Website	13	15.1	15.1	15.1
	Enterprise with Active Website	11	12.8	12.8	27.9
	Enterprise without Website	62	72.1	72.1	100.0
	Total	86	100.0	100.0	



MARKET RESEARCH

Market Research

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	81	94.2	94.2	94.2
	NO	5	5.8	5.8	100.0
	Total	86	100.0	100.0	



BRIEF MAKING

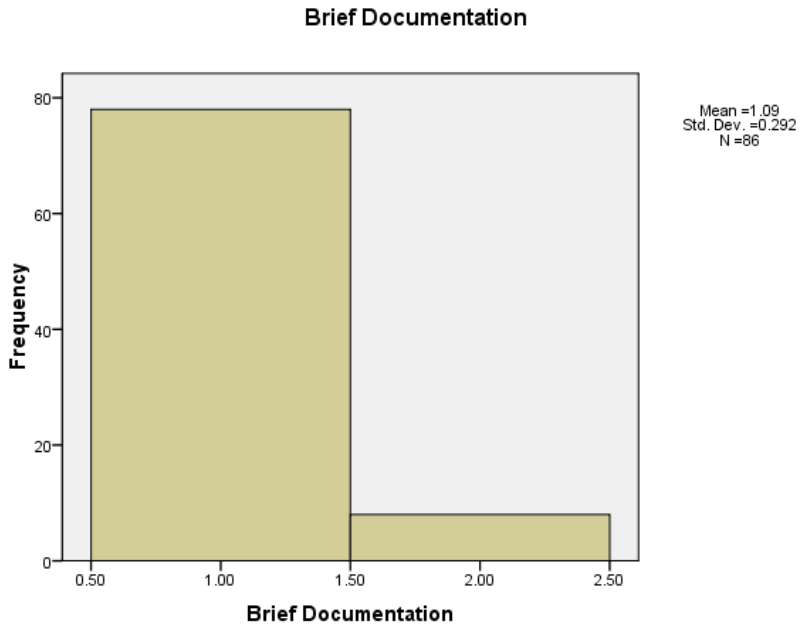
Brief Making/Creation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	78	90.7	90.7	90.7
	2	8	9.3	9.3	100.0
	Total	86	100.0	100.0	

BRIEF DOCUMENTATION

Brief Documentation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	78	90.7	90.7	90.7
	NO	8	9.3	9.3	100.0
	Total	86	100.0	100.0	



IDEA GENERATION

Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Customer Specification	81	94.2	100.0	100.0
Missing	9	5	5.8		
Total		86	100.0		

Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Current Market Trends	27	31.4	100.0	100.0
Missing	9	59	68.6		
Total		86	100.0		

Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Magazine & Exhibitions	35	40.7	100.0	100.0
Missing	9	46	53.5		
	System	5	5.8		
	Total	51	59.3		
Total		86	100.0		

Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Copying Existing Products	55	64.0	100.0	100.0
Missing	9	17	19.8		
	System	14	16.3		
	Total	31	36.0		
Total		86	100.0		

Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Learnt from Other Artisans	28	32.6	100.0	100.0
Missing	9	58	67.4		
Total		86	100.0		

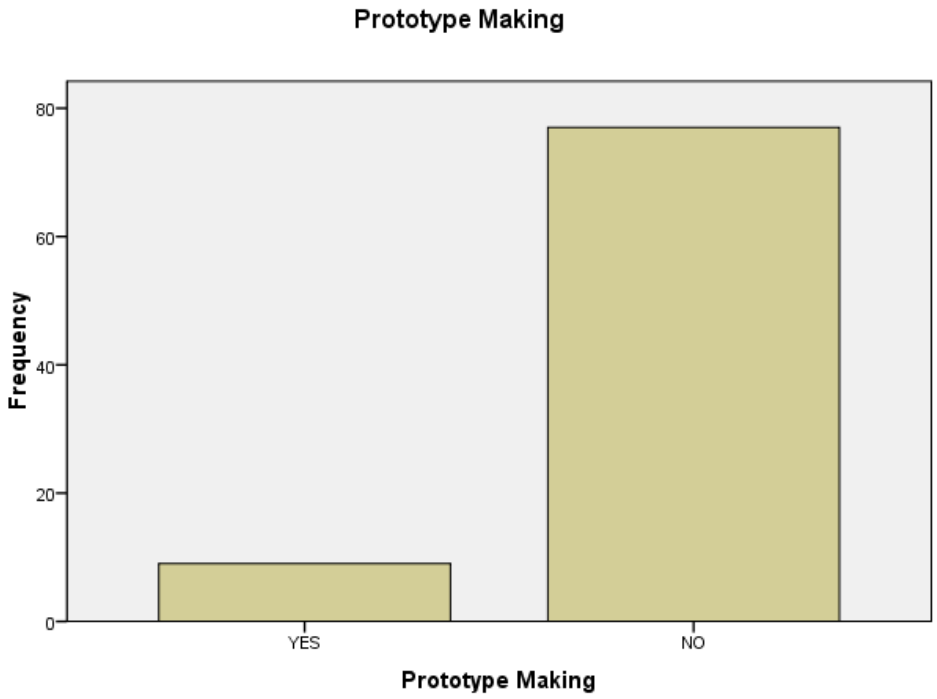
Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Memory	38	44.2	100.0	100.0
Missing	9	48	55.8		
Total		86	100.0		

PROTOTYPE MAKING

Prototype Making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	9	10.5	10.5	10.5
	NO	77	89.5	89.5	100.0
	Total	86	100.0	100.0	



SKILLS DEVELOPMENT

Skills Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal Training	9	10.5	100.0	100.0
Missing	9	77	89.5		
Total		86	100.0		

Skills Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	On-the-Job Training	73	84.9	100.0	100.0
Missing	9	12	14.0		
	System	1	1.2		
	Total	13	15.1		
Total		86	100.0		

Skills Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hereditary Skills	65	75.6	100.0	100.0
Missing	9	21	24.4		
Total		86	100.0		

MARKETING PRODUCTS

Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local Markets	51	59.3	100.0	100.0
Missing	9	35	40.7		
Total		86	100.0		

Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Walk-in-Customers	56	65.1	100.0	100.0
Missing	9	30	34.9		
Total		86	100.0		

Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Word of Mouth	65	75.6	100.0	100.0
Missing	9	21	24.4		
Total		86	100.0		

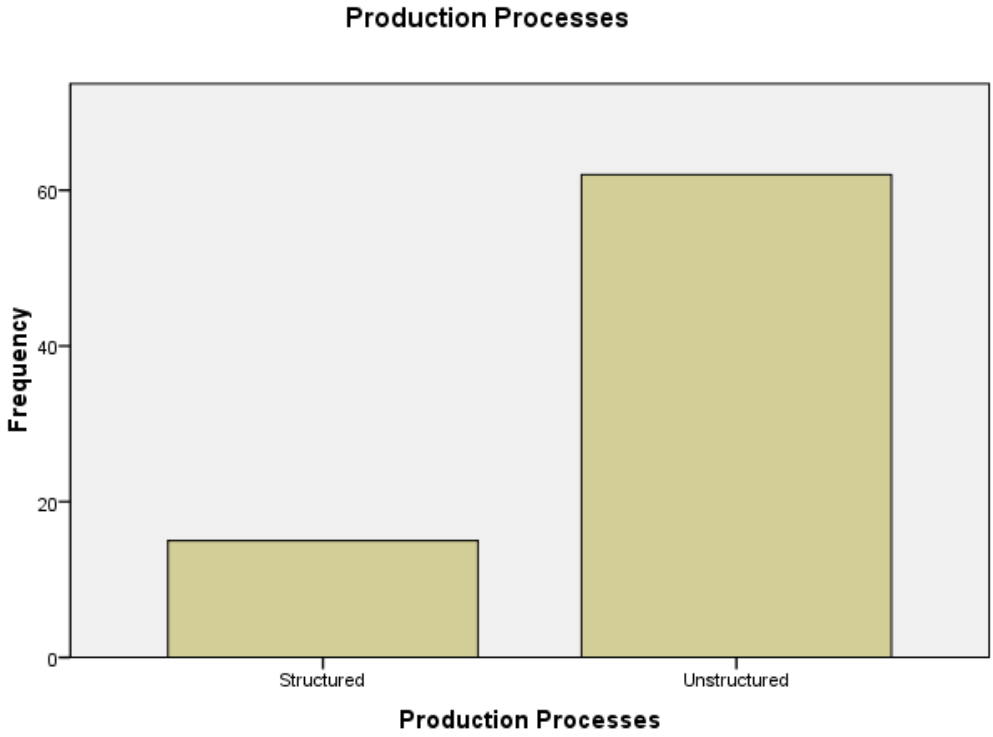
Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Exhibition/Trade Fairs	63	73.3	100.0	100.0
Missing	9	23	26.7		
Total		86	100.0		

PRODUCTION PROCESSES

Production Processes

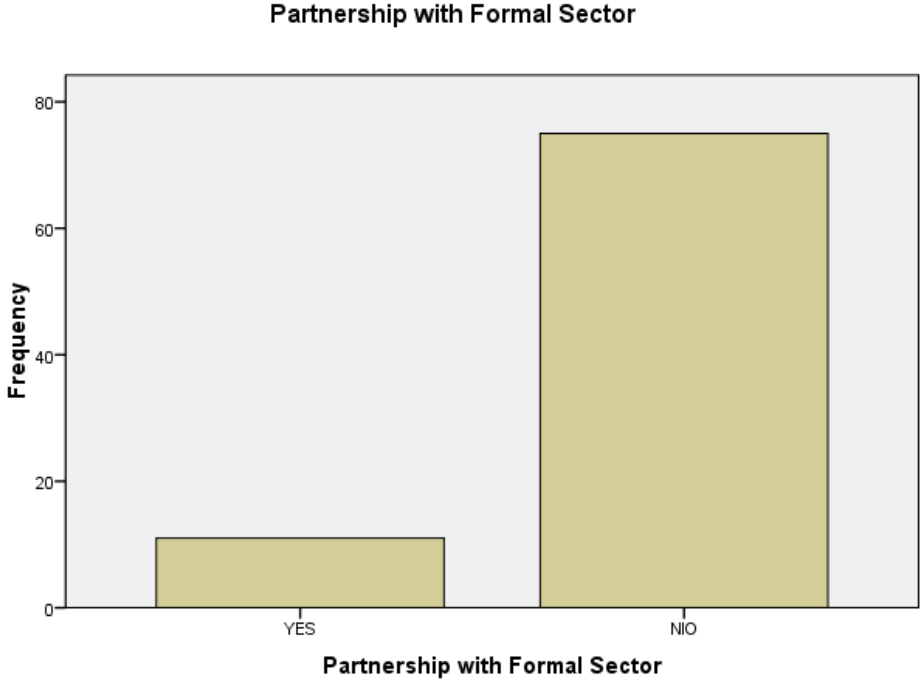
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Structured	15	17.4	19.5	19.5
	Unstructured	62	72.1	80.5	100.0
	Total	77	89.5	100.0	
Missing	System	9	10.5		
Total		86	100.0		



PARTNERSHIP WITH FORMAL SECTOR

Partnership with Formal Sector

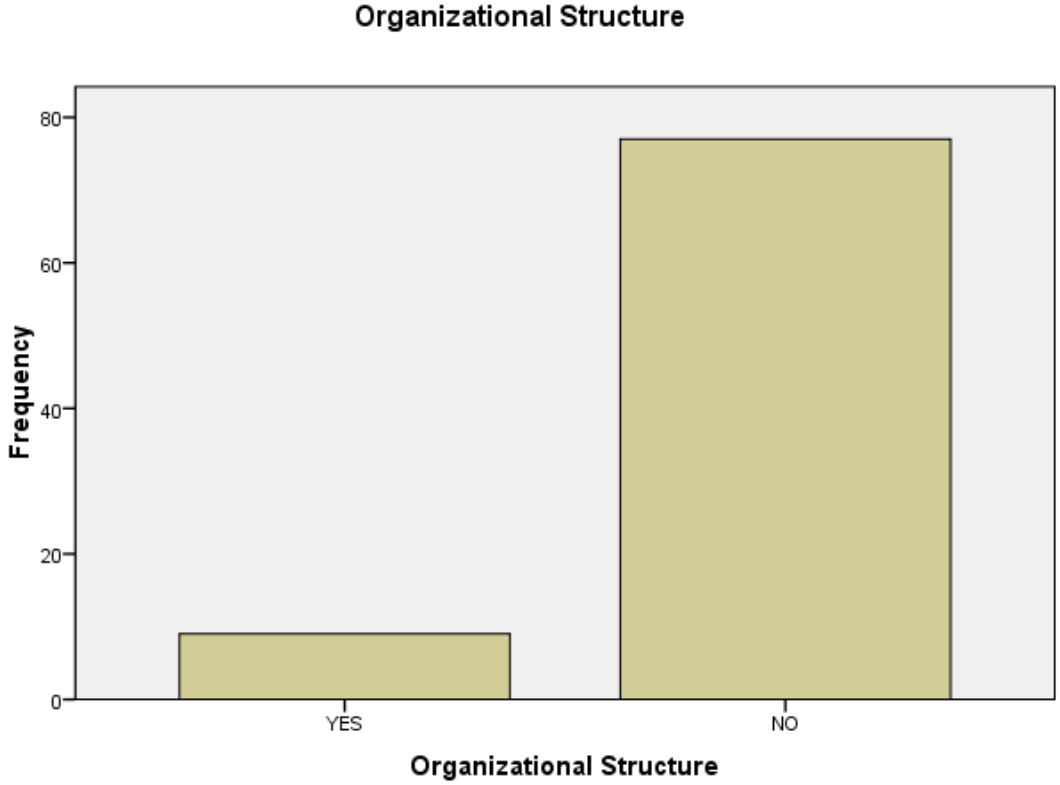
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	11	12.8	12.8	12.8
	NIO	75	87.2	87.2	100.0
	Total	86	100.0	100.0	



ORGANIZATIONAL STRUCTURE

Organizational Structure

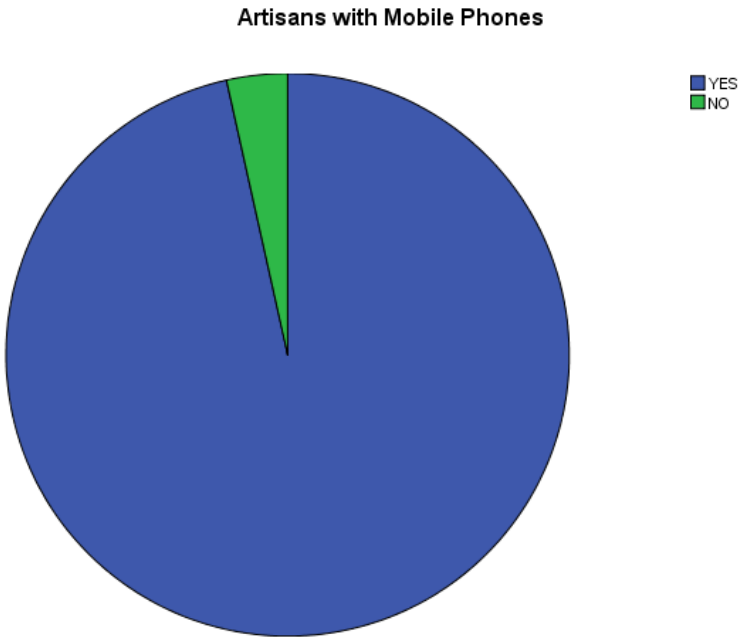
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	9	10.5	10.5	10.5
	NO	77	89.5	89.5	100.0
	Total	86	100.0	100.0	

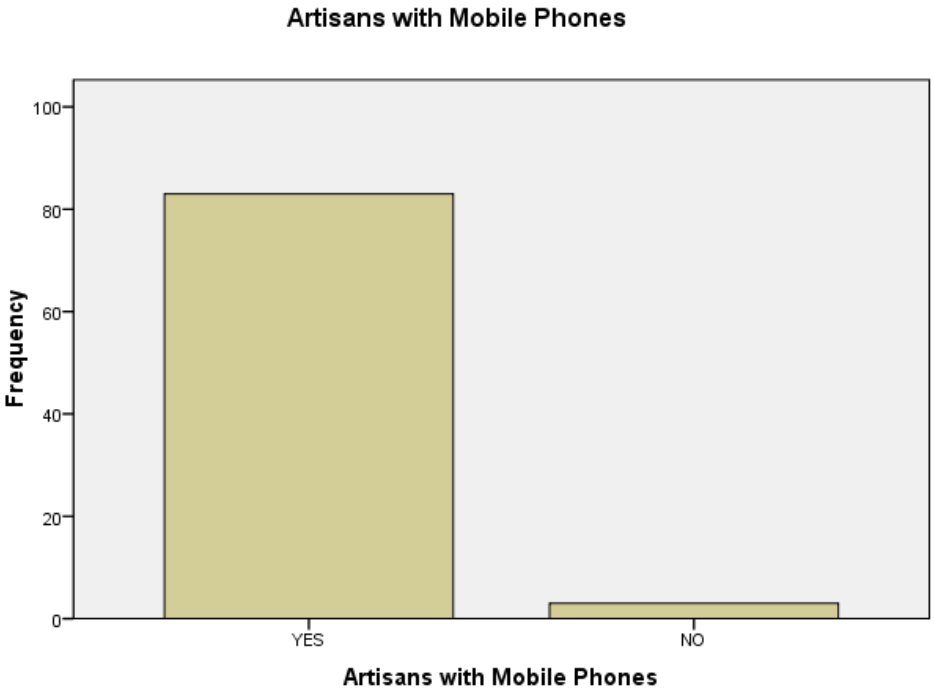


ARTISANS WITH MOBILE PHONES

Artisans with Mobile Phones

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	83	96.5	96.5	96.5
	NO	3	3.5	3.5	100.0
	Total	86	100.0	100.0	

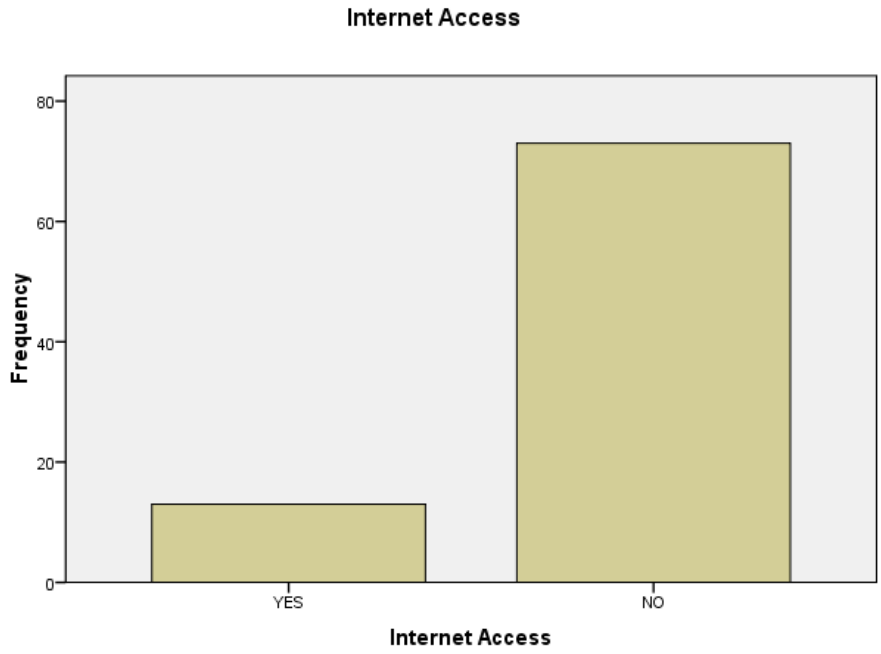




INTERNET ACCESS

Internet Access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	13	15.1	15.1	15.1
	NO	73	84.9	84.9	100.0
	Total	86	100.0	100.0	



CHALLENGES

Challenges/Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	65	75.6	100.0	100.0
Missing	9	21	24.4		
Total		86	100.0		

Challenges/ Working Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	77	89.5	100.0	100.0
Missing	9	9	10.5		
Total		86	100.0		

Challenges/Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	71	82.6	100.0	100.0
Missing	9	15	17.4		
Total		86	100.0		

Challenges/Inadequate Tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	75	87.2	100.0	100.0
Missing	9	11	12.8		
Total		86	100.0		

Challenges/No Market Research

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	60	69.8	100.0	100.0
Missing	9	26	30.2		
Total		86	100.0		

Challenges/No Brief

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	65	75.6	100.0	100.0
Missing	9	21	24.4		
Total		86	100.0		

Challenges/Idea Generation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	30	34.9	100.0	100.0
Missing	9	56	65.1		
Total		86	100.0		

Challenges/No Structured Production Processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	56	65.1	100.0	100.0
Missing	9	30	34.9		
Total		86	100.0		

Challenges/No Formal Partnership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	77	89.5	100.0	100.0
Missing	9	9	10.5		
Total		86	100.0		

Challenges/No Organizational Structure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	72	83.7	100.0	100.0
Missing	9	14	16.3		
Total		86	100.0		

Appendix 29: Detailed Curriculum for a Competency-based Design Training Intervention Model

Objective: To develop a relevant and responsive competency-based digital design training intervention that contributes to the country's human resource development by linking design education and training to the skills needed in the informal sector in Kenya.

