RELATIONSHIP BETWEEN DYNAMIC CAPABILITIES AND COMPETITIVE ADVANTAGE OF TECHNICAL, VOCATIONAL AND ENTREPRENEURSHIP TRAINING INSTITUTIONS IN KENYA

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Relationship between dynamic capabilities and competitive advantage of Technical, Vocational and Entrepreneurship Training Institutions in Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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DEDICATION

This work is dedicated to my loving wife Lillian and daughter Tiffany, who bore the effort and time I put into this work. May God bless you

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LIST OF ABBREVIATIONS AND ACRONYMS

CA- Competitive Advantage

DC- Dynamic Capability

DCP- Dynamic Capability Perspective

ICT- Information Communication Technology

IS- Information Systems

IT- Information Technology

ITs- Institutes of Technology

KM- Knowledge Management

KMC- Knowledge Management Capability

MoE- Ministry of Education

NACOSTI National Commission for Science, Technology and Innovation

RBV- Resource Based View

RoK- Republic of Kenya

ROR- Rate of Return

SCA- Sustained Competitive Advantage

SEM- Structural Equation Modelling

TTI- Technical Training Institutes

TVET- Technical, Vocational and Entrepreneurship Training

UNDP- United Nations Development Programme

UNESCO- United Nations Educational, Scientific and Cultural Organization

UNEVOC- International Project on Technical and Vocational Education

VRIN- Valuable, Rare, Inimitable, and Non-substitutable

OPERATIONAL DEFINITION OF TERMS

Competitive Advantage:	The objective of organisational strategies (Porter, 1985) which is measured in many dimensions such as innovativeness, market position, mass customisation, and difficulty in duplication (Byrd & Turner, 2001).
Curriculum capabilities:	The ability to develop and revise the TVET curriculum to adapt to changing industry requirements (Kearns, 2001).
Dynamic capabilities:	The capacity to renew competencies so as to achieve congruence with the changing business environment" by "adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competencies" (Teece, Pisano & Shuen, 1997).
ICT Capabilities:	The ability to utilize IT to enable firms to adapt faster to changes in the external environment (Fink & Neumann, 2007).
Knowledge Management:	Management's thorough efforts to use tools and approaches to locate, refine, transfer, and apply the knowledge and experience available to the organization, (Jennex & Olfman, 2006)
Knowledge Management Capabilities:	Organizational capability which creates, recombines, and use knowledge –based

	resources to create value in the firm (Nielsen, 2006).
Physical Infrastructural capabilities:	The ability to build, maintain and reorganize use of physical facilities within the TVET Institutions to adapt to changes in the environment (Rigsby & Greco, 2005).
Sustained Competitive Advantage:	The ability of firms to maintain a superior position in their industry for a long period of time (Porter, 1985)
TVET's Macro Environment:	comprises all those factors that are outside or external to an organization's boundary and directly or indirectly affects the operations of the organization and its managers' actions (Porter, 1985)
Western Kenya Region:	The geographical coverage in Kenya that comprises the 10 counties of Kisii, Nyamira, Migori, Homa-Bay, Kisumu, Siaya, Vihiga, Kakamega, Busia and Bungoma county, (RoK, 2010).

ABSTRACT

To develop Kenya's social and economic advancement, skill training is intended to play two critical roles: one, offer training prospects and occupation growth for school graduates; and two, provide experienced labour for all levels of the country's economy, and Technical, Vocational and Entrepreneurial Training (TVET) holds the key to building this type of technical and entrepreneurial workforce. This study sought to establish the relationship between dynamic capabilities and competitive advantage of TVET Institutions in Kenya. Specifically, the study sought to: determine relationship between Knowledge Management (KM) capabilities and competitive advantage of TVET Institutions; establish relationship between Information Communication Technology capabilities and competitive advantage of TVET Institutions; asses relationship between Physical Infrastructural capabilities and competitive advantage of TVET Institutions; and establish relationship between curriculum capabilities and competitive advantage of the TVET Institutions in western Kenya region. The study adopted a descriptive survey design. The target population included the principals and heads of sections and/or departments of the TVET Institutions in the western Kenya region owned by the Republic of Kenya. A census of all the Principals and head of sections/ departments was conducted. Primary data was collected by structured questionnaires and interview schedules. Secondary data was collected from institutional documents, Ministry of Education publications and relevant publications in referred journals. The collected data was edited, coded and entered into SPSS software version 21.0 for analysis. Data was analyzed using descriptive and inferential statistics. In particular, Regression Analysis was used to investigate the relationships between hypothesized variables. Analysis of Variance (ANOVA) was also used to investigate whether independent variables had combined effect on the dependent variable. The findings were presented using figures and tables. The study found out that TVET Institutions in Kenya has developed capabilities in the areas of Knowledge management and Curriculum. However, ICT and Physical Infrastructural capabilities are still low and work against their struggle to position themselves in the modern industry-institutional dynamics. The study established a positive relationship between Dynamic Capabilities and Competitive Advantage of the TVET Institutions in Kenya. The study recommends that TVET institutional managers should: understand and develop a holistic approach of

implementing an overall KM capability; develop Knowledge Management Policy that will guide their actions in knowledge management; build ICT infrastructure to support their market and operational competencies; use existing ICT capability to adapt to changes in both institutional framework and the job market; establish modern training facilities including well equipped laboratories, workshops and libraries; transform the large parcels of land that are idle into revenue streams for the institutions through income generating activities; in spite of strong curriculum capability, seek to be involved to a greater extent in the design, review and implementation of TVET curriculum due to their peculiar role as implementers of the Curriculum. Further, it recommends that government should allow each TVET institutions to develop customized curriculum to satisfy the unique training needs in their geographical regions even as they implement national curriculum; and that the Industry or Job market should be the approving body for whatever curriculum TVET Institutions intent to implement in order to bridge the industry skill needs from TVET graduates.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The role of Technical, Vocational and Entrepreneurship Training (TVET) on human resource development and the consequent growth and prosperity of society is an established fact. This is because TVET furnishes skills required to improve productivity, raise income levels and improve access to employment opportunities for people (Kerre, 2009). It does this by playing three major roles: meeting the human power needs of society; raising the employment opportunity of citizens thereby improving their livelihood; and motivating citizens for further education and training. Broadly speaking, therefore, TVET can be defined as education and training activity that is mainly provided to lead participants acquire skills, knowledge and understanding necessary for employment in a particular occupation or group of occupations (UNESCO-UNEVOC, 2004). Therefore, TVET is a part of the education system that makes an individual more employable as well as active participant and relevant in the socio-economic system of a country (UNEVOC, 2010). That is why countries are consistently striving to improve their education system in general and their TVET systems in particular (Kerre, 2009).This section introduces the main concepts of Dynamic Capabilities, Competitive Advantage and Kenyan Technical, Vocational and Entrepreneurship Training (TVET) Institutions.

1.1.1 Dynamic Capabilities

Dynamic capabilities have been defined as "the capacity to renew competencies so as to achieve congruence with the changing business environment" by "adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competencies" (Teece, Pisano & Shuen, 1997). More recently, Helfat *et al*. (2007) have defined a dynamic capability as "the capacity of an organization to purposefully create, extend or modify its resource base".

Dynamic capabilities are built rather than bought in the market (Makadok, 2001). They are organizational processes in the most general sense (Helfat *et al*., 2007) or routines (Zollo & Winter, 2002) which may have become embedded in the firm over time, and are employed to reconfigure the firm's resource base by deleting decaying resources or recombining old resources in new ways (Simon & Hitt, 2003). This means that dynamic capabilities are viewed to be essentially path dependent (Dierickx & Cool, 1989), as they are shaped by the decisions the firm has made throughout its history, and the stock of assets that it holds (Eisenhardt & Martin, 2000; Zollo & Winter, 2002). Path dependency "not only defines what choices are open to the firm today, but also puts bounds around what its internal repertoire is likely to be in the future". Path dependency could be grounded in knowledge, resources familiar to the firm or influenced by the social and collective nature of learning (Teece *et al*., 1997).

This suggests that learning plays a significant role in the creation and development of dynamic capabilities. This is illustrated, for instance, by Eisenhardt and Martin (2000) and Zollo and Winter (2002) who explain that learning is at the base of dynamic capabilities, and guides their evolution. Learning is also considered as a dynamic capability itself, rather than an antecedent of it. As such, learning as a dynamic capability has been identified as "a process by which repetition and experimentation enable tasks to be performed better and quicker" (Teece *et al*., 1997). Zollo and Winter (2002) attempted to meld these two positions by explaining that "dynamic capabilities are shaped by the co-evolution of learning mechanisms".

Helfat and Peteraf (2003) emphasise that to qualify as a dynamic capability, a capability not only needs to change the resource base, but it also needs to be embedded in the firm, and ultimately be repeatable. Those are key issues in the dynamic capability conversation and the research have addressed these criteria in our following theoretical development of the dynamic capability construct.

Dynamic capabilities are argued to comprise of four main processes: reconfiguration, leveraging, learning and integration (Bowman & Ambrosini, 2003 based on Teece *et al*., 1997). Reconfiguration refers to the transformation and recombination of assets and

resources, such as. the consolidation of manufacturing resources that often occurs as a result of an acquisition. Leveraging refers to the replication of a process or system that is operating in one area of a firm into another area, or extending a resource by deploying it into a new domain, for instance applying an existing brand to a new set of products. As a dynamic capability, learning allows tasks to be performed more effectively and efficiently, often as an outcome of experimentation, and permits reflection on failure and success. Finally, integration refers to the ability of the firm to integrate and coordinate its assets and resources, resulting in the emergence of a new resource base.

1.1.2 Competitive Advantage

The question of why some firms have advantages over their competitors and outperform them has been discussed for some time. In fact this debate has continued since the industrial revolution in the 18th century, when large-scale production and group work increasingly displaced traditional craftsmen working in cottages (Viljoen & Dann, 2003). In mid-18th century Scotland, Lord Kames identified entrepreneurship and documented the links between success and financial performance as the country was undergoing a transition from an agrarian society to an industrial society and developing a wealthy merchant class (Harvey, 2004). A major figure at that time, Smith (1937) stated that firms could perform better than others by being more productive or having better craftsmanship. Higher productivity leads to cost advantages and the ability to put more products on the market at lower prices and, therefore, to higher sales. Smith saw differences in output, for example, resulting from greater skills of labour or the invention and utilization of devices as either improving quality or shortening the time of the production process. However, productivity was not always the main goal, as craftsmanship was often required as well, and better craftsmanship enabled firms to achieve higher revenues by charging premium prices.

Competitive advantage is related to the competitive position of an organization within its industry and reflects firms' ability to achieve a performance greater than the average of that industry (Barney, 1991; Porter, 1985a). In the contemporary global environment, the literature about firm performance and competitive advantage becomes increasingly

important owing to the compression of time and distance and with managerial attention focusing more on multiple external and internal factors (Thomas *et al.*, 1999).

Scholars have realised more and more that some forms of competitive advantage are hard to imitate and can therefore lead to long-lasting, superior economic performance (Amit & Schoemaker, 1993; Barney, 1991; Black & Boal, 1994). This insight expanded the concept of competitive advantage from the industrial organisations (IO) as well as the resource-based views in the years leading up to the development of the concept of sustained competitive advantage (SCA). Porter (1985) defines SCA as above average performance in the long run. Hence, SCA includes two components: firstly, the notion of above average performance, as a relational measure within an industry; and, secondly, the notion of durability. Whereas above average performance within an industry can be measured unambiguously as the returns in comparison to the industry average, the notion of durability is not so clear. Wiggins and Ruefli (2005), for example, propose a minimum five-year period to ascertain durability.

In their seminal work "Hyper competition", D'Aveni and Gunther (1994) delineate the dynamics of competition and argue against the concept of persistent competitive advantage. This notion was confirmed by Wiggins and Ruefli (2002, 2005), who researched the persistence of SCA and the persistence of superior economic performance. In their longitudinal study with a sample of 6,772 firms in 40 industries over 25 years, Wiggins and Ruefli (2005) came to three major conclusions. Firstly, some firms do exhibit superior economic performance; secondly, only a very small minority does so; and, finally, the phenomenon very rarely persists for long time frames. These results, while not providing direct support for a particular extant strategic management or economic theory in regards to competitive advantage, have implications for significant aspects of many strategic management and economic theories. They are most consonant with a particular strategic management perspective, known as the resource-based theory of the firm (Wiggins & Ruefli, 2002), which will be investigated in later sections.

In sum, even though the concepts of firm performance, competitive advantage and SCA are often used interchangeably, they are distinct. Firm performance measures the output

of a firm (predominantly in financial terms). Competitive advantage is relational and reflects the superior competitive position of a firm within its industry. SCA builds upon competitive advantage and relates to the ability of firms to maintain a superior position in their industry for a long period of time. SCA is achieved when an achieved competitive advantage cannot be duplicated or imitated by competitors (Wiggins & Ruefli, 2002). Research on competitive advantage and SCA often comprises the major area of research in strategic management (Barney, 1991). It offers the current explanations for heterogeneity in firm performance and is an integral part of strategic management. Therefore, in the literature on strategic management, the terms competitive advantage and SCA are widely used, and have become central issues used to understand and explain causality (Schendel, 1994).

1.1.3 TVET Institutions in Kenya

To develop Kenya's social and economic advancement, skill training is intended to play two critical roles: one, offer training prospects and occupation growth for school graduates; and two, provide experienced labour for all levels of the country's economy (RoK, 2003, 2007, 2008). Due to scarce opportunities in paid employment nationwide, the skills developed are expected to lead to self-sufficiency, poverty alleviation and to advance Kenya's industrialization processes (UNDP, 2010). With the drastic rate of dropout seen in the educational system, the importance the country attaches to TVET is magnified by the number of potential trainees expected to benefit from the program. According to RoK (2005), of approximately 600,000 graduates of Kenya Certificate of Primary Education, only 55 per cent (or 350,000) proceed to secondary schools. At the end of four years of secondary school, only 20,000 of 200,000 graduates of the Kenya Certificate of Secondary Education enter universities. The 250,000 primary school and 180,000 secondary school graduates who do not proceed with regular education are expected to be catered for by the middle-level colleges to which TVET institutions belong.

The term Technical, Vocational, and Entrepreurship Training (TVET) as used in this study follows the 2001 UNESCO International Standard Classification of Education definition, which is education and training to "acquire the practical skills, know-how and understanding necessary for employment in a particular occupation, trade or group of occupations or trades." TVET (Technical, Industrial, Vocational and Entrepreneurship Training) is the Kenyan version of the internationally known TVET (Technical and Vocational Education and Training). It is important to note that TVET is not only about knowing how to do things but also understanding why things are done in a particular way. The conceptual definition of TVET cuts across educational levels (post-primary, secondary, and even tertiary) and sectors (formal or school-based, non-formal or enterprise-based, and informal or traditional apprenticeship).

One of the most important features of TVET is its orientation towards the world of work and the emphasis of the curriculum on the acquisition of employable skills. TVET delivery systems are therefore well placed to train the skilled and entrepreneurial workforce that Africa needs to create wealth and emerge out of poverty. Another important characteristic of TVET is that it can be delivered at different levels of sophistication. This means that TVET can respond, not only to the needs of different types of industries, but also to the different training needs of learners from different socio-economic and academic backgrounds, and prepare them for gainful employment and sustainable livelihoods. A skilled workforce is a basic requirement for driving the engine of industrial and economic growth, and TVET holds the key to building this type of technical and entrepreneurial workforce (Kerre, 2009).

In Kenya and other African countries, the problem of youth unemployment is alarming (Nafukho, 1998); each year, thousands of disillusioned young people enter the ranks of the unemployed (Johnson & Ferej, 1997). Efforts to solve the unemployment problem have included vocationalizing education systems and entrepreneurial skills development programs (Johnson & Ferej, 1997; Psacharopoulos, 1997). However, despite these efforts, unemployment problems remain, and now many African countries have realized that technical training and vocational skills are necessary but not sufficient to alleviate

unemployment problems (Nafukho, 1998; Ziderman, 1997). Kenya provides TVET so that "the trained manpower can enhance and sustain a high level of economic development which would in turn improve the quality of life by raising the standards of living" (Okaka, 1997).

A number of constraints, however, prohibit the effective provision of technical and vocational education training. Among these are: limited school budgets for up-to-date tools and equipment; infrequent repair of the old equipment for the laboratories; high costs of practical training materials and equipment (Farstad, 2002); and lack of qualified instructors (Koech, 1999). Another constraint is the development of curriculum for TVET, which is often considered too slow to keep pace with the changes in technology (Kerre, 2009; United Nations Educational, Scientific and Cultural Organization [UNESCO]—International Project on Technical and Vocational Education [UNEVOC], 2010).

Other common problems with TVET in developing countries, according to UNESCO-UNEVOC (1998), include: relevance, access, and quality of programs; lack of a national training strategy; lack of national policies to guide the development and implementation of TVET; and the use of foreign syllabuses. The lack of, or sophistication of, training equipment compared to the facilities in the workplace, is another problem for skill-based programs (UNESCO-UNEVOC, 2010). These problems are critical in developing countries where resources are scarce (Okaka, 1997), equipment often outdated, and funding inadequate. As a result, TVET programs are likely to produce graduates without relevant skills for the industry, limiting their employability. This will defeat the goal of industrialization of economies through technical and vocational education and training.

TVET programmes in Kenya are mainly offered in: Institutes of Technology (ITs), formerly institutions constructed through community efforts; Technical Training Institutes (TTIs), which have replaced former technical secondary schools established in the 1960s after the independence; Youth Polytechnics and Village Polytechnics catering for mostly primary school leavers; and National Polytechnics There are seventeen (17) ITs and twenty one (21) TTIs, which offer diploma and certificate courses. TVET

programmes are also offered by other institutions spread across government ministries as well as over 1 000 private institutions, that offer courses in computers and non-technical areas of training (Kerre, 2009).

1.2 Statement of the problem

The demand for a workforce that is multiskilled and capable of learning new skills more rapidly has changed the traditional purpose of vocational education (Kerre, 2009). The Republic of Kenya (RoK) policy states that the main objective of TVET is "the provision, promotion and co-ordination of lifelong education, training and research for Kenya's sustainable development" (RoK, 2003). Four specific objectives are derived from the main objective: to provide increased training opportunities for school leavers that enable them to be self-supporting; to develop practical skills and attitudes, which lead to income-generating activities in urban or rural areas through salaried or self-employment; to provide technical knowledge and vocational skills necessary for the growth of agriculture, industry and commerce; and to produce people who can apply scientific knowledge to the solution of environmental problems (RoK, 2003). Despite such elaborate and sound policies, implementation has been inadequate and often uncoordinated, leading to unrealized objectives (RoK, 2007). A number of constraints continue to prohibit the effective provision of technical and vocational education training in Kenya. Among these are: limited institutional budgets for up-to date equipments; lack of qualified instructors; development of curriculum for TVET; relevance; access; quality of programs; lack of a national training strategy; lack of training equipments compared to the facilities in the workplace, (Farstad, 2002; Nyerere, 2009; MoE, 2008; Kerre, 2009; UNESCO-UNEVOC, 2010). The status of TVET suggests that there is a need to carry out internal survey on the strategic orientation of the Management of these Institutes. This study sought to establish the relationship between dynamic capabilities and competitive advantage of TVET Institutions in western Kenya Region.

1.3 Objectives of study

1.3.1 General Objective

To establish relationship between dynamic capabilities and competitive advantage of Technical, Vocational, and Entrepreneurship Training Institutions in Kenya

1.3.2 Specific Objectives

The study specifically sought:

1. To determine relationship between Knowledge Management capabilities and competitive advantage of TVET Institutions in Kenya.
2. To asses relationship between Information Communication Technology Capabilities and competitive advantage of TVET Institutions in Kenya
3. To establish relationship between Physical Infrastructural Capabilities and competitive advantage of TVET Institutions in Kenya.
4. To determine relationship between Curriculum Capabilities and competitive advantage of TVET Institutions in Kenya.
5. To assess the moderating effect of TVET Institution's Macro Environment on Dynamic Capabilities and Competitive Advantage of TVET Institutions in Kenya.

1.5 Research Hypothesis

The following hypotheses were tested:

1. H_0: No significant relationship exists between Knowledge Management Capabilities and competitive advantage of TVET Institutions in Kenya.

   H_1: There is significant relationship between Knowledge Management Capabilities and competitive advantage of TVET Institutions in Kenya.

2. H_0: There is no significant relationship between ICT Capabilities and competitive advantage of TVET Institutions in Kenya.

   H_1: There is significant relationship between ICT Capabilities and competitive advantage of TVET Institutions in Kenya.

3. H_0: There is no significant relationship between Physical Infrastructural Capabilities and competitive advantage of TVET Institutions in Kenya.

   H_1: There is significant relationship between Physical Infrastructural Capabilities and competitive advantage of TVET Institutions in Kenya.

4. H_0: There is no significant relationship between Curriculum Capabilities and competitive advantage of TVET Institutions in Kenya.

   H_1: There is significant relationship between Curriculum Capabilities and competitive advantage of TVET Institutions in Kenya.

5. H_0: There is no significant effect of TVET Institution's Macro Environment on Dynamic Capabilities and competitive advantage of TVET Institutions in Kenya.

   H_1: There is significant effect of TVET Institution's Macro Environment on Dynamic Capabilities and competitive advantage of TVET Institutions in Kenya.

1.6. Significance of the study

Dynamic capabilities have lent value to the RBV arguments as they transform what is essentially a static view into one that can encompass competitive advantage in a dynamic context (Barney, 2001). Dynamic capabilities are "the capacity of an organization to purposefully create, extend or modify its resource base" (Helfat *et al*., 2007) and over the last few years the concept has received much attention in the form of publications (. Eisenhardt & Martin, 2000; Helfat and Peteraf, 2003; Teece *et al*., 1997; Zollo and Winter, 2002) and conference presentations (Academy of Management meeting 2004-2006; Strategic Management conference 2004-2006). However, as highlighted in the *British Journal of Management* Special Call for Papers on "The Practice of Dynamic Capabilities: Theory

Development and Research" and by Helfat *et al.* (2007) the concept is still in need of theoretical and empirical development. In this thesis we aim to develop the notion conceptually. Specifically we build on the work of Teece *et al.* (1997), Eisenhardt and Martin (2000) and Helfat *et al.* (2007) concerning what constitutes a dynamic capability in a TVET Institution and propose that there are four distinct types of dynamic capabilities for.

The Kenyan government views a strong TVET capacity as an absolute necessity for the nation to participate as a full partner in the world's fast forming, knowledge-based economy. This study is timely as we seek to implement strategies relevant for the attainment of Vision 2030. To the Kenyan government, this study present an independent status report on the dynamic capabilities of her TVET Institutions and suggestions of what to do to improve these capabilities towards competitive advantage. To the Kenyan TVET institutions in general, the study challenges their strategic mindsets in a new realization of what constitutes and sustains competitive advantage. To the specific institutions that were surveyed, the study will help inform their future debates and strategies, particularly leveraging on KM, ICT, Physical Infrastructure and Curriculum capabilities.

1.7. Scope of study

The study sought to establish relationship between dynamic capabilities and competitive advantage of TVET Institutions in Kenya, with a focus on public institutions in western Kenya region. The region is composed of Ten (10) out of the Fourty Seven (47) counties that make up Kenya's new geographical boundaries. This constitute 22% of the entire Kenyan geographical population, a percentage large enough to constitute a statistical population, Mugenda (2003). The four types of dynamic capabilities are: KM Capabilities, ICT Capabilities, Physical Infrastructural Capabilities and Curriculum Capabilities. In order to measure competitive advantage, the study focused on indicators of relevance to the labour market in terms of skills and knowledge; access to training with respect to admission criteria and funding for the system; and quality in terms of standardization, inclusion of soft skills and quality of delivery. The study considered the moderating variable of TVET's Macro Environment. Factors considered under the macro

environment are Government policy on TVET: legislation and by-laws, National Economic Growth: per capita income and disposable income, Other Institutions of higher learning: admission requirements in terms of cut-off grades and fees charged, and Existing partnerships between TVET Institutions and the private sector: objectives and benefits. The survey was done in the context of Government owned TVET Institutes established earlier than January 2012 and located in the western Kenya region .The study was conducted between the months of October 2014 and January 2015.

1.8 Limitations of study

Although this research presents strong evidence regarding relationship between Dynamic Capabilities and Competitive Advantage of TVET Institutions in Kenya, the results should be interpreted in light of the study's limitations.

First, this study used responses of senior management covering a variety of job functions/departments, assuming that their judgements regarding Dynamic Capabilities and CA are objective. However, an over-reporting or under-reporting of certain phenomena may occur as a result of the respondent's job satisfaction or personal and role characteristics (Bagozzi, Philips & Yi 1991).

Secondly, the measurement scales of several constructs within the sub-variables of dynamic capabilities, such as KMC, ICTC, PIC and CC constructs were reduced to increase the level of model fit and this may have limited the accuracy of the measures of these constructs. Although having reduced indicators per construct is acceptable, particularly when other constructs have more than three indicators, it is suggested that statistics under re-specification of the CFA model on a shortened scale require cross-validation studies to re-evaluate the measurement model and examine its generalisability. However, due to the complexity of the model and limitations of the study's resources, only a single sample was obtained and so model re-estimation was not attempted. Further research could address this problem.

Thirdly, practical implications suggested in the study were based on theoretical and empirical findings requiring a holistic and comprehensive approach. It is difficult and sometimes impossible for management to undertake the whole task at one time due to limited resources of the institutions, especially in less developed country like Kenya.
Though the relative importance of individual capabilities was discussed, future research is necessary to explore the model further to determine if there is an optimal level of capabilities.

The data of this study were collected from state owned TVET institutions in western Kenya region. Institutional environments might differ across the country. Hence, the ability to generalise the findings of this study depends on the limitations of comparable environmental backgrounds of western Kenya region. A replication of this study within different institutional environments will help to shed light on the question if the research environments of Dynamic capability and competitive advantage of TVET Institutions differ across Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter is divided into seven sections: section 2.2 introduces the theoretical background that this study is anchored on; section 2.3 demonstrate the conceptual framework of the study; section 2.4 provides an empirical review focusing on KM Capabilities and competitive advantage, ICT Capabilities and competitive advantage , Physical Infrastructural Capabilities and competitive advantage, and Curriculum Capabilities and competitive advantage of a firm; section 2.5 Critique of the existing literature relevant to the study; section 2.6 provides chapter summary and 2.7 brings to light the research gaps.

2.2 Theoretical Framework

The two strategic management theories from which the study draws its strength are Resource-Based theory and Dynamic Capability theory of competitive advantage.

2.2.1 Competitive advantage from the resource-based view

The primary influences on the RBV came from the works of Schumpeter (1934, 1939), Chamberlin (1933), Penrose (1959), Wernerfelt (1984), Barney (1991) and Prahalad and Hamel (1990).

While the roots of the RBV can be traced back a long time, many academics date the emergence of this view to the 1950s and the works of Selznik (1957) and Penrose (1959). Penrose's seminal book "The theory of the growth of the firm" is seen by many academics as the key contribution to the RBV. In her work, she delineates the significance of heterogeneous assets and establishes that it is the heterogeneity of firms' resources that gives firms a unique character and a chance to differentiate their products and services from those of their competitors. Sharing the perception that firms' success is not totally dominated by the environment with the protagonists of the 'environmental

determinism' perspective, Penrose believed in free will and strategic choice and argued that the success of firms was not fully dependent on good fortune or the environment. She turned to an internal view of the firm and described firms as collections of productive resources whose main source of differentiation lies in their resources, especially their labour. This view is complementary to Selznik's (1957) findings of the same period. Selznik came up with the idea that firms have 'distinctive competences'. This concept was later integrated into the RBV as the natural outcome of distinctive resource profiles.

Nevertheless, internal factors faded in importance during the 1970s and early 1980s, and apart from the work of Rubin (1973), little formal attention was paid to the firm as a broader set of resources (Wernerfelt, 1984). Rubin (1973) views the firm as a collection of particular resources, which are worth more than their market value because of the specialized experience within the firm. He also introduces aspects of learning, as he argues that not only can resources be used to produce new output but also to train new employees.

It was Wernerfelt's (1984) seminal work '*A resource based view of the firm'* which breathed new life into resource-centred perspectives on the firm. Wernerfelt (1984) developed a new model of competitive advantage, which mostly ignores the impact of external forces on a company and rather emphasises internal factors as sources of strength or weakness in determining firm-level competitive advantage. In order to implement and gain advantage from product market strategies, firms have to compete for resources based on their resource profiles. To explain this, Wernerfelt (1984) used and complemented Porter's (1981) product market position theory of competitive advantage, which was originally intended to be used as a tool for analysis of products only.