The model would enhance *Jua Kali* artisans' trade in Kenya by teaching them:

i. How to identify customer needs through market research then develop ideas.
ii. How to make competitive products
iii. How to manage their business
iv. How to persuade and satisfy their customers

The modules or Generated Areas of Competencies (GAC) include:
1.0 Design- Concept Development – Design Interventions

2.0 Production – Making Interventions

3.0 Marketing – Selling Interventions

4.0 Management Skills – Management Interventions

1.0: Module or Generated Areas of Competencies: Design- Concept Development

Objective: To identify, define and meet the needs of the market through market research and develop ideas

The objective of this module is to help the learner:

i. Identify your customers through market research
ii. Define market needs by creating or modelling a brief
iii. Generate ideas to meet the needs of the target market

Units or Skills

1.1 Do your market research – Market Research and Analysis

1.2 Create your brief

1.3 Generate your ideas

1.1 Market Research: Market Strategy and Analysis

To study consumers, competitors and markets and develop strategies for new and existing products and markets based on situation analysis. Carry out a detailed assessment of current marketing conditions facing *Jua Kali* , the competition and the market segments and identify the target markets the artisans wish to pursue. Market research is about persuasion and satisfying customer needs by understanding the marketplace; customer needs and wants to enable the artisans' design a customer-driven marketing strategy and build a profitable relationship and create customer delight.

In this module, you will learn how to:

a) Identify, define and meet the market demand or customer needs, wishes and wants.
b) Analyse market trends, consumer needs and competition
c) Improve the quality of the products provided to the market.

Learning outcomes or sub-skills

1.1.1 Opportunity analysis: Find your market

It is the process the *Jua Kali* artisan will use to identify market opportunities. It entails carefully examining the marketplace and noting demand trends and competition in various markets. This is analysis of the marketplace, should lead to alternative market opportunities for existing and new products. Market opportunities are unmet customer needs and desires.

Identify your market

Involves isolating consumers with similar lifestyles, needs and other specific requirements. The more the artisan establishes the common ground with the consumers, the more effective they will be in addressing their requirements.

I. What is your industry: Wide variety including woodwork; metal work; ceramics, handicraft; sculpture.

What are you selling? Examples are: furniture, porcelains, household goods, handicraft, decorative products; jewellery, sculptures, textiles, handicrafts, tableware, baskets, handbags, shoes; lamp stands; curtain boxes dressing tables, dining sets and others.

III. What material is it made from? Wood, clay metal, glass, beads, fabric, sisal, plastics, leather, papyrus, hyacinth, reeds, stone and others.

IV. ***What makes your products special?*** It is meeting the consumer's needs and wants and is it contributing to their appeal as well as their use.

- *Aesthetics (Aesthetics- the look)*

Aesthetic consideration includes the intended market group, styling, market trends and product semantics. It is the look i.e. shape, form, line, balance and colour.

a) *Shape:* the product should be well-constructed shape that should relate well with the surrounding. The shape of your product influences its style
b) *Form:* defines purpose, look and shape of the product. It is the total visual organization of your product regarding colour, texture and shape. Simplicity and harmony of form and function are easily visible.
c) *Line:* use line in your products to suggest movement and emphasis, combined with other lines to create textures and patterns that are expressive.
d) *Balance*: the products show equal visual weight in size, weight, or force. They are balanced symmetrically asymmetrically, radially or are discordant or off-balance.
e) *Colour*, proportion, contrast, material and concordant with target market
f) *Functional requirements:* The product should be fit for the purpose it is made. It is bought to do a job, and it should do it well. The product should be reliable. The consumers should interact with your products easily and use it with ease.
g) *Functional Developments*: These will include factors like:

Product performance, fitness for purpose, human interaction, ease of use, safety and reliability.

Strength, structure, stability, material, ergonomics, size, use maintenance, shape and construction, size, durability.

h) *Economics: Pricing:* Economic constraints explain how resources are used and managed. Further they determine the type of production process that is to be used, cost/ resources, available time, skills, volume, materials, market needs, standard components and standardisation of parts, product life strategy, obsolescence and future trends.

i) *Design for Sustainability*: Environmental friendliness. Every new product will have some effect on the environment. Consider environmental effects of your work, the pollution and waste generated through manufacturing, how the product will affect the local environment, the personal environment it is to be used in, its recyclability, reusability, reparability, and use of sustainability of the material used.

V) Who are your current or potential customers? Potential buyers will have three things in common: They have the same interest, needs or wants; roughly the same income; and they are easily accessible.

It is important for you to know:

a) Which county in Kenya do the potential customers of your product come from?

b) Identify your customer segment

- Geographically: divide them depending on where they are geographically located using counties, population, county, region or cities.

  The export market will be included as the DDTI is developed further.
- Demographically – age, sex, income, occupation, where they live, where they work, race.
- Behaviourally usage level, reason for purchase, brand loyalty

  Do they frequently use your product?

- Psychographically- divides buyers into different groups based on social class, lifestyle or personality characteristics
- Benefit- based on products that provide specific benefits for your clients.

c) What they would they pay for your product?
   - What is the average income of your customers?
   - What is their average disposable cash?
   - What are their spending habits? (Hennessy et al., 2010, p. 7)E.g. when do they spend?

d) What is their gender? Male or female.

Vi) Why should people buy your product?

The product should be accessible to the consumer to buy and well positioned in the market to compete with products. People should buy your product because it probably make their lives easier by functioning well, they are durable, look good, provide them with a feeling of safety, affordable, easy to maintain, functions well and it confers status on the user

1.1.2 Competitive Analysis: How to identify your customers

This is to analyse the competition the *Jua Kali* artisans will face in the market place. They must recognize that they are competing for consumers' income in an open market. Therefore, it is important that they understand the various ways potential customers choose and spend their money. The artisans can only do this if they understand the market segments they target. It is important that they determine their market segmentation either geographically by dividing the market into different units such as nations, regions, counties or cities; demographically they would divide the market into groups based on various variables such as age gender, family size, income and occupation; psychographic would divide buyers into different groups based on social class, lifestyle, personality of character; behaviouristic division would include groups based on attitudes, uses or response to products and finally segment them based on the benefit of the product to their market segments

1.1.3 Target market selection –Defining your target market

The *Jua Kali* artisan may select one or various market segments as a target market. This target market becomes the focus of the artisans marketing effort, and the goals and objectives are set to meet the needs and wants of their target market.

This is done by:

a) Selecting a market to target or define your target market
b) Identify needs, wants and wishes of your target Market
c) Positioning your products through marketing strategies or Market Positioning

1.2 Skill or Unit: Design Brief

Objective: To define the needs, functions and effectiveness of the product for their target market and come up with briefs using visual representation, simple sketches or models

Sub- skills or learning outcomes

1.2.1 Functionality (how the product will function)
1.2.1 Aesthetic Consideration (how it will look)
1.2.3 Economic Viability of the Product (what it will cost)
1.2.4 Product effects on the environment (will it have effects on the environment?)
1.2.5 Product vis-à-vis prevailing market trends (understand current market trends)
1.2.6 Product Requirements

1.3 Skill or Unit: Idea generation

Objective: To meet the needs of their target market by generating ideas and coming up with design solutions

Sub- skills or learning outcomes

1.3.1 Create a design solution problem solving. Product interacts with the purchaser.

1.3.2 Concept Development. Visualization, getting ideas down into pictorial representation or models to help clarify and test thoughts, providing new

perspectives and committing ideas to permanent record through brainstorming, visual notes, modelling, copying, sketches, hereditary skills and research

1.3.3 Consider the functionality of the product by choosing the right materials to be used for production

1.0 Module or Generated Areas of Competencies: Production – Making Interventions

Objective: To learn how to make products that are affordable, look good, function well and are environmentally friendly through product development, manufacturing, and proper operations.

In this module, you will learn more about how to make products that:

i. Are affordable
ii. Look good
iii. Function well
iv. Are environmentally friendly
v. Meet the needs of your target consumer

Units or skills

2.1 Product design specifications

2.2 Prototyping (making a Sample)

2.3 Product Development/Pre-production (before Production)

2.4 Manufacturing/production

2.5 Finishing

2.6 Operations/working condition

2.7 Skills transfer

2.8 Local cultural products

3.0 Marketing- Selling Interventions

Objective: To persuade customers and satisfy their needs.

This module will help the student learn:

i. How to persuade customers to buy your products by satisfying their needs.
ii. Preparing to sell, selling and getting feedback.

Units or Skills

3.1 Packaging and Branding

3.2 Influencing the demand for the product- The Marketing Mix

3.4 Sales and marketing

3.5 Customer care

4.0 Management Skills Planning Interventions

Objective: Learning how to organise your business

In this module you will gain more skills on how to organize and run your business by:

Assessing customers' needs,

i. Carrying out market research,
ii. Developing products that provide superior value,
iii. Offering the consumer tangible benefits.
iv. Learning how to distribute, price and promote your products effectively

Units or skills

4.1 Management

4.2 Business Analysis

4.3 Planning

4.4 Finances

4.5 Procurement Processes

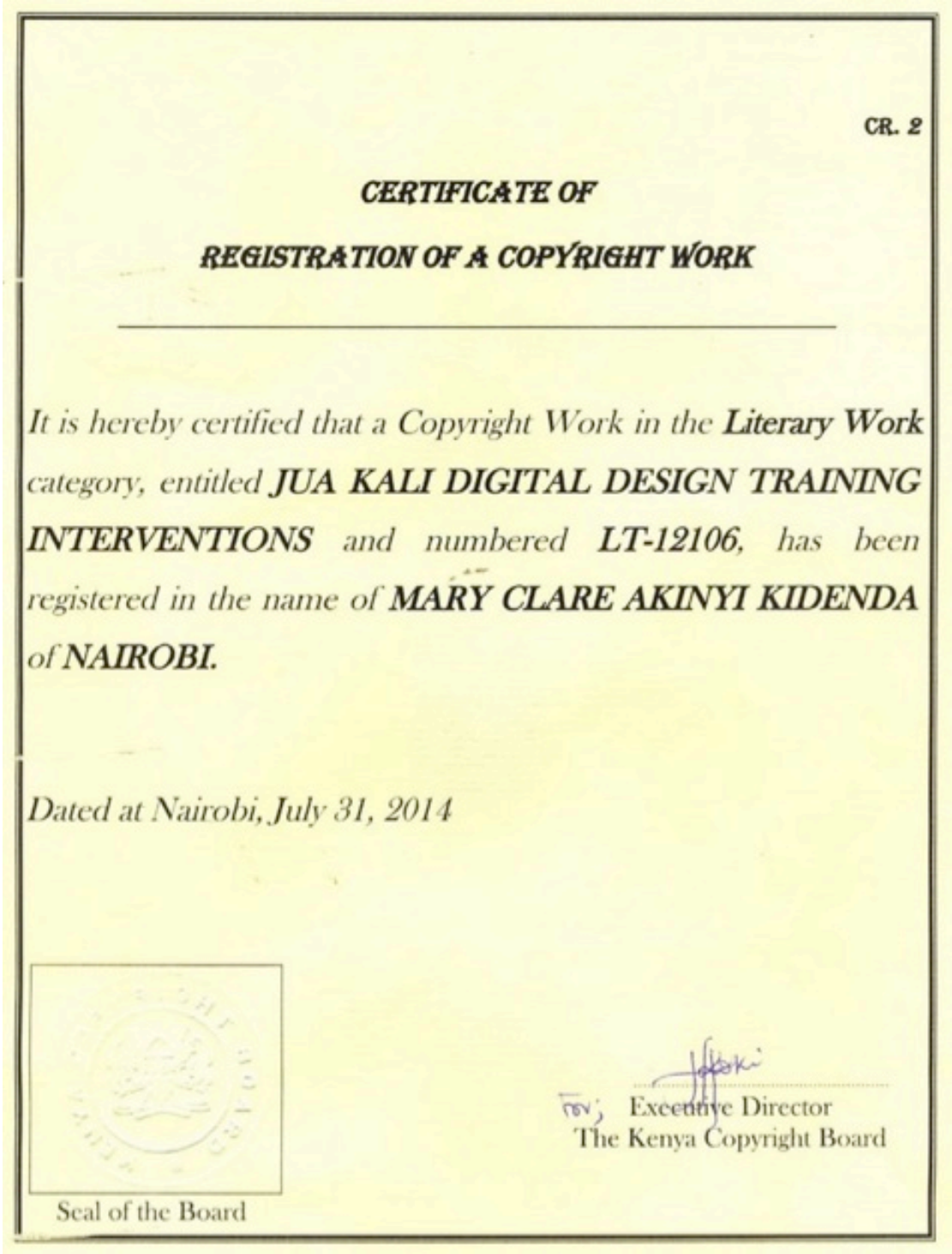
4.6 Legal and Regulatory Requirements

Appendix 30: Steps Followed in Development of the DDTI

DATE	EVENT
6th November 2013	Meeting with Studio ANG at Top Plaza, Sienna offices to discuss possibility of working together to develop the DDTI and signing the contract
9th November 2013	Meeting with Studio ANG at Top Plaza, Sienna offices to discuss the flowchart and milestones that will guide the digitization of the DDTIs
11th November 2013	Meeting with Studio ANG at Top Plaza to reset the milestones, Film development will include preproduction, recce, filming media management, editing, feedback, signoffs and final delivery and App development.
November 04th - 10th 3013	Project and system administration
November 11th - 14th 2013	Pre-production (Location Scouting, crew, budgets, etc.)
November 14th - 15th 2013	Interview Mary Kidenda and *Jua Kali* Chairman
November 18th - 22nd 2013	Filming
3rd January 2014	Meeting with Studio ANG at Top Plaza to discuss Flow Chart and to reschedule the milestones
7th January 2014	Meeting to discuss the preparation and discussion of milestones with Studio ANG on the App and Film development of DDTI model
8th-18th January 2014	Complimentary Shooting for DDTIs done
9th-29th January 2014	Media Management, Pickups and Editing were done at Studio ANG. Research and Design sketches and making of wireframes was done at Studio ANG.
22nd -29th January 2014	Transcripts of Shooting Released by Studio ANG.
30th January 2014	Meeting with, Prof Suki, studio ANG and myself at the Technical University of Kenya to look at the wireframes
1st February 2014 - 2nd March 2014	The web developer started the System Building, Hyper Text Mark-up Language (HTML) Production, Content Integration and Testing at Studio ANG

DATE	EVENT
6th of February 2014	Meeting with studio ANG, *Jua Kali* artisan, myself at Top Plaza to discuss the design layout.
10th February 2014	Meeting with Studio ANG and I at their studio to look at the video clips.
10th February 2014	Bob and I looked at the video clips for the introductory film that will be displayed on the DDTI home page at Studio ANG. I approved the edited version and agreed that we can go ahead and lock the picture, sound design, and grade the film.
12th February 2014	Meeting with *Jua Kali* artisan, Prof Suki, myself and studio ANG at The Technical University of Kenya to look at the Design Interface and Video clips to be included in the 4 modules
13th February -2014	Feedback on email to Studio ANG
14th February 2014	Meeting with Studio ANG to discuss Design Layout, text and illustrations, etc. at Studio ANG based on the meeting with artisans
20th of February 2014	Meeting with Studio ANG, Suki and myself at Top Plaza and a Skype meeting with Martin and Suki to discuss the design layouts and video clips on the web pages
17th March 2014	Meeting with Studio ANG. Presenting the app with integrated content, deployment

Appendix 31: The Certificate Of Registration of a Copyright Work for the Digital Design Training Intervention Model



CR. 2

CERTIFICATE OF

REGISTRATION OF A COPYRIGHT WORK

It is hereby certified that a Copyright Work in the ***Literary Work*** *category, entitled* ***JUA KALI DIGITAL DESIGN TRAINING INTERVENTIONS*** *and numbered* ***LT-12106,*** *has been registered in the name of* ***MARY CLARE AKINYI KIDENDA*** *of* ***NAIROBI.***

Dated at Nairobi, July 31, 2014

Seal of the Board

Executive Director
The Kenya Copyright Board

Appendix 32: Codes of Qualitative Data from the Artisans

QUESTION 1 – QUALITATIVE ANALYSIS

Do you think the implemented platform will enhance the business of the *Jua Kali* artisans?

RESPONSES	CODES
Because it will help me market my product outside my place of work	Marketing
To advertise your business	
It's a way to do marketing of our products	
It's a way of marketing	
Marketing and knowledge	
Marketing products is important in order to sell our produce easily	
It helps us do marketing	
I think through digital marketing we will increase our market for our goods	
Because of the marketing	
Because if tackles the product design marketing and the management of the process	
Because it makes my business known internationally	
Production and marketing enhanced	
It will help us improve our business through marketing	
It helps in marketing, getting money	
The platform is good enough; we *Jua Kali* artisans we lack some things i.e in the field of marketing so this website is key	
It makes me get many customers	Customers
I will be able to sell more	
It will help us to easily get customers	
It will make the artisans to sell their products even without the customer coming to your workshop	
It will encourage customers, manage my business	
It enhances business by reaching customers from a distance	
Yes I will visit more customers in web	
This is because it will be easy for us to meet or know customer easy and many around the country	
It will make us get many customers	
It will help us to easily get customers	
It will help me get more customers	
It will bring more customers	
To meet with many customers	
I will make more customers	
It will attract customers	
The customers will be able to know about our product	
You can access customers online and get skills	
Help with understanding	
Helps get more potential customers	
It help me get customers	

RESPONSES	CODES
Because I can get more customers through internet	
Because it will make me have more customers than before	
It connects us with many customers	
Because it will make *Jua Kali* artisans cooperate with many people/ customers form outside the country	
Because many customers are in the digital market through phones	
Helps get customers	
It is easy to access	Accessibility
It is efficient and reaches the majority	
It will reach people all across the world	
Easy to find and reach via phone or without internet	
Because it is in the web and phone	
Help manage my business, quotations and attract customers	
Because it reaches people where they are	
It will encourage customers, manage my business	Management
Management and entrepreneurship knowledge	
Help manage my business, quotations and attract customers	
It teaches us more skills	Enhancement (skills)
The platforms have covered a lot of the challenges we get in the business	
This will help us the artisans	
If implemented my business will improve	
Learning a lot of work	
It will make me have more experience in business	
Will help in implementing ideas and learning more about the industry	
Marketing and knowledge	
It will work because some of us do have enough time to go back to school	
It will enlarge the business	
Many artisans get into the industry with no background and experience on it and this will help them succeed and grow	
It can help me do my business well	
It will help artisans will opportunities to come up with good product	
Production and marketing enhanced	
It will provide information	
It will enable us to have new ideas	
Because the artisans will be able to produce good quality products and eventually manifest them appropriately	
Because it will give me easy time of doing my business	
By providing business knowledge	
Because people need to know a lot of information about *Jua Kali*	
Because if tackles the product design marketing and the management of the process	
Because this will educate many of our people who have never been educated in the work	
In making my products	

RESPONSES	CODES
It will provide more work	
They fasten up the processes of my work	
YES Because it is accessible even through mobile phones and it is easy to use	
Because as *Jua Kali* we will be able to move on through those platforms	
If improved to detail I think it can	
Because we nowadays live in a digital world	
Because now we can more together with the world of business which is so competitive	
Yes if we learn it fully	
This has been the problem for a long time	
Easy to understand and research done well	
I can find I formation easily	
Clear outline is given clearly and directions and way forward	
NO	Practicability
I feel the problem with *Jua Kali* is lack of information and technology hence nothing can go across the border	
It does not directly influence sales and it is not practical as people problems vary	
NOT SURE	
Many people will lose their job	
If it will succeed it will be good for my business; until I use it is when I will know	
Things are getting worse	

2. How would you rate overall the content of the Digital Design Training Interventions?

Responses	Codes
POOR	
FAIR	
It allows the business be covered in all networks	
Because everyone everywhere with a digital partner will know about the products of *Jua Kali* women	
Because it helps only artisans who are able to access the internet	Accessibility
Because few people have learnt how to use digital electronics	
Because most of us are not educated in this type of education	
Jua Kali people need more explanation Because I am not being digital programme	
Many people have no internet	

Responses	Codes
Depends with somebody's work	
So far so good but a lot needs to be done	
Learning platform and learning from others	
Well you have to understand the capital and machinery for financing is not locally available	
Not everybody will like the tool	
It will only be good if implemented	
GOOD	Marketing
It will attract customers	
Because one will be able to tell about what they are selling	
This is good because it makes many people to make and buy our goods easily	
To give me easy way to connect with the customers	
Because customers will know where you are working	
You can find more customers through the content as many will watch them	
Information will be helpful in our business	Enhancement/ educative
Teaching and educating in my business and how to run them	
It is educative	
It has brought to us a new idea	
It will help to enlighten me in my business; it has useful information	
It will make business come to us	
It is educative	
It exposes our talent and products	
We do what we don't know e.g marketing, pricing	
It makes many young men learn about *Jua Kali*	
It enlightens the *Jua Kali* artisans	
Something new and good information to add knowledge	
Because the artisans would be able to access everywhere information to help them improve in their business	
Because it will help upgrade the standard of my production	
Helpful and attractive	
It will make my work easier	
It teaches us so many things	
Because each of the group explain its cause, colour, texture etc	Content form
The content is very well designed and the colours are attractive	
It is focused and taken from the ground and therefore realistic	
Understandable	
Its method is simple; its not wordy	
The website is better; the video is good	
One can tale less time to go through the content especially one for the	

Responses	Codes
phones	
You can get the information from anywhere	Accessibility
Product designs need to be safeguard	Recommendations
You didn't give full information	
Something still needs to be added	
If you put more information it will be very good	
GOOD	
Digitization is the future	
We understand the work; we don't have the tools	
We are a little behind because we don't have machines	
Because they all with what the artisan would react	
VERY GOOD	
They will build me as a person and I can also help others	Educative / Enhance
It opens up the mind and encourages the *Jua Kali* people to get into the digital information	
It is educating us in a digital way	
Empowers mostly the young business sector	
It empowers artisans and motivates them	
Digital training will help me to compete with a world today no matter the distance and time	
This will at the end make informal activities to formalize	
What it contains is the truth	Comprehensive
Everything is covered (all challenges are covered)	
All the valuable have been brought together	
It addresses all the areas of the required areas of challenges	
Easy to understand and well research from the *Jua Kali* people	
It can market your business	Marketing
It will make us get customers outside the country	
It will help me meet customers	
It has provide chances for *Jua Kali* to display their items to be seen by customers who are searching from the web	
They will help in finding more customers	
VERY GOOD	
Good example of pictures which the *Jua Kali* artisans can use and implement	
Its okay but more should be added	
Because its good and easy to do my business	
If someone see it; it will be easy to access	

QUESTION 3 (QUALITATIVE ANALYSIS)
Has the information been grouped clearly?

RESPONSE	CODE
YES	
Since the digital way is a problem but they are okay	
Because we should look for customers first	
This is because every business or production activity you must have a plan to succeed	
For the web is better because I can select what to produce because each of the group explains its cause colour/texture etc	
It is clear	Coherence
Because the steps in the sector are just the same as the ones taught	
It is the way the industry works	
The steps flow correctly for the work to be successful	
Because everything is placed where it should be; there is separation of information	
The way you put is clear	
Because you see from buyer to the seller	
It is easy to understand	
It is clear	
Because it is short and straight to the point	
Because you can see everything clearly and understand without straining	
I can get the related information directly	
It is easy to go through the content	
The groups are coherent and consistent	
The information per group is well grouped	
Its procedure just the way each one should arrange their work	
The grouped clearly because it makes customers to know how we make and market our goods	
It was broken into four sections giving up easy understanding of the cause	
One can follow the flow	
Easy to understand	
Because they are easy to understand	
It is clear from starting to finish	
It is easier to reach the areas that you need	Accessibility /Navigability
The way they are accessed	
Easy to follow in making a good products	
Information can be clearly got and understood	
Because I can be able to follow it	
It makes the information clear and easily accessible	
It flows and it is easy to follow through	

RESPONSE	CODE
It is well arranged	
It helps someone get access to the information he needs	
It should capture all sectors of the *Jua Kali* sector	Comprehensive
It captures major items Because its from the raw materials to the end products to the market	
They are core important aspects of the business	
It reflects the real face of *Jua Kali* both leaders and artisans	
The process where products is required need to start at design, production, marketing and management play key role	
Information can be clearly got on the various area	
Because it has various categories	
All the *Jua Kali* sections are included right from production to the end product	
The information is grouped according to how it should be	
Helps me to know the first steps to the last steps	
Related to categories	
Because in business they are arranges according to the procedure of business	
It has been done from the scratch of how you can manage the business	
They are grouped well because the artisan can clearly see the processes one after another	
They have been arranged according to the work one does	
It covers everything	
All the *Jua Kali* sectors are included right from metal, capenter and tailors	
Covers everything	
It is educating us on the stages	Educative /Relevance
To give us knowledge to manage the business	
Well established for the market	
New ideas	
The information is good and will make us learn more things	
Because the challenges we face have been clearly grouped and addressed	
It will help us grow	
It can help an artisans	
They are understandable	
They can be helpful to people	
It is very good especially since one can market his goods well; the pictures are good	
It can encourage you to design your work	
We will make our business better	
It tackles all the processes which can help make a good product and access market	

RESPONSE	CODE
The information is clear and can help us a lot	
NO	
Certain work have no technical knowhow or any clue of the information	
I need more explanations	
Many people will not understand	
Certain works have no technical knowhow	
NOT SURE	
I have not understood them clearly	
I have not understood	
Not yet hence if you don't have capital and technology it is hard to prosper	

SECTION A – QUESTION 4 (QUALITATIVE ANALYSIS)

Is the content for the design module relevant and does it interpret your challenges?

RESPONSE	CODE
YES	
It is easy to identify	
One may come up with new design and a neighbor comes in with low price. If the platform will make a way of keeping the design it is okay	
But needs to be improved	
For me may be as I supply things like zebra it will be hard to face more than one client	
It contains the truth	
It will make our work lighter	
Because we have been lacking conditions to international market	
Because it makes one to even use m-pesa to do the purchase	
Because its something seen with eyes	
It shows the challenge and how the artisans can improve on skills	Challenges Addressed
It involves the challenges I face daily The challenges are addressed but please try to make it more clear	
Somehow it is relevant but as I said being developed to detail it can interpret the challenges	
All the challenges are addressed	
More challenges are captured	
It has interpreted my challenges	
All the challenges that have been captured are what I face	
Yes but the challenges could be on the higher taxation	
It addresses most areas	
What I normally do	
It should capture all sectors	
Because the challenges we face are there	
All challenges are addressed	
Because they have explained well and it shows clearly the challenges we face such	

RESPONSE	CODE
as lack of money	
The challenges of kind of goods, materials and even some environment we are working on	
It shows the actual challenges	
It relates to my business challenges	
Design is the main challenge; many artisans are copycats	
Helps to know how to carry out design process	Enhance skills/knowledge (Relevance)
Yes it does help design a products in a simple manner	
Its vey relevant, pushing somewhere near the digital world	
Enhance increase in marketing	
How the business work plan should be done	
Helpful	
We will get to know production methods up to selling	
Because it makes me expand my knowledge in how to do my business property	
Very relevant as it explains the whole concept each module by module up to the fourth module	
It teaches us how to design our products	
It teaches new design and how to sketch	
Helpful in making customers	
Because we might be good in manufacturing but not good in terms of marketing and management	
Innovation and technology are covered in the information	
Because it is all I need in the management of my busines	
It will help in marketing	
It will help	
This information will make us be enlightened more in doing more research	
Provides information that are useful to my business operation	
It helps us to make quality products because you will be following all the procedures you help	
Because I have learned what we actually didn't know	
It can teach one what and how to design	
It helps me to plan my business	
Its good because everybody want to have knowledge	
It may make me have ideas of many products	
It can improve my business	
Design is key and hold the integrity an the expected product appearance	
Helps to come up with designs and how to go about it	
It helps solve the need of the customer hence we achieve his satisfaction	Customer
Help to identify your customers and maintain them	
It helps solve the needs of the customers hence achieve satisfaction	
As indicated goods must be produced to the intended customers	
To know products what my customers needs	
It has provided me with skills to maintain my customers	
Because it shows how we can make similar designs and so it helps us to make a	

RESPONSE	CODE
specific design for a particular customer	
It will make me to know my customers	
It helps you handle your customers	
It helps to find new designs online and it encourages me to serve my customers better	
Because you can know how you can approach and contact my customers	
Its good for customers when they see	
Customers will know what we are making	
Because customer seeing the design modules will be able to categorize the products and able to pay for the product	
NO	
Because the work of artisans, many of us have been misused by the rich ones	
Because you can have one customer and this customer will not be able to buy this all goods *Jua Kali* has been out of order as in government has never been for it It doesn't teach me how to design	
NOT SURE It is confusing	
Sketching the product is difficult; we are used to just producing	

SECTION A – QUESTION 5 (QUALITATIVE ANALYSIS)

Do you think the content for the production module is easy to understand and can improve the production skills for the artisans?

RESPONSE	CODE
YES	Comprehensible
Because it has a good expectation	Its easy to understand and can help artisans to improve the quality of their product
It can be better because I can get about my business	The process is simple to understand and ease to use
Yes it can be if the product is in quality standards	It has been done simply and easy to understand
If only there will be a policy guiding these artisans as in competition from internal	Because it is easy to access
Everybody can know what you do	It is clearly seen and can be learned from
Because I can access my business (product) all over and also assistance if I need through the internet	True picture which are clear and taken from the *Jua Kali* artisans
Because it is easy to make and understand	Due to its subdivisions and clear language of use
We've got the work but no customers	It is arranged in a manner that's easy to follow
But a lot of improvements would be expected as time goes by	The way you put it is easy for artisans to understand
	I think its easy to understand according to me because I've been to Facebook, Tweeter etc Just by going through it; its very easy to understand It is easy to follow
	Breakdown is relevant
	Simple examples and good procedures that are easy to understand
	According to how has been grouped it will be easy for someone to understand it and can improve
	It is easy to understand
	Skills
	Helps us know what the customers wants through samples
	It will or rather opens ones mind to understand the approach of production and how one can advance in the fields
	I will make my work better from the things I have learnt
	It will make artisans improve in what they are making
	It can help develop businesses
	Sometimes we dint follow the clear steps and procedures our products so I think the steps here will enlighten us
	Helps us know the process of production
	It will help me make my business better
	It helps in keeping track of all the expenditures during and before production that helps know how much its costed
	It will help us produce good quality for our customers
	To make me to change designs
	What I go through - material choice etc

	Because you can understand the customer needs
	I will make more customers
	I will get more work/ orders
	Example the section on samples making is a place need to be keen on
	It will make my business better
	It will make *Jua Kali* people learn more about production
	It is well arranged methodically and easy to understand
	Because you can make it through seeing
	Because it makes me know what to produce to who and when to produce it
	When you follow them well it will lead to your success in business
	Learned something I never knew
	It points on some of the challenges i.e. lack of enough space, poor quality etc. and thus can improve on the business
	I can see how production process works and how to make it better
	To improve production skills
	It will help *Jua Kali* artisans to find more information that will help them improve in production
	It can help develop businesses
	It encourages you to work hard and make different designs
	Because one can see what his partner or co-worker is designing and so I can try to come up with a competitive design
	It will uplift my work
	Because it means one to properly arrange his/her work before starting
NO	Incomprehensible
Everyone does their own things and you cant dictate how they shall work	Its not easy to understand; we need further information to understand
Most of us today are educated and going and easy to catch up	I don't know what it means
	Because the digital way is a problem for me
Helps to know the weaknesses in production compared to the competitors	Because of the terms used
It takes me through the process of production step by step	
Learn from the people skills	
Show me how to make the products	
Gives opportunity to know what the customer wants	
Placed well to understand and if followed many are to reach us	
Helps me plan for production	

process of the products you are making	
It will assist me with getting customers	
NOT SURE	
Not everybody is aware of this	
Branding is very difficult in *Jua Kali*; hence no safeguard of products	
It needs more time to understand	
Not my job	
Because it needs a bit of learning and in *Jua Kali* all of us are not learned	
Am not understanding at all	

NB: For the rest of the questions See Appendix B (V)

Appendix 33: Themes Generated from Qualitative Data from the Artisans

SECTION A: **QUESTION ONE: THE RELEVANCE OF THE DDT I TO JUA KALI BUSINESSES**

YES : Most of the *Jua Kali* artisans claimed that the DDTI will enhance their business by helping them to market their products. This is in the sense that first the marketing module will provide them with the information and knowledge on marketing. They felt that marketing would boost the visibility of their products and businesses both locally and even internationally, since the DDTI platform is online.

The artisans also claimed that the DDTI would enhance their business as it would provide a link between them and their customers; prospective and existing; local and international customers. They expressed the need for accessing more customers for their products. According to them more customers translates into more sales. More so, since the DDTI is online, they will be able to sell their products without the customers having to come to their workshop. Other artisans thought the DDI would enhance their business due to its accessibility. They claimed that the platform is easy to access due to its availability on phones that even do not have the Internet. It is therefore, accessible to them wherever they are and they can use it right in their workshops.

There are those artisans who claimed that the DDTI would enhance their business as it addresses a cross section of their challenges and will impart relevant knowledge and skills. This knowledge includes the business elements of design, production, marketing and management as contained in the platform. They pointed out that they do not have time and/or resources to go back to school, whereas they wish to expand their knowledge and experience in their craft and the DDTI is an appropriate solution for this requirement. They claimed that besides being able to come up with new ideas for their products, they will be able to make products of good quality, with processes that are much more faster. They also claimed that using the DDTI will enable them to manage their businesses well.

NO: There are some artisan who didn't think the DDTI would help enhance their businesses. One was skeptical of the platform claiming that "the problem with *Jua Kali* is lack of information and technology, hence nothing can go across the border."

The other claimed that the platform doesn't directly influence the sales of their products and is not practical since the challenges that the artisans face are varied.

NOT SURE: Those who said they are not sure about the prospects of the DDTI enhancing their businesses cited factors such as it could lead people to lose business to their competitors.

QUESTION TWO: RATE OVERALL THE CONTENT OF THE DIGITAL DESIGN TRAINING INTERVENTIONS

The response to this question was varied. There are those artisans that rated the DDTI as being VERY GOOD, because it is educative and enhances their skills as artisans. They argued that this enhancement of skills and information will help them to compete globally. The platform will also help to formalize their informal activities.

The artisans also rated it as VERY GOOD claiming that the platform is quite comprehensive. They stated that the platform addresses all the challenges that they face in their businesses; that it is well researched and easy to understand. Other artisans rated it VERY GOOD as it can help them in marketing their businesses to customers both locally and internationally, as it provides them with a forum through which they can showcase their products.

Other artisans rated the platform as AVERAGE claiming that it educative in the sense that it is "enlightening the artisans in understanding themselves and their business" and that the information will help them to improve on their businesses. They also rated it AVERAGE because the accessibility of the platform to their phone (even without Internet) though they at the same time bemoaned their digital illiteracy.

The artisans rated the platform as GOOD as they claimed it would help them in marketing and also enhancing their skills and knowledge. They noted that the platform would help them to attract customers; enable them to communicate with the customers and thus sell their products. On the other hand, they claimed that the information in the platform will help them transform their businesses as it will help them conceive new ideas and upgrade their standards of production.

Other artisans rated the platform GOOD due to its content, which they found easy to use; simple and understandable; appropriate to their needs and with good videos. They also rated it as GOOD due to the accessibility of its information wherever they

might be located. They however pointed out that the platform needs to be developed further in terms of putting additional information in the modules.

QUESTION THREE: THE GROUPING OF THE INFORMATION

The artisans were asked their opinions on whether the information in the platform has been grouped appropriately. They were required to provide their answers as either YES; NO; or NOT SURE.

The artisans confirmed that the grouping of information was appropriate in the platform for various reasons, one being that the information is coherent as one can see "everything clearly and understand without straining" and that "everything is placed where it should be; there is separation of information." The information is also grouped correctly because it is representative of "the way the industry works" and that "the information per group (module) is well grouped).

The information is also well grouped because of its accessibility or rather navigability. This is because "it is easier for one to reach the areas that they need" and because "the information can be clearly got and understood."

The information is well grouped and also comprehensive. The artisans suggesting that the information "captures all sectors of the *Jua Kali*" and that it shows the "core important aspect of the business." They also cited that the platform shows "clearly see the processes one after another" from "the first steps to the last steps."

Other artisans claimed the information is well arranged because it is educative and also that the information "is educating us on the stages" and that "it is understandable." It also "tackled all the processes which can help make a good product and access markets" and that "it is clear" and will help them learn a lot.

NO: Some artisans didn't think that the information is well arranged., claiming that they didn't understand and thus needed more explanation.

NOT SURE : These artisans were not sure about the arrangement of the information on the platform as they claimed that they didn't understand it clearly.

QUESTION FOUR: DESIGN MODULE - THE RELEVANCE OF THE CONTENT AND ITS INTERPRETATION OF THE JUA KALI ARTISANS' CHALLENGES

YES : The artisans found the content of the design module relevant in the sense that it would help them “know how to carry out the design process” and that “it teaches new design and how to sketch.” The design module content is therefore relevant as some artisans indicated that it can help “expand my knowledge in how to do my business properly” and that it “provides information that is useful to my business operation.” The content will also help trigger the artisans to conduct research on their customer needs, and as one artisan put it “this information will make us be more enlightened in doing more research.”

CUSTOMERS: The artisans also said that the design content is relevant as it would help them understand their market better by appreciating the position of their customers. This is because the content “helps to solve the needs of the customers, hence achieve his satisfaction”; it will also “help to identify customers and maintain them.”

THE CHALLENGES ADDRESSED: The artisans also indicated that the design module content addresses the challenges that they encounter in their trade. The coverage of these challenges is comprehensive, as one artisan puts it “all the challenges that have been captured are what I face” and they include the “challenges of kind of goods, materials and even some environment we are working on.” Besides, design is a major impediment in the sector: “design is my main challenge.”

NOT SURE : The artisans that were not sure linked this to their lack of understanding of the platform. One said that the platform is confusing; another one said that “Sketching the product is difficult; we are used to just producing.”

QUESTION FIVE: PRODUCTION MODULE CONTENT - EASE OF UNDERSTANDING AND ABILITY TO IMPROVE THE ARTISANS’ SKILLS

YES: The artisans found the production module comprehensible, thus enabling them to improve their skills. They claimed that the processes are simple; the module is clearly subdivided and that the language is easy to use; that it contains “simple examples and good procedures that are easy to understand.” The module has also taken one “through the process of production step by step” and therefore would help to “plan for production process of the products you are making.”

They pointed out that the production module would improve their skills as it “opens the mind to understand the approach of production.” The module proposes to the

artisans the processes that would make their production efficient; something that has not been happening in the sector, suggested by one artisan who said that "sometimes we don't follow the clear steps and procedures in making our products and so I think the steps here will enlighten us." These procedures emerged as very new to some artisans and were a welcome improvement to their knowledge and skills. They therefore expected that the module would help them to come up with quality goods and as they do so they will also be able to keep track of all the expenditure incurred and therefore be able to cost their products more appropriately.

NO: There were interviewees who were skeptical about the module and mostly because they found it hard to comprehend it. Some claimed that they needed additional information to fully understand; others complained about its digital presentation.

NOT SURE: There were those who were not sure if they understood the module or whether it would help them improve on their skills. They claimed that they needed more time with the platform to understand it, especially because they felt less exposed to the digital platform.

QUESTION SIX: MARKETING MODULE CONTENT – IMPROVING THE MARKETING SKILLS OF THE ARTISANS

YES: The artisans claimed that the marketing module would help them improve on their marketing skills. The relevance of this module is reiterated by the assertion by one of the artisans who claimed that "artisans have a challenge with marketing products." They claimed that the module would help them know how to sell their products, because "it teaches the artisans how to identify their customers and learn what the customer wants" and will also "learn how to handle customer differently from before," especially because "It helps in identifying and targeting the market so that the products are sold." This knowledge is invaluable because as per now there is "no on-the-job training in marketing."

Secondly, they found the platform invaluable to their marketing skills; as it will enable them to actually access markets. This is in the sense that through the platform the customers will be able to reach them; they will visit the platform, see their products and make orders and this will boost their sales. In addition, the

market will not be limited to the locality of the artisan, in the sense that the artisan will be "able to reach customers who are far and serve them through their phones."