Wernerfelt (1984) defined resources very generally as 'anything which could be thought of as a strength or weakness of a given firm' and as assets which are semi-permanently tied to a firm. These assets can be intangible or tangible. When the tangible and intangible assets of a firm are heterogeneous and not tradeable on factor markets, the resource position of a firm may be an entry barrier at the industry level of analysis and may grant high returns. Wernerfelt (1984) further argued that suppliers and customers

can have bargaining power for a resource and that the returns of an utilised resource are dependent on the power of both the supplier and the buyer side in the resource market. Monopolistic control over the inputs of a resource, and the presence of only one or a few buyers for a resources' product on the output side, reduces rent from resources. The availability of substitute resources is another factor which could depress firms' rent from a utilised resource. Resources can achieve high profits if a company manages to set up resource position barriers, which restrict the utilisation of a resource by competitors. These resource position barriers are most effective when combined with product entry barriers for the resources' products (Wernerfelt, 1984).

The unique resources that are essential in the RBV to implement product market strategies can be acquired or developed on the basis of what Barney (1986) calls the strategic factor market. Barney (1991) built on the work of Draft (1983), and defined firm resources as 'all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness'. Furthermore, drawing from traditional strategic analysis and linking to the works of Porter (1981) and Learned *et al*. (1969), Barney (1991) defines resources as 'strengths that firms can use to conceive of and implement their strategies'. Amit and Schoemaker (1993) define resources as 'stocks of available factors that are owned or controlled by the firm'.

In general, resources are characterized as being either tangible or intangible. This distinction is not always precise but in general tangible resources include a firm's financial capital (e.g. equity capital, dept capital or retained earnings) and physical capital (e.g. machines and buildings). Intangible resources generally include a firm's human capital (e.g. the training, experience, judgement, intelligence, relationships, and insights of individual managers and workers) and organizational capital (e.g. attributes of collections of individuals associated with a firm, a firm's culture, or its reputation) (Barney & Arikan, 2001). Other authors also include social capital (interpersonal dynamics and relationships) (Lesser, 2000), intellectual property rights in patents,

copyrights, trademarks, registered designs, databases, trade secrets or contracts (Hall, 1993). TVET Institutions in Kenya poses all the categories of resources.

These definitions of resources that emerged in the late 1980s and early 1990s continued to be less than categorical owing perhaps to an inherent uncertainty in the external environment (Peteraf, 1993). Furthermore, these broad definitions encompassed many firm attributes which did not necessarily have the potential to create and maintain a sustainable competitive advantage (SCA) for a firm. The *'resource necessity*' perspective provides explanations of which attributes are necessary for a resource to create SCA.

The *'resource necessity'* perspective argues that only resources that are valuable, rare, non-substitutable, inimitable, non-replicable, heterogeneous and immobile (Barney, 1991) can lead to SCA. In his seminal work, Barney (1991) argues that a resource must have four attributes to be able to create a sustainable competitive advantage: valuable, rare, imperfectly imitable, and the absence of an equivalent substitute.

Barney's (1991) theory of resource attributes—commonly referred to as VRIN—is one of the most referenced works on resource attributes and is widely referenced by other authors as the *VRIN Framework*. In their work on strategic resources, Black and Boal (1994) argue that prevailing resource classification systems miss the key issue in the search for the creation and maintenance of sustainable competitive advantage (SCA), which is the ability of a resource to create rent. According to Barney (1991), only rare resources have the potential to create SCA, and the effort required to identify the underlying factors that create rare resource is high, adding to the scarcity of that resource. The simpler a factor bundle that leads to resources is to identify, the easier it is for competitors to imitate or substitute the resource and thus the rent generation potential of this resource will decrease (Grant, 1991). For this reason, Black and Boal (1994) based their resource categorisation on the degree to which the factor bundles that lead to resources could be identified. Resources in this categorisation are either contained resources or system resources. Contained resources comprise resource factors which can be identified and monetarily valued, whereas system resources are socially created, difficult to identify or ascribe with a monetarily value (Black & Boal, 1994).

2.2.2 The Dynamic Capability Perspective on Competitive Advantage

Due to the permanent risk of erosion of superior firm-specific resources and competences in the contemporary business environment of hypercompetition (D'Aveni & Gunther, 1994), companies face the omnipresent risk of erosion of their competitive advantage. To maintain competitiveness, companies are forced to continually generate new competitive advantages. In accordance with the RBV, this means a continual redevelopment of firm resources, capabilities and competences to obtain the necessary responsiveness and the potential to launch competitive actions when needed. In order to respond to and operate in rapidly changing environments, companies need the ability to adapt to change quickly and efficiently.

Competitive advantage in the dynamic capability view (DCP) involves organizational/companies' ability to adapt to environmental change through building, renewing and reconfiguring capabilities and competences (Teece *et al*., 1997).

The literature on dynamic capabilities varies in its delineation of what constitutes and causes dynamic capabilities (Thomas *et al.,* 1999). In their review of dynamic capabilities, Wang and Ahmad (2007) synthesize the conceptual debates and identify the commonalties of dynamic capabilities. The result is a classification of dynamic capabilities into three component factors which define dynamic capabilities: the adaptive capability, the absorptive capability and the innovative capability. Although correlated, these three components are conceptually distinct. Adaptive capability is about aligning organizations' internal factors with external environmental factors, and therefore focuses on organizations' ability to adapt themselves in a timely fashion to environmental change through flexible resource management and adequate alignment of resources and capabilities. Absorptive capability is concerned with learning and absorbing external knowledge, and making it available for internal use. Hence, this category stresses the importance of organizational learning and integration of knowledge to keep up with environmental changes. Innovative capability refers to organizations' innovative potential; hence, it focuses on organizations' ability to develop new products and/or markets (Wang & Ahmad, 2007).

The introduction of the Dynamic Capability Perspective (DCP) has enhanced the resource- based view's explanation of how to gain SCA in several ways. Firstly, while the RBV outlines the importance of specific resources, and argues that the existence of these gives companies competitive advantage, it does not explain how these resources actually contribute to competitive advantage. It fails to explain the mechanism that links resources and product markets to competitive advantage ((Priem, 2001, Williamson, 1999). Research on dynamic capabilities has begun to explore these transformational mechanisms (Wang & Ahmed, 2007). Secondly, the DCP overcomes the criticism aimed at the RBV that it is static. For developing and implementing sustainable competitive advantages, firms often have to make specific, irreversible commitments (Ghemawat & del Sol, 1998). On the one hand, irreversible and specific commitments enhance stability and equilibrium and assumed voluntary development by companies entering defined strategic paths.

On the other hand, committing to specific and irreversible investments reduces firms' flexibility by determining the strategic paths for development and reducing the strategic alternatives available to a company (Leonard-Barton, 1992). In the turbulent contemporary environment, companies with specific commitments are, therefore, in danger of being restricted by their specialized resources and capabilities (Ghemawat & del Sol, 1998). In dynamic contemporary markets that TVET Institutions find themselves in, sustainable competitive advantage is unlikely to prevail if it is not constantly renewed (D'Aveni & Gunther, 1994; Eisenhardt & Martin, 2000). The RBV fails to address the constant market dynamism and firm evolution over time (Wang & Ahmed, 2007).

The DCP addresses this shortcoming. Dynamic capabilities can be regarded as 'ultimate organizational capabilities that are conducive to long term performance' (Wang & Ahmed, 2007). The dynamic capabilities and, therewith, the competitiveness of a company are determined by three factors: firstly, strategic paths, which refer to the availability of a spectrum of strategic options for a company and the path dependency of strategic options (Leonard-Barton, 1992); secondly, the resource position of a company, which refers to tangible but especially intangible assets; finally, organizational processes

in terms of management skills, patterns of behaviour, thinking and learning (Teece *et al.*, 1997).

In general, dynamic capabilities enable SCA by focusing on strategy-relevant processes in companies and trying to improve responsiveness in a fast-changing environment. According to Teece and Shuen (1997), these 'dynamic capabilities' reflect a company's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions. In this view, the company's competitive advantage lies mainly in its dynamic capabilities, which refer to the capacity to build, renew and reconfigure capabilities and competences so as to achieve congruence with the changing business environment (Kylaheiko *et al.*, 2002).

2.3 Conceptual Framework

In the conceptual framework on figure 2.1, the link between the independent variable and dependent variable is made.

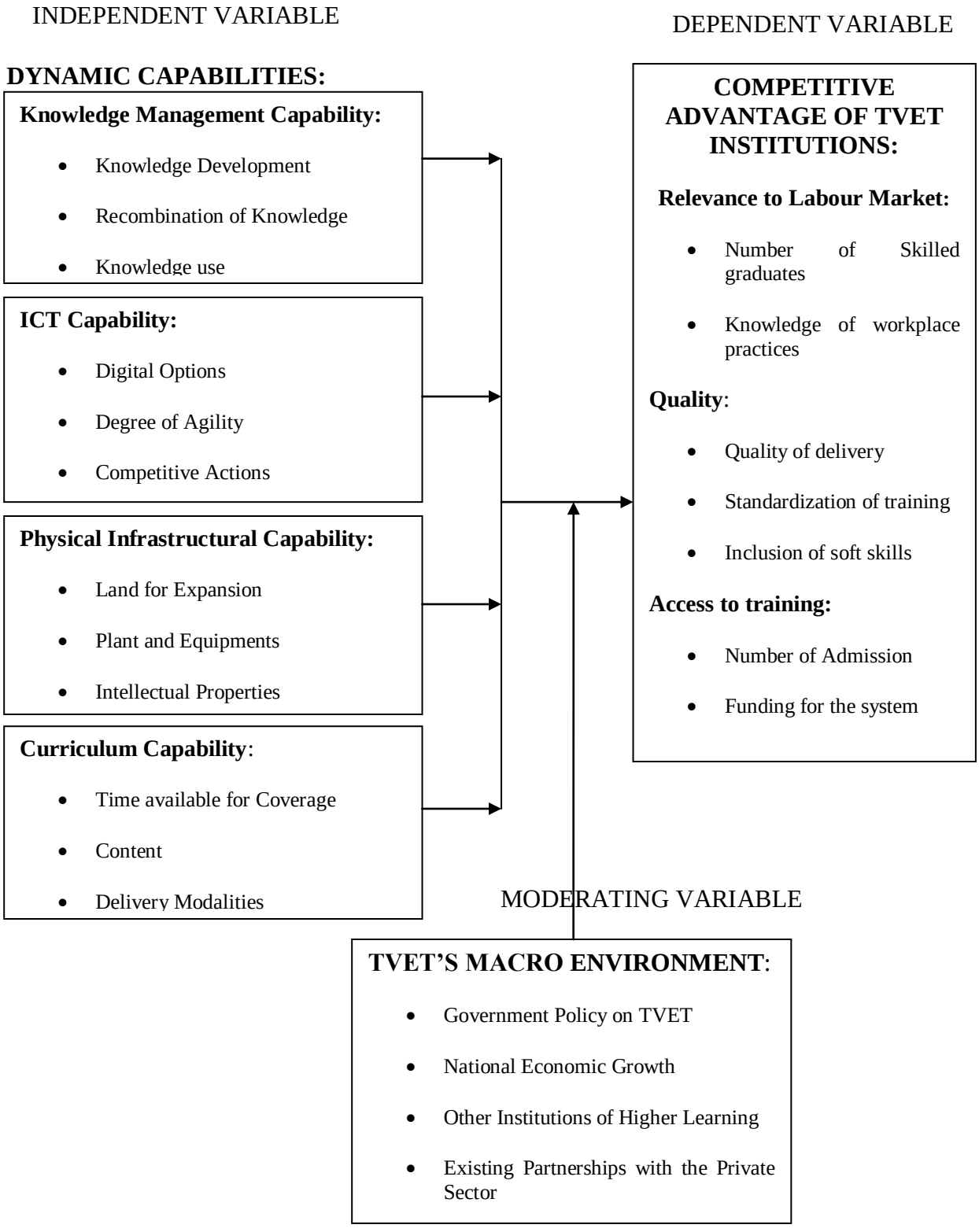


Figure 2. 1: Conceptual Framework

In figure 2.1, dynamic capabilities of TVET Institutes have the potential to deliver a competitive advantage on their core mandate of training and development of relevant graduates. Dynamic capability is the independent variable and competitive advantage the dependent variable. The dynamic capabilities that TVET institutions can leverage on include KM capabilities, ICT capabilities, physical infrastructural capabilities and curriculum capabilities. The expected outcome would be graduates with relevance to the labor market (one that meets employer's needs and expectations); access for trainees; quality of delivery; standardization; inclusion of soft skills, and funding for the TVET system which is secure and uninterrupted.

2.4. Review of Empirical Literature

2.4.1 Knowledge Management Capabilities and Competitive advantage

A more simplistic view considers knowledge to be at the highest level in a hierarchy with information at the valuable middle level and data to be at the lowest level (Davenport & Prusak, 1998). According to this view, knowledge is intrinsically similar to information and data, although it is the richest and deepest of the three, and is, consequently, the most important. In this study, Shankar *et al.'* s (2003) knowledge value chain (as shown in Figure 2.2) is utilized to distinguish between data, information, knowledge and wisdom.

Knowledge, at a higher level, is an awareness, understanding or familiarity gained from a blending of information, experience, skills, principles, rules, value, insight, study, investigation and observation (Bollinger & Smith, 2001; Davenport & Prusak, 1998; Pemberton & Stonehouse, 2000; Robbins *et al*., 2000). Because knowledge is a mixture of many things, it is usually subjective (James, 2005)

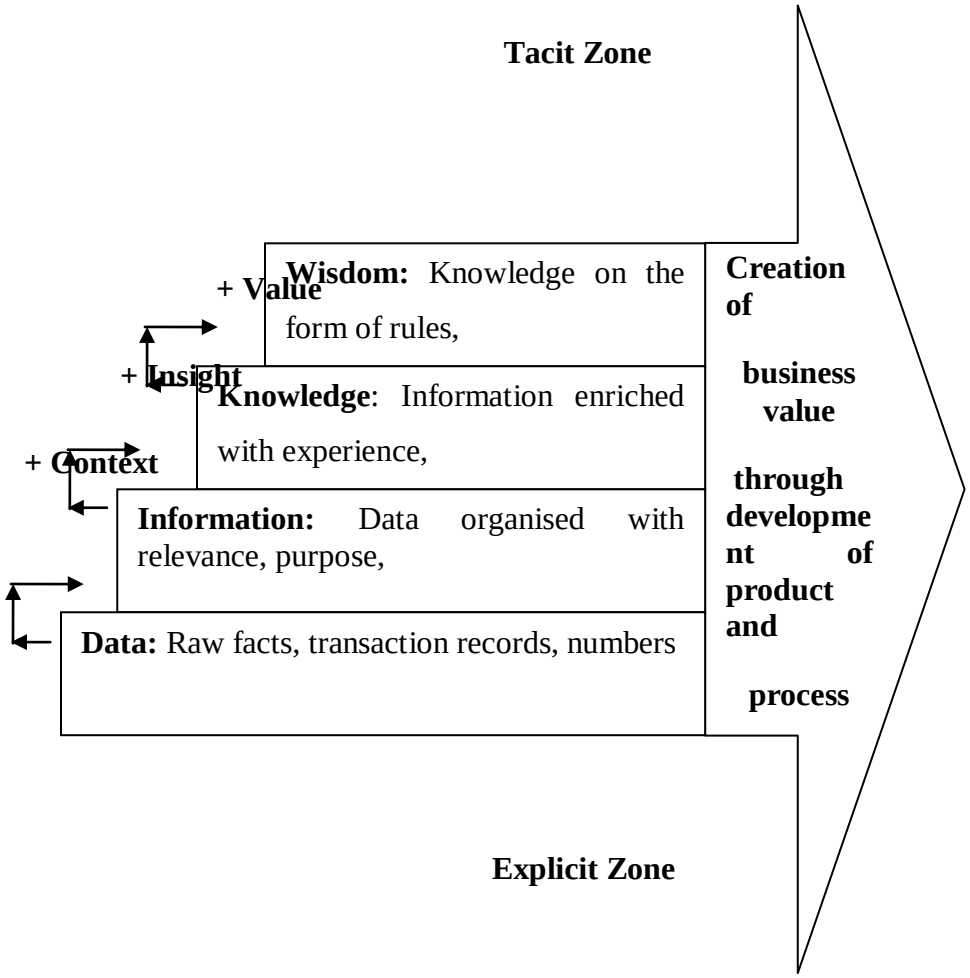


Figure 2. 2: Knowledge Value Chain

Source: Shankar *et al*. (2003)

Knowledge has been categorized in many different ways. Traditional epistemology identifies three distinct kinds of knowledge: knowledge of things and objects, knowledge of how to do things, and knowledge of statements or propositions (Musgrave, 1993). However, since the emergence of the knowledge economy, the traditional categories of knowledge are both imprecise and difficult to operationalise for management purposes, leading to a number of new classifications being proposed (Blumentritt & Johnston, 1999). These authors developed a framework followed by other researchers (as shown in Table 2.1) in which there are four categories of knowledge: codified knowledge, common knowledge, social knowledge, and embodied knowledge. The categories are arranged

according to the degree of difficulty involved in transferring knowledge from one individual to another or from an individual to an organization. In Table 2.1, the difficulty increases from left to right.

Table 2. 1: Frameworks for categories of knowledge

Codified knowledge	**Common knowledge**	**Social knowledge**	**Embodied knowledge**
Effective information of all kinds-facts and figures	Knowledge that is accepted as standard without being made formally codified	Knowledge of social links and shared values	Knowledge that is rooted in experience, background and skills of a person, strongly related to the person that holds it.
Explicit knowledge (Polanyi, 1966; Nonaka & Takeuchi, 1995) Knowledge of things and objects Knowledge of statements and propositions (Musgrave, 1993) Symbolic knowledge (Collins, 1993) Know what (catalogue knowledge) Know why (explanatory knowledge) (Lundvall, 1996)	Embrained knowledge (Collins, 1993) Embedded knowledge Embrained knowledge (Blackler, 1995) Informal knowledge	Encultured knowledge (Collins, 1993) Encultured knowledge (Blackler, 1995) Know who (Social knowledge) (Lundvall, 1996)	Tacit knowledge (Polanyi, 1966; Nonaka & Takeuchi, 1995; Williams, 2006) Embodied knowledge (Collins, 1993) Know how (Process knowledge) (Lundvall, 1996) Tacit knowledge
	Knowledge of how to do things (Musgrave,1993)		These concepts might contribute to either process knowledge or embodied knowledge depending on their content.

Source: Adapted from Blumentritt and Johnston (1999)

Despite the voluminous literature on KM, there is no widely accepted definition of KM (Earl, 2001; Manovas, 2004). Some of the definitions found in the literature define KM as a set of activities or processes of developing and exploiting knowledge to achieve or

enhance a variety of outcomes such as organisational objectives, value, long-term performance, overall success, or CA.

"Knowledge management can be defined as the organisational capability which identifies, locates (creates or acquires), transfers, converts and distributes knowledge into competitive advantage" (Walters, 2002).

A review of the current literature has identified a variety of KM-related resources or capabilities. In general, the KM capability of a firm is combined with the presence of KM infrastructure (some authors name it "enablers") and KM processes (Gold *et al.*, 2001). Table 2.2 presents a summary of previous empirical studies conducted since 1995, discussing different dimensions of KM capability, such as KM infrastructure elements (or enablers) and knowledge oriented processes. The research objectives, as displayed in the last column, are mainly to investigate the inter-connections among KM capability components and their impacts on organisational outcomes such as KM effectiveness, organisational effectiveness, CA, and firm performance.

Table 2. 2: A summary of previous Empirical studies in KM Capabilities/Infrastructure/ Enablers/ Processes

Author(s)	KM Enablers/Infrastructure	KM Process	Research Objective/Outcome
Donate and Guadamillas (2010)	Organisational culture	Knowledge storage -Knowledge transfer	To analyse the effect of the knowledge centered organizational culture on the relationship between knowledge storage and transfer practices and firms' Technological/innovative performance.
Zheng, Yang and McLean (2010)	- Organisational culture - Organisational structure - Organisational strategy	-Knowledge generation -Knowledge sharing -Knowledge utilisation	To examine the possible mediating effect of KM on the relationship between organisational culture, structure, strategy and organisational effectiveness.
Huang and Li (2009)	- Social Interaction: ▪ Trust ▪ Communication ▪ Coordination	-Knowledge acquisition -Knowledge sharing -Knowledge application	To examine the mediating role of KM in the relationship between social interaction and innovation performance.
Wu and Lin (2009)	- KM Strategy: ▪ Copier ▪ Skill acquirer ▪ Continuous improver ▪ Innovator	- KM Implementation Approach: ▪ Codification ▪ Personalisation ▪ Integration	To develop a complete process-based model that describes the relationships among four components: competitive strategy, KM strategy, implementation approach, and firm performance
Lee and Lee (2007)	- KM Capabilities: ▪ Culture (Learning organisation) ▪ People (T-shaped skills) ▪ Structure (Centralisation) ▪ Information technology (IT support)	- KM Processes: ▪ Generating ▪ Accessing ▪ Facilitating ▪ Representing ▪ Embedding ▪ Using ▪ Transferring ▪ Measuring	To examine structural relationships among the capabilities, processes, and performance of KM, and suggest strategic directions for the successful implementation of KM.
Hsu (2006)	- Intellectual Capital: ▪ Structure ▪ Human ▪ Innovation	Adapted from Gold, Malhotra & Segars (2001)	To examine the links between intellectual capital, KM process capability, organisational effectiveness, and CA.
Smith (2006)	Adapted from Gold, Malhotra & Segars (2001) model with an additional construct of Business Strategy		

Tanriverdi (2005)	-IT Relatedness: ▪ IT infrastructure ▪ IT strategy making processes ▪ IT HR management processes ▪ IT vendor management processes	- KM Capability (KMC): ▪ Product KMC ▪ Customer KMC ▪ Managerial KMC (each KMC manifests through the creation, transfer, integration and leverage of knowledge	To examine how the IT resources of a firm should be organised and managed to enhance the firm's KM capability and whether and how KM capability influences firm performance
Gimenez and Rincon (2003)	- Leadership - Technology - Culture	-Knowledge creation -Knowledge organisation -Knowledge sharing -Knowledge application	To predict what aspects/components of KM would be successful in diverse cultural contexts.
Khalifa and Liu (2003)	Adapted from Khalifa, Lam & Lee (2001)	To account for the interrelationships between KM infrastructure (IT) and KM process capabilities	
Lee & Choi (2003)	- KM Enablers: ▪ Structure ▪ Culture ▪ People ▪ IT	- Knowledge creation process: ▪ Socialisation ▪ Externalisation ▪ Combination ▪ Internalisation	To find the relationships among KM components such as KM enablers, knowledge creation process, organisational creativity, and organisational performance.
Appleyard (1996)	- KM Enablers: ▪ Industry and national characteristics	Transfer (number of times the respondents provided and received knowledge in a given period)	To examine the impact of industry and national characteristics on knowledge transfer.
Zander and Kogut (1995)	- KM Enablers: ▪ Characteristics of social knowledge	- Transfer (time to transfer)	To examine the effects of knowledge characteristics on the time to transfer.

Dynamic Capability View of Knowledge Management

Adopting a knowledge-based perspective, dynamic capabilities are seen as integrated sets of KM activities that change, renew, and exploit the knowledge-based resources of the firm, equivalent to knowledge development capability, knowledge (re)combination capability, and knowledge use capability (Nielsen, 2006). KM is an organisational capability and, at a higher level, a dynamic capability because KM focuses not only on the use of KM-based resources (as an organisational capability) but also on the creation or acquisition and (re)combination of knowledge (as a dynamic capability). Furthermore, KM capabilities create a flow to and from the firm's stock of knowledge, supporting the generation, renewal, and use of organisational capabilities, thereby, contributing to the creation of value in the firm (Nielsen, 2006).

As such, from the resource-based theory with knowledge and dynamic capability-based approaches, KM resources and capabilities are explicitly recognized to be central to the creation of CA in the dynamic market places of today (Hamel & Prahalad, 1994; Verona & Ravasi, 2003). While KM resources and capabilities tend to be heterogeneously distributed across firms, leading to different patterns of KM use and effectiveness (Chuang, 2004), a key to understanding the success and failure of KM within organisations is the identification and assessment of preconditions or organisational resources/capabilities that are necessary for the effort to flourish (Gold *et al.*, 2001). Organizational capabilities are created or renewed through the influence of different dynamic capabilities (Winter, 2000, 2003; Zollo & Winter, 2002). These dynamic capabilities are seen as key to the creation of value from the investments in knowledge creation or acquisition of the firm. Furthermore, the study will connect these dynamic capabilities to the knowledge management activities described above. The connection between the knowledge management activities and the three dynamic capabilities can be found in Table 2.3

The first dynamic capability is knowledge development where the firm creates, acquires and subsequently captures new knowledge. The second knowledge related dynamic capability is knowledge (re)combination, where knowledge-based resources from the stock of knowledge in the firm is being combined and integrated in order to form organizational capabilities. The third dynamic capability is knowledge use, where the firms existing and already integrated

knowledge resources are being used in the value creating activities of the firm. Knowledge recombination is similar to the concept of ‘‘combinative capabilities’’ coined by Kogut and Zander (1992). Kogut and Zander (1992) see a combinative capability as the organizational processes that take place in order to create new applications and innovations using the firms existing stock of knowledge. Kogut and Zander (1992) finds that the key to changes in the capability base of the firm is based on recombination of the firms existing knowledge resources and technologies. In connection with the thoughts about dynamic capabilities and their relation to innovation it is necessary to emphasize that not all of the different innovation outcomes can be related to intentional knowledge management or knowledge creation strategies. Burgelman (1983) demonstrated that autonomous behaviors can be a significant source of strategic renewal in companies. This indicates that one of the key challenges associated with developing a knowledge management strategy in a firm is to ensure that new and potentially relevant knowledge is captured, its potential understood, and the resulting opportunities are pursued. Organizational capabilities are changed through the influence of dynamic capabilities. Based on these tenets of dynamic capabilities it can be argued that knowledge recombination and integration in relation with the renewal or creation of organizational capabilities (re)combination is a dynamic capability.

Table 2. 3: Dynamic Capabilities seen as combination of knowledge management activities

Dynamic capability	Knowledge management activities activated
Knowledge development	Knowledge creation
	Knowledge acquisition
	Knowledge capture
Knowledge (re)combination	Knowledge assembly
	Knowledge sharing
	Knowledge integration
Knowledge use	Knowledge leverage
	Knowledge exploitation

Figure 2.3 illustrates this argument further. Figure 2.3 illustrates that the well-known knowledge management activities can be clustered into dynamic capabilities. These dynamic capabilities lead to the creation or renewal and use of organizational capabilities in the firm.