QUESTION SEVEN: RATING THE CONTENT OF MANAGEMENT MODULE

VERY GOOD: The artisans who rated the management content as very good claimed the content was relevant, in the sense that it showed the correct aspect of managing business and that it reflects the current trend of doing business in a "digital world." They also claimed that the management content would enhance their management knowledge. One artisan said that the content "makes me know whether I am making profits or losses and also know how to keep my records." It will thus "help in running the business, since we are the ones doing everything: we are the manager, accountant and artisans at the same time." The presentation of the content also prompted artisans to term the module as very good since it contained "good explanations which are easy to understand by the *Jua Kali* artisans" and it is "simple to understand and easy to implement in our workshops."

GOOD: The artisans rated the management module content as good since they indicated that it would enhance the businesses. They claimed that the content will help them to "plan for the next customer and market"; to "manage the use of funds"; and that through the content of the module "one is able to know how to plan well and keep proper records and know how the business fair."

The artisans rated the content as good due to its relevance. They noted that the content was in line with the challenges that they face in managing their businesses and therefore enlighten them on many issues with regard to management of their finances.

AVERAGE: The artisans rated the module average as some felt that it needs further improvement; others because they are yet to see how it works. One artisan claimed that many would see that it is a long process and be discouraged to use it.

FAIR: Though the artisans rated the module as fair, they acknowledge that it will enable them to monitor and manage the finances of their businesses.

POOR: Rated poor because of what the artisans termed as the "lack of space" on the platforms.

(CONTINUED IN APPENDIX B)

Appendix 34: SPSS Descriptive Analysis

1. The Relevance of the DDTI Platform to the *Jua Kali* Businesses

Enhancement of the *Jua Kali* Business

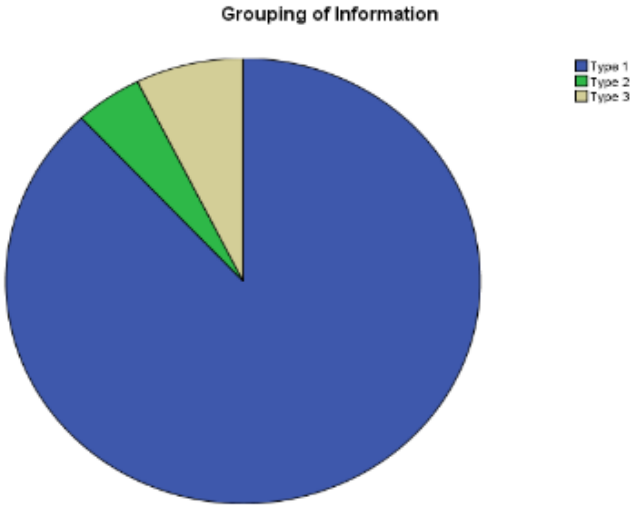
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	104	95.4	95.4	95.4
	NO	3	2.8	2.8	98.2
	NOT SURE	2	1.8	1.8	100.0
	Total	109	100.0	100.0	

Rating the Content on the DDTI

Rate the Content on the DDTI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor	1	.9	.9	.9
	Fair	6	5.5	5.6	6.5
	Average	24	22.0	22.4	29.0
	Good	50	45.9	46.7	75.7
	Very Good	25	22.9	23.4	99.1
	41	1	.9	.9	100.0
	Total	107	98.2	100.0	
Missing	99	1	.9		
	System	1	.9		
	Total	2	1.8		
Total		109	100.0		

The Grouping of the Information on the DDTI



Key: Type 1 = YES; Type 2 = NO; Type 3 = NOT SURE

The Relevance of the Content on the DDTI Platform Enhancement of the *Jua Kali* Business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	104	95.4	95.4	95.4
	NO	3	2.8	2.8	98.2
	NOT SURE	2	1.8	1.8	100.0
	Total	109	100.0	100.0	

The Production Module

Content Easy to Understand and Can Improve Production Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	94	86.2	86.2	86.2
	NO	6	5.5	5.5	91.7
	NOT SURE	9	8.3	8.3	100.0
	Total	109	100.0	100.0	

The Marketing Module

Marketing Module Content Relevant for Improving Marketing Skills

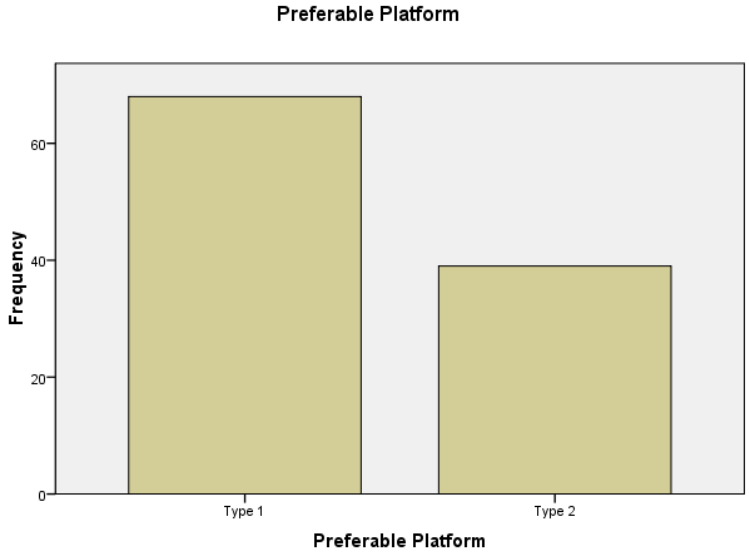
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	100	91.7	92.6	92.6
	NO	4	3.7	3.7	96.3
	NOT SURE	4	3.7	3.7	100.0
	Total	108	99.1	100.0	
Missing	99	1	.9		
Total		109	100.0		

Management Module

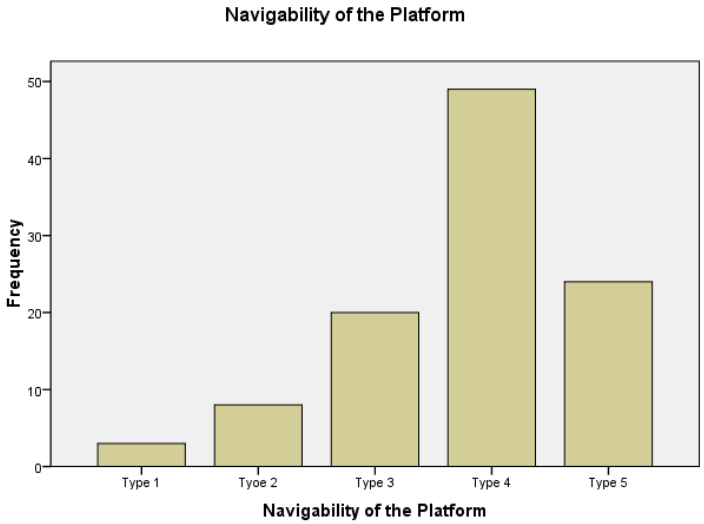
Rate Management Module Content

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	POOR	2	1.8	1.9	1.9
	FAIR	7	6.4	6.5	8.4
	AVERAGE	28	25.7	26.2	34.6
	GOOD	46	42.2	43.0	77.6
	VERY GOOD	24	22.0	22.4	100.0
	Total	107	98.2	100.0	
Missing	99	2	1.8		
Total		109	100.0		

Preference between the Web Based Platform and the USSD Platform

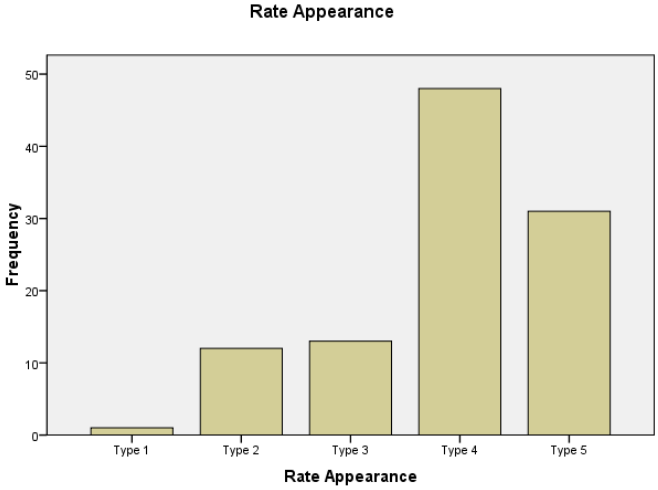


NB: Type 1 = Web Based Platform; Type 2 = USSD Mobile Based Platform; The Web-based Platform: Navigability



KEY: Type 1 = POOR; Type 2 = FAIR; Type 3 = AVERAGE; Type 4 = GOOD; Type 5 = VERY GOOD

The Web based Platform: Appearance



KEY: Type 1 = POOR;Type 2 = FAIR; Type 3 = AVERAGE; Type 4 = GOOD; Type 5 = VERY GOOD

The Web-based Platform: Content and Video Clarity

Rate Content and Clarity of Videos

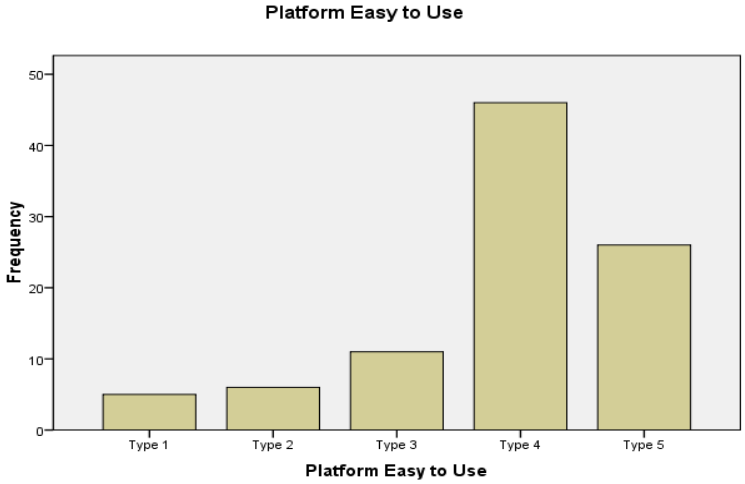
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	POOR	3	2.8	2.9	2.9
	FAIR	8	7.3	7.7	10.6
	AVERAGE	5	4.6	4.8	15.4
	GOOD	52	47.7	50.0	65.4
	VERY GOOD	36	33.0	34.6	100.0
	Total	104	95.4	100.0	
Missing	99	5	4.6		
Total		109	100.0		

Web based Platform: Signing Up Process

Signing Up on Web Based Platform

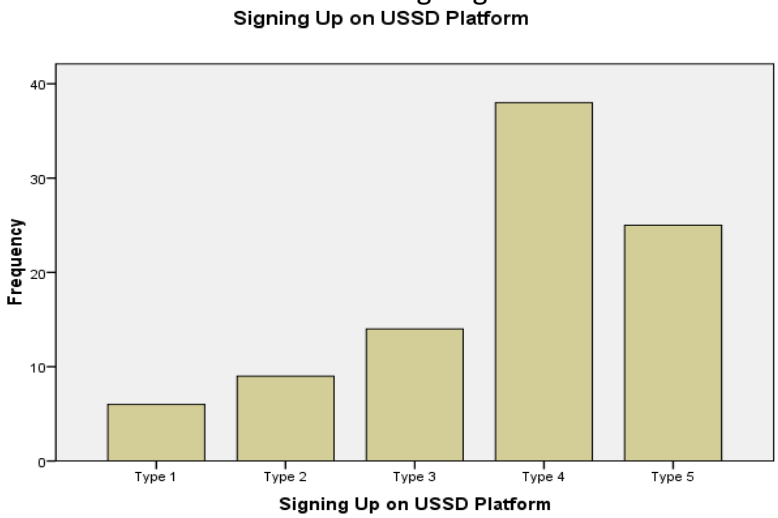
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	POOR	4	3.7	3.9	3.9
	FAIR	11	10.1	10.7	14.6
	AVERAGE	13	11.9	12.6	27.2
	GOOD	45	41.3	43.7	70.9
	VERY GOOD	29	26.6	28.2	99.0
	44	1	.9	1.0	100.0
	Total	103	94.5	100.0	
Missing	99	6	5.5		
Total		109	100.0		

USSD Mobile Based Platform: Ease of Use



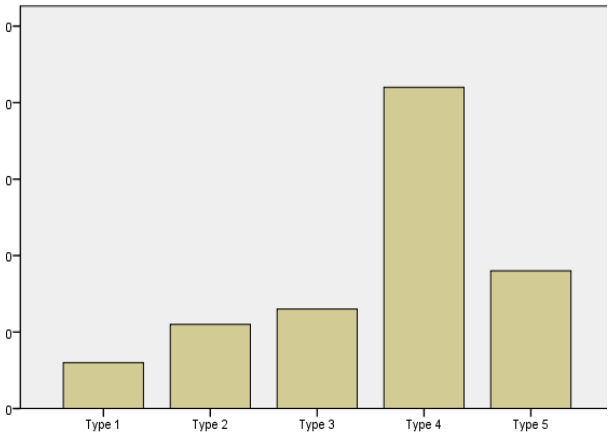
KEY: Type 1 = POOR; Type 2 = FAIR; Type 3 = AVERAGE; Type 4 = GOOD; Type 5 = VERY GOOD

USSD Mobile Based Platform: Signing Process



KEY: Type 1 = POOR; Type 2 = FAIR; Type 3 = AVERAGE; Type 4 = GOOD; Type 5 = VERY GOOD

USSD Mobile Based Platform: Appearance



Appendix 35: Triangulation of Quantitative and Qualitative of Jua Kali Artisans Responses

SECTION A: 1. Do you think the implemented platforms will enhance the businesses of the *Jua Kali* artisans?

	Quantitative Analysis	Qualitative Analysis
YES	104 of the respondents (95.4%)	Most of the *Jua Kali* artisans claimed that the DDTI will enhance their business by helping them to market their products. This is in the sense that first the marketing module will provide them with the information and knowledge on marketing. They felt that marketing would boost the visibility of their products and businesses both locally and even internationally, since the DDTI platform is online. The artisans also claimed that the DDTI would enhance their business as it would provide a link between them and their customers; prospective and existing; local and international customers. They expressed the need for accessing more customers for their products. According to them more customers translates into more sales. More so, since the DDTI is online, they will be able to sell their products without the customers having to come to their workshop. Other artisans thought the DDI would enhance their business due to its accessibility. They claimed that the platform is easy to access due to its availability on phones that even do not have the Internet. It is therefore, accessible to them wherever they are and they can use it right in their workshops. There are those artisans who claimed that the DDTI would enhance their business as it addresses a cross section of their challenges and will impart relevant knowledge and skills. This knowledge includes their business elements of design, production, marketing and management as contained in the platform. They pointed out that they do not have time and/or resources to go back to school, whereas they wish to expand their knowledge and experience in their craft and the DDTI is an appropriate solution for this requirement. They claimed that

		besides them being able to come up with new ideas for their products, they will be able to make products of good quality, with processes that are much more faster. They also claimed that using the DDTI will enable them to manage their businesses well.
NO	Three respondents (2.8 %)	There are some artisan who didn't think the DDTI would help enhance their businesses. One was skeptical of the platform claiming that "the problem with *Jua Kali* is lack of information and technology, hence nothing can go across the border." The other one claimed that the platform doesn't directly influence the sales of their products and is not practical since the challenges that the artisans face are varied.
NOT SURE	Two respondents (1.8 %)	Those who said they are not sure about the prospects of the DDTI enhancing their businesses cited factors such as it could lead people to lose their businesses to their competitors.

1. How would you rate overall the **content** of the Digital Design Training Interventions?

	QUANTITATIVE ANALYSIS	QUALITATIVE ANALYSIS
VERY GOOD	25 respondents (23.4 %)	The artisans also rated it as VERY GOOD claiming that the platform is quite comprehensive. They stated that the platform addresses all the challenges that they face in their businesses; that it is well researched and easy to understand. Other artisans rated it VERY GOOD as it can help them in marketing their businesses to customers both locally and internationally as it provides them with a forum through which they can showcase their products. There are those artisans that rated the DDTI as being VERY GOOD it is educative and enhances their skills as artisans. They argued that this enhancement of skills and information will help to compete. The platform will also help to formalize their informal activities.

GOOD	50 respondents (46.7 %)	The artisans rated the platform as GOOD as they claimed it would help them in marketing and also enhancing their skills and knowledge. They noted that the platform would help them to attract customers; enable them to communicate with the customers and thus sell their products. On the other hand, they claimed that the information in the platform will help them transform their businesses as it will help them conceive new ideas and upgrade their standards of production. Other artisans rated the platform GOOD due to its content, which they found easy to use; simple and understandable; appropriate to their needs with and with good videos. They also rated it as GOOD due to the accessibility of its information wherever they might be located. They however pointed out that the platform needs to be developed further in terms of putting additional information in the modules.
AVERAGE	24 respondents (22.4 %)	Other artisans rated the platform as AVERAGE claiming that it educative in the sense that it is "enlightening the artisans in understanding themselves and their business" and that the information will help them to improve on their businesses. They also rated it AVERAGE because the accessibility of the platform to their phone (even without Internet) though they at the same time bemoaned their digital illiteracy.
FAIR	6 respondents (5.6 %)	NO EXPLANATION PROVIDED
POOR	1 respondent (0.9 %)	NO EXPLANATION PROVIDED

31. Has the information been **grouped** clearly?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
YES	88.1 % of the respondents said YES	The artisans confirmed that the grouping of information was appropriate in the platform various reasons, one being that the information is coherent one can see "everything clearly and understand without straining" and that "everything is placed where it should be; there is separation of information." The information is also grouped correctly because it is representative

		of "the way the industry works" and that "the information per group (module) is well grouped). The information is also well grouped because of its accessibility or rather navigability. This is because "it is easier for one to reach the areas that they need" and because "the information can be clearly got and understood." The information is well grouped and also comprehensive. The artisans suggested that the information "captures all sectors of the *Jua Kali*" and that it shows the "core important aspect of the business." They also cited that the platform shows "clearly see the processes one after another" from "the first steps to the last steps." Other artisans claimed the information is well arranged because it is educative and also included all the processes that are involved in the making of their products and accessing markets and will thus help them to learn a lot.
NO	4.6 % of the	Some artisans didn't think that the information is well arranged; they claimed that they didn't understand and thus needed more explanation.
NOT SURE	7.6 %	These artisans were not sure about the arrangement of the information on the platform as they claimed that they didn't understand it clearly.

32. Is the **content** for the design module **relevant** and does it interpret your challenges?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
YES	104 respondents (95.4 %)	The artisans found the content of the design module relevant in the sense that it would help them know how to carry out the design process and that it teaches new design and how to sketch. The design module content is therefore relevant as some artisans indicated that that it can help expand my knowledge in how to do my business properly and that it provides information that is useful to their business operation. The content will also help trigger the artisans to conduct research on their customers' needs and will make them more enlightened in doing more research. The artisans also said that the design content is relevant as it would help them understand their market better by appreciating the position of their customers. This is because the content will help solve the needs of their customers. The artisans also indicated that the design module content addresses the challenges that they encounter in their trade. The coverage of these challenges is comprehensive; it captures all the challenges that they face including the challenge on the of kind of goods, materials and even some environment we are working on, especially design which is their major challenge.
NO	Three respondents (2.8 %)	
NOT SURE	Two respondents (1.8 %)	The artisans that were not sure linked this to their lack of understanding of the platform; with one pointing out that it is confusing.

33. Do you think the **content** for the production module is **easy to understand** and can **improve** the production skills of the artisans?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
YES	94 respondents (86.2%)	The artisans found the production module comprehensible, thus enabling them to improve their skills. They claimed that the processes are simple; the module is clearly subdivided and that the language is easy to use; that it contains simple examples and good procedures that are easy to understand. The module has also taken them one through the process of production step by step and therefore would help to plan for production process of the products you are making. They pointed out that the production module would improve their skills as it "opens the mind to understand the approach of production." The module proposes to the artisans the processes that would make their production efficient; something that has not been happening in the sector, who claimed that sometimes they don't follow the clear steps and procedures in making our products and so the steps here would enlighten them. These procedures emerged as very new to some artisans and were a welcome improvement to their knowledge and skills. They therefore expected that the module would help them to come up with quality goods and as they do so they will also be able to keep track of all expenditure incurred and therefore be able to cost their products more appropriately.
NO	Six respondents (5.5 %)	There were interviewees who were skeptical about the module and mostly because they found it hard to comprehend it. Some claimed that they needed additional information to fully understand; others complained about its digital presentation.
NOT SURE	Nine respondents (8.3 %)	There were those who claimed they were not sure if they understood the module or whether it would help them improve on their skills. They claimed that they needed more time with the platform to understand it, especially because they felt less exposed to the digital platform.

34. Do you think the **content** for the marketing module can improve the **marketing skills** of the *Jua Kali* artisans?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
YES	100 respondents (92.6 %)	The artisans claimed that the marketing module would help them improve on their marketing skills. The relevance of this module is reiterated by the assertion by one of the artisans who claimed that the artisans have a challenge with marketing products. They claimed that the module would help them know how to sell their products, because it teaches the artisans how to identify their customers and learn what the customers wants and will also learn how to handle customer differently from before, especially because It helps in identifying and targeting the market so that the products are sold. This knowledge is invaluable because as per now there is no on-the-job training in marketing. Secondly, they found the platform invaluable to their marketing skills; as it will enable them to actually access markets. This is in the sense that through the platform the customers will be able to reach them; they will visit the platform, see their products and make orders and this will boost their sales. In addition the market will not be limited to the locality of the artisan in the sense that the artisan will be able to reach customers who are far and serve them through their phones.
NO	4 respondents (3.7 %)	NO EXPLANATION OFFERED
NOT SURE	4 respondents (3.7%)	NO EXPLANATION OFFERED

35. How would you rate the **content** for the **management module** on the platforms?

	QUANTITATIVE ANALYSES	QUANTITATIVE ANALYSES
VERY GOOD	24 respondents (22.4 %)	The artisans who rated the management content as very good claimed the content was relevant, in the sense that it showed the correct aspect of managing business and that it reflects the current trend of doing

		business in a digital world. They also claimed that the management content would enhance their management knowledge. One artisan said that the content makes them know whether I am making profits or losses and also know how to keep my records. It will thus help in running the business, since we are the ones doing everything: we are the manager, accountant and artisans at the same time. The presentation of the content also prompted artisans to term the module as very good since it contained good explanations which are easy to understand by the *Jua Kali* artisans and it is simple to understand and easy to implement in our workshops.
GOOD	46 respondents (43 %)	The artisans rated the management module content as good since they indicated that it would enhance the businesses. They claimed that the content will help them to plan for the next customer and market; to manage the use of funds; and that through the content of the module "one is able to know how to plan well and keep proper records. They noted that the content was in line with the challenges that they face in managing their businesses and therefore enlighten them on many issues with regard to management of their finances.
	28 respondents (26.2 %)	The artisans rated the module average as some felt that it needs further improvement; others because they are yet to see how it works. One artisan claimed that many would see that it is a long process and be discouraged to use it.
FAIR	7 respondents (6.5%)	Though the artisans rated the module as fair, they acknowledge that it will enable them to monitor and manage the finances of their businesses.
POOR	2 respondents (1.9%)	Rated poor because of what the artisans termed as the lack of space on the platforms.

36. As an artisan, which of the two platforms do you like most, and would prefer to use?

	QUANTITATIVE ANALYSES	QUANTITATIVE ANALYSES
WEB-BASED PLATFORM	68 respondents (63.6 %)	The artisan preferred the web-based platform for various reasons. They claimed that it provides more information compared with the USSD, especially in terms of pictures and videos; that it is easy to understand, well-arranged and accessible online, and that it is clear

		and gives us that real feel of what they go through. They also preferred the web-based platform over the USSD due to its comprehensibility. They claimed that it is easy to use and understand as the content is visible and clear. The artisans preferred the web-based platform due to its marketing component. Through the platform the artisans noted that they could sell their products through the Internet; that they could provide the details of their products, post them online through the platform and be able to showcase them to their customers. The platform was also preferred on the basis of the relevance of its content. This can be attributed to the fact that it has well captured products from the *Jua Kali* and to the common artisan it is easy to understand and also to implement in our day to day advertising.
USSD PLATFORM	35 respondents (36. 4 %)	Artisans preferred the USSD platform mainly because of its accessibility. They claimed that they have phones that do not have Internet and thus find the sending and receiving of messages as convenient; they also understand it and can access and use it with ease. The artisans preferred the USSD platform because of its affordability, especially on feature phones that are cheap to acquire compared with smartphones. They therefore found it easy and cheap to access and time saving without visiting cyber café.

SECTION B: 1. Is the platform easy to use (navigability)?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
VERY GOOD	24 respondents (23.1 %)	The artisans said that it doesn't require much knowledge to use the platform and that even the semi-literate can navigate easily. It is easy to use because it is clear and easy to understand; it basically involves pressing buttons on your phone and reading the information. It is also easy to use because the information has been grouped clearly accompanied by clear illustrations. One of the artisans said that the platform is very good because you can load pictures and even play the videos therein. Others said that it is easy to use since it can be accessed on any phone.

GOOD	49 respondents (47.1 %)	The artisans rated it good Because it guides one on the direction of where to go next and that you only need to know how to operate your phone and answering the quiz on the platform. It is also good because it is understandable from the beginning to the end and that it states step by step which one it is moving to. In addition to acknowledging advantages, some artisans pointed out that the challenge with this platform will be in terms of the cost of access to the Internet network and data bundles, since they claimed that the Internet is expensive.
AVERAGE	20 respondents (19.2 %)	They found the platform average, citing their computer illiteracy and their inability to read and write; therefore calling for more time to learn the platform and also teach themselves how to use the Internet. One artisan claimed that the majority are still analogue and need to be upgraded technologically.
FAIR	8 respondents (7.7 %)	The artisans rated the platform fair claiming that it is not easy to use and that the procedures involved take a long time.
POOR	3 respondents (2.9 %)	NO EXPLANATION PROVIDED

1. How do you rate the look, feel and color of the web-based platform?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
VERY GOOD	31 respondents (29.5 %)	The artisans rated this platform as very good because it is attractive; it provides “pictures and an outlook that impresses the buyer and seller. Its colours are attractive, appealing and clear and pleasant to look at. This platform, one artisan said, will make it possible for the product to be seen if they are good or bad. The platform is not harsh to the eyes; its contents can be read at a distance. An artisan recommended that there is still more that needs to be done on the platform: I want to see a person who is painting, their working conditions and much more.
GOOD	48 respondents (45.7 %)	The artisans said the web-based platform is good because of its attractiveness, lent by its appealing, eye-catching colours. They also said the platform is clear: its information can be clearly read and that the photos and videos reflects the real look of the product. The artisans also rated the platform as good due to the arrangement of content on it. They said that the design of the information is well arranged and that it is not screaming in colour; it is easy to open and even the homepage is well arranged.

AVERAGE	13 respondents (12.4 %)	The artisans rated the platform average as they claimed that it needed some improvements as they found it very bright.
FAIR	12 respondents (11.4%)	An artisan rated the platform fair on the account that it is yet to be implemented.
POOR	1 respondent (1 %)	NO EXPLANATION OFFERED

2. How would you rate the content and clarity of the videos?

	QAUNTITATIVE ANALYSES	QUALITATIVE ANALYSES
VERY GOOD	36 respondents (34.6 %)	The artisans claimed that the content and videos are "well edited and very attractive" and that they are also "clear and audible." The text, photos and videos are also understandable. The artisans claimed that the videos are realistic in that they reflect a true account of the processes and procedures in the *Jua Kali* businesses. Apart from that the pictures are taken right from the *Jua Kali* people workshops. At the same time, the platform contains new information relevant to the artisans; one defined it as very comprehensive content while another said that the platform provides well detailed and well established information.
GOOD	52 respondents (50 %)	The artisans rated the content and videos as good based on their arrangement on the platform, claiming that they are "well arranged." They also stated that the pictures and videos are attractive; they are also educative and representative of the sector. The videos and content are also realistic as they give clear picture of what *Jua Kali* entails and the challenges that they face and, the real image of the products and how they are made. Additionally the artisans said that the videos are clear as they show clearly what the *Jua Kali* artisans are doing in their workshops and they are very clear and easily understandable.
AVERAGE	5 respondents (4.8 %)	The artisans rated the content and video as average citing that they are not clear enough and the pictures are good but the writings are too small.

FAIR	8 respondents (7.7 %)	The content and videos were rated fair, with the artisans citing that there is need for improvement on their clarity.
POOR	3 respondents (2.9 %)	The artisans rated the content and videos as poor on the basis of their clarity and also because they are not balanced in their representation. One artisan claimed that it looks like they are only videos of Kisumu City workshops while another claimed that they are not representative of his sector since there is too much wood work.

3. How would you rate the signing up process of the web-based platform?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
VERY GOOD	45 respondents (43.7%)	The artisans rated the signing up process as very good due its ease and the short time that it takes. They claim that the process is "simple and easy to do," and that "it doesn't require many things and it's understandable." They also indicate that the process is secure: that the personal information is safe because one uses a pin to access accounts.
GOOD	29 respondents (28.2 %)	The artisans rated the signing up process as good due to its ease. They said that it is easy to register and it is also a very short process. They claimed that the information for signing up has been well arranged and that the process has few requirements. It is therefore easy to understand the process. The artisans also rated the process as good due to the security of the information that they provided during the signing up process. The use of a password assured them that their personal information is secured.
AVERAGE	13 respondents (12.6 %)	The artisans rated it average with one claiming that it is not a hard process "especially to somebody who has an email." Some had difficulty signing up and claimed that it took too long to sign up and then their emails and/or passwords were rejected. Others claimed there were too many procedures for signing up. Computer illiteracy also prompted the artisans to rate the signing up process as average. The artisans claimed that the process was not just difficult but also complicated and that one could forget the password. Another noted that the process "requires much knowledge about computers and therefore the common *Jua Kali*

		artisan cannot understand easily."
FAIR	11 respondents (10.7%)	NO EXPLANATION PROVIDED
POOR	4 respondents (3.9 %)	NO EXPLANATION PROVIDED

SECTION C: 1. Is the platform easy to use?

	QUANTITATIVE ANALYSES	QUALITATIVE ANALYSES
VERY GOOD	26 respondents (27.7 %)	The artisans rated the USSD platform as very good due to its convenience: it is applicable to any kind of phone and doesn't depend on the Internet. They also rated it very good because of the ease of using the platform: they claimed it is like m-pesa (local mobile money transfer service) and that it is very open to all and easily directed. They also said that its steps are easy to follow and that it is very simple for the common *Jua Kali* artisan to use.
GOOD	46 respondents (48.9 %)	The artisans rated the USSD platform as good due to the ease of use: they claimed that it was easy to move from one page to another without any problem. Unlike the web-based platform that required the Internet, the artisans rated the USSD as good because they could access it on their simple feature phones that do not access to the Internet. It is also accessible anywhere and you can access it anytime.
AVERAGE	11 respondents (11.7 %)	The artisans ranked the USSD platform as average due to its accessibility in the sense it is not difficult to access. They pointed out however that one needs to learn it first and that it only becomes easy to use when one gets used to it. One artisan doubted if his fellow elderly artisans could use it; while another pointed out that it is not easy to use because not everybody in the sector understands English. Others rated it average because it's only text-based and doesn't include pictures and videos.
FAIR	6 respondents (6.4 %)	The platform was rated fair citing a lack of literacy on the part of some artisans.
POOR	5 respondents (5.3 %)	The platform was rated poor because it has no pictures and videos and that it isn't easy to use and understand.

For the rest of the question see **Appendix B (III)**

Appendix 36: Transcribed Government Officials Interviews

INTERVIEW: Respondent

MC: thank you very much for your time; I would like to ask you a few questions if you don't mind; on my research entitled enhancing *Jua Kali* trade in Kenya through digital design interventions. Could you tell a general view about *Jua Kali* artisans; do you consider them a problem or a resource?

Respondent: I am sure you could be aware that we have the technical vocation and training authority of which I am the chairman appointed of 25th april 2014 and the inauguration of my board was done on 4th June 2014 by the cabinet secretary in charge of education, science and technology. We are 9 members in the board, 5 appointed through competitive interview and the chair also appointed after the competitive interview; the two principal secretary one from the ministry of finance and one from the ministry of education science and technology in charge science technology and innovations; and we have been in existence almost for a month now; one of our functions is to provide structured training for formal and informal sector; where informal sector we address the *Jua Kali*. So I don't know if I have answered your question but the government is aware they are there; and have recognized their existence and how much they can be able to add to the economy of this country.

MC: what are the existing policies for the *Jua Kali* sector, as an authority now and in the next five years?

Respondent: I can only talk about what is there for them in my authority and what I know is that we have plans of seeing that they are formally trained to have certifications because we have recognized and appreciated the fact that we need people who are hands on to propel this country to greater heights and as Kenyan it is their right to have a decent living as stipulated in our constitution; and for us to have a decent living you must have a clean environment and economic power to enable you to live a decent life. and one way of doing this is to enable the citizen to acquire some skills that can be able to be turned into finances to enable them to buy what they don't have. So our interest is to make sure that we reorganize the *Jua Kali* sector; each one of them to specialize in a given trade; be certified, be trained properly under the competence based training, which is something we are trying to introduce in this country; so that if

you're a mechanic it is know you are a mechanic; you are registered with a professional body so that if the region wants a mechanic or some global set up some mechanic; you can just go and the click of a mouse we should be able to know how many artisans we have who are mechanics; how many have gone where and how many are available to be taken elsewhere.

MC: how do you relate this to the Kenya Vision 2030 – your policies and strategies?

Respondent: Kenya Vision 2030 aims at industrializing this country by 2030 and if you look at the ratio of – for example in engineering; we believe that for every one engineer we need 3 technologists; 12 technicians and 60 artisans; so if we have to go by that ratio we are nowhere near and we are probably 16 years away from 2030; so we have to look for ways and means in which we have to take deliberate efforts to train these artisans, technicians and technologists within these 16 years. And this is part of what my authority is looking at seriously at his moment.

MC: are you facing any challenges; I know you are young – its just a month; even in this month and you've been in this field for long – in achieving this training; this ratios you are talking about; what challenges are there in training them from the top to the artisan level?

Respondent: its good you've appreciated the fact that I'm not new in TVET activities but the authority is new; but me as the chair am not new in TVET matters and our interest is to roll out and introduce as many vocational training centers in almost all constituencies in this country; technical training institutes in every county; national polytechnic in almost every region; technical training teachers colleges – we are going to increase a number of them. And this should be able to open up avenues for training opportunities through the Kenya University Central Placement System (KUCPS); because we believe not everybody will manage to go to the university but going to a TVET institution does not mean you are a failure; it means the government is offering you an alternative mode of training which will be able to arm you with hands-on skills; that is something we desperately need in this country. We cannot, 51 years down the line after independence – we cannot continue to be a consumer country; we need to be a country that can now be in a position to manufacture products and export.

MC: are there any challenge that you have experienced as you plan for this on the TVET perspective; especially the *Jua Kali* artisans who are out there in the field?

Respondent: well we've not had much challenges because we have not interacted much with the *Jua Kali* but probably I can just share with you my own experience given the fact that I've been in TVET sector for some time. You will normally find that there are people who know; they have the hands-on skills and this one becomes a challenge; you are aware that I am an employee of I am lecturer at the Technical University of Kenya; administratively I am a director in charge of University Industry Partnership. Recently some industry came to me that they wanted some skilled workers whom they were taking to one of their firms outside the country but they were given condition that for them to take these people – these artisans must have some certification confirming that they are skilled in that particular trade – that this industry was interested in. they were sure that these artisans were the relevant people they wanted but the artisans did not have any certification. So the hands of the government was tied up; what instruments do we have to measure that these are the people you wanted, so they came to my office to ask me if I could certify these people; I told them I was not yet authorized to certify anybody; that time I was not the chair of this authority. But these are some of the challenges that we see around where you find quite a number of Kenyans are skilled; we have masons, electricians, mechanics, welders; but they just do it outside there without due care to make sure that they have certification which can make us to probably recognize that there are somewhere within the country.

MC: and they are out there in millions!

Respondent: they are out there in millions I can assure you that; such that how we can be able to know them is now the big challenge we have, because they are there but we have no instruments of knowing how many they are; but we need to know that for planning purposes.

MC: have you been in touch with the MSE Authority?

Respondent: not quite, I know it is also an authority within the ministry – is it labour.

MC: it was under labor but now it has moved to industrialization; they deal direct with the *Jua Kali* artisans and they have *Jua Kali* associations where their members have registered in. now they are about 12 million artisans who they can tell where they are and many other millions that they have no idea. But this may be a way of getting to know who they are.

Respondent: yes, I see us working very closely with the ministry of industrialization because if we have t industrialize we have to probably compare notes with them to know what is available; what is the shortfall and how can we be able to address the shortfall.

MC: do you think there are enough resources to support the *Jua Kali* artisans in all the areas to just empower them and if not what is the government planning or the authority to be able to get appropriate resources to empower these artisans? that's just the introductory, then now this is just defining the intervention; then we have this four modules; design, production, marketing and management. Now I have not developed them fully but I have the content for the units of these three but the design I've got a little further. For for example, if you click there – this is my logo for this intervention; now it has a video which am not going to go through becsue of time; now as I was developing this an artisan said

Respondent: don't worry about time just show me what it is

MC: okay. Its uploading. So when its doing that – these we're telling the artisans you must identify your customers needs through market research then develop ideas because most of them don't do any market research; they just go straight into production. So this unit is supposed to show them the three steps you must go through; step 1 is do your market research; 2 – get your brief and then generate your ideas. So here we're telling them the market is wide you can't serve it randomly; you must be able to look at the market ad zero in your customer and then target the specific customer and then go to the second step. Now this is the one I've gone a little further; find your market.

Now you've said find your market. I'm asking a few questions to probe them so that in case they don't see how important it is. I'm asking you what is your industry and if you click there you can choose; then what product are you selling; it could be furniture, utensils, decoratives – I've just taken a few because it is a prototype. Lets say you are making furniture; what materials is it made of – you say wood or metal. Then what makes your product special. Here you must really teach the intricacies of design.

Respondent: this is now when design comes in?

MC: yes, we're saying may be; its aesthetics, shape, color. A lot of these things they have got no ideas. You ask them why did you choose this color they say I chose it. They may be it's the functionality; did it function well. If I sit on the chair is it comfortable or is it the pricing; is it environmentally friendly; then who or where your potential

customers; you're telling them you don't just wake up and make a chair; you must know who are your customers – may be in Machakos; then what age group are they you dealing with; if the know they will say 20 -30 years; then what income because I must know how much you can spend make a product; so lets say its 10 – 20 thousand. Then what sex, may be its male – the gender.

Then we ask the artisans why should people buy your product; they must answer because; they must have a reason for making it and if they don't we're given a few options; may be it works well, it looks good, it can be reused. So if they submit this its summarized here. And they aren't able to answer we can probe them to know the importance of these market research.

Respondent: now when you submit it or it just summarizes all your answers?

MC: yes

Respondent: then once it summarizes

MC: then you know; you're able to zero in – to identify

Respondent: okay it helps you to identify your customers which county they are; whether they can afford or not; then where does this information help you

MC: once you've identified your customers who they are yo can now go nest step of segmenting them more and once you've zeroes in the very small segment then npow you're dealing with a primary school in Kayole – lower primary they want chairs; its not just primary school chairs in the whole country.

Respondent: so you will make chairs which is affordable to them but still user friendly they looking good.

MC: and if there's information you still want that you aren't sure of you can go back to it and be able to still learn. So after you do that first step you can move to the second step which is now; you're found your customers, then now which particular segment here, if it is secondary schools

Respondent: that county was just giving us county in general?

MC: it could be Machakos County; a primary school in Machakos County. So its to help them actually zero in – that is the segment I am dealing with; I am not just going wild to anybody who walks in; because they sit and wait.

Respondent: can it choose several counties?

MC: yes, we can work on that later on.

Respondent: and if their needs are different?

MC: yes

Respondent: because even their income may also vary or you'll have to go through this process again. Can you be able to do it one at a go?

MC: when we develop it – this is now to say it is good; we can actually develop it. Now based on that we can now spread it out. we are saying – on the homepage you can use Kiswahili or English. So all those we will be able to put in and say ok you can have customers in four counties and this county the income is this amount.

Respondent: even this one Mary you will probably put Kiswahili in bracket – you use Kiswahili somewhere. It looks a good tool. But try what you can; let it work first. The Kiswahili version is not a big deal – it can be done.

MC: we thought about it. What was prohibiting is was the cost. If I had a sponsor we could have actually done a Kiswahili and English. We can even fo to the 42 tribes of Kenya so that even if you're a Kalenjin in wherever place you can be able to make your chair properly, wherever you are.

Respondent: you can use vernacular language to reach your customers

MC: yes. Now when it comes to the production module; I didn't show you the video on design. I want them to talk about their own challenges for themselves (VIDEO PRESENTATION). The idea of documentation is that they really have to struggle with; now this is the last video on production. So here the health and safety; the workshops – the working conditions – all those (VIDEO PRESENTATION)

Respondent: so you've sort of a questionnaire

MC: no here we don't have a questionnaire because I've not developed this one; the ones remaining are just units tat can be developed later. Just to give an idea of what the intervention will be about and if it will be relevant at all to them. So its about leaving how to make competitive products because now you've identified your market so your product must be competitive and must be able to sell. So we're saying before production what do you do? Choose your material, look at tools, transportation. Then making of prototypes is something they don't like; its important you make a sample and discuss it with your customers, which they don't like to do.