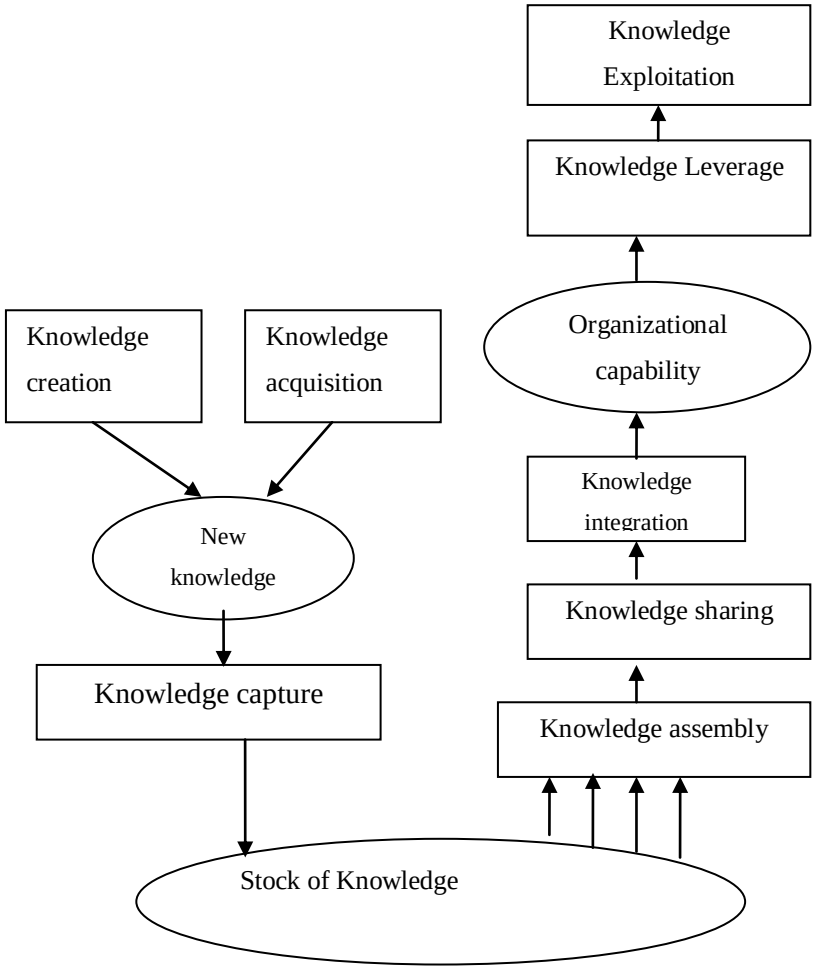


Figure 2. 3: Relationship between KM activities, Stock of knowledge, dynamic and organizational capabilities

2.4.2 ICT Capabilities and Competitive Advantage

Previous research concerned with IT and competitive advantage has investigated how and to what extent the application of IT can lead to competitive advantage. These studies have included investigating IT's impact on firm performance, inventory reduction, productivity enhancement, profitability improvement, process enhancement and other measures of organisational performance. Many IT researchers distinguish between the terms information technology (IT) and information systems (IS). IT processes, transmits and stores information and is asset-based, whereas IS represents a mixture of assets and capabilities around the productive use of IT (Wade & Hulland, 2004). IT researchers mainly use IT to refer to the asset-based technology resources. In contrast, the term IS is primarily used to refer to the more comprehensive mixture of IT, capabilities and organisational assets that enable IT to support individual, group and business goals. Hence, IS has a broader focus and incorporates not only IT but also integrated software that uses IT to support individual, group and business goals as well as managerial and transformational IT capabilities. This study uses the generic term ICT to include both IT and IS.

Scholars have investigated the relationship between IT and competitive advantage from a variety of perspectives. This has led to a variety of diverse conceptual, theoretical and analytic approaches within research into IT business value (Melville *et al.,* 2004).

Conceptually, research has investigated either firm performance or competitive advantage as the common dependent variable. The common independent variables vary from financial measures of IT investments to IT systems, IT capabilities and IT support for core competences.

Theoretically, scholars have most commonly either based their research on the *economic perspective*, or drawn from one of the three major theories of strategic management—the *strategic perspective* (Porter, 1985a), the *resource-based view* (RBV) (Barney, 1991; Prahalad & Hamel, 1990) or the *dynamic capabilities perspective* (DCP) (Teece *et al.*, 1997). Table 2.4 below provides an overview of the different perspectives within IT and competitive advantage research and the subsequent sections discuss the literature under each view in some detail.

Table 2. 4: Perspectives on IT and Competitive Advantage

	Economic	**Strategic**	**Resource-based**	**Dynamic capability**
Key argument	IT investments directly affect firm performance	IT can be used to shape the external environment of organisations	IT has to support organisational resources, capabilities and competences	IT has to enable organisational dynamic capabilities
Informing theory	Economic production functions	Industrial organisations view	Resource-based theory	Dynamic capability view
Common dependent variable	Firm performance	Competitive advantage	Competitive advantage	Competitive advantage or availability of competitive actions repertoire
Common independent variable/ s	IT investments	IT's potential to increase bargaining power, strengthen entry barriers and deter competitive rivalry	IT resources, IT capabilities, IT support for core competences	IT resource flexibility, IT capabilities, IT support for core competences
Seminal References	Hitt and Brynjolfsson (1996); Brynjolfsson (1993,2003)	McFarlan (1984); Porter and Millar (1985)	Wade and Hulland (2004); Ravichandran and Lertwongsatien (2005)	Pavlou (2006); Sambamurthy Bharadwaj and Grover 2003 (2003)
Findings	Unequivocal findings on the IT–firm performance relationship	Only explains short-term competitive advantages	IT can lead to competitive advantage if it forms complementarities with other firm resources	**IT can enable dynamic capabilities**
Comment	Firm performance as a dependent variable only measures financial performance	Even if specific IT can give short-term advantage, external environmental advantage erodes over time and IT can be copied	Studies many find positive relationships between IT and competitive advantage	**Not all studies explicitly mention the DCP**

As competitive advantages are influenced by many variables, isolating the direct impact of IT investments on competitive advantage seems difficult to realize. Many IT researchers question the direct link between IT, firm performance and competitive advantage and argue for indirect links between IT and competitive advantage. Therefore, a number of researchers approach the IT value research from the strategic perspective and draw from the theories of strategic management (Porter, 1980b). These studies predominantly examine how IT can be utilized to alter and manipulate a firm's external competitive forces and the structure of the industry, and also how IT can enable a firm to create a superior position in the industry in which it operates. IT's potential to increase a firm's bargaining power over its buyers and suppliers, to deter competitive rivalry and to toughen entry barriers were main areas of investigation (Bakos & Treacy, 1986; McFarlan, 1984; Stalk *et al*., 1992). IT research founded in the industrial economic perspectivetherefore, focuses on advantages of IT utilization in regards to possibilities to shape the external environment. As such, most of these IT researchers have argued how firms can use (or have actually used) IT to manipulate market forces or how IT can support a firms' competitive strategy directly by either reducing its cost or differentiating its offerings.

The major limitation of these studies arises because external environmental advantages erode over time due to imitations of strategies and the possibility of copying IT applications.

Furthermore, as IT becomes increasingly standardized, any strategic advantage that derives solely from its usage will erode. Therefore, many IT researchers have turned their interest from focusing on the external environment and IT spent towards a focus on the internal environment as an alternative means to investigate IT-enabled competitive advantage. This internal IT research perspective draws from the RBV.

Dynamic Capabilities Perspective on ICT and Competitive Advantage

The Dynamic Capability perspective (DCP) on ICT and competitive advantage covers a very broad field. In general, the DCP of ICT and competitive advantage captures the ability to utilise IT to enable firms to adapt faster to changes in the external environment than their competitors,

hence, providing them with a SCA (Teece *et al.*, 1997). Despite the fact that most IT researchers have not explicitly drawn from the strategic management literature and thus have not referred to the DCP, some have contributed to an understanding of dynamic capabilities (Fink & Neumann, 2007; Overby *et al*., 2006; Sambamurthy *et al*., 2003). The DCP on IT and competitive advantage is similar to the above discussed IT resource complementarities and IT intangibles perspective in that both have their roots in the RBV. The DCP is an enhancement of the RBV. Hence, the conceptualisation of IT resources, IT capabilities and IT support for core competences is similar in each.

Pavlou and Sawy (2006) found that the influence of IT on competitive advantage was mediated by a specific organisational dynamic capability—resource configurability (coordination competence, absorptive capacity, collective mind and market orientation). All four constructs of resource re-configurability are enhanced by digital options (Pavlou, 2004). Digital options refer to digitised enterprise work processes and knowledge systems which enable a business infrastructure that shapes a company's capacity to launch varied and frequent competitive actions (Sambamurthy *et al.,* 2003). Digital options are exhibited within organisations through digitised process reach, digitised process richness, digitised knowledge reach and digitised knowledge richness. Digitised knowledge reach and range support the sensing of external change, whereas digitised process reach and range can be the foundation for response activities (Overby *et al.,* 2006).

Sambamurthy *et al.(*2003) model was conceptual and provided new insights into the value-adding role of IT in terms of enabling a business infrastructure that has the capacity to launch frequent and varied competitive actions, and contributed to our understanding of the interplay of the three dynamic capabilities—digital options, agility and entrepreneurial alertness. Their conceptual work also provided a benchmarking framework to assess the value of IT in three ways. Firstly, firms can assess the value of IT by the quality of the digital options (IT supports for organisational processes and knowledge systems). Secondly, their notion of an agility construct suggests a measurement of the degree of (IT enabled) agility in organisations. Lastly, the frequency and variety of competitive actions can be measured (Sambamurthy *et al.,* 2003).

Furthermore, their work contributes to IT research by highlighting three strategic processes: capability building, entrepreneurial action and co-evolutionary adaptation.

While the literature states that digital options can strengthen firms' ability to deal with change and emphasizes the importance of strategic processes, it does not explicitly address how digital options or IT support for core competence can change in order for the business to keep up with changing requirements. Possessing a broad variety of digital options does enable a broader variety of competitive actions, but digital options have to adapt themselves to changes in the environment to be able to offer innovative competitive action moves. The notion of competitive action moves as a dependent variable gives IT research a good insight into the strategic value of agile IT, but it does not elucidate the effect of IT-enabled organisational agility on competitive advantage.

Research into how IT can support organisational ability to react to environmental change was conceptualised differently by Fink and Neumann (2007). Their concept of IT-enabled organisational agility consists of three constructs: *IT-dependent information agility, IT dependent strategic agility*, and *IT-dependent system agility*. Using Structural Equation Modelling (SEM) techniques Fink and Neumann (2007) were able to assess several alternative models in parallel, and hence further validate their findings. The best fitting and most valid model in their research was the one that revealed the positive effects of IT personnel capabilities on IT infrastructure capabilities as well as the positive impacts of IT infrastructure capabilities on three constructs of IT-dependent organisational agility: IT-dependent information agility, IT-dependent system agility, and IT dependent strategic agility.

Using the capacity of SEM to investigate the relationships among several latent variables, Fink and Neumann (2007) found that the three constructs of IT-dependent organisational agility were related to each other. IT-dependent system agility has positive effects on IT-dependent information agility. The ability to adjust IT quickly and efficiently seems to impose a technical constraint on the quality of the information itself. Furthermore, both IT-dependent system agility and IT-dependent information agility demonstrate a positive effect on IT-dependent strategic agility. This reveals that when changes in the business environment occur, enterprises

require the ability to adapt their information systems and their utilisation of information resources in accordance with the new information needs (Fink & Neumann, 2007).

Furthermore, with the exception of a few studies, the DCP on IT and competitive advantage is silent on the subject of the resources, capabilities and competences that are required to enable IT to enhance organisational dynamic capabilities (Piccoli & Ives, 2005). Existing frameworks at the organisational level suggest relationships between capabilities, competences and organisational dynamic capabilities (Wang & Ahmed, 2007). In addition, IT researchers have found relationships between concepts of IT capabilities and one organisational dynamic capability: resource configurability (coordination competence, absorptive capacity, collective mind and market orientation).

2.4.3 Physical Infrastructural capabilities and competitive advantage

Naturally, executives look inside their organizations for the internal resources or building blocks that form the strategic bundles necessary to execute strategies to build their points of differences. These building blocks are the input that managers use to create product and service attributes that meet current and future customer needs and bring the firm a competitive advantage. Hamel and Heene (1994) provide a nice description of the variety of depictions of the internal mechanisms of the firm. Rigsby and Greco (2005) described financial, physical, human, technological, and reputation resources as the major internal firm assets necessary for executing strategy.

Resources, capabilities, and assets are both tangible and intangible and are tied either permanently or semi-permanently to the organization (Wernerfelt, 1984). For example, employees in the organization provide key capabilities and competencies to the organization. Such capabilities and competencies are intangible and consist of the knowledge, skills, thought patterns, motivation, culture, and networks of the employees in the organization (Dubois, 2009). Dubois and Rothwell, (2000) argued that employee capabilities could be further classified as either technical-functional or personal functioning. Technical capabilities include specialized knowledge, skills, and capabilities that can be used in particular ways within the company. For example, gas metal arc welders have specialized skills because of their ability to

weld aluminum at Boeing. Without this capability, Boeing would be unable to deliver fabrication attributes that its airframe customers value. Likewise, computer programmers at Microsoft and Apple have specialized capabilities necessary to produce attributes that end users value in their computer operating systems. A second category of human resource competencies is "personal" and includes management skills, strategic views, networking abilities, and psychological characteristics. Southwest Airlines has often been cited for its managerial skills that create customer relationship attributes that are valued by customers. These managerial competencies have helped build attributes in Southwest Airline's point of differences that other airlines have not been able to imitate. While technical competencies are easier to define, interpret, and apply than personal competencies, personal competencies are also very important and cannot be overlooked (Dubois, 2009).

Finances, plants, equipment, and physical assets are resources that are absolutely necessary for creation of attributes that are both valued and expected by customers. Physical resources also include the intellectual property and trade secrets that can be used to create and sustain a point of difference (an Area-A) market advantage. Distinctive patents, copyrights, and other assets protect the organization's advantage from being imitated by competitors and make an important feature of the resource bundle that sustains the distinctiveness of competencies. Physical resources are not considered firm competencies; however, they are necessary for the human competencies to create products and services that are valued by customers. An organization can have the best human capital and capabilities in the industry, but if the organization lacks the physical resources to execute those competencies, it cannot build its competitive advantage (Dubois, 2009).

Likewise, a company can have all the distinctive physical resources but lack the core competencies necessary to develop the products valued by customers for a distinctive advantage. For example, the University of Iowa built a laser-technology building with distinctive, state-of-the-art equipment; however, the university was unable to attract key scientists with the core competencies necessary to bring the university a point of difference in laser research. As a result, the building was renamed the "Iowa Advanced Technology Laboratories" and now houses multidisciplinary research rather than the planned laser

technology focus, .*Iowa Alumni Review*, 45. A primary reason new ideas and ventures fail is that they lack the bridge funding and physical resources necessary to bundle with human competencies to deliver a product or service to the market. Without the distinctive physical resources to complement the human competencies (knowledge, capabilities, and skills), the organization cannot successfully produce attributes that bring the organization a sustainable advantage (Rigsby & Greco, 2005).

These resources, capabilities, and assets are structured to build the attributes that are viewed by customers. The sequence of activities that an organization develops to produce attributes often defines the firm, its processes, and culture.

2.4.4 Curriculum capabilities and competitive advantage

The structure of an education system comprises the levels characterizing that system, and the length of time a learner is expected to spend or the content of the curriculum expected to be covered at each level, in fulfilment of clearly articulated objectives (Koech, 1999). Curriculum content dictates duration of a cycle. This cycle can be arranged into annual, term, quarter or semester duration. A structure is basic to success of any education system for the following reasons: It determines entry into various levels of the education system; It determines the time available for curriculum coverage; It determines the curriculum content and delivery modalities; It is through a structure that the system is fitted into the natural cycle of life; and, Structure dictates transferability/mobility of citizens, nationally and internationally.

While identification of needed skills and competencies remains a structured and systematic quest in the context of training, industry associations in the European Union underscored employability and job retention aspects as key considerations in identifying what skills need to be taught and learned in the midst of the changing pace of work. Skills and competencies required by industry are further identified, and are regarded as components of employability, according to an EU industry association (adapted from NCVER, 2001 based on CBI, 1998). The qualities and competencies required are: Values and attitudes compatible to work; Basic literacy and numeracy skills; Key skills (communication, application of number, IT, performance-based self-improvement, team work etc.) sufficient for the needs of the work;

Other generic skills that are becoming increasingly "key" (i.e. customer service skills, modern language etc); Up-to-date and relevant knowledge and understanding; Up-to-date job specific skills; Ability to manage one's own career.

While there could be difference in the nature and details of generic skills that needed to be included in the TVET curriculum among the countries in the context of the development stages, policies and priorities, there can be no disagreements about integrating higher order generic skills in the TVET curriculum on priority basis. The integration of essential generic skills into the TVET curriculum will require substantial change, including those that relate to new learning technologies, flexible learning strategies and assessment practices (Kearns, 2001).

There could be many models adopted for incorporating "Generic skills" components into the curriculum, but two specific models have been very much talked about in this field. The first model is known as "Diffusion Model" whereas the second model is known as " Infusion Model".

In the diffusion model the generic thinking issues arising from different disciplines of education are diffused ,that is., taken out from their respective areas and pooled into a common generic discipline or subject known as 'Curriculum on Thinking Skills' Hence Implementation of this model in TVET may lead to Separate courses on Generic Thinking Skills. These courses, being interdisciplinary, necessitate the interactions between a wide range of people trained in different fields of knowledge (discipline) each with its own concepts, methods, body of knowledge and language attacking a common problem from various viewpoints. The interaction may range from simple communication of ideas to mutual integration or organization of the concepts, methodology, procedures, epistemology, terminology and development of generic thinking skills and techniques Kearns, (2001).

In the Infusion model, the concepts of thinking skills are injected into the various conventional disciplines and subjects without introducing new subjects such as thinking education or so. The main issues with this approach are that thinking cuts across the range of subjects and is to be integrated into all of the subjects. Integration of thinking skills in the subject area is generally difficult to design and implement. It means therefore that teachers of different subject areas and

from different levels must be in regular dialogue with each other to validate and confirm whether or not the generic skills are still attuned with the times and disciplines.

However, in the opinion of the researcher, the best way to integrate generic skills in the TVET curriculum is by combining both models through Hybrid approach. We need to offer both the separate discipline on generic skills as well as the integration of the same in different subject contents depending on the requirement of the TVET curriculum.

In some countries, there has been a switch in TVET curriculum design away from "long courses" with assessment of learners at the end, to programs consisting of sequences of short courses (modules) with assessment at the end of each module (typically "criterion based") and with more flexibility for trainees to sequences tailored for their particular requirements (and pace of progress). The approach is also advocated as a means to enable trainees to more easily "interrupt" and later "return to" training. What has been the experience of such modular models? Some of the issues are: Is there improved learning? Is "flexibility" made use of? Does it lead to excessive fragmentation? "Assessment overload"? (Lauglo, 2006).

2.5 Critique of the existing Literature Relevant to the Study

2.5.1 Knowledge Management Capability and Competitive Advantage

KM resources and capabilities are explicitly recognized to be central to the creation of CA in the dynamic market places of today (Verona & Ravasi, 2003). While KM resources and capabilities tend to be heterogeneously distributed across firms, leading to different patterns of KM use and effectiveness (Chuang, 2004), a key to understanding the success and failure of KM within organisations is the identification and assessment of preconditions or organisational resources/capabilities that are necessary for the effort to flourish (Gold *et al.*, 2001). The study concurs with the proposition that organizational capabilities are created or renewed through the influence of different dynamic capabilities (Winter, 2000, 2003; Zollo & Winter, 2002). These dynamic capabilities are seen as key to the creation of value from the investments in knowledge creation or acquisition of the firm. Furthermore, the study connects these dynamic capabilities to the knowledge management activities in TVET Institutions.

The first dynamic capability is knowledge development where the TVET Institutions are expected to create, acquire and subsequently captures new knowledge. The second knowledge related dynamic capability is knowledge (re)combination, where knowledge-based resources from the stock of knowledge in the institutions is being combined and integrated in order to form organizational capabilities. The third dynamic capability is knowledge use, where the institution's existing and already integrated knowledge resources are being used in the value creating activities of the firm. Knowledge recombination in TVET Institutions is similar to the concept of ''combinative capabilities'' coined by Kogut and Zander (1992). Kogut and Zander (1992) see a combinative capability as the organizational processes that take place in order to create new applications and innovations using the firms existing stock of knowledge. Kogut and Zander (1992) finds that the key to changes in the capability base of the firm is based on recombination of the firms existing knowledge resources and technologies. Based on these tenets of dynamic capabilities it can be argued that knowledge recombination and integration in relation with the renewal or creation of organizational capabilities (re)combination is a dynamic capability.

2.5.2 ICT Capability and Competitive Advantage

Dynamic Capability Perspective (DCP) of ICT and competitive advantage captures the ability to utilise IT to enable firms to adapt faster to changes in the external environment than their competitors, hence, providing them with a SCA (Teece *et al.,* 1997). Despite the fact that most IT researchers have not explicitly drawn from the strategic management literature and thus have not referred to the DCP, some have contributed to an understanding of dynamic capabilities (Fink & Neumann, 2007; Sambamurthy *et al.,* 2003). The study of Pavlou and Sawy (2006) found that the influence of IT on competitive advantage was mediated by a specific organisational dynamic capability—resource configurability (coordination competence, absorptive capacity, collective mind and market orientation). All four constructs of resource re-configurability are enhanced by digital options (Pavlou, 2004). Digital options refer to digitised enterprise work processes and knowledge systems which enable a business infrastructure that shapes a company's capacity to launch varied and frequent competitive actions (Sambamurthy *et al.,* 2003). Digital options are exhibited within organisations through

digitised process reach, digitised process richness, digitised knowledge reach and digitised knowledge richness. Digitised knowledge reach and range support the sensing of external change, whereas digitised process reach and range can be the foundation for response activities (Overby *et al*., 2006).

This study borrows from the works of Sambamurthy *et al.* (2003) model that was conceptual and provided new insights into the value-adding role of IT in terms of enabling a business infrastructure that has the capacity to launch frequent and varied competitive actions, and contributed to our understanding of the interplay of the three dynamic capabilities—digital options, agility and entrepreneurial alertness. Their conceptual work also provided a benchmarking framework to assess the value of IT in three ways. Firstly, TVET Institutions can assess the value of IT by the quality of the digital options (IT supports for organisational processes and knowledge systems). Secondly, their notion of an agility construct suggests a measurement of the degree of (IT enabled) agility in TVET Institutions. Lastly, the frequency and variety of competitive actions can be measured (Sambamurthy *et al.,* 2003). Furthermore, their work contributes to IT research by highlighting three strategic processes: capability building, entrepreneurial action and co-evolutionary adaptation.

While the literature states that digital options can strengthen firms' ability to deal with change and emphasizes the importance of strategic processes, it does not explicitly address how digital options or IT support for core competence can change in order for the TVET Institutions to keep up with changing requirements. Possessing a broad variety of digital options does enable a broader variety of competitive actions, but digital options have to adapt themselves to changes in the environment to be able to offer innovative competitive action moves.

2.5.3 Physical Infrastructural Capability and Competitive Advantage

Finances, plants, equipment, and physical assets are resources that are absolutely necessary for creation of attributes that are both valued and expected by customers (Dubois, 2009). Distinctive patents, copyrights, and other assets protect the organization's advantage from being imitated by competitors and make an important feature of the resource bundle that sustains the distinctiveness of competencies. Physical resources are not considered firm

competencies; however, they are necessary for the human competencies to create products and services that are valued by customers. An organization, such as TVET Institution can have the best human capital and capabilities in the industry, but if the organization lacks the physical resources to execute those competencies, it cannot build its competitive advantage (Dubois, 2009).

The study concurs with the work of Rigsby and Greco that without the distinctive physical resources to complement the human competencies (knowledge, capabilities, and skills), a TVET Institution cannot successfully produce attributes that bring the organization a sustainable advantage (Rigsby & Greco, 2005).

2.5.4 Curriculum Capabilities and Competitive Advantage

While there could be difference in the nature and details of generic skills that needed to be included in the TVET curriculum among the countries in the context of the development stages, policies and priorities, there can be no disagreements about integrating higher order generic skills in the TVET curriculum on priority basis. The integration of essential generic skills into the TVET curriculum will require substantial change, including those that relate to new learning technologies, flexible learning strategies and assessment practices (Kearns, 2001).

Following on Kearns models of "Diffusion Model" and "Infusion Model", the implementation at the TVET Institution should be by combining both models through Hybrid approach. We need to offer both the separate discipline on generic skills as well as the integration of the same in different subject contents depending on the requirement of the TVET curriculum.

In Kenya, there has been a switch in TVET curriculum design away from "long courses" (or TEP program) with assessment of learners at the end, to programs consisting of sequences of short courses (modules) with assessment at the end of each module (typically "criterion based") and with more flexibility for trainees to sequences tailored for their particular requirements (and pace of progress). The approach is also advocated as a means to enable trainees to more easily "interrupt" and later "return to" training. Just as Lauglo point out, the fundamental questions to address are: What has been the experience of such modular models? Some of the

issues are*:* Is there improved learning? Is "flexibility" made use of? Does it lead to excessive fragmentation? "Assessment overload"?

2.6 Summary

Dynamic capabilities have a direct effect on firm performance and competitive advantage, as well as an indirect effect through resource reconfiguration. Although Eisenhardt and Martin (2000) view competitive advantage as more difficult to achieve through dynamic capabilities than does Teece, their basic chain of logic is very similar to that of Teece and of Helfat *et al*. (2007). In all of these treatments, organizational processes play a central role. Helfat *et al.* (2007) propose two conceptual measures of performance for dynamic capabilities. The first, technical fitness, denotes 'how effectively a capability performs its intended function when normalized (divided) by its cost' (Helfat *et al.*, 2007). This metric has several advantages. First, it provides a sliding scale of measurement; the dynamic capabilities of some firms may be less technically fit than others. Second, technical fitness takes into account the cost of the capability, which A&B note is important. Third, technical fitness enables us to separate the performance of a task from firm performance. In order to measure firm performance, we introduce a second metric, evolutionary fitness, which refers to 'how well a dynamic capability enables an organization to make a living by creating, extending, or modifying its resource base' (Helfat *et al.*, 2007).

These two measures remove any possibility of a tautological link between possession of a dynamic capability and firm performance or competitive advantage. A firm might not use a dynamic capability that it possesses, the dynamic capability may have poor technical fitness, and even with high technical fitness, a dynamic capability still may not lead to high firm performance in terms of evolutionary fitness. At this early stage, we are agnostic regarding empirical metrics that researchers might use to implement these performance yardsticks. We note, however, that researchers have already started using these yardsticks in empirical work (Hess & Rothaermel, 2008).

2.7 Research Gaps

TVET Institutions in Kenya possesses most of the categories of resources that have been described by the RBV. Some of the resources have been acquired from the factor market, while others, mainly soft assets have been built over the years. With the changes occurring in the Institutional environments, these resources needs attention in the manner in which they are acquired, built, and reconfigured in order to match the industry requirements. The capabilities should be dynamic in order to respond to uncertainties in the job markets.

The prominence and importance of Dynamic Capabilities of: Knowledge Management, ICT, Physical Infrastructure, and Curriculum has been increasingly recognized in the academic and business arena. As such, many researchers and practitioners have developed various frameworks and other relevant approaches to help the emergence of these capabilities into practice. However, most of the existing frameworks appear to have been derived from the experiences and considerations of business organizations, rather than of TVET Institutions. In addition, existing methods do not adequately address all of the four constructs for effective Dynamic Capability of a TVET Institution. In this context, the need for a new conceptual framework and research agenda in using Dynamic Capabilities to enhance Competitive Advantage in TVET Institutions has never been more urgent.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in undertaking the study. It starts by explaining the research philosophy, the research design adopted, target population, sample frame, Sample and sampling techniques, data collection instruments, data collection procedures, pilot testing and data analysis and presentation techniques. Lastly, the analytic technique used to test the hypotheses are also presented.

This study adopted a research philosophy from the empirical literature, hinged on two prominent research paradigms: positivistic and deductive philosophical approach. The positivistic approach is quantitative and based upon values of reason, truth and validity. The focus is purely on facts gathered through direct observation and experience, and measured empirically using quantitative survey methods, experiments and statistical analysis (Lewis & Thornbill, 2007; Erickson & Kovaleinen, 2008). Positivism maintains that knowledge should be based on real facts, not abstractions.

3.2 Research Design

A research design is a plan or an overall strategy for conducting the research. It is a means of ensuring that a research process is systematic and scientific enough so that the results obtained can be applied in real life (Oso & Onen, 2006). This study was mainly a descriptive research. Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual or characteristics of a group (Kothari, 2004). Mugenda and Mugenda (2003), on the other hand define descriptive research as a process of collecting data in order to test hypothesis or to answer questions concerning the current status of the subject of study. Sekaran (2006) also contends that a descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in a situation. Descriptive survey design was adopted for this study because; first, it was used to quantitatively describe specific aspects of the population. These aspects often involved

examining the relationships among variables. Second, the data required for survey research were collected from people and were, therefore, subjective. Finally, the study used a portion of the population, that is TVET Institutions in western Kenya region, from which the findings were later generalized back to the population. By their very nature, Public TVET institutions in western Kenya region share nearly similar contextual backgrounds with their counterparts in other parts of Kenya. They enjoy same policy regime from the Republic of Kenya; are financed and facilitated infrastructurally by the same government. Thus, for convenience and not to duplicate findings, western Kenya region presented enough locale for the study.

3.3 Target Population

Target population is also referred to as the universe. Target population is an aggregation of study elements and refers to all members of a real or hypothetical set of people, events, or objects to which we wish to generalize the findings (Oso & Onen, 2006). The target population consisted of the Principals and Heads of sections and/or departments of the TVET Institutions in Kenya. The public Institutions under the State Department of Higher Education, Science and Technology in western Kenya region includes one National Polytechnic (the Kisumu Polytechnic) and Thirteen TTI's and IT's (Gusii, Mawego, Siaya, Bumbe, Sang'alo, Kisiwa, Sigalagala, Kaimosi, Shamberere, Bushiangalla, Matili, Keroka, and Riat) totaling 14 Institutes. The study population was 140, an average of 10 respondents per Institution. The population targeted is responsible for the development, implementation and evaluation of various policies and strategies within these Institutions.

3.4. Sampling Frame

A sample size is the number of subjects that should be studied and from which reliable inferences can be made about a population. The sample frame for this study included administrative, teaching and non-teaching staff of the fourteen Institutes in the western Kenya region.

3.5. Sampling Technique

Sampling is the process of selecting "few cases" from a target population in order to provide information that can be used to make judgments about a much larger number of cases (Kothari, 2004). A census of all the principals and head of sections and/or departments from the fourteen TVET Institutes was adopted. A census enables a complete enumeration of all items in the population (Oso & Onen, 2006).

3.6. Data Collection Instruments

Primary and secondary data was collected. Structured questionnaire and Interview Schedules were used to collect primary data and were administered by face-to-face and telephone interviews. Structured questionnaire are constructed in such a way as to require direct answers in a particular prescribed format. They facilitate consistency of responses among respondents, (Oso & Onen, 2006). Interview schedules are particularly useful for getting the story behind a participant's experience and as follow–up to questionnaires (McNamara, 1999). Secondary data came from Institutional Publications, Ministry of Education Publications, and referred journals.

3.7 Pilot Test Study

Reliability of study Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda & Mugenda, 2003). Reliability is concerned with stability and consistency in measurement. Reliability indicates consistency, or the extent to which a measure does not contain random error. Sunders *et al* (2007) explains that the extent to which data collection techniques or analysis procedures will yield consistent findings it can be assessed by posing the following three questions.

1. Will the measure yield similar observations on other occasions?
2. Will similar observations be observed by other observers?
3. Is there transparency on how sense was made from the raw data?

Similarly, Sekaran (2003) observes that reliability is established by testing for both consistency and stability. Consistency indicates how well the items measuring a concept hang together in a set.

To test the reliability of the instruments a test- retest method was used. Test re-test estimates of reliability were obtained by correlating data collected with those from the same questionnaire collected under as near equivalent conditions as possible (Saunders *et al* 2003).The questionnaire was therefore administered twice to respondents. The instruments were also piloted using a small representative sample identical to, but not including the group going to be surveyed (Orodho 2003) .The results obtained, were coded and entered into a computer program after which a reliability index was calculated using the Cronchbach's alpha.

A cronchbach alpha coefficient of 0.7 and above was considered high enough to judge the instrument as reliable. A high cronchbach alpha coefficient implied that the items correlated highly among themselves, that is, there was consistency among the items in measuring the concept of interest (Mugenda& Mugenda 2003). A test-re-test coefficient of 0.904 was achieved and considered desirable. This is consistent with the proposition of Muganda (2010) that, the higher the test-re-test coefficient, the better the test-re-test reliability, hence the stability of the measure across time.

Validity of study Instruments.

Validity refers to the accuracy and meaningfulness of inferences, which are based on research results (Mugenda & Mugenda, 2003). Validity therefore, has to do with how accurately the data obtained in the study represents the variables of the study. Robinson (2003) argues that validity means what is measured is the same as what was purported to be measured.

Sekaran (2003) describes two types of validities: internal validity and external validity. Internal validity he says refers to the confidence we place in cause- and- effect relationships. 'To what extent does the research design permits us to say that the independent variable A causes a change in the variable B? External validity he goes on to say refers to the extent of generalizability of the results of a causal study to other settings, people, and events. In this

study the following measures were taken to ensure the items in the questionnaire produced valid data.

Expert opinion: The comments of supervisors were incorporated in the instruments as a way of improving their validity.

A pilot study: a pre test study was carried out at the Rift Valley Technical Training Institute in Eldoret, Uasin Gishu County-Kenya, after which the results of the pilot data analysis were used to improve validity of the instruments.

Factor analysis: Validity test was also done on the research instrument using a method of Principal Component Analysis (PCA) to extract the factors. The criteria, as suggested by Hair *et al*. (2010), was that factor loadings greater than 0.40 were considered statistically significant for studies with sample size less than 200. Consequently in this study, 0.40 was used as the cut-off for loadings since the sample size of the study was 140. The higher the factor loadings were, the greater they were related to the variable.

3.8. Data Analysis and Presentation

Data analysis was conducted according to the research objectives and hypotheses. This included the need to establish the relationship between dynamic capabilities and competitive advantage of TVET Institutions in the Western region of Kenya. Before processing the responses, data preparation was done on the completed questionnaires by editing, coding, entering and cleaning the data. Data collected was analyzed by descriptive and inferential statistics. Descriptive statistics was used to summarize the survey data and provide immediate summary statistics for the various objectives. These included measures of central tendency and measures of relationships. In particular, Regression Analysis was used to investigate the relationship(s) that had been hypothesized amongst the variables of study. Analysis of variance (ANOVA) was also used to investigate whether independent variables had combined effect on the dependent variable. As espoused by Mugenda and Mugenda (2003) correlation technique was used to analyze the degree of relationship between the variables.

Content analysis was also conducted on the data that are of qualitative nature. In conventional terms, content analysis involves description and discussion of the data. Results were presented on frequency tables, charts and graphs.

3.9 Model specification

The study used a multiple linear regression model of the form:

$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$, without the moderator, and

$Y = \beta_o + \beta_1 X_1 * Z + \beta_2 X_2 * Z + \beta_3 X_3 * Z + \beta_4 X_4 * Z + \varepsilon$, with the moderator

Where:

Y : Competitive Advantage

X_1 : Knowledge Management Capability

X_2 : Information Communication Technology Capability

X_3 : Physical Infrastructure Capability

X_4 : Curriculum Capability

Z : TVET's Macro Environment

β_0 : coefficient of intercept

$\beta_1 - \beta_4$: The corresponding coefficients for the respective independent variables for Dynamic Capabilities

ε : error term

The linear regression model is based on the following assumptions; randomness of the error term, assumption of zero mean of the error term, the assumption of constant variance and assumption of normality of the variables.

3.9.1 Measurement of Independent Variables

In this study, the independent variable of Dynamic Capabilities was measured in four indicators of: Knowledge Management, Information Communication Technology, Physical Infrastructure and Curriculum Capabilities. In Knowledge Management Capability, the study measured the various components of Knowledge development, Knowledge recombination and Knowledge use in the TVET Institutions in western region of Kenya. ICT Capability looked into the quality of digital options, degree of agility, and competitive actions of TVET Institutions in western region of Kenya. Physical Infrastructural Capability measured the Land available for Expansion, Plant and Equipments and Intellectual properties in TVET Institutions in western region of Kenya. Curriculum Capability focused on components of delivery modalities, content and time available for coverage. These indicators represented the dynamic capabilities of TVET Institutions.

3.9.2 Measurement of Dependent Variable

The dependent variable for this study is competitive advantage of TVET Institutions. In order to measure competitive advantage, the study focused on indicators of relevance to the labour market in terms of skills and knowledge; access to training with respect to admission criteria and funding for the system; and quality in terms of standardization, inclusion of soft skills and quality of delivery.

3.9.3 Measurement of Moderating Variables

The study considered the moderating variable of TVET's Macro Environment. Factors considered under the macro environment were Government policy on TVET: legislation and by-laws, National Economic Growth: per capita income and disposable income, Other Institutions of higher learning: admission requirements in terms of cut-off grades and fees charged, and Existing partnerships between TVET Institutions and the private sector: objectives and benefits.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This section presents the results and findings of the study according to the research objectives and hypotheses. Frequencies, mean and percentages were used to analyze data descriptively, while inferential statistics using regression analysis was conducted for the purpose of testing hypothesis and predicting the relationship between the dependent and independent variables.

4.2 Response Rate

A survey was conducted during November 2014- February 2015 covering TVET Institutions within the western region of Kenya. A total of 140 structured questionnaires were distributed to the principals and heads of departments/heads of sections of the 14 TVET Institutions targeted within the Western region of Kenya. Out of the 140 questionnaires, 101 were filled and returned. This represented 72% response rate. This response rate is considered satisfactory to make conclusions for the study. Mugenda and Mugenda (2003) observed that a 50% response rate is adequate, 60% good and above 70% rated very good. The response rate of 72% is therefore very good.

The recorded high response rate can be attributed to the data collection procedure, where the researcher obtained a research permit from National Commission for Science, Technology and Innovation (NACOSTI), pre-notified the potential participants of the intended survey, utilized a self administered questionnaire where the respondents completed the questionnaires which were picked shortly after, and made follow up calls to clarify queries as well as prompt respondents to fill the questionnaires.

4.2.1 Response according to TVET Institutions

There was a hundred percent response to the questions. Majority of the respondents were in the Kisumu National polytechnic 11(10.9%). This is because the polytechnic has more departments unlike some TVET Institutes which have fewer departments having merged operations of some departments or just being newly established. Gusii, and Sang'alo Institutes of technology followed with 9(9.9%), and 8(8.9%) respectively. RIAT, Bushiangala and Matili both had 8(7.9%). Shamberere TTI had 7(6.9%), while both Siaya, Sigalagala, Mawego, Bumbe and Friends College Kaimosi had 6(5.9%). The least response was fron Keroka at 4(4.0%).

Table 4. 1: Response according to TVET Institutions

	Frequency	Valid Percentage
Bumbe TTI	6	5.9
Bushiangala TTI	8	7.9
Friends college K	6	5.9
Gusii IT	10	9.9
Keroka TTI	4	4.0
Kisiwa TTI	6	5.9
Kisumu polytechnic	11	10.9
Matili TTI	8	7.9
Mawego TTI	6	5.9
RIAT	8	7.9
Sang'alo IT	9	8.9
Shamberere TTI	7	6.9
Siaya IT	6	5.9
Sigalagala TTI	6	5.9
Total	101	100.0

4.2.2 Response by Position held

Most of the respondents at 84.2% (85) were heads of academic departments/sections. 8.9% (9) were Deputy Principals and 2% (2) were registrars both representing the office of the principal. The response from principals was at 5% (5). The low participation of principals was due to tight schedules they operate in and the created environment of work delegation.

Table 4. 2: Position held by respondent

	Frequency	Percent	Cumulative Percent
Deputy Principal	9	8.9	8.9
Head of department	85	84.2	93.1
Principal	5	5.0	98.0
Registrar	2	2.0	100.0
Total	101	100.0	

4.2.3 Response by length of service

Most of the respondents had worked at their current designations for less than four years 65.3% (66). This was followed by 5-10 years at 25.7% (26). Only two, 9 % (9) respondents had worked with the Institutions for more than ten years.

Table 4. 3: Response according to number of years in that position

Length of service in years	frequency	Percent	Cumulative %
Less than one year	0	0	0
1-4	66	65.3	65.3
5-10	**26**	25.7	91.0
10 and above	**09**	9.0	100.0
Total	101	100	

4.2.4 Response by gender

Out of the 101 respondents, 66.3% (67) were male while 33.7% (34) were female from the sampled TVET Institutions in western region of Kenya as provided in table below.

Table 4. 4: Response according to gender

	Frequency	Percent	Cumulative Percent
male	67	66.3	66.3
female	34	33.7	100.0
Total	101	100.0	

4.2.5 Response according to Education level of respondent

Most of the respondents at 53.5% were holders of degree while 23.8% had post graduate level, 13.9% diploma level and 8.9% diploma level.

Table 4. 5: Response according to Education level

	Frequency	Percent	Cumulative Percent
Diploma	14	13.9	13.9
Higher National diploma	9	8.9	22.8
Degree	54	53.5	76.2
Post graduate degree	24	23.8	100.0
Total	101	100.0	

4.2.6 Response on Number of Employees

Most of the TVET Institutions within the western region of Kenya have a combined workforce of teaching and non teaching staff between 50- 199 78.2% (79), followed by 200- 299 at 20.8% (21). Only 1% (1) indicated a staff population of between 300- 499.

Table 4. 6: Number of Employees

	Frequency	Percent	Cumulative Percent
50-199	79	78.2	78.2
200-299	21	20.8	99.0
300-499	1	1.0	100.0
Total	101	100.0	

4.2.7 Response on Type of Ownership of TVET Institution

All the 14 TVET Institutions survey were wholly owned by the Republic of Kenya at 100% (101) response.

Table 4. 7: Type of ownership of TVET

	Frequency	Percent	Cumulative Percent
state owned	101	100.0	100.0

4.3 Pilot study results

The main purpose of conducting a pilot study was to detect and remedy any possible errors in questionnaire design prior to administering the main survey (Cavana, Delahaye & Sekeran 2001; Malhotra 2004; Polit, Beck & Hungler 2005) and typically, to refine and revise the questionnaire to help ensure the validity and reliability of the measures, as well as making it more user-friendly (Flynn *et al.* 1990). In addition, the pre-test was also used to estimate response rates for the questionnaire and determine the sample size of the main study.

Once the research instruments were finalized, they were tried out on a sample of eleven (11) respondents selected outside the study population but with similar characteristics to the actual study population. For this study, the pilot test for the instruments was carried out at the Rift Valley Technical Training Institute in Eldoret, Uasin Gishu County-Kenya. The rule of thumb is that 1% of the sample should constitute the pilot test (Cooper & Schilder, 2011).

In terms of a pilot sample, Hunt, Parkman & Wilcox (1982) and Green, Tull & Albaum (1988) share the opinion that pre-test subjects should be as similar as possible to the final group, representative but with extreme as well as typical respondents, or more succinctly, should mirror the composition of the main survey.

4.3.1 Reliability and validity of research instrument.

To provide a preliminary evaluation and refinement of the measurement scales of the draft questionnaire, coefficient alpha was calculated to assess the reliability of composite variables. SPSS software version 21.0 was employed to conduct these analyses. The reliability of a measure is the consistency of the results each time the same thing is measured using Coefficient (or Cronbach's) alpha (Hair *et al.* 2006). Coefficient alpha is "an index of the internal consistency of the items" and also "a useful estimate of reliability" (Gregory 2000). Reliability will be high if the scale items are highly correlated. As a standard of reliability, values of coefficient alpha above 0.70 are considered to represent acceptable reliability, those above 0.80 to represent good reliability, and those above 0.90 to represent excellent reliability, (Mugenda & Mugenda 2003, Hair *et al.* 2006). Reliability of the instrument was carried out using Cronbach's alpha constant which is a measure of internal consistency and average correlation. Cronbach constant test was carried out for every variable as shown in table 4.8

The variable Knowledge Management Capability had four factors. Reliability test was carried out on the instrument and Cronbach constant was 0.812 which was above the threshold. Items on variable ICT Capability did not require any adjustment since the alpha constant was 0.924 which represented excellent reliability. For Physical Infrastructure capability alpha constant

was 0.844. However, for Curriculum Capability, alpha constant was 0.591 which is far much below 0.7. After removing factor one the reliability increased to 0.809 which was above the threshold. TVET's Macro Environment had an alpha constant of 0.82 considered very good . Table 4.8 shows the summery of the finding based on the reliability of the research instrument and the overall Cronbach's constant was 0.860 hence the instrument was reliable.

Table 4. 8: Reliability of Instruments

		Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
Knowledge management capability	Acquisition process	.842	6	.842	6
	Conversion process	.775	6	.775	6
	Application process	.930	7	.930	7
	Competitive advantage	.701	5	.701	5
ICT capability	ICT infrastructure	.923	7	.923	7
	ICT personnel	.927	6	.927	6
	ICT Management	.940	9	.940	9
	ICT Support	.941	9	.941	9
	ICT Adaptive	.961	10	.961	10
	Competitive advantage	.851	4	.851	4
Physical infrastructural capability	Physical infrastructure	.872	11	.872	11
	Physical infrastructure Competitive advantage	.816	4	.816	4
Curriculum capabilities	Curriculum	.848	8	.848	8
	Competitive advantage	.334	4	.770	3
TVET's Macro Environment	Government Policy	.868	6	.868	6
	Economic growth	.634	3	.734	2
	Existing partnership	.903	5	.903	5
	Other institution of higher learning	.875	5	.875	5
Average		.830		.860	

Validity refers to the accuracy and meaningfulness of inferences, which are based on research results (Mugenda & Mugenda, 2003). Validity therefore, has to do with how accurately the data obtained in the study represents the variables of the study. The study applied content/construct and face validity. Construct validity was assessed through various forms of correlation analysis

from the results obtained in pilot tests. Validity test was done on the research instrument using a method of Principal Component Analysis (PCA) to extract the factors. The findings are summarized in table 4.9 to table 4.24.

Table 4. 9: Factor Loadings for Knowledge Management Capabilities-Acquisition process

Knowledge Management Acquisition process	Initial	**Factor Loadings**
Our institution has processes for acquiring knowledge about our customers	1.000	.580
Our institution has processes for generating new knowledge from existing knowledge	1.000	.631
Our institution has processes for acquiring knowledge about our suppliers	1.000	.584
Our institution has processes for distributing knowledge throughout the organization	1.000	.288
Our institution has processes for acquiring knowledge about new products/services within our industry	1.000	.679
Our institution has processes for exchanging knowledge between individuals	1.000	.606

Extraction Method: Principal Component Analysis.

The sub-variable Knowledge management acquisition process had 6 items as originally compiled. However one item with loadings less than 0.40 was discarded see Table 4.9. Therefore 5 factors for knowledge management acquisition process with factor loadings between 0.58 and 0.679 were considered valid for the constructs represented.

Table 4. 10: Factor Loadings for Knowledge Management Capabilities-Conversion process

Knowledge Management Conversion process	Initial	**Factor Loadings**
Our institution has processes for filtering knowledge	1.000	.271
Our institution has processes for transfering organizational knowledge to individuals	1.000	.500
Our institution has processes for absorbing knowledge from individuals into the organization	1.000	.490
Our institution has processes for integrating different sources and types of knowledge	1.000	.511
Our institution has processes for storing knowledge	1.000	.536
Our institution has processes for replacing outdated knowledge	1.000	.530

Extraction Method: Principal Component Analysis.

The sub-variable Knowledge management conversion process had 6 items as originally compiled. However one item with loadings less than 0.40 was discarded see Table 4.10. Therefore 5 factors for knowledge management conversion process with factor loadings between 0.49 and 0.536 were considered valid for the constructs represented.

Table 4. 11: Factor Loadings for Knowledge Management Capabilities-Application process

Knowledge Management Application process	Initial	**Factor Loadings**
Our institution has processes for using new knowledge in development of products/services	1.000	.607
Our institution has processes for using new knowledge to solve problems	1.000	.704
Our institution matches sources of new knowledge to problems and challenges	1.000	.593
Our institution uses new knowledge to improve efficiency	1.000	.804
Our institution uses new knowledge to adjust strategic direction	1.000	.764
Our institution is able to locate and apply new knowledge to changing competitive conditions	1.000	.776

Our institution takes advantage of new knowledge	1.000	.706

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable knowledge management application process by using 7 items as indicated in table 4.11. All the 7 had factor loadings above 0.40 that is between 0.593 and 0.804. Therefore all were found to be valid enough for use in the study.

Table 4. 12: Factor Loadings for Knowledge Management Competitive Advantage

Knowledge Management competitive advantage	Initial	**Factor Loadings**
Our institution's knowledge management capability has led to knowledge-based innovations that meet job market demands	1.000	.414
Our institution's knowledge management capability can create strong barriers to entry for other institutions of higher learning competing for customers	1.000	.609
Our institution's knowledge management capability has widen the range of products we offer without increasing costs	1.000	.471
Our institution's knowledge management capability would be difficult and expensive for other learning institutions [to duplicate	1.000	.427
Our institution's knowledge management capability guarantees quality of graduates and access to training in terms of increased admissions	1.000	.340

Extraction Method: Principal Component Analysis.

The sub-variable Knowledge management competitive advantage had 5 items as originally compiled. However one item with loadings less than 0.40 was discarded see Table 4.12. Therefore 4 factors for knowledge management competitive advantage with factor loadings between 0.414 and 0.609 were considered valid for the constructs represented.

Table 4. 13: Factor Loadings for ICT Capabilities-Digital option

ICT digital option	Initial	**Factor Loadings**
Our institution has a high degree of system interconnectivity	1.000	.662
Our system is sufficiently flexible to incorporate electronic links to external parties	1.000	.644
Our organizational data is available to everyone in the institution in real time	1.000	.603
Our user interface provide transparent access to all platforms and applications	1.000	.737
Our institution makes intensive use of middleware to integrate key enterprise applications	1.000	.702
Our legacy systems within the institution incorporates the development of new IT applications	1.000	.705
Our IT functionality can be quickly added to critical applications	1.000	.746

Extraction Method: Principal Component Analysis.

From table 4.13, the study intended to measure the sub-variable ICT capabilities-digital option by using 7 items. All the 7 had factor loadings above 0.40 that is between 0.603 and 0.746. Therefore all were found to be valid enough for use in the study.

Table 4. 14: Factor Loadings for ICT Capabilities-Digital Agility (personnel capability)

ICT digital agility- personnel capability	Initial	**Factor Loadings**
Our institution can easily handle variations in data formats and standards	1.000	.515
Our IT personnel are cross-trained to support other IT services outside their domain	1.000	.709
Our IT personnel are skilled in multiple programming languages	1.000	.826
Our IT personnel are skilled in multiple operating systems	1.000	.804
Our IT personnel are knowledgeable about our IT projects	1.000	.752
Our IT personnel are knowledgeable about the key success factors in our institution	1.000	.815

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable ICT capabilities-digital agility (personnel capability) as in table 4.14 by using 6 items. All the 6 had factor loadings above 0.40 that is between 0.515 and 0.826. Therefore all were found to be valid enough for use in the study.

Table 4. 15: Factor Loadings for ICT Capabilities-Digital agility (management capability)

ICT Digital Agility-management capability	Initial	**Factor Loadings**
Our IT management understand the business environments they support	1.000	.656
Our IT management is up to date with the emerging business development	1.000	.697
Our IT management evaluates opportunities and risks from emerging technologies	1.000	.729
Our IT management contributes to our institutional strategy	1.000	.694
Our institution manages IT strategically	1.000	.691
There is a high degree of trust between our IT department and other departments/sections	1.000	.770
Critical information and knowledge that affect IT projects are shared freely between departments and IT department	1.000	.650
Our IT department and other departments understand the working environments of each other	1.000	.677
The goals and plans for IT projects are jointly developed by both the IT department and other departments	1.000	.544

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable ICT Capabilities-digital agility (management capability) as in table 4.15 by using 9 items. All the 9 had factor loadings above 0.40 that is between 0.544 and 0.770. Therefore all were found to be valid enough for use in the study.

Table 4. 16: Factor Loadings for ICT Capabilities-Competitive action for IT support

ICT Competitive Action for IT Support	Initial	**Factor Loadings**
Our IT management is able to interpret industry problems and develop solutions	1.000	.449
Our IT is utilized to redefine the scope of our business	1.000	.635
Our IT supports analyzing customer needs (i.e. products/services, preferences, costing and quality)	1.000	.704
Our IT is utilized to produce quality products/services	1.000	.771
Our IT is improving our operational efficiency	1.000	.686
Our IT supports our innovation processes	1.000	.744
Our IT supports our product development	1.000	.709
Our IT supports knowledge-sharing in the institution	1.000	.711
Our IT supports cross-functional integration in the institution	1.000	.727

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable ICT Capabilities-competitive action by using 9 items as in table 4.16. All the 9 had factor loadings above 0.40 that is between 0.449 and 0.771. Therefore all were found to be valid enough for use in the study.

Table 4. 17: Factor Loadings for ICT Capabilities-Competitive Action for adaptive IT

ICT Competitive Action for Adaptive IT	Initial	**Factor Loadings**
Our IT is able to adapt quickly to changes in the market and customer demands	1.000	.730
Our IT is able to adapt quickly to changes in the institution's products or services	1.000	.779
Our IT is able to develop new institutional products and services	1.000	.591
Our IT is able to adapt quickly to changes which can become necessary because of competition	1.000	.758
Our IT is utilized to increase the speed of responding to institutional opportunities/threats	1.000	.750
Our IT is able to adapt quickly to changes in business processes and organizational structures	1.000	.807
Our IT is able to adapt quickly to changes in knowledge-sharing in the institution	1.000	.739
Our IT is able to adapt quickly to changes in product development	1.000	.745
Our IT is able to adapt quickly to changes in the cross-functional integration of our institution	1.000	.765
Our IT is able to enhance strategic business process flexibility	1.000	.778

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable ICT capability-competitive action for adaptive IT using 10 items as in table 4.17. All the 10 had factor loadings above 0.40 that is between 0.591 and 0.807. Therefore all were found to be valid enough for use in the study.

Table 4. 18: Factor Loadings for ICT Competitive Advantage

ICT Competitive Advantage	Initial	**Factor Loadings**
Our IT related innovations have increased the quality of training and quality of our products	1.000	.553
Our IT systems have been seamless and increased access to training	1.000	.714
Our graduates has been widely accepted in the industries because they poses industry-relevant IT skills	1.000	.737
Our IT systems has led enabled us achieve standardization in training acceptable globally	1.000	.771

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable ICT competitive advantage by using 4 items as in table 4.18. All the 4 had factor loadings above 0.40 that is between 0.553 and 0.771. Therefore all were found to be valid enough for use in the study.

Table 4. 19: Factor Loadings for Physical Infrastructural Capabilities

Physical Infrastructural	Initial	**Factor Loadings**
Our workshops are well equipped with relevant and modern tools and machinery	1.000	.760
Our laboratories are well equipped with relevant and modern training facilities	1.000	.812
Our library is well stocked with modern facilities and has the capacity to accommodate current students population	1.000	.558
Our institution has enough space for future expansion	1.000	.744
Our physical aesthetics is outstanding and projects an educational image	1.000	.623
Our recreational facilities are adequate and modern	1.000	.502
Our available land has been put into productive use to supplement our budget through income generating activities	1.000	.592
Our institution has processes to protect knowledge-based innovations from theft	1.000	.716
Our institution has extensive policies and procedures for protecting intellectual properties	1.000	.800
Our institution values and protects knowledge embedded in individuals	1.000	.784
Our institution clearly communicates the importance of protecting knowledge	1.000	.669

Extraction Method: Principal Component Analysis.

The study intended to measure the variable physical Infrastructural capabilities by using 11 items as in table 4.19. All the 11 had factor loadings above 0.40 that is between 0.502 and 0.812. Therefore all were found to be valid enough for use in the study.

Table 4. 20: Factor Loadings for Physical Infrastructure Competitive Advantage

Physical Infrastructural Competitive Advantage	Initial	**Factor Loadings**
Our institution's physical infrastructural capability has sustained our finances and reduced our dependence on external funding mainly from income generating activities from our farm	1.000	.572
Our institution's physical infrastructural capability provides room for increased access to training	1.000	.653
Our institution's physical infrastructural capability has made our products superior in terms of knowledge and skills and thus become relevant to market demands due to the protection of intellectual properties	1.000	.702
Our institution's physical infrastructural capability supports quality training particularly from plants and equipments which are modern	1.000	.663

Extraction Method: Principal Component Analysis.

The study intended to measure the sub-variable physical infrastructure competitive advantage by using 4 items as in table 4.20. All the 4 had factor loadings above 0.40 that is between 0.572 and 0.702. Therefore all were found to be valid enough for use in the study.

Table 4. 21: Factor Loadings for Curriculum Capabilities

Curriculum Capabilities	Initial	**Factor Loadings**
Our institution uses syllabus that is rated highly within the TVET sector and job market	1.000	.602
Our institution uses syllabus that has been developed in collaboration with the stakeholders	1.000	.587
Our institution has adopted a learner centered methodology of syllabus coverage	1.000	.845
Our institution has highly incorporated practical experiencing in students training	1.000	.679
Our institution has fully integrated ICT in its training delivery	1.000	.698
Our institution has a broad and progressive content syllabus	1.000	.699
Our institution has partnered with the industry to continually review the existing syllabi	1.000	.582
Our institution uses modularized syllabus that allows flexible entry and exit modalities	1.000	.571

Extraction Method: Principal Component Analysis.