Respondent: and the surface finishing

MC: so in short that is the production then when it comes to marketing its also just the units we're showing; this is in Kibuye Kisumu in that picture but this unit they really liked because we're saying you can market your products online. But you see marketing is about to learn how to persuade your customers and you will be able to ake money out of them; so how you package and brand your products is very important. If the demand for the products – the 4ps and then how to - sale and marketing; know your market, competition, and then customer care is also important that they need to be trained on. So those are the units in marketing and the last one is management – then learn how to run your business; entrepreneurship, planning finances, procurement and business management.

And then here we're just going to have questions; its going to be interactive; you can ask your questions and we answer and now your contacts. So, basically that the web-based platform; the second one is the sms based; its exactly the same information; you're given a pin number; you can get the same information but its in black and white – not in colour; but w e are saying every artisan whatever part in the country they will be able to access this information on this platform that we have. So I would like to ask you a few questions on that and how you think TVETA benefit from this. Now basically whats your opinion about this intervention that you've seen?

Respondent: I must sincerely thank you for coming up with this IT intervention; you've decided to call it DDTI. Because one of the functions of the authority is Section 7 of the TVETA Act 2013 is to ask us to create an intervention on how we can be able to sensitize the formal and informal sector using IT; and now looking for ways and means, which we can be able to conduct training using e-leraning and this is honestly one way that can be able to help the artisans not to leave their workplaces but be able to learn new ways; new things – doing market research; knowing where to sell their products and being able to even to get feedback from their customers. So I honestly feel that this has come at the right time when its required in this country.

MC: that answers many questions I have here; I was asking "do you think the DDTI would enhance implementation of relevant policies that you've developed for *Jua Kali* artisans?"

Respondent: it will because first of all you are aware ; ok if you are not aware we have had in the past tried o create short programmes in the TTI for the *Jua Kali*. But you find that

they are not willing to come because theu think that if they leave their workplaces they wont be able to find money for the day. But if thru can be able to interact with this DTTI within their workplace then theu will be working and at the same time learning and probably your platform will have a question and answer; where you will be able to ask a question and probably get an answer from whatever source. A few improvement probably I may suggest issues to do – the motor vehicle technology is improving on almost yearly or half yearly basis and these artisans need to catch up with the developments. So if they could ask questions there and get answers to the problems and challenges they have I come of these things; I think this will go a long way in helping them to manage and know the new technologies developments. And I am of the opinion that if you rope in the cellphones which are now basically said an average Kenyan will have a minimum of two and this will also help people who cannot access the internet.

But if we can (the government) to see that the *Jua Kali* is organized in a way that they should be able to have an IT center within the set up; may be just within their working area so that they could also be able to access the internet; know what other people are doing which they are not doing. One of your people in the clip was saying that sometimes if they have time they look at the net and see some of the products made by their colleagues elsewhere; they try to see if they can make them bit in the process the modify or they make the same deisgn which is something we need to encourage.

MC: we're actually testing the *Jua Kali* artisan; the one we talked to had phones; so they can acess this on their phones and actually they are testing this on their phones so that they see its something they can use even at home, when am working, anywhere that's convenient. So this am just putting here for them to understand it on a large screen; otherwise on your phone you can access this and am hopping in the next 2-3 years with this fiber optic they should be able to have internet they can access easily and even if they can't access online they can access it on their sms. Now your mandate is to promote access of relevant training programmes with the framework of overall national socio-economcial plans and policies. Do you think this DDTI can help you in achieving this objective?

Respondent: yes and this is what I had probably indicated to you earlier that we amy not be able to reach all the artisans but they are the strength of industrialization because

we need over 3 million trade before we get to 2030 if we have to be anywhere near industrialization. And for us to do that we need ways and means to reach them. Reorganize them in a way that they can be able to produce global competitive products with good surface finish and good aesthetics that can be able to attract customers and one way of doing this is to probably look for ways to interact with them from the academic side from the technical training institutes; the technical universities and that's why the government is making efforts to see we have as many TTIs and TVTs centers in almost all constituencies.

MC: (45.05) that needs of both the informal and formal sector; how do you think this will be able to help you achieve this?

Respondent: well we are thinking f developing what is called competence based education training which entails – if you acquire - the various skill they acquire in their *Jua Kali* and you come in a formal setting – we should be able to appreciate those skills that you have in form of a credit transfer and be able to interpret it to a semester or a term so that you skip one term because of the skills you have acquired and in this way we see tha we can be able to help them realize some of these and then we are also not very keen on having classroom intervention; we are keen on having intervention like what your DDTI is doing and be able to examine and give them results online; so that very soon we don't see the relevance of people coming 8 – 5 o clock to the classroom; that one is going to die very soon. But the digital way is the way to go. Because it will help the *Jua Kali* to attend to their normal activities and at the same time learn. And it will also help us as an authority to make sure we also come up with some modules that can be structured and followed in a way that we can do them practically but now through the online.

MC: in your opinion can the modules of DDTI assure quality and relevance in programs in training the *Jua Kali* artisans?

Respondent: I would say 50-50. I think at some point we may need interaction in way that we do what we can in the digital way but at some stage somebody has to come face to face with the candidate and be able to interview or administer some practical sessions with him or her and be able to also ask some oral questions about the particular trade the artisan is taking.

MC: your authority is also charged with the responsibility of ensuring the maintenance of standards, quality and relevance of training including open distance and electronic training, which we have talked about, now how do you think this will be relevant to help you achieve this?

Respondent: as I said before this is quite relevant because it is part of our wish in this authority that we interact with the *Jua Kali* is a convenient way as possible because in the past we have called them for short term trainings but you find that they are in the room but they are not concentrating because they are losing out by not being in their workplace. But this one will interact with them at the workplace and because you also have a tab for questions and answers; if they have any question they can be able to write it down there and we expect that they have an answer. So we see it to be a positive move to some of the wishes in our authority. And the quality and relevance is something that we need to check out and right now within my authority I have my technical team that can be able to check out and see if there is quality and if there is some improvement we have to make but for now I think it's a good start.

MC: what are your personal views of the current plans with *Jua Kali* artisans from the government perspective? Do you think they are getting enough attention

Respondent: I think the government has good will for the *Jua Kali* sector it is only that as a country the government has a lot of responsibilities so that the limited resources that they have they cannot be able to fulfill all the requirements in the country. But I assure you the government has got a lot of good will for *Jua Kali* because it is a sector that will see us realize Vision 2030 if we structure it properly; we appreciate their efforts and make it organized in a way that we can be able to get a meaningful output from it.

MC: now how important are they politically?

Respondent: I am not a politician so I may not be able to base that well but what I know as I indicated to you, my authority believes that any Kenyan has a right to live and has a purpose to live; and any graduate, whether you graduate at nursery level ; primary or secondary level – you have something to do in Kenya; such that even those mothers and fathers at home who didn't go to school – if they are taught how to read and write through the adult education; that one will just enable them to know how to read and write but after knowing reading and writing we should be able to impart some skills on them making cake; because each and every time they will be weddings where cakes

will be required; so if you know how to read and write and you know how to make a cake you will be useful to your village; if you know how to make baskets, crotchets you will be useful to your village and probably to your county. So this will be the way we like everybody to be appreciated in this country; you cannot expect everybody to live a good life without doing anything; you must do something and that something is the skill that we would wish to impart in every Kenyan irrespective of the level of education.

MC: thank you very much that's generally the information I wanted on you; if you have a little more time you can comment on the modules.

Respondent yeas, am very happy with the modules but on the production side I expected that may be you will be able to have a range of production processes of various article or various products ranging from masonry, woodwork, carpentry, metal, mechanics and many others so that when somebody click on carpentry the next thing he will be able to see is table chair stool; so that when he clicks on table then he will be able to see the various types and shapes of tables then he can be able to say I want this one; then now the procedures of how to get to that one is known to the artisan. And probably another platform especially for the mechanics where they can be able to know – troubleshoot – put their questions there and they get answers; if a vehicle behaves like this what is likely to be the problem; when he tells you it is not starting – so when he clicks the mouse it should be able to tell him these are the possible problems; if its not starting then you're told go and check on the battery; so you go and check on the battery – if battery is okay, what is the next possible problem. Check on this – like that and that – that will enable them to trouble shoot because at the moment what they are doing , some *Jua Kali*s, they rely on some of their colleagues who are in formal employment of the motor sector and they have to pay them for giving them an idea of what the problem is and they use their cellphones to contact those in the formal employment. We could make use of these formal employees in the vehicle industries in some structured ways in which they are also rewarded.

MC: the other thing I was thinking about we are talking of other things like metal work, mechanics is because people have already done this; some of these processes are on you tube and other connections; later on we can give them the links.

Respondent: lovely, if they are already there we just direct them on those links but remember that os for somebody who is computer literate and one thing which we have to do is to look for ways and means in which we can be able to train them on basic computer applications – all of them for them to benefit from this platform.

MC: yea we actually went to where the Kambas do their curving in Shauri Moyo; they have a little compute lab and theyr are so IT savvy I was in total shock; it took us a very short time and we said we can give them the linkages and they said can we be able to market our products; there is something called – its used for marketing; its advertised on TV – olx. They said OLX is good but its not giving them what they want; can we develop this in a way that we can actually buy and pay online. Like you can pay using mpesa and transport the product where your customer is; olx they are using it but they are saying its not meeting their needs as artisans; so if here we can be able to

Respondent: bridge that gap

MC: so that has already been noted; then the issue of the link because at some point I thought of doing the processes; I actually got books to be able to animate the process but like a shared it is extremely expensive and then we thought if we have links on you tube; since somebody has already done it we can tell them for you to be able to learn how to make a chair you can go on this link and give them an idea of what to do. So those are think to do later on once this is approved.

Respondent: I think that is a bright idea; if you already have some links that is a good beginning. But as we go on we can be able to improve on this platform; we don't necessarily need to have the ones on you tube; we can make ours because the you tube ones may not be necessarily giving the procedures of the types of chairs we need for ourselves; so we might need to customize to what is available for us within the country.

MC: yes, I think that is a good idea; that if we can customize for our own market here that will be very good for us. What about marketing and management?

Respondent: these others are also okay but because you know my background am … that is why I was keen on that one; but of course everything starts from design, conceptualization of ideas, putting them and then you actualize them and then you must be able to make people know that you have products – that is how marketing; of course management has to be there because we must know how many of these

products we need; what type of skills do we require; what type of legal compliance do we need – that is management and how clean do we keep our environment because these products are functional; they can be good but if the environment is hostile even the customers which in your place of work may be a challenge; so all you have here is relevant; I think you might just need another one for feed back from the customers or anybody else who is looking at the platform and having an idea which can improve your platform

MC: I think we have a link on twitter and face book, which they can be able to reach us.

Respondent that is good enough; may be you'll put another one called whatsapp am told its now very popular.

MC: yes its extremely popular; we can add that. Lastly, what's your opinion on the videos that we have just watched?

Respondent: these ones I was very impressed; in fact I was almost asking you to give me some copies of the same because they are very relevant; and I must be honest with you that I will share this with my principal secretary because I remember, whispering to me something like this and now that you have started on it; I think this one is going to give us a mileage as an authority and I encourage you as the chairman to build up on it and make sure it serves the desired purpose because I think within the university, of course I've learnt that you're in Coventry; Coventry was a polytechnic before, so they actually emphasize on practically oriented solution, which is now what your project is doing and that is commendable.

MC: what about the appearance, the use of colour – when you look at it?

Prof. Ogolla: as usual Mary with men but I think you're a designer probably you might have an advantage over me on that

INTERVIEW MR. OGENGA

MC: Good morning Mr. Ogenga.

Respondent :Good morning Mary.

MC: thank you for allowing me time to come and interview you about my research. I would like to ask you a few questions. Now could you tell me your general views of the *Jua Kali* artisans; do you consider them a problem or a resource?

Respondent: very interesting; I think it is important to realize that when you look at the Kenyan economy at the moment they will be to a large extent a resource because we are looking at the fact that the country is preparing to transit to a middle level industrialized country by 2030 as per our development blue print; so we look at this sector as the one to drive this kind of transition; so therefore this is actually a very large resource because considering the fact that unemployment in Kenya is quite widespread and therefore this is a sector that tries to absorb that component as far as our economy of Kenya is concerned. So actually, as much as it could be an indicator of being a problem because of not properly being managed we would rather say that this is quite a resource to the country.

MC: What are the existing policies for the *Jua Kali* sector in Kenya now and in the next five years? Do you know any of those policies in line with Vision 2030; you've just mentioned

Respondent: yes, we would want to recall that the key development blue print for Kenya is Vision 2030 and of course when you go to that document and go through the three pillars, you will discover that if we want to be able to achieve the vision then a couple of flagships have to be realized in the context of enhancing the capacity of the country first of all; to continue supporting the industries and also to ensure that the human capital in the country is fairly developed to e able to the requirements in the several pillars. If you look at the economic pillar of course, we are looking at several sectors: some of the key sectors are of course, agriculture; there will be of course, tourism and hospitality. But again there is another sector that is coming up strongly: mining petroleum and others. But of course all these things rely on the kind of support that the human capital developed will be able to give them. Therefore, I would say even if you look at the Sessional Paper No. 14 of 2012, which is actually talking about reforming education and training in Kenya – it puts a lot of emphasis on technical and vocational education and training. And this is where the *Jua Kali* system is falling because we are looking at all sorts of capacity building platforms when we talk about the mainstream or the formal but of course we really talk about the informal sector, and therefore the *Jua Kali* as part of the informal sector plays a critical role in terms of informing the economy of the country. And therefore we are trying to see that almost all key government policies try examine the possibility of ensuring that the country

then prepares itself in terms of medium term plans, which is we had Medium Term Plan 2, which of course covering up to the next five years. And we therefore want to say that a lot of policies are in place. Be they in the industry sector or the education and training sector and all these actually to a large extent seem to support the *Jua Kali* sector to some extent. And of course, as we said, these policies are drawn from Kenya vision 2030. For example if you look at the Sessional Paper No. 14 OF 2012 – It draws that to satisfy the demands of that Kenya Vision 2030 then the government has put in strategies and then of course we try to TVET sector. And therefore, there is a very clear relationship between what the Vision says and what key government policies says in terms of human capital development. And then also to support the industries and all the others economic sectors.

MC: What challenges are there is any, if you are dealing with the informal sector are you experiencing in achieving these policies and strategies

Respondent: well, the informal sector is fairly wide to the extent that if it has not been properly documented, properly data based and you want to recall that one of the key thing that is going on at the moment is trying to standardize training in Kenya, especially in the informal sector. You want to remember that at the moment we have the Kenya Qualification Framework Bill which almost ready to go to the second reading and approval and assent into law. And you want to remember that it is this bill that will be able to outline the kind of skill level that country requires. So that then this can be able to be informed properly by the Kenya Qualifications Authority; whereas you will discover that then informal training will be given a lot of prominence in terms of the competencies that the country requires at various levels to be able to drive the economy. So we are saying that well that could have been a challenge because probably at the moment in Kenya we don't have a properly or current qualified national database of skills. And of course, then this should have been informed by the Kenya Qualifications Framework, which then details out the qualification level that is required in the country so that we can be able to service; so that could be seen as the challenge but of course we are still on as a country because we still have programmes the informal sector to a large extent; and of course we have issues of proper competence standards in the country, which have not been properly resourced and also we are looking at facilitation. Of course, we might be struggling in terms of

resources, in terms of facilitations – in terms of the people who are carrying out the training to the informal sector and also equipment and tools. So we are saying that the country is trying to balance between the mainstream programs because we are talking about basic education, which is high stakes, then when you go into the informal sector to a large extent it's not been properly regulated. So we are looking at first of all a legal environment or ecosystem that is still undergoing development to be able to ensure that – say intellectual property rights, development etc - have not been properly documented and facilitated. And therefore we can say this is part of the challenges that is ongoing: proper structures for training, equipment backup, legal ecosystem that will be able to support the informal sector in Kenya. So we could say those are some of the challenges; of course, they could be wide.

MC: Do you think there are enough resources to support the challenges you are talking about? Is the government allocating enough?

Respondent: yes, I think the government is trying its best in terms of – of course we are undergoing decentralization of services; because we are aware that upon the enactment of the Constitution of Kenya 2010 and which now has given birth to the devolved system of governance; therefore you will discover that a couple of centralized function have been given to county government; and therefore as they are fully resourced to achieve those, including for example, youth training and home craft centers – these are functions which have been given to the devolved government systems and therefore if the government then ensures that resources are allocated appropriately to service those functions then I think we are in the process of achieving and coping with those challenges. So the most important thing is we ensure that the devolved functions including the sectors that support the informal sector; the youth training including the youth polytechnics, technical training institutes – you remember the other day they were saying that each and every county will have a number of technical training institutes. And if these are properly facilitated in terms of funding then we say we are coping well with the challenge of human capital to a large extent. And of course there are other strategies that the government has put in place including of course expanding the training sector. You want to remember that at higher levels I think there are a number of university colleges that have come up although at the detriment of middle level colleges to some extent. And therefore I

would like to say that the strategy that we don't go wholesome in converting middle level colleges into university colleges would be able to add value; and therefore we need to put a lot of effort in facilitating our technical training institutes; our youth polytechnics, our home craft centers and ensuring that these are properly regulated and properly given competence based training so that they are able to have proper competencies being developed and being certified for upskilling and upgrading.

MC: What is your opinion of the DDTI that we've just looked at?

Respondent: Extremely innovative I think and this is the right time to be able to realize that when you look at the tenets of education and training in Kenya, you'll normally talk about four tenets: access, relevance, quality and equity. And therefore this platform is actually driven to service almost all those tenets. One is access – you said very well that in the informal sector other citizens don't have time or the practitioners do not have time to be able to access mainstream or formal training and therefore they require a flexible system which can be able to add value so that they combine both work and training at the same time and therefore this provides a lot of access in terms of the same especially given the fact that mobile communication in Kenya is a bit high; so if the mobile platform can be developed further it will even make it easier so that they can be able to access the same. And again the modules that you've suggested here have a lot of relevance to education and training in Kenya because they seem to anchor onto the process that ensure that service and products are properly done so that – to service the economy. So in terms of relevance I think it's also very key. In terms of equality it's also very important because you've gone to the key principles that are supposed to drive each of the modules and I think that quality has been properly serviced in the same. And of course then you are balancing because apart from servicing the informal sector the same platform can be used in the mainstream sector because the mainstream has not fully gone into having this kind of interface especially in TVET training. Therefore this actually service the non-formal, the informal and even formal sector; and therefore I think it is appropriate product that would be able to add a lot of value.

MC: Do you think this intervention would enhance the implementation of relevant policies that have been developed for the *Jua Kali* artisans?

Respondent: I think to a very large extent in this context that the government is trying as much as it can; you know this a digital government and of course when you look at the manifesto of the current government they try to emphasize that we are going to a society that is paperless, that is cashless; that has got several indicators of the digital world; therefore this then will serve as a key step in achieving that; of course the government has put in a lot of effort through the communications authority of Kenya in terms of enhancing ICT. Almost all products and services are ICT driven and therefore this comes in at the right time to be able to enhance that drive towards ensuring that we sustain a system in terms of the kinds of resources that we have that will be able to add value in terms of the way that we conduct our businesses. Therefore this platform I think in terms of an ICT driven system will be able to add a lot of value.

MC: Now KICD is charged with the responsibility of promoting appropriate utilization of technology to enhance innovation and achievement of a knowledge based economy. Do you think intervention will be one of the ways of achieving this objective?

Respondent: Because one is that KICD in terms of its core mandate is developing curriculum and curriculum support materials. And especially that is able to meet international standards and of course as we have rightly mentioned we were talking about utilization of appropriate technology to be able to ensure that we achieve those core mandates. So this is very important because at the moment we have been embarking on the development of e-content especially for basic education. So that was to give us the drive to be able to see the extent to which the same procedures could be able to service the tertiary education in Kenya and tertiary – we talk of TVET, teacher college – below the university. So this is a very good platform to be able to see the extent, to which the tertiary and the non-formal sector education in Kenya can be able to be serviced, especially the fact that we need a lot of flexibility in terms of delivery of training. And therefore when we talk about of flexibility we talk of modularization of chunks of units that are geared towards certain competencies and skills; and therefore this gives that flexibility to be able to develop those modules for specific competencies to service areas. And therefore this then can be able to serve as a tool box; an e-tool box that then goes much further than the original intention because as much as it is

designed for the informal sector; I want to assure you that it will be very critical even for the mainstream TVET training in Kenya.

MC: I was actually showing it to my fourth year design students and they want to use it to learn; so it's not just TVET even the formal really would like to use this to learn; these are students who are going to the industry in the next one semester.