The study intended to measure the variable curriculum capabilities by using 8 items as in table 4.21. All the 8 had factor loadings above 0.40 that is between 0.571 and 0.845. Therefore all were found to be valid enough for use in the study.

Table 4. 22: Factor Loadings for Curriculum Capabilities competitive advantage

Curriculum Capabilities and Competitive Advantage	Initial	**Factor Loadings**
Our institution's curriculum has included soft skills in its content	1.000	.669
Our institution's curriculum passes out graduates who meet industry needs in terms of skills and knowledge	1.000	.652
Our institution's curriculum leads to standardized skills and knowledge of graduates applicable globally	1.000	.213
Our institution's curriculum allows for ease of entry for new admissions	1.000	.648

Extraction Method: Principal Component Analysis.

The sub-variable curriculum competitive advantage had 4 items as originally compiled. However one item with loadings less than 0.40 was discarded see Table 4.22. Therefore 3 factors for curriculum competitive advantage with factor loadings between 0.648and 0.669 were considered valid for the constructs represented.

Table 4. 23: Factor Loadings for TVET's Macro Environment

Government policy	Initial	**Factor Loadings**
The current government policy on TVET supports the acquisition and development of physical infrastructure	1.000	.640
The current government policy on TVET supports increased funding to the TVET sub-sector	1.000	.445
The current government policy on TVET supports the acquisition, conversion and application of knowledge	1.000	.651
The current government policy on TVET supports the development of ICT infrastructure	1.000	.767
The current government policy on TVET supports the establishment of distinct TVET programs from those offered by other institutions of higher learning	1.000	.691
The current government policy on TVET supports partnerships between TVET institutions and the industry	1.000	.504
Economic Growth	Initial	**Factor Loadings**
The current Kenyan economic growth supports the establishment of small and medium enterprises that requires manpower from TVET institutions	1.000	.628
The current Kenyan economic growth has guaranteed a sustainable disposable income to parents/guardians in the catchment area of our institution that allows uninterrupted fee payment	1.000	.628
Existing partnerships	Initial	**Factor Loadings**

Our institution has signed a number of collaborative agreements with the industry to support our core mandate	1.000	.752
The existing partnerships have led to quality graduates that meet the labour market requirements	1.000	.815
The partnerships have been a source of financing to our institution thereby making training accessible	1.000	.552
Existing partnerships have contributed greatly towards skills and knowledge transfer to our institution	1.000	.783
Existing partnerships has led to quality of delivery, standardization and the inclusion of soft skills to training	1.000	.714
Other Institutions of Higher Learning	Initial	**Factor Loadings**
Other institutions of higher learning have developed strong dynamic capabilities than our institution	1.000	.443
Other institutions of higher learning passes out graduates with more relevant skills and knowledge to the job market than our institution	1.000	.802
Other institutions of higher learning has standardized training programs rich in quality than our institution	1.000	.807
Other institutions of higher learning has a secure and uninterrupted funding options than our institution	1.000	.749
Other institutions of higher learning has admission requirements that erodes our customer base in terms of cut-off grades	1.000	.567

Extraction Method: Principal Component Analysis.

From table 4.23, the study intended to measure the sub-variable TVET's Macro Environment-Government policy by using 6 items. All the 6 had factor loadings above 0.40 that is between

0.445 and 0.845. Therefore all were found to be valid enough for use in the study. The sub-variable TVET's Macro Environment-Economic Growth in table 4.23 was measured by using 2 items. All the 2 had factor loadings above 0.40 that is 0.628 which was found to be valid enough for use in the study. The sub-variable TVET's Macro Environment-Existing partnerships in table 4.23 was measured by using 5 items. All the 5 had factor loadings above 0.40 that is between 0.552 and 0.815. Therefore all were found to be valid enough for use in the study. The sub-variable TVET's Macro Environment-Other Institutions of Higher Learning in table 4.23 was measured by using 5 items. All the 5 had factor loadings above 0.40 that is between 0.443 and 0.807. Therefore all were found to be valid enough for use in the study.

4.3.2 Factor Analysis

Factor Extraction

Factor extraction can be described as the process of determining the linear components within the data set (eigenvectors) by obtaining eigenvalues associated with the factors. Factor extraction help in obtaining those factors which are more important and discarding the less important ones Kaiser (1960). This is done by looking at the Eigenvalues. Eigeinvalues greater than 1 are considered to be more important than those with values below 1.

Table 4. 24: Total Variance Explained for Knowledge Management Acquisition process

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.369	56.148	56.148	3.369	56.148	56.148
2	.807	13.455	69.603			
3	.673	11.225	80.828			
4	.533	8.888	89.716			
5	.366	6.098	95.814			
6	.251	4.186	100.000			

Extraction Method: Principal Component Analysis.

Table 4.24 shows total variation explained factors under knowledge management capabilities mainly knowledge management acquisition process. From the table only one factor was extracted out of the factors with cumulative percentages of 56.15%.

Table 4. 25: Total Variance Explained for Knowledge Management Conversion process

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.838	47.307	47.307	2.838	47.307	47.307
2	.860	14.329	61.636			
3	.787	13.109	74.745			
4	.684	11.407	86.152			
5	.509	8.489	94.641			
6	.322	5.359	100.000			

Extraction Method: Principal Component analysis

Table 4.25 shows total variation explained factors under knowledge management capabilities mainly knowledge management conversion process. From the table only one factor was extracted out of the factors with cumulative percentages of 47.31%.

Table 4. 26: Total Variance Explained for Knowledge Management Application process

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.956	70.794	70.794	4.956	70.794	70.794
2	.666	9.510	80.303			
3	.459	6.555	86.859			
4	.355	5.071	91.930			
5	.242	3.453	95.383			
6	.187	2.665	98.049			
7	.137	1.951	100.000			

Extraction Method: Principal Component Analysis.

Table 4.26 shows total variation explained factors under knowledge management capabilities mainly knowledge management application process. From the table only one factor was extracted out of the factors with cumulative percentages of 70.8%.

Table 4. 27: Total Variance Explained for Knowledge Management Competitive advantage

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.262	45.238	45.238	2.262	45.238	45.238
2	.863	17.262	62.501			
3	.802	16.033	78.534			
4	.593	11.853	90.387			
5	.481	9.613	100.000			

Extraction Method: Principal Component Analysis.

Table 4.27 shows total variation explained factors under knowledge management competitive advantage. From the table only one factor was extracted out of the factors with cumulative percentages of 45.24%.

Table 4. 28: Total Variance Explained for ICT Capability- Digital Option

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.800	68.572	68.572	4.800	68.572	68.572
2	.780	11.144	79.716			
3	.558	7.977	87.693			
4	.278	3.971	91.664			
5	.232	3.314	94.978			
6	.206	2.937	97.915			
7	.146	2.085	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.28 shows total variation explained factors under ICT Capabilities mainly ICT digital option. From the table, only one factor was extracted with a cumulative factor loadings of 68.57%.

Table 4. 29: Total Variance Explained for ICT Capability -Digital Agility (Personnel capability)

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.420	73.666	73.666	4.420	73.666	73.666
2	.588	9.807	83.473			
3	.378	6.294	89.767			
4	.240	4.002	93.769			
5	.207	3.442	97.211			
6	.167	2.789	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.29 shows total variation explained factors under ICT Capabilities mainly ICT digital agility- personnel capability. From the table, only one factor was extracted with a cumulative factor loadings of 73.7%.

Table 4. 30: Total Variance Explained for ICT Digital Agility (Management Capability)

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.136	68.176	68.176	6.136	68.176	68.176
2	.964	10.716	78.892			
3	.624	6.934	85.825			
4	.312	3.462	89.287			
5	.270	2.998	92.285			
6	.230	2.554	94.839			
7	.192	2.136	96.975			
8	.185	2.060	99.035			
9	.087	.965	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.30 shows total variation explained factors under ICT Capabilities mainly ICT digital agility- management capability. From the table, only one factor was extracted with a cumulative factor loadings of 68.2%.

Table 4. 31: Total Variance Explained for ICT Capability-competitive action (IT support)

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.136	68.176	68.176	6.136	68.176	68.176
2	.964	10.716	78.892			
3	.624	6.934	85.825			
4	.312	3.462	89.287			
5	.270	2.998	92.285			
6	.230	2.554	94.839			
7	.192	2.136	96.975			
8	.185	2.060	99.035			
9	.087	.965	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.31 shows total variation explained factors under ICT Capabilities mainly competitive action for IT support for market and operational competence. From the table, only one factor was extracted with a cumulative factor loadings of 68.18%.

Table 4. 32: Total Variance Explained for ICT Capability- competitive action (Adaptive IT)

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.443	74.426	74.426	7.443	74.426	74.426
2	.633	6.330	80.756			
3	.522	5.216	85.972			
4	.354	3.543	89.515			
5	.259	2.594	92.109			
6	.245	2.455	94.564			
7	.217	2.170	96.734			
8	.138	1.380	98.114			
9	.116	1.160	99.274			
10	.073	.726	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.32 shows total variation explained factors under ICT Capabilities mainly competitive action fot adaptive IT capability. From the table, only one factor was extracted with a cumulative factor loadings of 74.4%.

Table 4. 33: Total Variance Explained for ICT Competitive Advantage

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.775	69.383	69.383	2.775	69.383	69.383
2	.611	15.273	84.656			
3	.378	9.456	94.112			
4	.236	5.888	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.33 shows total variation explained factors under ICT Capabilities and competitive advantage. From the table, only one factor was extracted with a cumulative factor loadings of 69.4%.

Table 4. 34: Total Variance Explained for Physical Infrastructural Capabilities

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.997	45.429	45.429	4.997	45.429	45.429
2	1.456	13.236	58.664	1.456	13.236	58.664
3	1.109	10.081	68.745	1.109	10.081	68.745
4	.806	7.325	76.070			
5	.570	5.183	81.253			
6	.534	4.853	86.106			
7	.465	4.224	90.330			
8	.436	3.964	94.293			
9	.242	2.204	96.498			
10	.213	1.936	98.434			
11	.172	1.566	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.34 shows total variation explained factors under physical infrastructural capabilities. From the table, three factors were extracted from Physical Infrastructural capabilities having cumulative factor loadings of 45.4%, 58.66% and 68.75% respectively.

Table 4. 35: Total Variance Explained for Physical Infrastructure competitive advantage

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.591	64.767	64.767	2.591	64.767	64.767
2	.580	14.503	79.271			
3	.456	11.411	90.681			
4	.373	9.319	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.35 shows total variation explained factors under physical infrastructural capabilities and competitive advantage. Only one factor was extracted with a cumulative factor loadings of 64.77%.

Table 4. 36: Total Variance Explained for Curriculum capabilities

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.074	50.923	50.923	4.074	50.923	50.923
2	1.188	14.854	65.776	1.188	14.854	65.776
3	.776	9.703	75.480			
4	.598	7.478	82.958			
5	.459	5.742	88.700			
6	.377	4.707	93.406			
7	.323	4.035	97.441			
8	.205	2.559	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.36 shows total variation explained factors under curriculum capabilities. From the table, two factors were extracted having cumulative percentages of 50.9% and 65.78% respectively.

Table 4. 37: Total Variance Explained for Curriculum Competitive Advantage

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.183	54.564	54.564	2.183	54.564	54.564
2	.923	23.073	77.637			
3	.544	13.611	91.248			
4	.350	8.752	100.000			

Extraction Method: Principal Component Analysis.

Tables 4.37 shows total variation explained factors under curriculum competitive advantage. From the table, only one factor was extracted having cumulative percentage of 54.56%.

Table 4. 38: Total Variance Explained for TVET's Macro Environment –Government policy

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.697	61.623	61.623	3.697	61.623	61.623
2	.730	12.158	73.781			
3	.521	8.678	82.459			
4	.428	7.125	89.584			
5	.404	6.736	96.321			
6	.221	3.679	100.000			

Extraction Method: Principal Component Analysis.

Table 4.38 shows total variation explained factors under TVET's Macro Environment particularly Government policy. From the table, only one factor was extracted having a cumulative percentage of 61.6%.

Table 4. 39: Total Variance Explained for TVET's Macro Environment- Economic Growth

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.257	62.840	62.840	1.257	62.840	62.840
2	.743	37.160	100.000			

Extraction Method: Principal Component Analysis.

Table 4.39 shows total variation explained factors under TVET's Macro Environment particularly Economic Growth. From the table, only one factor was extracted having a cumulative percentage of 62.8%.

Table 4. 40: Total Variance Explained for TVET's Macro Environment- Existing partnerships

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.616	72.316	72.316	3.616	72.316	72.316
2	.602	12.034	84.350			
3	.356	7.119	91.469			
4	.227	4.531	95.999			
5	.200	4.001	100.000			

Extraction Method: Principal Component Analysis.

Table 4.40 shows total variation explained factors under TVET's Macro Environment particularly Existing partnerships. From the table, only one factor was extracted having a cumulative percentage of 72.32%.

Table 4. 41: Total Variance Explained for TVET's Macro Environment- Other Institutions of Higher Learning

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.367	67.347	67.347	3.367	67.347	67.347
2	.731	14.614	81.961			
3	.396	7.926	89.887			
4	.318	6.365	96.252			
5	.187	3.748	100.000			

Extraction Method: Principal Component Analysis.

Table 4.41 shows total variation explained factors under TVET's Macro Environment particularly Other institutions of higher learning. From the table, only one factor was extracted having a cumulative percentage of 67.35%.

4.4 Multicollinearity Test

Factor analysis was conducted to ascertain the suitability of all the factors observed within the five variables. First correlation matrix was obtained for all the factors and scrutinized for chances of Multicollinearity. Correlation matrix gives the correlation coefficients between a single factor and every other factor in the investigation. The correlation coefficient between a factor and itself is always 1; hence the principal diagonal of the correlation matrix contains 1s. This therefore means it is an identity matrix (Kothari 2009). According to Tables of correlation

Matrices in table 4.76 without moderator and table 4.77 with moderator, there was no Multicollinearity amongst the observed factors for the variable under investigation and the matrices were also identify matrices. Further analysis using the determinants of the correlation matrices shown at the foot of each table indicates that the matrices obtained were all identity matrices since the determinants were all greater than 0.00001, so there was no problem of Multicollinearity for all the variables.

4.4.1 Identity Correlation Matrix Test (Bartlett's test of Sphericity)

Bartlett's test indicates the strength of the relationship among variables. It tests the null hypothesis that the correlation matrices in table 4.76 were identity matrices. An identity matrix is one in which all of the diagonal elements are 1 and all off diagonal elements are 0 (Kothari 2009). From table 4.42, we can see that the Bartlett's test of Sphericity is significant since all the p-values were less than 0.05. This means that correlation matrices in tables 4.76 and table 4.77 were all identity matrices. The correlation matrices for all the variables have the diagonal elements as one and off diagonal have the significance of 0.

4.4.2 Sample adequacy test (Kaiser-Meyer- Olkin (KMO))

The sample adequacy was measured using the Kaiser-Meyer- Olkin (KMO) test. The sampling adequacy should be greater than 0.5 for a satisfactory factor analysis to proceed. A common rule is that a researcher should have 10 – 15 participants per variable. A factor analysis is inappropriate when the sample size is below 50 (Fiedel 2005). Kaiser (1974) recommends 0.5 as minimum (barely accepted), values between 0.7- 0.8 acceptable, and values above 0.9 are superb. From table 4.42, the sample was acceptable since the KMO values were mainly

between 0.727 and 0.918. The least value was 0.500 which was within the barely acceptable minimum of 0.5.

Table 4. 42: Sample size adequacy test

Knowledge management capability		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.803
	Bartlett's Test of Sphericity	Approx. Chi-Square	234.22
		df	15
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.729
	Bartlett's Test of Sphericity	Approx. Chi-Square	149.288
		df	15
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.881
	Bartlett's Test of Sphericity	Approx. Chi-Square	547.272
		df	21
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.727
	Bartlett's Test of Sphericity	Approx. Chi-Square	78.763
		df	10
		Sig.	.000
ICT capability		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.865
	Bartlett's Test of Sphericity	Approx. Chi-Square	528.050
		df	21
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.904
	Bartlett's Test of Sphericity	Approx. Chi-Square	467.343
		df	15
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.918
	Bartlett's Test of Sphericity	Approx. Chi-Square	701.375
		df	36
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.883
	Bartlett's Test of Sphericity	Approx. Chi-Square	809.534
		df	36
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.903
	Bartlett's Test of Sphericity	Approx. Chi-Square	1071.185
		df	45
		Sig.	.000
		Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.771
	Bartlett's Test of Sphericity	Approx. Chi-Square	184.921
		df	6

		Sig.	.000
Physical infrastructure capability	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.829
	Bartlett's Test of Sphericity	Approx. Chi-Square	538.281
		df	55
		Sig.	.000
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.789
	Bartlett's Test of Sphericity	Approx. Chi-Square	133.419
		df	6
		Sig.	.000
Curriculum capabilities	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.827
	Bartlett's Test of Sphericity	Approx. Chi-Square	353.341
		df	28
		Sig.	.000
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.652
	Bartlett's Test of Sphericity	Approx. Chi-Square	93.654
		df	6
		Sig.	.000
Macro Environment	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.865
	Bartlett's Test of Sphericity	Approx. Chi-Square	284.385
		df	15
		Sig.	.000
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
	Bartlett's Test of Sphericity	Approx. Chi-Square	6.720
		df	1
		Sig.	.010
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.853
	Bartlett's Test of Sphericity	Approx. Chi-Square	326.610
		df	10
		Sig.	.000
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.841
	Bartlett's Test of Sphericity	Approx. Chi-Square	277.350
		df	10
		Sig.	.000

4.5 Normality test

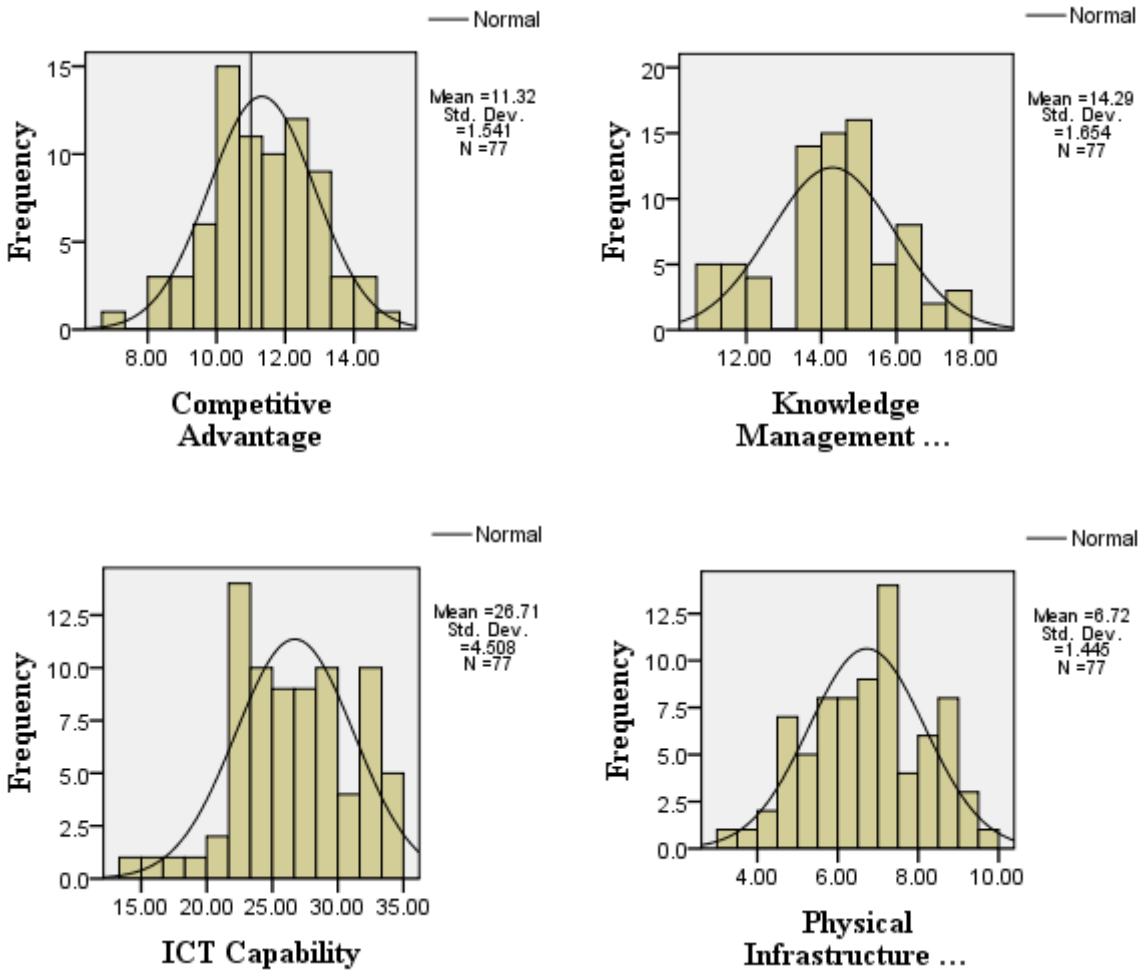
Skewness and Kurtosis test for normality

The study sought to find out how well the distribution could be approximated using the normal distribution. Consequently skewness and Kurtosis was employed as shown in table 4.43. Skewness measures the deviation of distribution from symmetry and Kurtosis measures 'peakness' of the distribution (Ming'ala 2002). The values of skewness and Kurtosis should be zero in normal distribution (field 2009). Z score values for both skewness and kurtosis normally fall within -1.96 and +1.96 if P-values are 0.05 for normally distributed data. From the finding as indicated on table 4.43 it is evident that all the data for the four variables were normally distributed.

Table 4. 43: Skewness and Kurtosis

Variables		Descriptive	Statistic	Std. Error	Z score
Knowledge Management Capability	Macro	Std. Deviation	1.65389		
		Skewness	-.230	.274	
		Kurtosis	-.247	.541	
ICT Capability		Std. Deviation	4.50818		
		Skewness	.173	.274	
		Kurtosis	.365	.541	
Physical Infrastructure Capability		Std. Deviation	1.44479		
		Skewness	-.092	.274	
		Kurtosis	-.705	.541	
Curriculum Capability		Std. Deviation	0.65091		
		Skewness	-.397	.274	
		Kurtosis	.056	.541	
TVET's Environment		Std. Deviation	1.36160		
		Skewness	-.113	.274	
		Kurtosis	-.651	.541	
Competitive Advantage		Std. Deviation	1.54148		
		Skewness	-.138	.274	
		Kurtosis	-.163	.541	

Although it is assumed in multiple linear regression that the residuals are distributed normally, it is a good idea before drawing final conclusions to review the distributions of major variables of interest (Ming'ala, 2002). Histograms are a good way of getting an instant picture of the distribution of data (Field 2009). Therefore histograms were also employed in the study to test for normality on the data analysis that was used in the study that is; t- test, regression and ANOVA was based on the assumption that the data were sampled from a Gaussian distribution (Indiana, 2011). The researcher made the evaluation by checking how far the data deviated from a bell- shaped normal distribution.



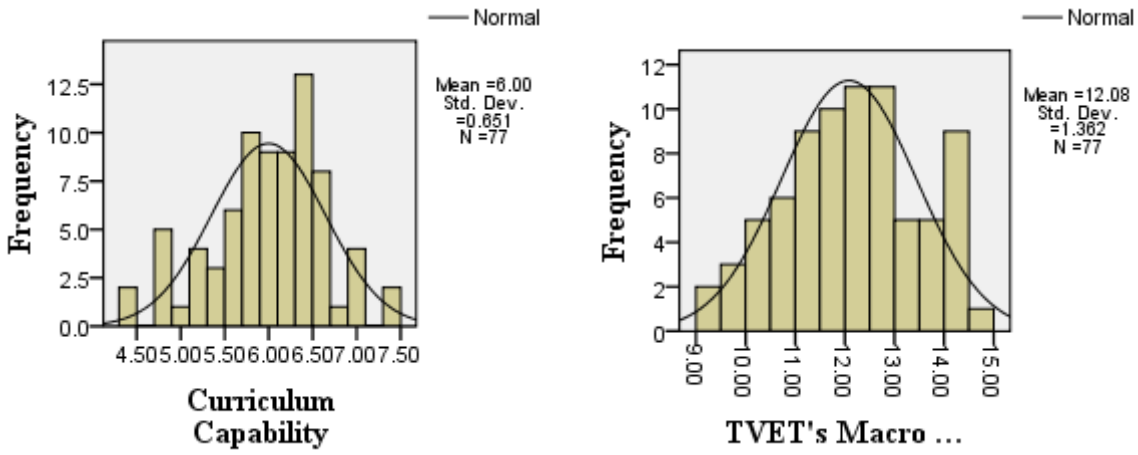


Figure 4. 1: Histogram for normality test

Kolmogorov- Smirnov and Shapiro Wilk test for Normality

Kolmogorov- Smirnov and Shapiro Wilk test was also used to test the normality of all the variables. They compare the scores in the samples and check whether they have the same mean or standard deviation. In the finding, the p- values were greater than 0.05, showing that the distributions were normally distributed for the case of Shapiro-Wilk. On the other hand Kolmogorov- smirnov test also shows that all the variables were normally distributed since the p- values were greater than 0.05. The details of the findings are shown in table 4.44.

Table 4. 44: Kolmogorov-Smirnov and Shapiro-Wilk

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CA	.063	77	.200*	.993	77	.941
KMC	.113	77	.061	.971	77	.072
ICTC	.074	77	.200*	.975	77	.141
PIC	.060	77	.200*	.979	77	.241
CC	.108	77	.210	.968	77	.052
TVET's Macro Environment	.063	77	.200*	.980	77	.257

Outliers test

An outlier may be described as any observation far from the rest of other observation. The presence of outlier in any given data may make the data not to assume Gaussian condition that is normality condition. It is therefore important to test the presence of outliers in any given data and even remove them for normality condition to be satisfied. In this study the outliers presence was tested using box plot and the findings were given in the table 4.45.

Table 4. 45: Outliers detected

Variables	Position of observed outliers	Total number of outliers
Knowledge Management Capability	19,25,28,35,40,49,83,85	8
ICT Capability	16,96,97,99,101	5
Physical Infrastructure Capability	-	0
Curriculum Capability	5,10,17,20,25,27,49,54,65	9
TVET's Macro Environment	10,47,48,49	4
Competitive Advantage	49,51,78	3

The figures below show Box plots after removing outliers. Only Physical Infrastructure had no outlier.

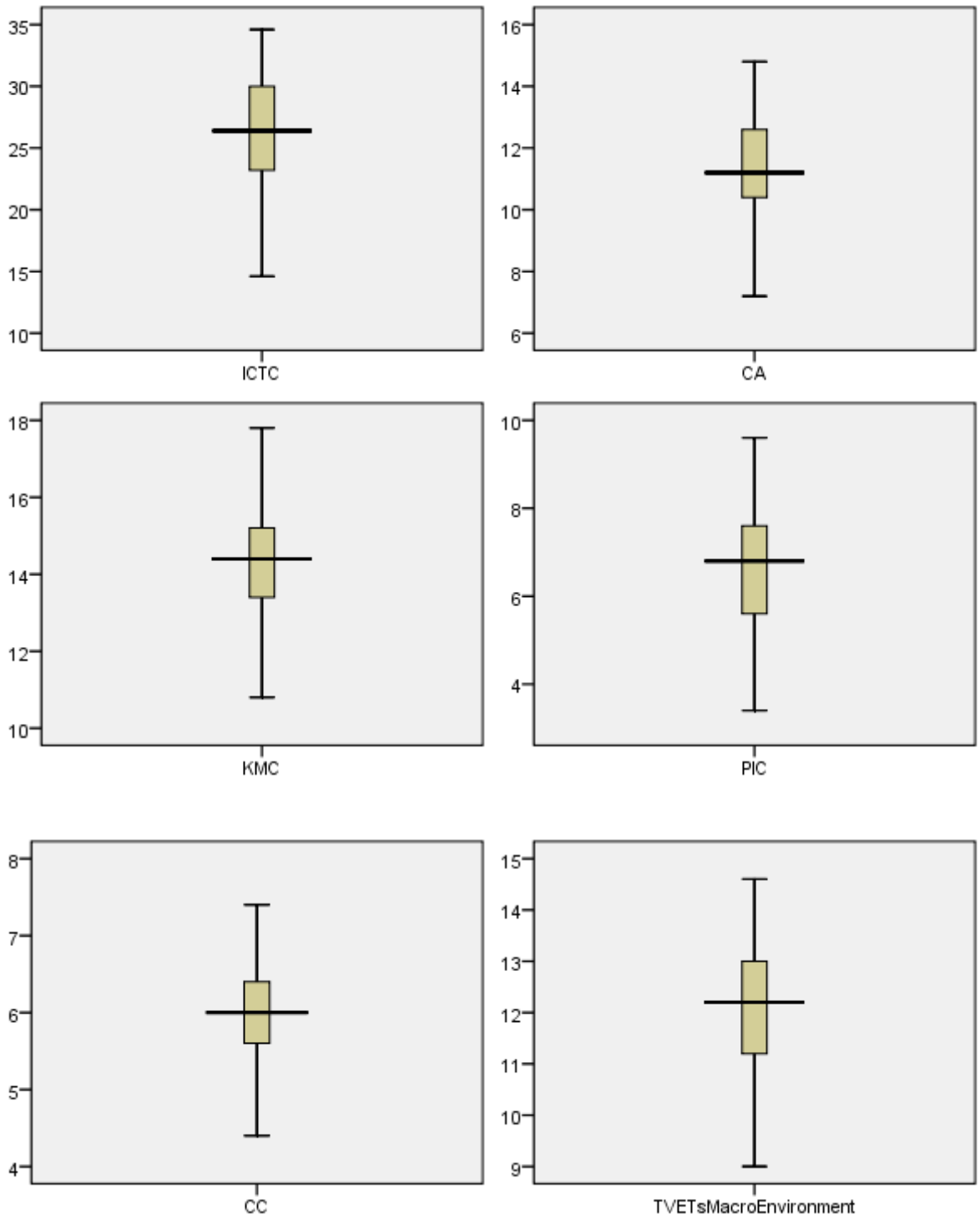


Figure 4. 2: Box Plots after removing Outliers

4.6 Descriptive Analysis

Table 4. 46: Knowledge Management Acquisition Process

Statement	SD	D	N	A	SA
Our institution has processes for acquiring knowledge about our customers	5.9%	5.9%	9.9%	55.4%	22.8%
Our institution has processes for generating new knowledge from existing knowledge	5.9%	10.9%	21.8%	52.5%	8.9%
Our institution has processes for acquiring knowledge about our suppliers	3.0%	8.9%	18.8%	58.4%	10.9%
Our institution has processes for distributing knowledge throughout the organization	0%	5.9%	15.8%	62.4%	15.8%
Our institution has processes for acquiring knowledge about new products/services within our industry	3.0%	10.9%	22.8%	52.5%	10.9%
Our institution has processes for exchanging knowledge between individuals	3.0%	9.9%	19.8%	54.5%	12.9%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

From table 4.46, 78.2% of respondents were in agreement that their institutions has processes for acquiring knowledge about our customers, 61.4% agreed that their institutions has processes for generating new knowledge from existing knowledge, 69.3% agreed that their institutions has processes for distributing knowledge throughout the organization, 63.4% agreed that their institutions has processes for acquiring knowledge about new products/services within their industry, and 67.4% were in agreement that their institutions has processes for exchanging knowledge between individuals. These findings compare with those of Nielsen (2006), that Knowledge creation and acquisition are both important sources of new knowledge for a firm. That the former is concerned with the development of new organisational knowledge in the firm, including the improved use or new application of existing knowledge, while the latter represents a flow of knowledge from external stocks of knowledge into the firm (Nielsen 2006). The full value-creating potential of new knowledge can only be realised through knowledge capture which can include both knowledge personalisation and codification strategies (Hansen, Nohria & Tierney 1999). Discussing these processes, Gold, Malhotra and

Segars (2001) concentrate on two aspects: benchmarking and collaboration. In particular, through benchmarking, an organisation identifies outstanding practices from organisations (including itself), assesses the current state of a particular process to identify gaps and problems and then captures the knowledge for use internally (O'Dell & Grayson 1998). Collaboration can take place at two levels within the organisation: between individuals and between the organisation and its network of business partners and both are potential sources of knowledge (Inkpen 1996; Nonaka & Takeuchi 1995).

Table 4. 47: Knowledge Management Conversion Process

Statement	SD	D	N	A	SA
Our institution has processes for filtering knowledge	.0%	12.9 %	30.7%	52.5%	4.0%
Our institution has processes for transferring organizational knowledge to individuals	3.0%	5.9 %	15.8%	57.4%	17.8%
Our institution has processes for absorbing knowledge from individuals into the organization	2.0%	11.9 %	23.8%	55.4%	6.9%
Our institution has processes for integrating different sources and types of knowledge	2.0%	9.9 %	24.8%	56.4%	6.9%
Our institution has processes for storing knowledge	1.0%	5.9 %	20.8%	55.4%	16.8%
Our institution has processes for replacing outdated knowledge	3.0%	14.9 %	28.7%	43.6%	9.9%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

Results in table 4.47 indicates that cumulatively 56.5% of respondents agreed that their institutions has processes for filtering knowledge, 75.2% agreed that their institutions has processes for transferring organizational knowledge to individuals, 62.3% agreed that their institutions has processes for absorbing knowledge from individuals into the organization, 63.3% agreed that their institutions has processes for integrating different sources and types of

knowledge, 72.2% agreed that their institutions has processes for storing knowledge, and 53.5% agreed that their institutions has processes for replacing outdated knowledge. The results corroborated those of Lee and Suh (2003), that knowledge is something not to be easily shared and collected but needs to be converted for use in the business environment. First, without common representation standards, no consistent dialogue of knowledge would exist, and this would make it hard to effectively manage (Davenport & Klahr 1998; Gimenez & Rincon 2003; O'Dell & Grayson 1998). Secondly, knowledge needs to be integrated and combined if strong organisational capabilities are to emerge (Zahra, Nielsen & Bogner 1999). In particular, integration focuses on making the assembled knowledge resources function together to create an organisational capability that can form the basis for new products or services (Teece *et al*., 1997; Winter 2003), serving as a platform for expansion into new competitive arenas (Prahalad & Hamel 1990).

Table 4. 48: Knowledge Management Application Process

Statement	SD	D	N	A	SA
Our institution has processes for using new knowledge in development of products/services	4.0%	9.9%	26.7%	45.5%	13.9%
Our institution has processes for using new knowledge to solve problems	3.0%	10.9%	21.8%	49.5%	14.9%
Our institution matches sources of new knowledge to problems and challenges	2.0%	14.9%	24.8%	49.5%	8.9%
Our institution uses new knowledge to improve efficiency	3.0%	9.9%	14.9%	56.4%	15.8%
Our institution uses new knowledge to adjust strategic direction	3.0%	6.9%	25.7%	53.5%	10.9%
Our institution is able to locate and apply new knowledge to changing competitive conditions	3.0%	8.9%	23.8%	56.4%	7.9%
Our institution takes advantage of new knowledge	2.0%	7.9%	22.8%	51.5%	15.8%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results in table 4.48 indicates that cumulatively 59.4% of respondents were in agreement that their institutions has processes for using new knowledge in development of products/services, 64.4% agreed that their institutions has processes for using new knowledge to solve problems, 58.4% agreed that their institutions matches sources of new knowledge to

problems and challenges, 72.2% agreed that their institutions uses new knowledge to improve efficiency, 64.4% agreed that their institutions uses new knowledge to adjust strategic direction, 64.3% agreed that their institutions are able to locate and apply new knowledge to changing competitive conditions, and 67.3% agreed that their institutions takes advantage of new knowledge. This findings are aligned to Nielsen (2006), application processes are related to knowledge leverage and exploitation, among which knowledge leverage entails the search for new ways to exploit the integrated knowledge-based resources of the firm in as many ways and in as many competitive arenas as possible (Hamel & Prahalad 1994; Wang and Ahmed 2004). Meanwhile, the performance of a firm is dependent on the ability to exploit its integrated knowledge resources in order to create and deliver products and services to its customers utilising its organisational capabilities (Nielsen 2006).

The knowledge-based theory of the firm posits that the major source of competitiveness rests in the ability to apply knowledge and not in the ability to create new knowledge per se (Grant 1996). Effective application of knowledge has helped companies improve their efficiency and reduce costs (Davenport & Klahr 1998).

Table 4. 49: Knowledge Management Competitive Advantage

Statement	SD	D	N	A	SD
Our institution's knowledge management capability has led to knowledge-based innovations that meet job market demands	4.0%	12.9%	31.7%	41.6%	9.9%
Our institution's knowledge management capability can create strong barriers to entry for other institutions of higher learning competing for customers	3.0%	32.7%	30.7%	30.7%	3.0%
Our institution's knowledge management capability has widen the range of products we offer without increasing costs	.0%	24.8%	38.6%	31.7%	5.0%
Our institution's knowledge management capability would be difficult and expensive for other learning institutions to duplicate	4.0%	34.7%	33.7%	22.8%	5.0%
Our institution's knowledge management capability guarantees quality of graduates and access to training in terms of increased admissions	1.0%	10.9%	22.8%	49.5%	15.8%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results in table 4.49 indicates that cumulatively 51.5% of respondents agreed that their institutions knowledge management capabilities has led to knowledge-based innovations that meet job market requirements, 35.7% disagreed that their institutions knowledge management capabilities can create a strong barrier to entry for other institutions of higher learning competing for customer (30.7% being neutral and 33.7% in agreement), 38.6% were neutral on the proposition that their institutions knowledge management capabilities has widen the range of products they offer without increasing costs (36.7% agreeing while 24.8% disagreeing), 38.7% disagreed that their institutions knowledge management capabilities would be difficult and expensive for other learning institutions to duplicate (33.7% remained neutral, while 27.8% agreed), 65.3% of respondents agreed that their institutions knowledge management capabilities guarantee quality of graduates and access to training in terms of increased admissions.

These results contradicts those of Chakravarty *et al.* (2005), which posit that while the characteristics of knowledge are primarily valuable defending existing advantages, the processes it uses to accumulate and leverage knowledge have greater implications for creating new sources of advantage. Each of the three KM activities plays a distinctive role in providing a firm its CA: knowledge leverage is necessary for growth; knowledge accumulation is needed to ensure that this growth is profitable; and knowledge protection is needed to sustain this profitable growth.

Using the dynamic capabilities approach, Nielsen (2006) illustrates a link between dynamic capabilities and KM according to which dynamic capabilities are seen as integrated sets of KM activities including the creation, acquisition, capture, assembly, sharing, integration, leverage, and exploitation of knowledge. A combination of these well-known processes into three important types of dynamic capabilities relates to the development, (re)combination, and use of knowledge-based resources of the firm. Similarly, Cepeda and Vera (2007) describe the KM processes associated with dynamic capability development and utilisation, enabling firms to achieve and sustain a CA in the dynamic marketplaces of today (Eisenhardt & Martin 2000; Hamel & Prahalad 1994; Powell & Snellman 2004; Verona & Ravasi 2003; Winter 2003).

Table 4. 50: ICT Capability-digital option

Statement	SD	D	N	A	SA
Our institution has a high degree of system interconnectivity	5.9%	28.7%	24.8%	33.7%	6.9%
Our system is sufficiently flexible to incorporate electronic links to external parties	5.0%	27.7%	23.8%	38.6%	5.0%
Our organizational data is available to everyone in the institution in real time	7.9%	41.6%	20.8%	25.7%	4.0%
Our user interface provide transparent access to all platforms and applications	5.0%	33.7%	30.7%	27.7%	3.0%
Our institution makes intensive use of middleware to integrate key enterprise applications	9.9%	24.8%	38.6%	23.8%	3.0%
Our legacy systems within the institution incorporates the development of new IT applications	7.9%	21.8%	28.7%	38.6%	3.0%
Our IT functionality can be quickly added to critical applications	7.9%	25.7%	24.8%	38.6%	3.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

Results in table 4.50 indicates that majority of respondents 40.6% agreed that their institutions has a high degree of system interconnectivity (34.6% disagreed, 24.8% neutral), 43.6% agreed that their system is sufficiently flexible to incorporate electronic links to external parties, 49.5% disagreed that their organizational data is available to everyone in the institution in real time, 38.7% disagreed that their user interface provide transparent access to all platforms and applications, 38.6% were neutral on whether their institutions make intensive use of middleware to integrate key enterprise applications (34.7% disagreeing and 26.8% agreeing), 41.6% agreed that their legacy systems within the institution incorporates the development of new IT applications, and 41.6% agreeing that their IT functionality can be quickly added to critical applications. The findings gives impetus to the works of Byrd & Turner (2001), that IT infrastructure supports and enables the fast design, development and implementation of heterogeneous IT applications, as well as the ability to distribute any type of information (data, text, voice, image or video) across the organisation and beyond. IT infrastructure is the building block for enterprise-wide ICT services and applications. It also builds on the survey by Duncan

(1995) and operationalized by Tallon and Kraemer (2004) of the shared and re-usable IT resources and strategic potential of the flexible IT infrastructure in the insurance industry. The result was a framework for IT infrastructure evaluation, which combines the technological components (platform/networks/data/applications) with flexibility characteristics and types of applied flexibility indicators.

Table 4. 51: ICT capability- digital agility (personnel capability)

Statement	SD	D	N	A	SA
Our institution can easily handle variations in data formats and standards	5.9%	21.8%	28.7%	38.6%	5.0%
Our IT personnel are cross-trained to support other IT services outside their domain	6.9%	12.9%	22.8%	49.5%	7.9%
Our IT personnel are skilled in multiple programming languages	5.0%	9.9%	39.6%	33.7%	11.9%
Our IT personnel are skilled in multiple operating systems	5.9%	11.9%	31.7%	40.6%	9.9%
Our IT personnel are knowledgeable about our IT projects	4.0%	10.9%	27.7%	45.5%	11.9%
Our IT personnel are knowledgeable about the key success factors in our institution	5.9%	10.9%	25.7%	47.5%	9.9%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results from table 4.51 indicates that cumulatively the majority of respondents 43.6% agreed that their institutions can easily handle variations in data formats and standards, 57.4% agreed that their IT personnel are cross-trained to support other IT services outside their domain, 45.6% agreed that their IT personnel are skilled in multiple programming languages, 50.6% agreed that their IT personnel are skilled in multiple operating systems, 57.4% agreed that their IT personnel are knowledgeable about out IT projects, 57.4% agreeing that their IT personnel are knowledgeable about the key success factors in their institutions. This finding is in agreement with those of Byrd *et al.* (2004), that the IT skills of the personnel working in the IT department are an intangible capability. On the one hand, highly specialised IT personnel are needed to solve today's complex IT problems, and on the other, IT personnel need general

knowledge to cope with changing demands from the business side. IT personnel capability defines the degree to which IT personnel possess the skills and knowledge to perform tasks outside of their original area of training or original domain (Byrd *et al*. 2004).

A broad range of technical knowledge and skills is necessary to deliver data across locations and applications, bridge old and new systems, and to identify technical opportunities emerging from new technologies. The increasing rate of change in new technology opportunities requires even more varied and in-depth technical skills (Fink & Neumann 2007). Hence, a broad base of IT knowledge and skills of the IT personnel is essential to develop and maintain capable IT support for the business (Byrd *et al.,* 2004). The business knowledge and skills of the IT personnel are needed to understand and solve business problems. IT personnel do not have to be experts in business knowledge, but to a certain extent they should understand the goals, languages and processes of the organisation.

Table 4. 52: ICT capability- digital agility (management capability)

Statement	SD	D	N	A	SA
Our IT management understand the business environments they support	5.9%	13.9%	28.7%	48.5%	3.0%
Our IT management is up to date with the emerging business development	6.9%	17.8%	32.7%	38.6%	4.0%
Our IT management evaluates opportunities and risks from emerging technologies	6.9%	16.8%	43.6%	29.7%	3.0%
Our IT management contributes to our institutional strategy	6.9%	15.8%	23.8%	47.5%	5.9%
Our institution manages IT strategically	5.9%	20.8%	27.7%	42.6%	3.0%
There is a high degree of trust between our IT department and other departments/sections	6.9%	23.8%	25.7%	37.6%	5.9%
Critical information and knowledge that affect IT projects are shared freely between departments and IT department	7.9%	25.7%	29.7%	34.7%	2.0%
Our IT department and other departments understand the working environments of each other	5.9%	22.8%	26.7%	40.6%	4.0%
The goals and plans for IT projects are jointly developed by both the IT department and other departments	10.9%	31.7%	20.8%	32.7%	4.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The cumulative majority respondent's view on ICT Digital Agility-Management capability was summarized in table 4.52. 51.5% of respondents agreed that their ICT management understands the business environment they support, 42.6% agreed that their ICT management is up to date with the emerging business development, 43.6% of respondents were however neutral that their ICT management evaluates opportunities and risks from emerging technologies, 53.4% agreed that their ICT management contributes to their institutional strategy, 45.6% agreed that their institutions manages ICT strategically, 43.5% agreed that there is a high degree of trust between their IT department and other departments/sections, 36.7% agreed that critical information and knowledge that affect ICT projects are shared freely between departments and

IT department, 44.6% agreed that their IT department and other departments understand the working environment of each other, and 42.6% of respondents disagreed that the goals and plans for ICT projects are jointly developed by both the IT department and other departments. This position is supported by the earlier works of Hines (2006), that says IT management has to ensure continuous business support from top management in order to enable alignment of business and IT strategies. Hence, strategic IT management encompasses three interrelated tasks: Business strategic foresight, IT management strategic foresight and ensuring business support from top management. IT that is managed by the senior management level has a higher chance of receiving ongoing support from management, and thus is better able to implement effective IT support for business processes, products, services and information sharing (Ravichandran & Lertwongsatien 2005). Business management need the ability to envision how IT can contribute to business value and the ability to integrate IT planning with the firm's business strategies (Bharadwaj *et al.,* 1999).

Table 4. 53: ICT capability- IT support for market and operational competence

Statement	SD	D	N	A	SA
Our IT management is able to interpret industry problems and develop solutions	10.9%	25.7%	26.7%	36.6%	.0%
Our IT is utilized to redefine the scope of our business	7.9%	21.8%	27.7%	41.6%	1.0%
Our IT supports analyzing customer needs (i.e. products/services, preferences, costing and quality)	8.9%	22.8%	21.8%	40.6%	5.9%
Our IT is utilized to produce quality products/services	7.9%	18.8%	24.8%	43.6%	5.0%
Our IT is improving our operational efficiency	7.9%	12.9%	19.8%	48.5%	10.9%
Our IT supports our innovation processes	6.9%	17.8%	26.7%	44.6%	4.0%
Our IT supports our product development	6.9%	13.9%	33.7%	40.6%	5.0%
Our IT supports knowledge-sharing in the institution	6.9%	11.9%	25.7%	48.5%	6.9%
Our IT supports cross-functional integration in the institution	6.9%	14.9%	28.7%	42.6%	6.9%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The respondents view on ICT capability-competitive action for market and operational competence are summarized in table 4.53. 36.6% of respondents agreed and an equal number disagreed to the position that their IT management is able to interpret industry problems and develop solutions, 42.6% agreed that their ICT is utilized to redefine the scope of their business, 46.5% agreeing that IT supports analyzing customer needs, 48.6% agreed that their IT is utilized to produce quality products/services, 59.4% agreed that their ICT is improving their operational efficiency, 48.6% agreed that their ICT supports their innovation processes, 45.6% agreed that their ICT supports their product development, 55.4% agreed that their ICT supports knowledge sharing in the institution, and 49.5% agreed that their ICT supports cross-functional integration in the institution. This finding lends credence to those of Sambamurthy *et al.*, (2003), that new business environments often require new IT support for core competences, that is, a continual scanning of business environment and the ability to evaluate the impact of changing business environments on firm's IT systems improve IT systems' ability to support and, if necessary, adapt products, services and business processes.

Table 4. 54: ICT capability –Adaptive IT

Statement	SD	D	N	A	SA
Our IT is able to adapt quickly to changes in the market and customer demands	7.9%	23.8%	29.7%	33.7%	5.0%
Our IT is able to adapt quickly to changes in the institution's products or services	7.9%	21.8%	31.7%	36.6%	2.0%
Our IT is able to develop new Institutional products and services	7.9%	20.8%	34.7%	31.7%	5.0%
Our IT is able to adapt quickly to changes which can become necessary because of competition	5.0%	20.8%	32.7%	35.6%	5.9%
Our IT is utilised to increase the speed of responding to institutional opportunities/ threats	6.9%	20.8%	33.7%	35.6%	3.0%
Our IT is able to adapt quickly to changes in business processes and organisational structures	5.9%	21.8%	33.7%	36.6%	2.0%
Our IT is able to adapt quickly to changes in knowledge-sharing in the institution	7.9%	20.8%	27.7%	40.6%	3.0%
Our IT is able to adapt quickly to changes in product development	5.9%	18.8%	38.6%	33.7%	3.0%
Our IT is able to adapt quickly to changes in the cross-functional Integration of our Institution	8.9%	18.8%	33.7%	35.6%	3.0%
Our IT is able to enhance strategic business process flexibility	6.9%	18.8%	35.6%	35.6%	3.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The cumulative majority respondent's view on ICT capability- competitive action for adaptive IT capability are summarized in table 4.54. 38.7% of the respondents agreed that their IT is able to adapt quickly to changes in the market and customer demands, 38.6% agreed that their IT is able to adapt quickly to changes in the institution's products or services, 36.7% agreed that their IT is able to develop new institutional products and services, 41.5% agreed that their

IT is able to adapt quickly to changes which can become necessary due to competition, 38.6% agreed that their IT is utilized to increase the speed of responding to institutional opportunities/threats, 38.6% agreed that their IT is able to adapt quickly to changes in business processes and organizational structures, 43.6% agreed that their IT is able to adapt quickly to changes in knowledge sharing in the institution, 38.6% were neutral that their IT is able to adapt quickly to changes in product development, 38.6% agreed that their IT is able to adapt quickly to changes in the cross-functional integration of our institution, and 38.6% agreed that their IT is able to enhance strategic business process flexibility. This is in support of Ravichandran and Lertwongsatien (2005) that firms not only need the static support of IT for their competences, but also the ability to renew and adapt their IT support to march new environmental settings. These findings are also similar to that of Pavlou and El Sawy (2006) who discovered positive effects of IT on resource configurability and found that IT can support coordination competence, absorptive capability, collective mind and market orientation.

Table 4. 55: ICT capability and competitive advantage

Statement	SD	D	N	A	SA
Our IT related innovations have increased the quality of training and quality of our products	5.0%	23.8%	21.8%	45.5%	4.0%
Our IT systems have been seamless and increased access to training	6.9%	24.8%	28.7%	38.6%	1.0%
Our graduates have been widely accepted in the Industries because they posses industry-relevant IT skills.	5.9%	20.8%	31.7%	39.6%	2.0%
Our IT system has led to standardized training acceptable globally	6.9%	17.8%	35.6%	34.7%	5.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

Results in table 4.55 indicates that 49.5% of respondents were in agreement that their ICT innovations have increased the quality of training and quality of their products, 39.6% agreed that their ICT systems have been seamless and increased access to training, 41.6% agreed that

their graduates has been widely accepted in the job market because the poses industry relevant IT skills, 39.7% agreed that their ICT system has led to standardized training acceptable globally. These findings strengthen the arguments of Eisenhardt and Martin (2000) that IT can be a source of competitive advantage by providing firms with the ability to adapt themselves more quickly than their competitors to environmental changes.

Table 4. 56: Physical Infrastructure capabilities

Statement	SD	D	N	A	SA
Our workshops are well equipped with the relevant and modern tools and machinery	6.9%	32.7%	19.8%	34.7%	5.9%
Our laboratories are well equipped with relevant and modern training facilities	6.9%	36.6%	21.8%	28.7%	5.9%
Our Library is well stocked with modern facilities and has the capacity to accommodate current students population	8.9%	42.6%	19.8%	22.8%	5.9%
Our institution as enough space for future expansion	3.0%	19.8%	16.8%	41.6%	18.8%
Our Physical aesthetics is outstanding and projects an educational image	4.0%	24.8%	19.8%	39.6%	11.9%
Our Recreational facilities are adequate and modern	10.9%	39.6%	19.8%	22.8%	6.9%
Our available land has been put into productive use to supplement its budget through income generating activities	8.9%	27.7%	18.8%	39.6%	5.0%
Our Institution has processes to protect knowledge-based innovations from theft	7.9%	27.7%	32.7%	30.7%	1.0%
Our institution has extensive policies and procedures for protecting intellectual properties	5.9%	32.7%	28.7%	31.7%	1.0%
Our institution values and protects knowledge embedded in individuals	5.0%	33.7%	26.7%	33.7%	1.0%
Our institution clearly communicates (create awareness of) the importance of protecting knowledge	4.0%	31.7%	27.7%	31.7%	5.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

Results in table 4.56 indicates that cumulatively, majority of respondents 40.6% agreed that their workshops are well equipped with the relevant and modern tools and machinery (39.6% disagreed), 43.5% disagreed that their laboratories are well equipped with relevant and modern training facilities (34.6% agreed), 51.5% disagreed that their library is well stocked with modern facilities and has the capacity to accommodate current students population (28.7% agreed), 60.4% agreed that their institutions has enough space for future expansion, 51.5% agreed that their physical aesthetics is outstanding and projects an educational image, 50.5% disagreed that their recreational facilities are adequate and modern (29.7% agreed), 44.6% agreed that the available land has been put into productive use to supplement their budget through income generating activities (36.6% disagreed), 35.6% disagreed that their institutions has processes to protect knowledge-based innovations from theft (32.7% were neutral, 31.7% agreed), 38.6% disagreed that their institutions has extensive policies and procedures for protecting intellectual properties (32.7% agreeing), 38.7% disagreed that their institution values and protects knowledge embedded in individuals (34.7% agreeing), and 36.7% agreed that their institution clearly communicates the importance of protecting knowledge (34.7 disagreed).This findings follow on the arguments by Dubois (2009) that physical resources are not considered firm competencies, however, they are necessary for the human competencies to create products and services that are valued by customers. An organization can have the best human capital and capabilities in the industry, but if the organization lacks the physical resources to execute those competencies, it cannot build its competitive advantage.

Table 4. 57: Physical Infrastructural competitive advantage

Statement	SD	D	N	A	SA
Our Institution's physical infrastructure has sustained our finances and reduces our dependence on external funding mainly from Income Generating Activities from our farm	7.9%	37.6%	24.8%	24.8%	5.0%
Our Institution's physical infrastructure Provides room for increased access to training	3.0%	20.8%	16.8%	51.5%	7.9%
Our Institution's physical infrastructure has made our products superior in terms of knowledge and skills and thus become relevant to market demands due to the ongoing protection of intellectual properties	4.0%	25.7%	39.6%	25.7%	5.0%
Our Institution's physical infrastructure supports quality training particularly from Plants and Equipments which are modern	3.0%	26.7%	25.7%	39.6%	5.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

Results in table 4.57 indicates that 45.5% of respondents disagreed with the position that their institutions' physical infrastructure has sustained their finances and reduced their dependence on external funding mainly from income generating activities from their farm (29.8% agreed), 59.4% agreed that their institution's physical infrastructure provides room for increased access to training, 39.6% of respondents were neutral that their institution's physical infrastructure has made their products superior in terms of knowledge and skills and thus has become relevant to market demands due to ongoing protection of intellectual properties (30.7% agreed), 44.6% agreed that their institution's physical infrastructure supports quality training particularly from plants and equipments which are modern (29.7% disagreed). These findings is a rejoinder to the proposition by African Union report (2007) that a number of policy issues are critical to the successful implementation of the a TVET strategy including funding and equipping of TVET institutions. Further, ROK, (2012) acknowledges that the TVET programme has other that includes inadequate physical facilities for training, coupled with lack of sufficient modern equipment and inadequate and expensive training materials and textbooks.