Respondent: That is really true and I think if this can be properly commercialized then we are saying like you've said, it goes beyond tertiary; it goes up to university. All forms of education and training can be able to customize this kind of platform to be able to service the kind of interest they have. In any case this can also be used to moderate the e-learning platforms that are already existing in Kenya at the moment to see the extent to which they are properly designed to be able to assure that the learners acquire some kind of skills that they are supposed to acquire using which platform; so I think it could be used as a moderator for even the mainstream formal e-learning platforms that we currently have

MC: One of your other mandates is to develop, disseminate and transmit programs and curriculum support material through mass media, electronic learning, distant learning and any other mode of delivery of education and training programmes. Would this intervention be a step towards achieving this objective?

Respondent: Yes that is true because at the moment you will discover that a lot of emphasis as an institute has been put on radio and TV dissemination of programmes

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MC: Would this intervention be a step towards achieving this objective?

Respondent: yes it is true this is going to be a very innovative interface because we have been using traditional system of dissemination of educational content including radio programs and TV programs; and of course you will discover that these platforms have their own advantages and disadvantages in terms of reach and quality and in terms of ensuring that the learners actually gain from the same program in terms of being mainstreamed with normal teaching and learning time table; and therefore this goes a step further to ensure that because of a lot of emphasis in terms of ICT Policy and because of the drive towards e-learning in Kenya then this provides a platform for formal and even formal and tertiary education; no formal of course, we are talking of

alternative provision of basic education in Kenya including what we used to call adult programs and continued education. And then this one now goes further to the TVET sector and of course this can be even replicated by the universities because you know we want flexibility; we have large learners in our systems, institutions; to be able to do this and you will discover that Kenyatta University already has a digital school. You might be able to say that this is going to be part of interface that they can be able to use as a benchmark for determining the success of e-learning in Kenya. And therefore we want to say that then this goes beyond the tradition systems of disseminations and normal radio programs and TV programs. Of course the regulations of TV programs even the commercial TV stations – it's a matter of debate in terms of the quality that they are giving. So if this is dedicated to the training sector and the content is properly done; the quality assured – then we are saying this is the platform that can be able to be used to enhance further access to education and training in Kenya. And therefore I agree with you that with a little improvement in terms of developing the full content of the modules that you have included here then this will be very great in terms of the same.

MC: Now I want to ask you a few questions about each of these modules. First what is your overall opinion about the content generally, and then we will go into the different modules; then the video and then the look of the websites

Respondent: When you look at the interface here for the four areas; the concept in terms of the ideas, the production, and the management – this basically covers the total product that is required in terms of informal training sector; because they need to go through all these modules to be able to build their capacity. And the interface is very precise, it's simple; it's easy to understand – the language is fair and then I think that with just a couple of improvements including if you have an interface for frequently asked questions – of course this is falling under help to some extent so that is already covered under help. And of course later on you will discover that you'll be able to sustain this interface, you might want to put an interface for payment to the access of the modules because if we are going to an extent of certifying the modules; if this is authorized and properly mainstreamed by training authorities then we are saying that it's important that participants in this program will have to inject something to sustain it, which means that you'll have an interface for payment. May be you will be thinking

about that. But so far the modules are very well designed, simple, clear – the interactivity between the video component and the print; the words are quite alright, very much simplified.

MC: what I am having at the back of my mind are several things: one, there is what is called freemium, where we put the homepage free, now for you to access that may you put Ksh. 10 – so that is at the back of my mind ultimately. But if like the KICD decides to buy it and take it up, they can fund it – that is fine. If the Ministry of Industrialization buy because they want to empower the artisans – so it's all open at the end but definitely it's going to need a lot of injection in terms of money to be able to develop all the content and keep updating it as times goes.

I had actually hoped to use animations to be able to teach the processes but it's extremely expensive. So all those would come in later and of course I want African animations so that they can know this can be able to be done by us – we can give them You Tube links but it's still wazungus – how will they react to that? So what you're saying is really important because later on I was thinking that would be a way to go. It has been extremely expensive to put up this together. And again if we are going to go into Kiswahili, Kalenjin, Luo – all that. And TVET are telling me to think of Chinese, Japanese, all those – just localize it; let us think of internationally. I had not gone internationally in my mind – I was still localized. But when they said that I though yeah, maybe it will be the way to go.

Respondent: yes, I think you are very right because what is going to happen is that these many agencies will be interested in this and of course they can still buy you out once you've developed it and there's a lot to be done, in terms of interactivity, content development which has to be current all the time and of course management of the same. So basically I am seeing that the future of this is that several agencies could pick the platform and customize it to their requirements because the sectors of training and education are wide and this interface can be customized to be able to attempt to service each and every particular level of education and training. And therefore it is upon the interested parties to do their bit and like we've seen there's a lot of work because you need content developers; you need management of the same; you'll be able to have implementers of the same. So all these – that system will be able to look at this – the best way to approach. And of course even regionally we are saying that

when we look at the East African Protocol – then we are saying that the behavior in terms of education and training should be regionalized. So we are saying that once this is properly certified for the local market then obviously you want to examine the East African neighborhood to see the extent to which they can add to that and then later on you can explode it internationally.

MC: do you think content will be able to – if I am an artisan and I was trained in this – would it develop to the extent that they can do certificates, diploma, degrees

Respondent: Yes and that is very true because you want to understand that when you want to quantiize training, you need to certify – so certification is very important. The most important thing will be the mode of certification; like we are saying that if it is made as flexible as it is now because each and every particular thematic area can form modules and sub modules; then we have a system of certification, and examination and assessment that recognizes that particular skill areas within these theme areas can be certified, then that is the way to go. So what would happen is that even at the lowest possible level people who could be getting in and out of the system: multi-entry and multi-exit system, whereby some would be coming for the purpose of competencies only, they don't want certification but those who want to cross-skill or up skill they can start accumulating the modules and then we could say that we have certification of the lowest levels of artisans; then we can accumulate this to become a craft certificate and later on we can accumulate enough modules to go into a diploma and then of course diplomas can credit transfer into degree programs. So this could be generated and structure to have a system in which we are able to certify up to degree level; because we are aware that we have what we call the technical universities in Kenya. And these universities have opportunities for people to upgrade from certificate to diploma to degree; and therefore this interface there comes in; if we can be able to properly structure the courses, and the modules and the units and the competencies then we can progressively allow learners and participants to accumulate modules into certificates; credit transfers – the same into diploma where possible; accumulate them same into bachelor degree and that is sustainable – up to PhD level.

MC: I think what I wanted to request is on specifics; you've told me about the general content but do you have comments on the specifics – I don't know if you remember them; I could still show them to you

Respondent: I think let me go through them again – I think when you looked like you've said you've moderated the language to be able to fit within – into the level of the sector and therefore when we are looking at concepts and ideas its very key because this is time they are able to understand the concept of ability to be innovative and creative. Like you've indicated earlier much of it could be a lot of reproduction in terms of not being able to rethink and be innovative and creative although they are very creative because they try to modify a lot of things to be able to fit into the customer's needs; so when you look at the interface of ideas and design I think it is quite great in terms of motivating them at the entry point. But again you might want to ensure that probably the aspect of occupational safety and health – I've seen its going to come under production; of course, it is important to then realize that this is very motivating how they enter into this because they want to see that they are able to have concepts that are able to be generated and then satisfy a certain segment of the market that they are servicing; so this is very motivating in this context. Of course, later on you'll discover that you might want interfaces that allow them to internally assess themselves upon going through the same. May be that is an additional interface that can be explored – small assessment interface. And of course you have covered key areas in terms of the area of the industry and of course the procedures of design and innovation and of course this is quite okay. It will depend on how some of this will be analyzed later but so far this is alright. The steps might want to be reorganized for example the generic information flow might need to be organized; for example potential customers could come before actual design; I don't how their thinking look like but you might want to look at the market and then come backwards to the design instead of designing before looking at the market. May be this could be logically arranged but the totality is existing.

Production is very important because there are a couple of challenges in the production area and of course you have captured the entire key thing. Later on this will have to be properly populated in terms of links because when you say before production: choice of materials then of course you are saying that choice of material is very wide; then you have to be sector specific because you are looking at 12 economic sectors in Kenya. So initially you will open it up to the key high stakes sectors that you have looked at but of course you want to open it up because we want to believe that while

Kenya is slowly transiting to balance between agriculture and mining; so want to ensure that we are moving towards servicing in that kind of sector of course *Jua Kali* cut across in terms of developing products and services that service all economic sectors; then you will want to populate this to drive each sector that you are looking at. And that is quite okay; of course at the bottom of it you've created an interface that allows you to go back to each and every link that requires for example the home, the help and the contact.

Marketing is a very key one because this is where also they face a lot of challenges and of course, you are talking about building their capacity to understand market segments, market principles and concepts and then later on packaging the products and services to be able to service the market. And also giving them the capacity to know the after sales of the customer care component. So probably you will be looking at building their capacity to understand the concepts of market and marketing. And of course I am sure that later on we are looking at their ability to manage the business. Then this one will be able to come in – I don't know the logical sequence because management is also very key; probably we are looking at this being a terms that assist them having gone through these key skill areas then they should have the capacity manage having known all these; so I think it can still come where it is but of course in terms of implementation this can be logically arranged to reflect the logical sequence in which these modules come.

MC: The other reason I made it into modules is that I realized that they have got different challenges; some of them is just marketing like Kisii Stone – the skills are very good. So if you just want to go into the marketing module and get out – that's it. If yours is just to come up with design, you go in do that and that's it. So much as they are interrelated they are also very independent, depending on your area of need as an artisan.

Respondent: That is extremely true because this should be self-contained and you will be able to be servicing the requirements of the clients like you've said; so that goes very well with the kind of the policy we have at the moment; when we say flexibility it interprets into modularizations – modules; then these modules can even be further subdivided, for example in management procurement could even stand out a lone: some people have issues with procurement. So I totally agree with you that you can

still break this down to allow people to access these specific areas they could be having challenges in. you're extremely right. That is the policy at the moment that flexibility, modularization, focusing and customizing on key skill areas. This can now allow us to have standards, like we said earlier the country lacks certain competence standards – we are looking at; if the Kenya Qualification Framework goes through and we have Qualifications Authority then that will be assisted to be able to have standards that can be able to standardize the interface that you're designing.

MC: What about my videos; what's your opinion about them?

Respondent: They are very clear and relevant; they are extremely relevant because they – each particular area was; that particular interaction was quite relevant. of course may be later on you might want to expand it so that they cover as much – although the advantage that you had is that you captured several aspects of the informal sector by interviewing several people. of course then you are going to add other sectors that also subscribe to the informal training program but so far I think it's quite good; quite relevant; the most important thing I think is that the quality is very high and relevant to the area that it was servicing in the module. I think the videos are okay – like you've said later on you might want to go into animations, where you are not able to simulate or use real-time videos; of cause you are going to go into that bit

MC: And to make them feel this is not a Kamau or an Onyango.

Respondent: That is true, you want to detribalize. But of its also important that you show the face of Kenya and that is what you've done. You've cross-sectioned and of course later on you'll make it go to counties because you might have – like you've said you've already examined some counties specific market segments. You might want to expand it and look at North Eastern, Mandera and Wajir and all they are doing. Already you saw the Isiolo Park come up; so might want to go and look what are they doing in other sectors? What the *Jua Kali* systems will require for the emerging markets and you tailor-make it for them.

MC: It's going to be a full time job.

Respondent: Actually this is full time until Vision 2030; this is an interface that will create a system on its own. You're going to create a system of education and training and you have fulltime people running whole and the agency, which picks up will be able to customize it. For example in KICD if we picked this up; then we are saying we want to

use the same to be able to conduct induction and orientation for the programs that we develop in this sector. and if its other agency like NITA the way they have been carrying out their grade test etc. they should now be able to rethink the cost effectiveness of what they have been doing before with the platform that you've developed. And of course it will add a lot of value; they will see the value in using this. Of course it implies then people have to be trained; facilitators have to be trained to do this.

MC: And the ICT is also saying with them training core people in the *Jua Kali*

Respondent: That is it; you will have a casket system of training. so I think the interface is highly innovative and creative and it is anchored very well on what policy documents strategize to achieve if you go into education and training; if you go into the interpretation of the acts of parliaments that we have at the moment; if you go into the County Government Act and start interpreting it in terms of subsidiary education it ends up in education and training and even other models; you can remodel this for even revenue collection; property management or asset management; it can be customized although it is still intended for education and training. So when you look at these Acts that we have at the moment, you look at assessment – Kenya National Exams Act; you go into TSC Act – teacher management; this is the interface that they require to ensure that you don't put teachers out of school. You still train them on a similar platform in terms of their capacities; so each agency can be able to customize this to reflect their requirements.

MC: Thank you very much unless you have another comment I would like to stop there.

Respondent: Thanks. There's still a lot I am trying to understand; the concept is very wide and I can still add value after the interview if I feel there are other things I can comment on especially on design. I can do something on the interface whether there is need to further or rethink improvement and this is possible. But so far I think within the limit of what you are doing I am sure you should be winding it up and people should pick it up; they should pay you a lot of money to pick it up and you coordinate because it is your concept which can be grown into very many things.

MC: in fact I teach at – with professor Ogolla; so the university is thinking of opening a center where we can house it and deal with KICD, NITA – all those areas but house it at the university

Respondent: He should be able to do that; he is the chairman of TVETA and he is also my friend and I am sure he is going to support you because this can help streamline even the TVET sector. You need these kinds of interfaces to rethink – there's a lot; so many things to be filled.

MC: Whenever I think – he calls me, where have you reached? Thank you Mr. Ogenga.

For the rest of the transcriptions see Appendix B (IV)

Appendix 37: Codes of Qualitative Data from Government Officials

QUALITATIVE ANALYSIS Respondent – DIRECTOR NITA

MC: So I'd probably ask questions that you've not answered unless you want to add something on them mainly about the intervention now that we've been able to look through it – so I'll just jump to number 7 because all the rest we had already mentioned. Respondent what's your opinion about this intervention that I've just shared with you? GITAKA: I would say it's an important intervention for this country and I would recommend that you go ahead with the program.	**DDTI IMPORTANCE** I would say it's an **important intervention** for this country and I would recommend that you go ahead with the program.
MC: Why do you think it's important for this country? Respondent: It will assist the *Jua Kali* artisans to market their products, improve production and manage their resources in reasonable ways than they are doing at the moment.	**DDTI IMPORTANCE** It will assist the *Jua Kali* artisans to **market their products, improve production and manage their resources in reasonable ways than they are doing at the moment**.
MC: Do you think this intervention would enhance the implementation of your policies that have been developed for the sector on the NITA perspective? GRespondent: Yes, since we are in the industrial training in this country this will improve the quality of the skills in this sector and thus it will be good for the country.	**Enhance NITA policies** Yes, since we are in the industrial training in this country **this will improve the quality of the skills in this sector and thus it will be good for the country**.
MC: How do you think this will enhance your achievement of Vision 2030 as NITA?	**Enhance Achievement of Vision 2030** Since this will improve knowledge and skills of

Respondent: Since this will improve knowledge and skills of those in the *Jua Kali* sector; it will improve productivity and make us earn as a country more foreign currency for the good of this country.	those in the *Jua Kali* sector; **it will improve productivity and make us earn as a country more foreign currency for the good of this country**.
MC: What is your opinion on the overall content that we've just shared of this intervention? Respondent: I would say it is good and a lot of work has gone into it; so may be with just minor refinements – the program is a good one.	**DDTI Content** I would say it is **good** and a lot of work has gone into it; so may be **with just minor refinements** – the program is a good one.
MC: What kind of refinement do you propose I make on it Respondent: I think may be more research on may be accessibility of finances and may be some form of encouragement on the issue of training; those are aspects that are key in this *Jua Kali* sector.	**DDTI REFINEMENT RECOMMENDATIONS** I think may be **more research on** may be **accessibility of finances and may be some form of encouragement on the issue of training**; those are aspects that are key in this *Jua Kali* sector.
MC: What I am hoping to do later is to have – like when you go to the homepage you have English and Kiswahili, Russian – because I realized they are very fluent in Kiswahili more than English and may be later on we can go down to the 42 vernacular so that none of the artisans is disadvantaged but that will now be later on if it is a relevant intervention. RespondentA: It will be good for the country especially the Kiswahili is understood by many of the communities in Kenya than even English. So you will be able to access many artisans as far as that language is concerned.	**DDTI REFINEMENT RECOMMENDATIONS – LANGUAGE** It will be good for the country especially the Kiswahili is understood by many of the communities in Kenya than even English. So you will **be able to access many artisans as far as that language is concerned**.
MC: I am also hoping that later on I will be able to tailor make like if it is for wood work; if it's	**DDTI DESIGN MODULE CONTENT – RECOMMENDATIONS**

for metal work, if it's for pottery so that you can access the information; and even I can animate the process for them to be able to see it visually even more than reading it. And I could also put links for them where they could be able to get links to other – what other people have done in other places; so that those who are very keen will be able to actually interact with it in able to improve their processes; if it is management, production or marketing. So that would be later on once it has been approved. Now about each of the module what is your opinion about the design module; the content in the design one specifically. Respondent: I would recommend that may be you can liaise with experts may be in curriculum development when you are finalizing the same but they should be modules that are really understandable by the *Jua Kali* sector; it should a program that is really understandable, which they can be able to digest easily.	**I would recommend that may be you can liaise with experts may be in curriculum development when you are finalizing the same but they should be modules that are really understandable by the Jua kali sector; it should a program that is really understandable, which they can be able to digest easily.**
MC: Will that apply to the other three modules? Respondent: I would recommend the same for the three modules, so lest not come up with programs, which will be very difficult for them to understand. you can even be done in levels; it can be production may be in level one – you target a certain level of people may be with some kind of understanding; after that may be you can have level two and level three.	**DDTI MODULES CONTENT – RECOMMENDATIONS** **I would recommend the same for the three modules, so lest not come up with programs, which will be very difficult for them to understand. You can even be done in levels; it can be production may be in level one – you target a certain level of people may be with some kind of understanding; after that may be you can have level two and level three.**
MC: Do you think this will be able to feed into; I	**DDTI SUITABILITY FOR NITA TRADE TESTING**

know you are doing trade testing and all that and you are also training here; do you think this can be a bridge that you can use to train artisans in preparation for something like trade testing? Respondent: Yes, it will important for us who conduct trade testing and we even hope to involve the industry more as we are carrying out these testing. So that those who are in the industry can assist us in even assessing their products; the quality so that we can also test – or we can release in the industry qualified graduates, people who can really make products that are good for industry.	Yes, it will important for us who conduct trade testing and we even hope to involve the industry more as we are carrying out these testing. So that those who are in the industry can assist us in even assessing their products; the quality so that we can also test – or we can release in the industry qualified graduates, people who can really make products that are good for industry.
MC: Do you think we can use this intervention to be able to train the artisans to enter the mainstream TVET training? Respondent: What currently we are suffering as a country is the lack of National Qualification Framework but since the ministry of education is trying to come up with the framework; these graduates of this sector can enter the mainstream and even go to higher levels when we have the qualification framework, since we can say that if you have this and this what do you require to go to the next level. That way we can even make them move to the higher levels as far as the TVET program is concerned.	**DDTI AS AN ENTRY POINT TO MAINSTREAM TVET TRAINING** what currently we are suffering as a country is the lack of National Qualification Framework but since the ministry of education is trying to come up with the framework; these graduates of this sector can enter the mainstream and even go to higher levels when we have the qualification framework, since we can say that if you have this and this what do you require to go to the next level. That way we can even make them move to the higher levels as far as the TVET program is concerned.
MC: What's your opinion about the videos that we have just looked at? Respondent: I would say they are good; maybe we should have more from – I have seen woodwork and welding; maybe you can do may	**DDTI VIDEOS** I would say they are **good**; **maybe we should have more from** – I have seen woodwork and welding; maybe you can do may be whether we have **other areas** – and I think pottery.

be whether we have other areas – and I think pottery. Those are your areas that may be, you can look at other areas – are there others – may be electrical or motor vehicle mechanics; a cross-section of those in the *Jua Kali* I think it will be good.	Those are your areas that may be, **you can look at other areas** – are there others – **may be electrical or motor vehicle mechanics; a cross-section of those in the Jua kali** I think it will be good.
MC: Why I chose this is because from the product design perspective these are the most popular; but I have another documentary for a half an hour that I was shooting as I was going around the country; that covers all those motor vehicle, handicraft, all those areas. But I was picking this particular four just as a sample so that in case it is accepted and it is relevant we can actually have one for each of these areas you are talking about; so that we tailor-make for each of the areas; if it is motor vehicle, panel beating – we have an entire course; if it is making chairs – an entire course; if it is making tables – an entire course. So it's going to be a process of now developing content for each of the different areas Respondent: That will be good for the country	
MC: What about the overall look of the website, right from my logo here Respondent: Since I've just seen it now I would say it is good but may be given time one would go through may be the nitty-gritty; but overall it good – but given time to assess it may be one would come up with comment but not right now.	**DDTI OVERALL LOOK** Since I've just seen it now I would say it is good but may be given time one would go through may be the nitty-gritty; but overall it good – but given time to assess it may be one would come up with comment but not right now.
MC: Now overall in the short time we've looked	**RELEVANCE OF THE RESEARCH**

at it what is your opinion about this research that I am doing and it's relevance and how far do you think it can take us? Respondent: As I said at the start it will be good for the country that you precede with the same, since the improvement of the quality of these products you bring more income not only to the artisans but even the country at large when we export some of these products.	As I said at the start **it will be good for the country that you precede with the same, since the improvement of the quality of these products you bring more income not only to the artisans but even the country at large when we export some of these products.**
MC: Thank you very much for your time. Respondent: Thank you too for carrying this important task. MC: I am hoping when I finish we can now come back and work on it; put in all the content and develop it to the point of each particular artisan can get relevant information Respondent: When you are through come and share with us; with senior managers of NITA so that we can see how we can integrate it in our training programmes. MC: Okay, I'll do that. Thank you very much.	