Table 4. 58: Curriculum Capabilities

Statement	SD	D	N	A	SA
Our Institution uses syllabus that is rated highly within the TVET sector and job market	1.0%	10.9%	10.9%	57.4%	19.8%
Our Institution uses syllabus that has been developed in collaboration with the stakeholders	2.0%	4.0%	15.8%	58.4%	19.8%
Our Institution has adopted a learner centered methodology of syllabus coverage	1.0%	2.0%	13.9%	64.4%	18.8%
Our Institution has highly incorporated practical experiencing in students training	1.0%	8.9%	7.9%	67.3%	14.9%
Our Institution has fully integrated ICT in its training delivery	4.0%	16.8%	20.8%	49.5%	8.9%
Our Institution has a broad and progressive content syllabus	1.0%	9.9%	13.9%	63.4%	11.9%
Our Institution has partnered with the Industry to continually review the existing syllabi	5.9%	18.8%	31.7%	34.7%	8.9%
Our Institution uses Modularized syllabus that allows flexible entry and exit modalities	2.0%	5.0%	15.8%	60.4%	16.8%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results in table 4.58 indicates that cumulatively 77.2% of respondents agreed that their institution use syllabus that is rated highly within the TVET sector and job market (11.9% disagreed), 78.2% agreed that their institution uses syllabus that has been developed in collaboration with the stakeholders, 83.2% agreed that their institution has adopted a learner centered methodology of syllabus coverage, 82.2% of respondents agreed that their institution has highly incorporated practical experiencing in students training, 58.4% agreed that their institution has fully integrated ICT in its training delivery (20.8% being neutral), 75.3% of respondents agreed that thei institution has a broad and progressive content syllabus, 43.6% of respondents agreed that their institution has partnered with the industry to continually review the existing syllabi (31.7% stood neutral), 78.2% of respondents agreed that their institution uses modularized syllabus that allows flexible entry and exit modalities. These finding are supported by the ROK (2012) taskforce report on education that established that a successful TVET framework should therefore provide the platform for harmonization and rationalization

of TIVET curricula, examinations, testing and certification. There is need to review and develop the curriculum that addresses the emerging needs of our society in order to enable the learners to acquire and develop the desired knowledge, skills, values and attitudes for life in the emerging knowledge society. In addition, it will enable the government attain the Millennium Development Goals (MDGs), industrialization by the year 2020 and the Kenya Vision 2030, in which TIVET has been identified as critical in realizing its economic, social and political pillars. In order to achieve this objective, the report noted TIVET Curriculum Framework should be shared and owned by all stakeholders to enhance implementation. Further to this, the Task Force recommended the following: (a) Provide vertical and lateral curriculum overlaps to facilitate credit points transfer between successive training levels and from one programme to another. (b) Introduce adequate, relevant contents and curriculum delivery modes to cater for new and emerging job performance trends as well as modern planning and quality management best practices.(c) Integrate ICT driven industrial processes and technologies in the trade contents on national production systems. (d) Adopt a broadly scoped, units driven, competences based modular curriculum design model to achieve multi-skill training programmes, flexible attendance, self-paced learning and alternative routes of progression via the course modules formulation.(e) Adopt an appropriate mechanism for syllabus development that makes testing flexible and responsive to the current trends in the skilled labour market. (f) Increase the general academic component of the curriculum to cater for the life skills and knowledge of citizens. (g) Develop programmes on pedagogy and andragogy to satisfy demand for TIVET trainers. (h) Design a flexible technical teacher education curriculum that allows skilled persons with valuable experience as trainers or part-time instructors to be considered for credit transfer when they enroll for teacher training or pedagogy.

Table 4. 59: Curriculum capability and competitive advantage

Statement	SD	D	N	A	SA
Our Institution's Curriculum has included soft skills in its content	1.0%	7.9%	14.9%	61.4%	14.9%
Our Institution's Curriculum passes out graduates who meets industry needs in terms of skills and knowledge	1.0%	7.9%	24.8%	58.4%	7.9%
Our Institution's Curriculum leads to standardized skills and knowledge of graduates applicable globally	1.0%	9.9%	33.7%	47.5%	6.9%
Our Institution's Curriculum allows for ease of entry for new admissions	1.0%	5.0%	12.9%	66.3%	14.9%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results in table 4.59 indicates that 76.3% of respondents agreed that their institutions' curriculum has included soft skills in its content, 66.3% agreed that their institutions' curriculum passes out graduates who meet industry needs in terms of skills and knowledge, 54.4% of respondents agreed that their institutions' curriculum leads to standardized skills and knowledge of graduates applicable globally (33.7% were neutral), 81.2% of respondents agreed that their institutions' curriculum allows for ease of entry for new admissions. These results corroborated the work of Lauglo (2006), that in some countries, there has been a switch in TVET curriculum design away from "long courses" with assessment of learners at the end, to programs consisting of sequences of short courses (modules) with assessment at the end of each module (typically "criterion based") and with more flexibility for trainees to sequences tailored for their particular requirements (and pace of progress). The approach is also advocated as a means to enable trainees to more easily "interrupt" and later "return to" training. Kearns (2001) offers a model for clustering the generic skills for the TVET system which include the cognitive cluster; interpersonal cluster; enterprise, innovation and creativity cluster; and work readiness and work habits cluster.

Table 4. 60: TVET's Macro Environment

Statement	SD	D	N	A	SA
The current Government policy on TVET supports:					
Acquisition and Development of Physical Infrastructure	2.0%	1.0%	17.8%	66.3%	12.9%
Increased funding to the TVET's sub-sector	4.0%	5.0%	23.8%	57.4%	9.9%
Acquisition, conversion and application of Knowledge Management Capabilities	1.0%	9.9%	20.8%	60.4%	7.9%
The development of ICT infrastructure	1.0%	6.9%	12.9%	69.3%	9.9%
Establishment of distinct TVET program from that offered by other higher learning institutions	1.0%	7.9%	12.9%	67.3%	10.9%
Partnerships between TVET institutions and the industry players	2.0%	12.9%	17.8%	58.4%	8.9%
The current Kenyan Economic Growth :					
Supports the establishment of Small and Medium Enterprises that requires manpower from TVET institutions	1.0%	14.9%	18.8%	56.4%	8.9%
Has guaranteed a sustainable disposable income to parents in the catchment area of my institution that allows uninterrupted fee payment	9.9%	53.5%	21.8%	12.9%	2.0%
Existing Partnerships:					
Our Institution has signed a number of collaborative agreements with the Industry to support our core mandate	5.0%	26.7%	23.8%	40.6%	4.0%
The partnerships have led to quality graduates that meet the labour market requirements	3.0%	25.7%	25.7%	40.6%	5.0%
The partnerships have been a source of financing to our institution thereby making training accessible	6.9%	31.7%	32.7%	25.7%	3.0%
Have contributed greatly towards skills and knowledge transfer to our institution	4.0%	24.8%	20.8%	44.6%	5.9%
Has led to quality of delivery, standardization and the inclusion of soft skills to training	4.0%	21.8%	29.7%	35.6%	8.9%

Other Institutions of Higher Learning;					
Have developed strong dynamic capabilities than our institution	3.0%	23.8%	39.6%	26.7%	6.9%
Passes out graduates with more relevant skills and knowledge to the job market than our institution	5.0%	22.8%	37.6%	31.7%	3.0%
Has standardized training programs rich in quality than our institution	6.9%	20.8%	34.7%	33.7%	4.0%
Has a secure and uninterrupted funding options than our institution	5.9%	19.8%	37.6%	32.7%	4.0%
Has admission requirements that erodes our customer base in terms of cut-off grades	6.9%	19.8%	35.6%	35.6%	2.0%

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree

The results in table 4.60 indicates the level of current Government policy supports on TVET: 79.2% of respondents agreed on support for acquisition and development of physical infrastructure, 67.3% agreed on support for increased funding to the TVET-sub sector, 68.3% agreed on support for acquisition, conversion and application of knowledge , 79.2% agreed on support for the development of ICT infrastructure, 78.2% agreed on support for establishment of distinct TVET program from that offered by other institutions of higher learning, and 67.3% agreed on support for partnerships between TVET institutions and the industry players. The results in the table also shows that the current Kenyan Economic Growth: supports the establishment of small and medium enterprises that requires manpower from TVET institutions (65.3% agree, 15.9% disagree), has not guaranteed a sustainable disposable income to parents in the catchment area of their institutions that allows uninterrupted fee payment (63.4% disagree, 14.9% agree). The results in the table shows that on existing partnerships: 44.6% of respondents agreed that their institution has signed a number of collaborative agreements with the industry to support their core mandate (31.7% disagree), 45.6% agree that the partnerships have led to quality graduates that meet the labour market requirements, 38.6% of respondents disagreed that the partnerships have been a source of financing to their institution thereby making training accessible (28.7% agreeing), 50.5% agreed that the partnerships have contributed towards skills and knowledge transfer to their institution, 44.5% agreed that the

partnerships has led to quality of delivery, standardization and the inclusion of soft skills to training. Table 4.60 also indicates that other institutions of higher learning: have neither/nor developed strong dynamic capabilities than our institution (39.6% neutral,33.6% agree, 26.8% disagree), neither/nor passes out graduates with more relevant skills and knowledge to the job market than their institution (37.6% neutral, 34.7% agree, 27.8% disagree), has standardized training programs rich in quality than their TVET institutions (37.7% agree, 27.7% disagree), neither/nor has a secure and uninterrupted funding options than their institution (37.6% neutral, 36.,7% agree, 25.7% disagree), as admission requirements that erodes their customer base in terms of cut-off grades (37.6% agree, 35.6% neutral, 26.7% disagree). These findings are in line with the recommendation of African Union (2007) that the TEVT strategy implementation roles of a national government may include: giving legislative backing to national TVET policies; improving coherence of governance and management of TVET; introducing policies and incentives that will support increased private sector participation in TVET delivery; investing in training materials and equipment; introduce sustainable financing schemes for TVET; increase funding support to the sector; mainstream vocational education into the general education system, so that the vocational track is less dead-end; introduce ICT into TVET, and constantly monitor and periodically evaluate the performance of the system and apply corrective measures accordingly. That Government should allocate a respectable percentage of their national budgets to the TVET sector

4.7 Regression Analysis

4.7.1 Objective One: To Determine Relationship between Knowledge Management Capabilities and Competitive Advantage of TVET Institutions in Kenya

Figure 4.3 shows the distribution of the scatter plot Knowledge Management Capability on Competitive Advantage. The line of best fit along the scatter plot in figure 4.3 Passes through the origin. There is no skewness to either side indicating there is a constant variance. Thus, the line suggested that there was a linear relationship between Knowledge Management Capability and Competitive Advantage in the form: $Y = \beta_0 + \beta_1 X_1 + \varepsilon$.

The goodness of fit model presented in table 4.61 involves Knowledge Management Capability (X_1) as the only independent variable. The coefficient of determination (R square) of 0.267 (without moderating variable) and 0.424 (with moderating variable) indicated that the model explained only 26.7% of the variation or change in the dependent variable (without moderator) and 42.4% of the variation in the dependent variable (with moderator), with the remainder of 73.3% and 57.6% respectively being explained by other factors other than Knowledge Management Capability. Adjustment of the R square did not change the results substantially, having reduced the explanatory behaviour of the predictor to 25.9% and 41.7% respectively.

Table 4.62 presents the regression results of Knowledge Management Capability on Competitive Advantage of TVET Institutions in western Kenya region. With a constant (p-value = 0.000) of 4.754, the study concluded that even without Knowledge Management Capability, the TVET Institutions seemed to display some form of Competitive Advantage. The gradient coefficient of 0.46 indicated the extent to which a unit change in KMC causes a change in CA. In this case, a unit change in KMC leads to 0.46 units of positive change in CA of the TVET Institutions. This means that KMC was significant (p-value = 0.000) in positively influencing the CA of TVET Institutions in western Kenya region.

Therefore, the Knowledge Management Capability and Competitive Advantage model can now be presented as follows: $Y = 4.754 + 0.460X_1 + \varepsilon$, without the moderating variable and

$Y = 5.972 + 0.031X_1{*}Z + \varepsilon$, with the moderating variable. The moderator in this case reducing the influence of KMC on CA significantly to just 3.1%

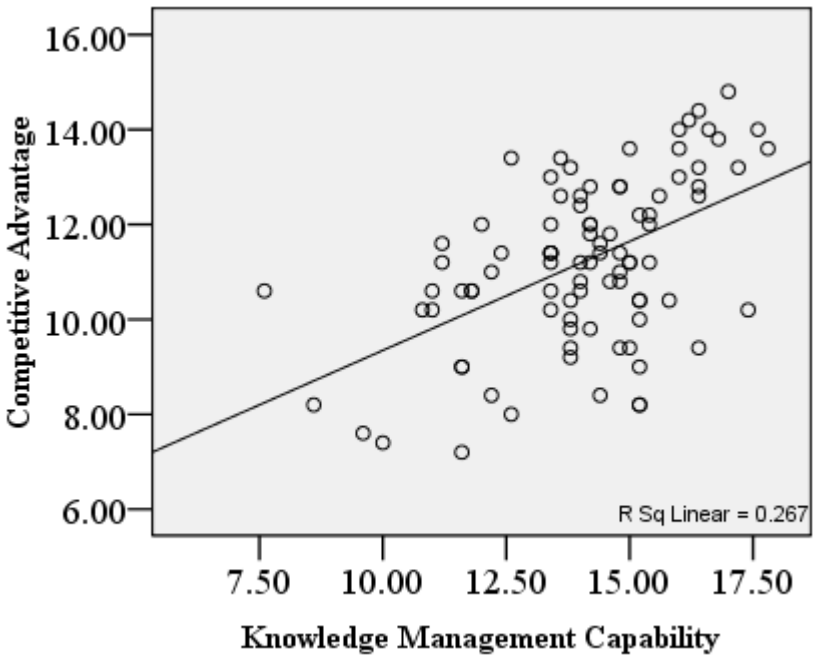


Figure 4. 3: Regression analysis scatter plot for Knowledge management capability and competitive advantage

Table 4. 61: Goodness of fit model summary-KMC and CA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (without moderator)	.517[a]	.267	.259	1.51354
2 with moderator	.651[a]	.424	.417	1.33311

a. Predictors: (Constant), KMC

Table 4. 62: Coefficients- KMC and CA

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1(Without Moderator)	(Constant)	4.754	1.146		4.150	.000
	KMC	.460	.081	.517	5.694	.000
2(With Moderator)	(Constant)	5.972	.668		8.941	.000
	$x_1 * z$	.031	.004	.651	7.951	.000

a. Dependent Variable: CA

4.7.1.1 ANOVA Analysis- Knowledge Management Capability and Competitive Advantage of TVET Institutions in western Kenya region

The Analysis of Variance (ANOVA) of the relationship between Knowledge Management Capability and Competitive Advantage of TVET Institutions in Kenya is presented in table 4.63. The results with a p-value of 0.000 being less than 0.05 both for the model without the moderator and for the model with the moderator, indicates that the models are statistically significant in explaining the relationship between KMC and CA of TVET Institutions in western Kenya region. In this regard, we reject the null hypothesis that there is no significant relationship between Knowledge Management Capability and Competitive Advantage of

TVET Institutions in Kenya. Therefore, we conclude that there is significant positive relationship between KMC and CA of TVET Institutions in Kenya.

Table 4. 63: ANOVA analysis- KMC and CA

Model		Sum of Squares	df	Mean Square	F	Sig.
1(Without Moderator)	Regression	74.262	1	74.262	32.418	.000[a]
	Residual	203.882	89	2.291		
	Total	278.144	90			
2(With Moderator)	Regression	112.350	1	112.350	63.218	.000[a]
	Residual	152.838	86	1.777		
	Total	265.189	87			

a. Predictors: (Constant), KMC

b. Predictors: (Constant), x_1*z

c. Dependent Variable: CA

4.7.2 Objective Two: To asses Relationship between Information Communication Technology Capability and Competitive Advantage of TVET Institutions in Kenya

Figure 4.4 shows the distribution of the scatter plot Information Communication Technology Capability on Competitive Advantage. The line of best fit along the scatter plot in figure 4.4 passes through the origin. There is no skewness to either side indicating there is a constant variance. Thus, the line suggested that there was a linear relationship between ICT Capability and Competitive Advantage in the form: $Y = \beta_0 + \beta_2 X_2 + \varepsilon$.

The goodness of fit model presented in table 4.64 involves ICT Capability (X_2) as the only independent variable. The coefficient of determination (R square) of 0.543 (without moderating variable) and 0.533 (with moderating variable) indicated that the model explained 54.3% of the variation or change in the dependent variable (without moderator) and 53.3% of the variation in the dependent variable (with moderator), with the remainder of 45.7% and 46.7% respectively being explained by other factors other than ICT Capability. Adjustment of the R square did not

change the results substantially, having reduced the explanatory behaviour of the predictor to 53.8%% and 52.7%% respectively.

Table 4.65 presents the regression results of ICT Capability on Competitive Advantage of TVET Institutions in western Kenya region . With a constant (p-value = 0.000) of 4.762, the study concluded that even without ICT Capability, the TVET Institutions seemed to display some form of Competitive Advantage. The gradient coefficient of 0.247 indicated the extent to which a unit change in ICTC causes a change in CA. In this case, a unit change in ICTC leads to 0.247 units of positive change in CA of the TVET Institutions. This means that ICTC was significant (p-value = 0.000) in positively influencing the CA of TVET Institutions in western Kenya region.

Therefore, the ICT Capability and Competitive Advantage model can now be presented as follows: $Y = 4.762 + 0.247X_2 + \varepsilon$, without the moderating variable, and

$Y = 6.774 + 0.014X_{2*}Z + \varepsilon$, with the moderating variable. The moderator in this case reducing the influence of ICTC on CA significantly to just 1.4%

Figure 4. 4: Regression analysis scatter plot for ICTC and CA

Table 4. 64: Goodness of fit model summary-ICTC and CA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Without Moderator)	.737[a]	.543	.538	1.11833
2 (With Moderator)	.730[a]	.533	.527	1.12142

a. Predictors: (Constant), ICTC

b. Predictors: (Constant), $x_{2*}z$

Table 4. 65: Coefficients- ICTC and CA

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1 (Without Moderator)	(Constant)	4.762	.640		7.439	.000
	ICTC	.247	.024	.737	10.394	.000
1 (With Moderator)	(Constant)	6.774	.463		14.628	.000
	$x_2 * z$	.014	.001	.730	10.016	.000

a. Dependent Variable: CA

4.7.2.1 ANOVA Analysis- ICT Capability and Competitive Advantage of TVET Institutions in western Kenya region

The Analysis of Variance (ANOVA) of the relationship between ICT Capability and Competitive Advantage of TVET Institutions in Kenya is presented in table 4.66. The results with a p-value of 0.000 being less than 0.05 both for the model without the moderator and for the model with the moderator, indicates that the models are statistically significant in explaining the relationship between ICTC and CA of TVET Institutions in western Kenya region. In this regard, we reject the null hypothesis that there is no significant relationship between Information Communication Technology Capability and Competitive Advantage of TVET Institutions in western Kenya region. Therefore, we conclude that there is significant positive relationship between ICTC and CA of TVET Institutions in western Kenya region.

Table 4. 66: ANOVA analysis- ICTC and CA

Model		Sum of Squares	df	Mean Square	F	Sig.
1 (Without Moderator)	Regression	135.118	1	135.118	108.037	.000[a]
	Residual	113.810	91	1.251		
	Total	248.927	92			
2 (With Moderator)	Regression	126.153	1	126.153	100.314	.000[a]
	Residual	110.667	88	1.258		
	Total	236.820	89			

a. **Predictors: (Constant), ICTC**
b. **Predictors: (Constant), $x_{2*}z$**
c. **Dependent Variable: CA**

4.7.3 Objective Three: To establish Relationship between Physical Infrastructure Capability and Competitive Advantage of TVET Institutions in western Kenya region

Figure 4.5 shows the distribution of the scatter plot Physical Infrastructure Capability on Competitive Advantage. The line of best fit along the scatter plot in figure 4.5 passes through the origin. There is no skewness to either side indicating there is a constant variance. Thus, the line suggested that there was a linear relationship between Physical Infrastructure Capability and Competitive Advantage in the form: $Y = \beta_0 + \beta_3 X_3 + \varepsilon$.

The goodness of fit model presented in table 4.67 involves PI Capability (X_3) as the only independent variable. The coefficient of determination (R square) of 0.447 (without moderating variable) and 0.482 (with moderating variable) indicated that the model explained 44.7% of the variation or change in the dependent variable (without moderator) and 48.2% of the variation in the dependent variable (with moderator), with the remainder of 55.3% and 41.8% respectively being explained by other factors other than Physical Infrastructure Capability. Adjustment of the R square did not change the results substantially, having reduced the explanatory behaviour of the predictor to 44.1% (without moderator) and 47.7% (with moderator).

Table 4.68 presents the regression results of Physical Infrastructure Capability on Competitive Advantage of TVET Institutions in western Kenya region. With a constant (p-value = 0.000) of 6.08, the study concluded that even without PI Capability, the TVET Institutions seemed to display some form of Competitive Advantage. The gradient coefficient of 0.768 indicated the extent to which a unit change in PIC causes a change in CA. In this case, a unit change in PIC leads to 0.768 units of positive change in CA of the TVET Institutions. This means that PIC was significant (p-value = 0.000) in positively influencing the CA of TVET Institutions in western Kenya region.

Therefore, the Physical Infrastructure Capability and Competitive Advantage model can now be presented as follows: $Y = 6.086 + 0.768X_3 + \varepsilon$, without the moderating variable, and

$Y = 7.313 + 0.048X_{3*}Z + \varepsilon$, with the moderating variable. The moderator in this case reducing the influence of PIC on CA significantly to just 4.8%

Figure 4. 5: Regression analysis scatter plot for PIC and CA

Table 4. 67: Goodness of fit model summary- PIC and CA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Without Moderator)	.669[a]	.447	.441	1.30735
2 (With Moderator)	.695[a]	.482	.477	1.25555

a. **Predictors: (Constant), PIC**
b. **Predictors: (Constant), $x_{3*}z$**

Table 4. 68: coefficients- PIC and CA

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1 (Without Moderator)	(Constant)	6.086	.590		10.310	.000
	PIC	.768	.087	.669	8.811	.000
2 (With Moderator)	(Constant)	7.313	.427		17.121	.000
	$x_{3*}z$	.048	.005	.695	9.311	.000

a. Dependent Variable: CA

4.7.3.1 ANOVA Analysis- Physical Infrastructure Capability and Competitive Advantage of TVET Institutions in western Kenya region

The Analysis of Variance (ANOVA) of the relationship between PI Capability and Competitive Advantage of TVET Institutions in western Kenya region is presented in table 4.69. The results with a p-value of 0.000 being less than 0.05 both for the model without the moderator and for the model with the moderator, indicates that the models are statistically significant in explaining the relationship between PIC and CA of TVET Institutions in western Kenya region. In this regard, we reject the null hypothesis that there is no significant relationship between Physical Infrastructure Capability and Competitive Advantage of TVET Institutions in western

Kenya region. Therefore, we conclude that there is significant positive relationship between PIC and CA of TVET Institutions in western Kenya region.

Table 4. 69: ANOVA analysis- PIC and CA

Model		Sum of Squares	df	Mean Square	F	Sig.
1(Without Moderator)	Regression	132.682	1	132.682	77.630	.000[a]
	Residual	164.080	96	1.709		
	Total	296.762	97			
2 (With Moderator)	Regression	136.663	1	136.663	86.693	.000[a]
	Residual	146.605	93	1.576		
	Total	283.267	94			

a. **Predictors: (Constant), PIC**
b. **Predictors: (Constant), $x_{3*}z$**
c. **Dependent Variable: CA**

4.7.4 Objective Four: To Determine Relationship between Curriculum Capability and Competitive Advantage of TVET Institutions in western Kenya region

Figure 4.6 shows the distribution of the scatter plot Physical Infrastructure Capability on Competitive Advantage. The line of best fit along the scatter plot in figure 4.6 passes through the origin. There is no skewness to either side indicating there is a constant variance. Thus, the line suggested that there was a linear relationship between Curriculum Capability and Competitive Advantage in the form: $Y = \beta_0 + \beta_4 X_4 + \varepsilon$.

The goodness of fit model presented in table 4.70 involves Curriculum Capability (X_4) as the only independent variable. The coefficient of determination (R square) of 0.231 (without moderating variable) and 0.372 (with moderating variable) indicated that the model explained only 23.1% of the variation or change in the dependent variable (without moderator) and 37.2%

of the variation in the dependent variable (with moderator), with the remainder of 76.9% and 62.8% respectively being explained by other factors other than Curriculum Capability. Adjustment of the R square did not change the results substantially, having reduced the explanatory behaviour of the predictor to 22.3% (without moderator) and 36.5% (with moderator).

Table 4.71 presents the regression results of Curriculum Capability on Competitive Advantage of TVET Institutions in Kenya. With a constant (p-value = 0.000) of 3.942, the study concluded that even without Curriculum Capability, the TVET Institutions seemed to display some form of Competitive Advantage. The gradient coefficient of 1.198 indicated the extent to which a unit change in CC causes a change in CA. In this case, a unit change in CC leads to 1.198 units of positive change in CA of the TVET Institutions. This means that CC was significant (p-value = 0.000) in positively influencing the CA of TVET Institutions in western Kenya region.

Therefore, the Curriculum Capability and Competitive Advantage model can now be presented as follows: $Y = 3.942 + 1.198X_4 + \varepsilon$, without the moderating variable, and

$Y = 5.881 + 0.073X_4{*}Z + \varepsilon$, with the moderating variable. The moderator in this case reducing the influence of CC on CA significantly to just 7.3%

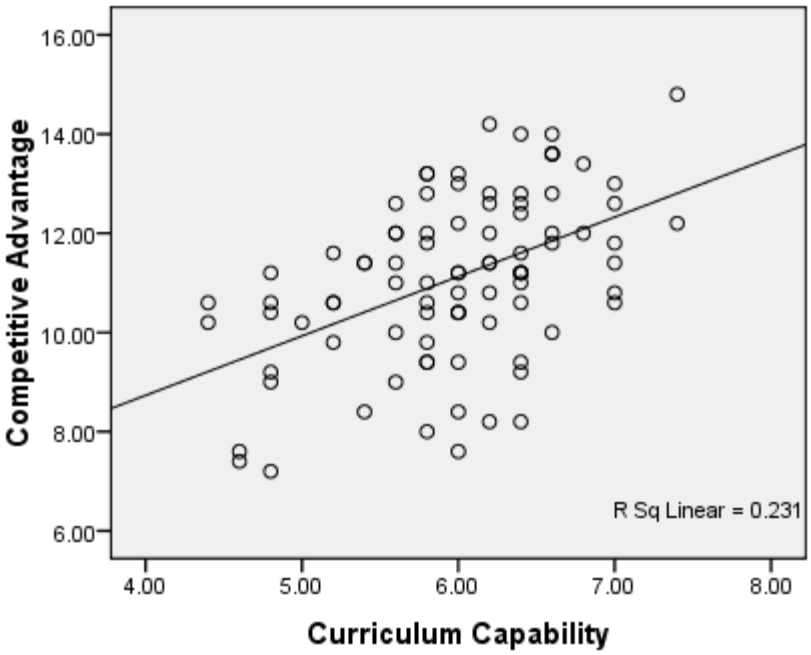

Competitive Advantage
16.00
14.00
12.00
10.00
8.00
6.00
R Sq Linear = 0.231
4.00
5.00
6.00
7.00
8.00
Curriculum Capability

Figure 4. 6: Regression analysis scatter plot for CC and CA

Table 4. 70: Goodness of fit model summary –CC and CA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Without Moderator)	.481[a]	.231	.223	1.48193
2 (With Moderator)	.610[a]	.372	.365	1.34008

a. Predictors: (Constant), CC

b. Predictors: (Constant), x_4*z

Table 4. 71: Coefficients-CC and CA

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1 (Without Moderator)	(Constant)	3.942	1.400		2.815	.006
	CC	1.198	.233	.481	5.148	.000
2 (With Moderator)	(Constant)	5.881	.742		7.924	.000
	x_4*z	.073	.010	.610	7.142	.000

a. Dependent Variable: CA

4.7.4.1 ANOVA Analysis- Curriculum Capability and Competitive Advantage of TVET Institutions in western Kenya region

The Analysis of Variance (ANOVA) of the relationship between Curriculum Capability and Competitive Advantage of TVET Institutions in Kenya is presented in table 4.72. The results with a p-value of 0.000 being less than 0.05 both for the model without the moderator and for the model with the moderator, indicates that the models are statistically significant in explaining the relationship between CC and CA of TVET Institutions in western Kenya region. In this regard, we reject the null hypothesis that there is no significant relationship between

Curriculum Capability and Competitive Advantage of TVET Institutions in western Kenya region. Therefore, we conclude that there is significant positive relationship between CC and CA of TVET Institutions in western Kenya region.