(FOR THE REST FIND IN APPENDIX B)

Appendix 38: Themes Generated from Qualitative Data from Government Officials

QUALITATIVE ANALYSIS GOVERNMENT OFFICIAL INTERVIEWS CONSOLIDATED RESPONSES

SECTION A

1. Could you tell me your general views on the *Jua Kali* artisans? Do you consider them as a problem or a resource?

Respondent **(JGO 1):** The *Jua Kali* is an important resource because they make utility products that serve their purpose to the local market, which may not be able to afford fancy products. They however, could become a problem if they are not helped to join the mainstream industrial production.

Respondent **(JGO 2):** The *Jua Kali* are a resource in the sense that as the country prepares to transit into a middle-income economy; the sector is heavily relied upon to drive this industrial transition. The sector also plays a crucial role in terms of creating employment and therefore absorbing the unemployed. The sector's mismanagement makes it come across as a problem but it is actually more of a resource than a problem.

Respondent **(JGO 4) :** The *Jua Kali* are a major resource for the economy: they create jobs and make products for the local market. Their contribution to the economy is captured in the Vision 2030 blue print where the government has projects that are aimed at creating an enabling environment for them to make and finish products to the international standards.

Respondent**TDC (JGO 5):** The *Jua Kali* are a resource, largely because of their contribution in reducing unemployment. Their products satisfy the unique needs of their target market. However, their working conditions need to be improved to ensure that they can make quality and competitive goods; that adequately satisfy the needs of their customers.

Respondent **– VISION 2030 (JGO 3):** The *Jua Kali* are a resource since it is a sector that many Kenyans depend on and it also contributed to the mainstream economic growth for the country; due to this the sector needs to be inculcated into the mainstream economy.

Respondent**:** The *Jua Kali* are a resource that needs to be harnessed; if not they can become a security threat and therefore, a problem.

2. What are the existing government policies for the *Jua Kali* sector in Kenya now and in the next five years?

   How do they relate to the Kenya Vision 2030?

Respondent **(JGO 1):** The support that the government extends to the *Jua Kali* sector is informed by the fact that the sector is grow from micro to middle-level since many people are joining the sector.

Through TVET Act the government has introduced the policy of competency-based education and training with the aim of training the *Jua Kali* in practical skills. This competency-based education is not purely academic; the artisans will simply gain skills and knowledge that they require to perform tasks. With proper implementation of this policy the *Jua Kali* will grow their skills and be able to make better products for their customers.

Respondent **(JGO 2):** The Kenya Vision 2030 is the key development blue print that is composed of three pillars. To be able to achieve this vision then a couple of flagship program need to be realized in the context of enhancing the capacities required. It is also imperative that the government continues supporting industries and ensuring that the human capital is well developed to the requirements of the pillars. The Sessional Paper No. 14 of 2012 advocates for the reformation of education and training in Kenya; putting emphasis on the technical and vocational education and training. This is where the *Jua Kali* sector fits in in terms of building capacities given that the sector has a great impact on the formal economy in the country.

The government is therefore trying to ensure that all key policies facilitate the preparation for the country's economy in terms of the Medium Term Plan II, which covers the next five years. Most of the policies in place support the education and training in the *Jua Kali* sector.

Respondent **(JGO 7) 125:** We have the Technical Vocation and Training Authority; whose functions include providing a structured training for the formal and informal sector. The authority has got a plan to see that the *Jua Kali* are trained formally and that they have certification for that based on competence-based training. This comes

from the recognition of the fact that the economy needs people that are hands-on for it to grow to greater heights.

Therefore, our key objective is to roll out many vocational centers across the country in almost all the constituencies and technical training institutes in all counties. This will open up training opportunities through Kenya Universal Central Placement System (KUCPS) since not everybody can go to public universities but they can join TVET institutions; the government is therefore providing an alternative mode of training that impart hands-on skills to artisans in the informal sector.

Respondent**:** The Directorate of Technical and Vocational Education and Training is responsible for post basic education training. The government is implementing reforms in this sector, which are in accordance to the Session Paper No. 14 on Reforming Education and Training Sector in Kenya, which contains the three important components of those reforms. One component is the diversify curriculum modes of delivery; then the second is a major paradigm shift in curriculum development where we are moving away from subject-based time-bound courses to flexible competency based education and training that gives a learner an opportunity to choose what they want rather than institutions dictating to the learner what they have to offer and in this regard then we have diversified programs and courses will be designed in this flexible manner where we shall have modules. We therefore will no longer talk about curriculum and courses but rather about training packages; these training packages would be based on occupational standards that we would be developing together with regulators in industry for every sector.

So, through that process we should be able to have a system that provides for multi-skilling at the pace and progress level of the learner according to what they need and therefore that is the system we want to develop. The TIVET policies direct that all our programs should emphasis Seince, Engineering and Technology, which is really in the foundation to the Vision 2030.

Respondent **(JGO 4):** The MSE authority has been formed with the specific aim of promoting the *Jua Kali* sector. The Vision 2030 has facilitated the creation of MSE park; with the aim of improving the standards of the artisans' working conditions through creating 5 SME parks across the country. There is already one in Taita Taveta created in conjuction with JKUAT university; and another one at Eldoret created in

collaboration with Egertorn University. In these parks, all the necessary utilities provided; water, electricity, security, roads – the thing will be good for them to operate; not the way they operate at Kamukunji or Shauri Moyo but we want to create an environment and change the mentality that *Jua Kali* is for people that have failed in life. Once we put the SME Parks we will be also able to find buyers; we want to ensure that we create that environment where customers can feel safe to come and buy.

In our policy today we are building a TIVET that is seamless, and all-inclusive; we do not regard informal, formal, and/or non-formal education. So it doesn't matter whether you access training through other job trainings or you access through university or you are just attached to an experienced as apprentice or an intern. What counts is the right of every body including those who are illiterate or literate to acquire skills and possibly earn a living.

Respondent**:** The Vision 2030 is a catalyst for the manufacturing sector; aimed at revolutionizing and modernizing the MSE sector through building capacity for mass production in terms of innovation, design, product development and standardization.

Respondent**:** As NITA we come in to certify the skills of the artisans in their areas of interest.

Respondent**:** The TVETA is mandated to provide structured training for formal and informal sector; where informal sector we address the *Jua Kali*: we have plans of seeing that they are formally trained to have certifications because we have recognized and appreciated the fact that we need people who are hands on to propel this country to greater heights. So our interest is to make sure that we reorganize the *Jua Kali* sector; each one of them to specialize in a given trade; be certified, be trained properly under the Competence Based Training, which is something we are trying to introduce in this country.

TVETA intends to roll out and introduce as many vocational training centers in almost all constituencies in this country; technical training institutes in every county; national polytechnic in almost every region; technical training teachers colleges. This will enable TVETA to open up avenues for training opportunities through the Kenya University Central Placement System (KUCPS). In this way the government will be

offering an alternative mode of training, which will be able to arm you with hands-on skills

Respondent **TDC (JGO 5):** Currently KEPSA and the World Bank are partnering in an internship programs that are geared towards enabling artisans to set up *Jua Kali* businesses. The jubilee government also has the way of tackling youth unemployment, its targeting the *Jua Kali* sector to be able to give them skills and also be able to create employment for them. There has been an emphasis on vocational training as a way of ensuring the youth are given necessary skills that can be able to enable them work and gainfully employed. This is also in line with vision 2030 because as we grow as a nation, we require artisans, they are very critical but my only contention will be the quality and may the creativity that is involved.

TRAINING/MARKETING – POLICIES: In terms of marketing there are various shows such as the EA Exhibition, *Jua Kali* Exhibition where EA countries join together and exhibit product that are produced in their member country.

Respondent **– VISION 2030 (JGO 3):** GOVERNMENT POLICIES – EDUCATION/SOCIAL PILLAR

There is an overhaul on the curriculum that is factored in the second medium term plan of the Vision 2030. The review is to focus on incorporation of talent development, arts and culture in the schooling system. This will bring about a scenario whereby by the time children are in their 12 years of schooling they can take certain tracks where they feel they are more endowed to work. This will enable a paradigm shift where parents will be guided to support their children who aren't necessarily academically endowed.

The TVETA is also a new authority that has been set up by the government to provide vocational training to young people.

3. Could you please share with me are the existing government strategies for the *Jua Kali* sector in Kenya currently and in the next five years?
   How are they in line with Kenya Vision 2030?

Respondent **(JGO 1):** The Vision 2030 is all about transforming the country into a middle-income country. It is about providing the citizens with a better life, safe environment and producing internationally competitive products. This will need that all people, literate and semi-literate embrace technology in the making of their products rather

than doing it manually as is normally the case in the *Jua Kali* sector. The adoption of technology will make the artisans understand that what they normally consider as waste could actually be things that can be make another product; therefore, you find that there is more efficient utilization of limited resources. The *Jua Kali* sector is currently associated with quite substantial pollution and this could be considerably reduced.

Respondent **TVETA:** The Kenya Vision 2030 aims at industrializing the country by the year 2030. Engineering recommends that for every engineer there should be 3 technologists; 12 technicians and 60 artisans. Kenya is far from achieving this ratio. There is therefore need for deliberate efforts to be done to train these artisans, technicians and technologists. And this is part of what my authority (TVETA) is looking at seriously at his moment.

Respondent**:** We have establishing the TIVET curriculum development assessment and certificaton council which will be a body dedicated to TIVET and will be combining the work of KICD an KNEC but for TIVET. Currently, TIVET is a separate sector from KNEC. So what KNEC and KICD is to basic education, is what this TCDAK will be to TIVET as a sector but it will be one entity. This body should be the one to guide properly and to structure the way competency based education training curriculum will be done. It is not in place yet but we are in the process of setting it up.

4. What CHALLENGES if any are you experiencing in achieving the above named strategies and policies?

   If none, please tell me about a few of your main achievements.

Respondent **(JGO 1):** One challenge is attitudinal: there are artisans who have been in the sector for a long while and resist any change on how they have been conducting business. There is also the dependence syndrome amongst the artisans: the artisans believe that it is the duty of the government to fund them and provide them with shades. This attitudinal challenge needs to be addressed.

The *Jua Kali* sector also suffers from low-literacy levels. The sector is shunned by college and university graduates, who are the people that can help in improving the sector; yet these are the people that can join the sector and take advantage of the opportunities that the sector provides.

CAPACITY BUILDING – CHALLENGE: The challenge of capacity building in *Jua Kali* is caused by the apprenticeship, through which artisans gain entry into the sector. This apprenticeship transmits poor design and product development practices to the new entrants. The government could help counter this trend by urging the *Jua Kali* to be innovative and come up with new designs.

FUNDING – RESOURCES: The government has done a lot in terms of providing funds to the *Jua Kali* sector; it has however done little in terms of structuring the process of making *Jua Kali* self-supportive.

Respondent**:** The legal framework poses a challenge for policy implementers in terms of realizing the existing strategies and policies, in terms of the institution s that should drive the agenda forward. The situtation has improved because there are institutions that have been established to particularly carry out certain mandates. Due to this youth centers have been developed up to the constituency level. Youth polytechnics have also been devolved to the county level. The challenge is the inadequacy of trainers in these training institutions; there is insuffiecny of expert trainers to do the job. We have lesss than 200 instructors for all youth polytechnics and they about 1000 touth polytechnics so you can see its an average of 2:1, that is hardly something you can write home about it is very unsustainable. There is also the challenge in skills development in the sense that the outputs from institutions is increasing but the industry base is kind of stagnated. This calls for employement creation in the *Jua Kali* sector.

Respondent **(JGO 2):** The informal sector is fairly wide to the extent that if it has not been properly documented. This is happening at the backdrop of plans to standardize training in Kenya and particularly the informal sector and the Kenya Qualification Framework Bill that is being discussed in parliament, which is informed by the input of the Kenya Qualifications Authority and give much prominence to in terms of the competencies that the country requires at various levels to be able to drive the economy. Lack of documentation of the sector is therefore a challenge especially because there is no properly or current qualified national database of skills; there are also issues of proper competence standards in the country, which have not been properly resourced and also we are looking at facilitation.

RESOURCES – CHALLENGES: There is a strain in resources especially in carrying out the training to the informal sector and also buying equipment and tools.

LEGAL ENVIRONMENT – CHALLENGES: The legal environment is undergoing development to be able to ensure that things such as intellectual property rights are properly facilitated. The challenge is therefore ongoing: proper structures for training, equipment backup, legal ecosystem that will be able to support the informal sector in Kenya.

Respondent **(JGO 7):** The artisans do not have certification for their skills. There are a number of Kenyans are skilled; we have masons, electricians, mechanics, welders; but they just do it outside there without due care to make sure that they have certification and therefore go unrecognized by the government that could hire their services. The government needs to know their numbers and skills for the purpose of planning.

Respondent **(JGO 4):** The challenge *Jua Kali* artisans have is in terms of location: they operate in crowded location, as they cannot afford to buy land and relocate to spacious, safe locations. But in this crowded locations; they have walk-in customers whom they would lose if they are relocated to safer, spacious locations.

Funding is also a challenge but not that much; once we get land, I think, because this is an enterprise it's going to generate money, so there's a business case for that, so we're able to move forward with that and the investment isn't that huge compared to other projects that we have in the country.

Market access is another challenge, especially the international market. For instance the artisans at Kamukunji sell their wheelbarrows to South Africa, Rwanda, Burundi and South Sudan but they don't make huge profits because they sell through brokers (middle-men).

The production of *Jua Kali* products is also poor especially because their finishing is not up to standard. The middlemen buy the products and they go do finishing in other countries where there's the advanced technology to give it a superior finish; they then label it and sell the product. This way products from Kamukunji end up getting branded as coming from foreign manufacturers.

The sector also has a problem in terms of design: there is a lot of copying of design ideas from one another. However, the artisans are quite creative; with an oral brief from

the customer they can make any product. They however cannot protect their product idea and they need help in those areas.

The management of *Jua Kali* enterprises is extremely poor; the artisans claim that they have financial difficulties and that they are not making profits yet they don't keep records of their transactions, which can give the funding institutions a premise to intervene. Their businesses are family-based and therefore do not grow into big companies.

Respondent**:** The system of education in the country is the greatest challenge, whose negative consequences trickle down to the informal sector. The system doesn't pay attention to the creative industry. The system doesn't emphasize on providing hands-on knowledge; the system rather focuses on theory and churning out manpower for white colour job market.

Respondent**:** The artisans have skills that are not certified. There should be a legal framework to compel artisans to come through NITA to have a certificate; irrespective of their level of competence; just the way one cannot be a driver if they do not undergo testing. Though the number of artisans coming to NITA for testing has increased; all sectors need to ensure that before any artisan practices their craft they go through NITA and have a certificate.

Respondent**:** The artisans should be certified by the government so that their numbers can be known and this will help the government in terms of planning. Currently there are skilled artisans working as masons, electricians, mechanics and welders yet they are not certified. In answer to this TVETA is developing competence based education training, which will enable the artisans to acquire their skills and join the formal sector of the economy. TVETA seeks to appreciate those skills in terms of credit transfer and use them to shorten the duration for training.

Respondent **ICT (JGO 6):** Attitude is one of the major challenge: on element of attitude come in the form copying of design ideas – the "me-too" mentality has made the sector to get saturated with the same kind of products, which do not have any specific markets; neither do the artisans themselves understand their reasons for making the jikos.

The other attitudinal problem comes in the form of the mentality that the blue collar jobs found in the *Jua Kali* sector cannot be undertaken by the educated, who instead opt

for the white collar jobs. The sector has therefore been abandoned in the hands of the semi-literate and doesn't attract the type of entrepreneurs that can take a cottage business into a large enterprise.

CAPACITY BUILDING: The *Jua Kali* artisans do not scale up their skills; they therefore risk working under graduate engineers when they eventually enter into the formal sector. They need to get empowered to scale up the value chain or risk remaining just a pair of hands.

INNOVATION: The informal sector doesn't just lack innovation; it also fails to conduct a market assessment of the needs of the customers. This is the big contributor of the "me-too" attitude that has resulted in replication of product designs. The artisans have also not explored on the concept of product differentiation, especially when it comes to utility products such as a jiko, a ladle, a chapatti karayi. The users have also not been demanding any innovation. This has created a balance of apathy where the producer doesn't think further than the normal while the consumer is contented with what they get.

FINISHING: The *Jua Kali* artisans lack standardization and this is reflected in the finish of their products. The product you buy from one artisan one day could be of different dimension and even quality the next day. This lack of standardization could be because their models are of poor quality and inconsistent.

BUSINESS ETHICS: The *Jua Kali* artisan lack business ethics; they often do not deliver their orders as agreed upon with the client; this is largely because they take up many orders than they can accomplish in time and end up inconveniencing their customers.

Respondent - **TDC:** There is a lack of trainers in specific fields that are critical for the development of the informal sector. TDC had managed to acquire new equipment, which require competent trainers that can work on those equipment. There also weak linkages between the *Jua Kali* sector and the training institution to the extent that the artisans are not willing to participate in TDC training programmes.

Respondent **– VISION 2030 (JGO 3):** The challenge with the sector is attitudinal where people who join it are perceived as being failures as they didn't make to join tertiary education.

The *Jua Kali* businesses have also been socially excluded; they don't have proper business certificates; they are outside the tax bracket and are subject to constant government harassment.

5. What is your view in terms of achieving the aims for the *Jua Kali* sector as expressed in Kenya Vision 2030?

Respondent **(JGO 7) :** We need to generate about 3 million trade before we reach 2030 for us to be anywhere close to industrializing. This means that all the artisans should be reached and helped so that they can produce globally competitive products with good aesthetics and finish. This will achieved through interacting with the *Jua Kali* artisans on the academic front in the technical training institutes and technical universities. That's why the government is coming up with TTIs and TVTs centers in all constituencies so that artisans will not need to travel far to acquire or upgrade their skills. With this set up it is expected that the artisans will be able to learn design, identification of markets, improve production processes in terms of colouring, finishing etc. They will therefore stop gambling with their production through identifying their market and making relevant, targeted products. They will also be helped to adopt relevant technology and work in a structured way so that they can make their environment clean and safe for themselves.

6. Are there enough resources currently allocated to support the *Jua Kali* artisans in Kenya? If no, what is the government planning to do to provide appropriate resources to the *Jua Kali* artisans?

Respondent **(JGO 1):** The government is doing enough to provide funds for developing the *Jua Kali* sector and doing little in terms of structuring the sector so that it can be self-supportive.

Respondent- **TDC (JGO 5):** The government has not allocated enough resources to the sector and this has resulted into the current cycle of underdevelopment. If well funded the *Jua Kali* should have grown just like with other developing countries around the world.

Respondent **– VISION 2030 (JGO 3):** There are sufficient resources for the sector. The government is funding a review of the curriculum; they will also provide funds to implement it. We need to create a financial model that will support that; this

depends on different stakeholders to try to come up with this and what I know is once the curriculum is reviewed and there is funding implication for its implementations there are different players that come into it; for example the TVETA will be one source; private sector is a major source.

There are already funding for vocational training in various institutions and as well as the universities; and as well as the industry because if we don't make the link which is actually a major thing for the social pillar; making the link between industry and the education system then it won't work because industry have for many years complained that they always have to retrain graduates; so I think this will be a major motivation for private sector to provide some funding; some resource towards developing these specific skills that they are interested in.

(CONTINUED IN APPENDIX B)