Table 4. 72: ANOVA analysis –CC and CA

Model		Sum of Squares	df	Mean Square	F	Sig.
1 (Without Moderator)	Regression	58.199	1	58.199	26.501	.000[a]
	Residual	193.259	88	2.196		
	Total	251.458	89			
2 (With Moderator)	Regression	91.611	1	91.611	51.014	.000[a]
	Residual	154.440	86	1.796		
	Total	246.051	87			

a. **Predictors: (Constant), CC**
b. **Predictors: (Constant), x_4*z**
c. **Dependent Variable: CA**

4.7.5 Objective Five: To assess the moderating effect of TVET's Macro Environment on Dynamic Capabilities and Competitive Advantage of TVET Institutions in western Kenya region

The fifth objective of the study was to establish the role of TVET's Macro Environment as a moderating factor in establishing the relationship between Dynamic Capabilities and Competitive Advantage of TVET Institutions. The analysis of the significance tests of the overall regression model was carried out in two stages, that is, with and without the moderating variable. This was to establish the effect of the moderating variable on the independent variable's contribution to the dependent variable- competitive Advantage. The findings are presented below.

Regression Analysis of the overall Model without the Moderating Variable

$H_{0:}$ There is no significant effect of TVET's Macro Environment on Dynamic Capabilities and Competitive Advantage of TVET Institutions in the western Kenya region.

The regression analysis of the overall model without the moderating variable determined the significance of the relationship of the independent variable-Dynamic Capabilities on the dependent variable- Competitive Advantage, in the absence of the TVET's Macro Environment. The linear regression analysis presented in table 4.74 indicated that regression coefficients were significant in explaining the relationship between each of the four independent variables. It also confirmed the significant roles of the four variables on competitive advantage of TVET Institutions in western Kenya region. All the four variables recorded p-values of 0.000, which was less than 0.05 levels. The regression coefficients are positive for each independent variable, and as such, in concurrence with the hypothesis that each individually positively influences competitive advantage.

The interpretation of these results was that the contributions of all variables collectively were positive. That is, there was a positive relationship between Dynamic Capabilities and Competitive Advantage.

The model can be represented as follows:

$Y = 2.334 + 0.057X_1 + 0.188X_2 + 0.160X_3 + 0.343X_4$

Where X_1 = Knowledge Management Capability

X_2 = Information Communication Technology

X_3 = Physical Infrastructure Capability

X_4 = Curriculum Capability

The significance of the model was further reaffirmed by the goodness of fit tests in table 4.73 whereby the coefficient of determination (R square) of 0.616 confirmed that the model explained 61.6% of the variation or change in the dependent variable. The adjusted R square did not make any difference either, since the model now explained 59.5% of the variations.

The ANOVA analysis in table 4.75 presents the influence of all the independent variables on Competitive Advantage of TVET Institution in western Kenya region. The results with a p-value of 0.000, which is less than 0.05, indicated that the model was statistically significant in explaining the relationship between dynamic capabilities and competitive advantage in Kenya. It was, therefore, concluded that Dynamic Capabilities had significant combined effects on Competitive Advantage of TVET Institutions in Kenya.

The findings follow on Eisenhardt & Martin (2000) that described dynamic capabilities as processes that firms can use to obtain, integrate, reconfigure and release resources, leading to new resources and resource configurations (or new positions, in Teece's terms). According to their findings, dynamic capabilities have a direct effect on firm performance and competitive advantage, as well as an indirect effect through resource reconfiguration. Although Eisenhardt & Martin (2000) view competitive advantage as more difficult to achieve through dynamic capabilities than does Teece, their basic chain of logic is very similar to that of Teece and of Helfat *et al.* (2007). In all of these treatments, organizational processes play a central role.

Table 4. 73: Goodness of fit overall model summary- Dynamic Capabilities and Competitive Advantage

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1 (Without Moderator)	.785[a]	.616	.595	.98031
2 (With Moderator)	.728[a]	.531	.505	1.08504

a. Predictors: (Constant), CC, ICTC, KMC, PIC

b. Predictors: (Constant), x_4*z, x_3*z, x_1*z, x_2*z

Table 4. 74: Coefficients- overall regression analysis for Dynamic Capabilities and Competitive Advantage

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1 (Without Moderator)	(Constant)	2.334	1.180		1.978	.000
	KMC	.057	.081	.061	.709	.000
	ICTC	.188	.038	.557	4.949	.000
	PIC	.160	.119	.153	1.347	.000
	CC	.343	.208	.145	1.649	.000
2 (With Moderator)	(Constant)	7.041	.727		9.690	.000
	x_1*z	-.003	.008	-.064	-.387	.000
	x_2*z	.010	.003	.519	2.807	.006
	x_3*z	.018	.011	.272	1.634	.007
	x_4*z	.002	.018	.016	.102	.000

a. Dependent Variable: CA

Table 4. 75: ANOVA analysis- overall model for Dynamic Capabilities and Competitive Advantage

Model		Sum of Squares	df	Mean Square	F	Sig.
1 (Without Moderator)	Regression	114.049	4	28.512	29.669	.000[a]
	Residual	71.115	74	.961		
	Total	185.164	78			
2 (With Moderator)	Regression	95.822	4	23.956	20.348	.000[a]
	Residual	84.766	74	1.177		
	Total	180.588	78			

a. **Predictors: (Constant), CC, ICTC, KMC, PIC**
b. **Predictors: (Constant), x_4*z, x_3*z, x_1*z, x_2*z**
c. **Dependent Variable: CA**

Regression Analysis of the overall Model with the Moderating Variable

The results of the regression analysis of the whole model with the moderating variable are presented in table 4.74 The regression coefficients remained unchanged at the levels presented in the same table for each independent variable, and as such, in concurrence with the hypothesis that each individually positively influences competitive advantage.

The interpretation of these results was that the contributions of all variables collectively were positive. That is, there was a positive relationship between Dynamic Capabilities and Competitive Advantage.

The model can be represented as follows:

$Y = 7.041 – 0.003X_1*Z + 0.10X_2*Z + 0.18X_3*Z + 0.002X_4*Z$

Where X_1 = Knowledge Management Capability

X_2 = Information Communication Technology

X_3 = Physical Infrastructure Capability

X_4 = Curriculum Capability

Z = TVET's Macro Environment

The significance of the model was further reaffirmed by the goodness of fit tests in table 4.73 whereby the coefficient of determination (R square) of 0.531 confirmed that the model

explained 53.1% of the variation or change in the dependent variable. The adjusted R square did not make any difference either, since the model now explained 50.5% of the variations. In the full model without moderating variable, the coefficient of determination was 0.616 implying that the model was suited for the study and worked better even without the inclusion of the moderating variable.

The ANOVA analysis in table 4.75 presents the influence of all the independent variables on Competitive Advantage of TVET Institution in western Kenya region. The results with a p-value of 0.000, which is less than 0.05, indicated that the model was statistically significant in explaining the relationship between dynamic capabilities and competitive advantage of TVET Institutions in Kenya. It was, therefore, concluded that even with the moderator, Dynamic Capabilities had significant combined effects on Competitive Advantage of TVET Institutions in Kenya. The effect of TVET's Macro environment is not significant and can be ignored. This means that although TVET Institutions Macro environment is important to its sustainability, dynamic capabilities remain more of an internal process than an externally controlled variable. Thus, as a strategic management concept, it leverages more on organizational competencies.

The Optimal Model

The optimal conceptual model for the study takes the form illustrated in figure 4.7.

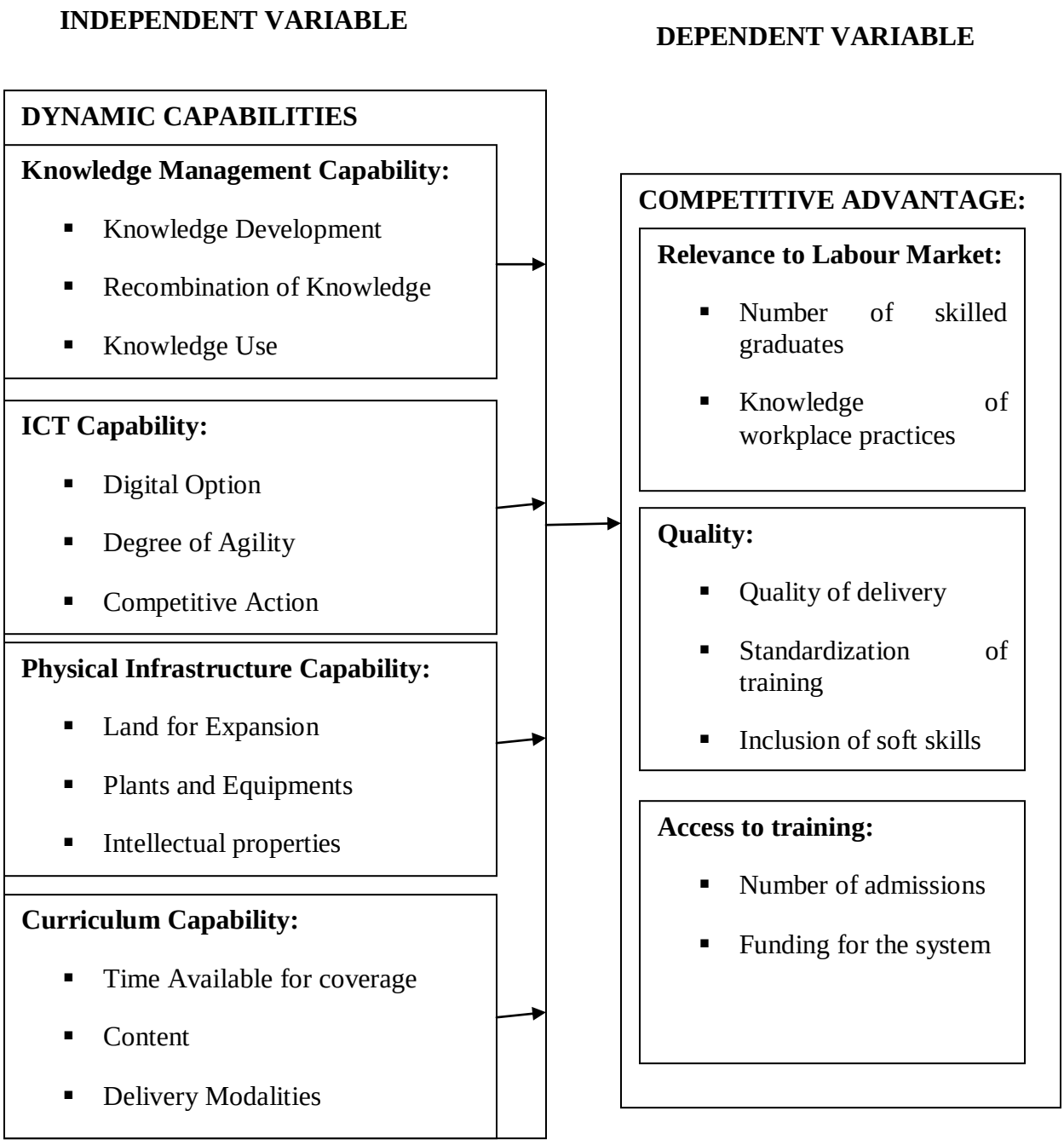


Figure 4. 7: Optimal Conceptual model

4.8 Correlation Analysis of Independent Variables

Correlation analysis gives the relationship between variables. In this study, Pearson product moment correlation coefficient (*r*) was used to establish the relationship between the independent variables. The correlation coefficients are summarized in table 4.76. The findings also reveals that there was significant relationship between the independent variables since all the p-values were less than 0.01 that is p- values 0.000 <0.01. Even though there was a significant relationship between the independent variables, there was no problem of multi-collinearity among the variables since all the r values were less 0.8 as suggested by Tabachnick and Fidel (2001).

Table 4. 76: Correlation analysis of Independent Variables without Moderator (EEE)

		KMC	ICTC	PIC	CC
KMC	Pearson Correlation	1	.465**	.445**	.462**
	Sig. (2-tailed)		.000	.000	.000
	N	93	88	93	86
ICTC	Pearson Correlation	.465**	1	.681**	.440**
	Sig. (2-tailed)	.000		.000	.000
	N	88	96	96	87
PIC	Pearson Correlation	.445**	.681**	1	.416**
	Sig. (2-tailed)	.000	.000		.000
	N	93	96	101	92
CC	Pearson Correlation	.462**	.440**	.416**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	86	87	92	92

****. Correlation is significant at the 0.01 level (2-tailed).**

In the presence of moderator, correlation coefficient r values were above 0.8 and the relationship among the independent variable was significant. Since the r values were above 0.8, Tabachnick and Fidel (2001) rule of thumb was contradicted hence probably there was a problem of multicollinearity this therefore suggest that the model was good enough in the absence of moderator

Table 4. 77: Correlation analysis of Independent Variable with moderator (EEE))

		x_1*z	x_2*z	x_3*z	x_4*z
x_1*z	Pearson Correlation	1	.828**	.783**	.827**
	Sig. (2-tailed)		.000	.000	.000
	N	90	85	90	84
x_2*z	Pearson Correlation	.828**	1	.837**	.794**
	Sig. (2-tailed)	.000		.000	.000
	N	85	92	92	85
x_3*z	Pearson Correlation	.783**	.837**	1	.755**
	Sig. (2-tailed)	.000	.000		.000
	N	90	92	97	90
x_4*z	Pearson Correlation	.827**	.794**	.755**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	84	85	90	90

****. Correlation is significant at the 0.01 level (2-tailed).**

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study which sought to investigate the relationship between Dynamic Capabilities and Competitive Advantage of TVET Institutions in western Kenya region. The study was guided by specific objectives and hypotheses. This chapter therefore presents the summary of the research work, conclusions drawn from the study, recommendations and areas of further research in relation to data analysis.

5.2 Summary of Findings

5.2.1 Preliminary Findings

From the findings it was observed that majority of respondents were heads of departments/sections at 84.2%. The findings also revealed a majority response being male at 66.3%, the majority having been in those position for between 1 year to 4 years (65.3%). The highest level of education for the majority respondents was degree at 53.5%, with each institution surveyed having a combined workforce of between 50 to 199 (78.2%). All the institutions surveyed turned a response of state owned institution, 100%.

5.2.2 Knowledge Management Capability and Competitive Advantage

Specific objective 1: To determine the relationship between Knowledge Management Capability and Competitive Advantage of TVET Institutions in Kenya

From the results of the descriptive analysis most respondents agreed that: their institutions has processes for acquiring new knowledge (68%); their institution has processes for converting knowledge acquired into organizational knowledge (64%); and that their institutions has

processes for application of new knowledge (64.3%). The respondents were however not committal (48%) that their market position from the Knowledge Management capability is stronger compared to global rivals. In the context of KM, knowledge-oriented processes that change, renew, and exploit knowledge-based resources can represent the knowledge-related dynamic capabilities of the firm which are central to creating and sustaining a CA in today's dynamic markets. The management's role in acquisition, conversion and application of Knowledge Management Capabilities is paramount. Knowledge Management in any organization is a strategic orientation that requires commitment of organizations resources.

Moreover from the analysis of variance carried out, it was clear that there was a significant relationship between the predictor variable knowledge management capability and competitive advantage and the relationship between the two variables existed with or without the moderator with p-value= 0.000 < 0.05 This implies the more management of the TVET institutions got involved with knowledge management the higher the possibility of creating and sustaining competitive advantage in their markets. Moreover the findings of the regression models one with a moderator and without showed that knowledge management capability was significantly related to competitive advantage of TVET institutions in Kenya ($Y= 4.754 + 0.460X_1$ and $Y= 5.972 + .031X_{1*}Z.$) respectively.

5.2.3 Information Communication Technology Capability and Competitive Advantage

Objective two: To find out the relationship between Information Communication Technology Capability and Competitive Advantage of TVET Institutions in Kenya

The findings of descriptive statistics showed that majority of the respondents,63.7%, were neutral on whether or not TVET institutions in western Kenya region lacked IT infrastructure capability; 52% indicated that they agreed there was digital agility in terms of IT personnel

capability, 45% indicated there was digital agility in terms of management capability; 48% indicated there was IT support for market and operational competence; while 35% indicated existence of adaptive IT capability. On average (51%), the institutions had a superior position from their ICT capability. The response agreed with the earlier information gleaned from literature that indicated that poor IT infrastructure coupled with low management capability are barriers to sustainability of a firm's competitive advantage.

The Pearson's product moment correlation statistic was used to test the relationship between ICT capability and competitive advantage of TVET Institutions in western Kenya Region. The R square value without the moderating variable showed that 0.543 (54.3%) of TVET's competitive advantage in the western Kenya region was explained by ICT capability but went slightly lower to 0.533 (53.3%) with the moderating variable, effect of TVET's Macro Environment. This finding was further collaborated by the results of Analysis of Variance (ANOVA). With the moderating variable and without it the value was 0.00 which is less than 0.05. Statistically it means there is a significant relationship between ICT capability and competitive advantage of TVET institutions in Kenya. The regression coefficient was further proof that the predictor variable had a significant influence on the dependent variable; without and with moderating variable; it showed a p- value of 0.000 which is less than 0.05, significance level.

5.2.4 Physical Infrastructural Capability and Competitive Advantage

Objective three: To establish the relationship between Physical Infrastructural Capability and Competitive Advantage of TVET Institutions in Kenya.

From the descriptive analysis,(61.3%) disagreed with the statement that there exist physical infrastructure capacity in the TVET institutions surveyed. Particularly, a large number (43.5%, 51.5% and 50.5%) disagreeing to the statements that their laboratories are well equipped with modern training facilities, libraries are well stocked with modern facilities and that their recreational facilities are adequate and modern.

It is however, important to note from the findings that majority of respondents indicated 60.4% approval for availability of physical land for future expansion, 40.6% agreeing of the availability of workshops that are well equipped with relevant and modern tools and machinery. This confirms the challenge these institutions have in building lasting advantage since without the distinctive physical resources to complement the human competencies (knowledge, capabilities, and skills), the organization cannot successfully produce attributes that bring the organization a sustainable advantage (Rigsby & Greco, 2005). The respondents (at 68%) dismissed the institutions superior market position arising from their physical infrastructure.

Analysis of Variance results for regression coefficients revealed that the significance of p-values was 0.000 which is less than 0.05 hence the null hypothesis was rejected. The implication was that there was a significant relationship between physical infrastructure capability and competitive advantage of TVET institutions in Kenya.

5.2.5 Curriculum Capability and Competitive Advantage

Objective four: To determine the relationship between Curriculum Capabilities and Competitive Advantage of TVET Institutions in Kenya

From the study findings, majority of respondents 72% indicated that their institutions have developed curriculum capabilities with respect to the constructs of: syllabus development, content, mode of delivery, flexibility and entities involved in its development and review. A large majority (at 65%) of respondents further emphasized the superior position that these institutions enjoy from the dynamic curriculum capability.

From the analysis of variance carried out, it was clear that there was a significant relationship between the predictor variable curriculum capability and competitive advantage and the relationship between the two variables existed with or without the moderator with p-value= $0.000 < 0.05$. Moreover the findings of the regression models one with a moderator and without showed that curriculum capability was significantly related to competitive advantage of TVET institutions in the western Kenya region ($Y= 3.942 + 1.198X_4$ and $Y= 5.881 + 0.073X_{4*}Z_.$) respectively.

5.2.5 TVET's Macro Environment

Objective Five: To assess the moderating effect of TVET's Macro Environment on the relationship between Dynamic Capabilities and Competitive Advantage of TVET Institutions in Kenya

From overall model summary 61.6% of competitive advantage of TVET Institutions in the western Kenya region was explained by the four predictor variables: knowledge management capability, ICT capability, physical infrastructure capability, and curriculum capability. However the figure dropped to 53.1% when the moderating variable, effect of macro

environment, was present. The optimal model was the one without a moderator since it registered a higher R square value than one with a moderator.

From the ANOVA the p- value for the first model without moderating variable and the second with moderating variable are both 0.000 which is less than 0.05. This implies there is a significant relationship between the independent variable; dynamic capabilities and dependent variable, competitive advantage of TVET Institutions. Using the overall coefficient the results of the t-test revealed that the p- value was less than 0.05 for ICTC, 0.481 for KMC, 0.182 for PIC, 0.103 for CC without the moderating variable (effect of macro environment). With the moderating variable, p-value for KMC was 0.700, ICTC was 0.006, PIC was 0.107 and CC was 0.919 indicating that KMC, PIC and CC had no influence on competitive advantage of TVET Institutions. In conclusion it was deduced from the R square values that in presence of the moderator, the model was less optimal compared to without moderator. Therefore the moderating variable external environment should be discarded.

5.3 Conclusion

The study established existence of a strong knowledge management capability within TVET Institutions in Kenya. The institutions have developed unique competences in knowledge management processes of acquisition, conversion and application of new knowledge, which have given them the ability to effectively fulfill their mandate. The study also showed that knowledge management capability is significantly related to competitive advantage of TVET Institutions.

Secondly, ICT infrastructural capability and adaptive IT capability in most of the TVET institutions in Kenya is low, although the institutions have developed digital agility and IT support for market and operational competence.

This study also found TVET Institutions in Kenya lacking physical infrastructural capabilities with inadequate and poor workshops, laboratories, libraries and recreational facilities. These institutions however, have enough land for future expansions.

The study established that TVET Institutions in Kenya have developed strong curriculum capabilities in terms of content, mode of delivery, flexibility and stakeholder involvement in its review.

From the findings, it is concluded that TVET Institutions in Kenya have a comparative Advantage accruing from their dynamic capabilities (relevance to labour market, quality and access to training). This advantage if built further is capable to guarantee a competitive advantage in the global stage of industrial and technological development.

Finally, the study established a positive relationship between Dynamic Capabilities and Competitive Advantage of TVET Institutions in Kenya.

5.4 Recommendation

In view of the findings as well as the conclusion deduced from the study some recommendations were made.

5.4.1 Knowledge Management Capability

Achieving a CA is always one of the strategic objectives of every business and any other organization. To remain sustainable and competitive in the turbulent, dynamic environments of today, firms are required to acquire strong dynamic capabilities by implementing a variety of KM activities. Therefore, the most important concern of senior management must be how to develop and effectively exploit such capabilities to improve organisational competitiveness. This study attempts to provide a variety of practical recommendations for guiding executives, especially those who are operating in TVET sector in Kenya, to be successful in using KM process to attain strategic objectives. Firstly, the study suggests that institutional managers

should understand and develop a holistic approach of implementing an overall KM capability which is composed of the three processes of acquisition, conversion and application processes. These correlated and complementary capabilities should not be considered in isolation but rather should be integrated and combined to leverage, exploit and sustain a competitive advantage. Secondly, management of TVET Institutions should develop Knowledge Management Policy that will guide their actions in knowledge management to develop even greater Knowledge Management capability.

5.4.2 Information Communication Technology Capability

Literature reviewed indicate that IT can be a source of competitive advantage by providing firms with the ability to adapt themselves more quickly to environmental changes, the study findings being no exception. Management of TVET Institutions should: Build IT infrastructure to support their market and operational competencies; use existing ICT capability to adapt to changes in both institutional framework and the job market.

5.4.3 Physical Infrastructural Capability

Modern training facilities need to be established in the TVET Institutions including well equipped laboratories, workshops and libraries with modern facilities. Moreover, a concerted effort to transform the large parcels of land that are idle into revenue streams for the institutions through income generating activities should be put.

5.4.4 Curriculum Capability

While no single list of generic skills can be concluded as conclusive to one job or sector in this constantly changing economic and social landscape, the dominating skills sets and competencies required in 21st century occupations must be consigned to the learner. The management of TVET Institutions should in spite of strong curriculum capability: Seek to be

involved to a greater extent in the design, review and implementation of TVET curriculum due to their peculiar role as implementers of the Curriculum; that government should allow each TVET Institution as a matter of policy to develop customized curriculum to satisfy the unique training needs in their geographical regions even as they implement national curriculum; and that the Industry or Job market should be the approving body for whatever curriculum TVET Institutions intent to implement in order to bridge the industry skill needs from TVET graduates.

5.5 Areas of further research

A review of the literature indicated that research on dynamic capabilities particularly within the TVET sub-sector in the country is low. In view of this the study provides a basis for future studies on the following areas. The cross-sectional survey design of the study provided a snapshot of the variables under investigation and did not allow for examination of the longitudinal impact of dynamic capabilities: KMC, ICTC, PIC and CC on competitive advantage. Dynamic capability builds on several other constructs which could take time to develop. Hence, this study provides a foundation for further studies which might use this study as a foundation to retest the research model in a couple of years to compare the results. The limited scope of this study lends credence to the need for future studies on dynamic capabilities and competitive advantage in TVET Institutions to capture the entire geographical boundaries of Kenya. Lastly, an optimal level of capabilities should be determined in future research to get a holistic and comprehensive model for TVET Institutions.

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APPENDICES

Appendix 1: Questionnaire

DYNAMIC CAPABILITY AND COMPETITIVE ADVANTAGE OF TVET INSTITUTIONS IN KENYA

This study focuses on the relationship between Dynamic capabilities and competitive advantage of TVET Institutions in the western region of Kenya.

Please note that your responses are anonymous and confidential and will be used by the researcher only for the purposes of research. There is no right or wrong answers. Please answer all questions to the best of your knowledge.

Section 1: Participant & Institutional background Information

Name of Institution:

……

Position held …….....

No of years in that position: …….....

Gender of respondent: ……..

Education level of respondent:

Diploma ☐ Higher National Diploma ☐

Degree ☐ Post Graduate Degree ☐

What is the number of employees in your Institution/Department?

☐ Less than 20 ☐ 50-199 ☐ 300-499

☐ 20-49 ☐ 200-299 ☐ 500 and over

What type of ownership is your Institution?

☐ State-owned

☐ Private Limited

If you would like to receive a copy of the research results, please indicate your mailing or email address below:_____

Section 2: KM Capabilities and competitive Advantage of TVET Institutions

Please indicate (by ticking (√) the appropriate box) the extent to which you agree or disagree with each of the statements. The following scale is applied for all statements:

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

1. Acquisition Process

	My Institution …					
ACP1	Has processes for acquiring knowledge about our customers	1	2	3	4	5
ACP2	Has processes for generating new knowledge from existing knowledge	1	2	3	4	5
ACP3	Has processes for acquiring knowledge about our suppliers	1	2	3	4	5
ACP4	Has processes for distributing knowledge throughout the organization	1	2	3	4	5
ACP5	Has processes for acquiring knowledge about new products/services within our industry	1	2	3	4	5
ACP6	Has processes for exchanging knowledge between individuals	1	2	3	4	5

2. Conversion Process

	My Institution …					
CP1	Has processes for filtering knowledge	1	2	3	4	5
CP2	Has processes for transferring organisational knowledge to individuals	1	2	3	4	5
CP3	Has processes for absorbing knowledge from individuals into the organisation	1	2	3	4	5

CP4	Has processes for integrating different sources and types of knowledge	1	2	3	4	5
CP5	Has processes for storing knowledge	1	2	3	4	5
CP6	Has processes for replacing outdated knowledge	1	2	3	4	5

3. Application Process

	My Institution …					
APP1	Has processes for using new knowledge in development of products/services	1	2	3	4	5
APP2	Has processes for using new knowledge to solve problems	1	2	3	4	5
APP3	Matches sources of new knowledge to problems and challenges	1	2	3	4	5
APP4	Uses new knowledge to improve efficiency	1	2	3	4	5
APP5	Uses new knowledge to adjust strategic direction	1	2	3	4	5
APP6	Is able to locate and apply new knowledge to changing competitive conditions	1	2	3	4	5
APP7	Takes advantage of new knowledge	1	2	3	4	5

4. Competitive Advantage

	My Institution's Knowledge Management Capability:					
CA1	Has led to knowledge-based innovation that meet job market demand	1	2	3	4	5
CA2	Can create strong barriers to entry for other higher learning institutions competing for customers	1	2	3	4	5
CA3	Has widen the array (line/range) of products without increasing costs	1	2	3	4	5
CA4	Would be difficult and expensive for other institutions to duplicate	1	2	3	4	5
CA4	Is good enough to guarantee quality of graduates and access to training in terms of increased admissions.	1	2	3	4	5

Section 3: ICT Capability and Competitive Advantage of TVET Institutions

5. Digital Option

IT infrastructure capability

ITI1	Our Institution has a high degree of system interconnectivity	1	2	3	4	5
ITI2	Our system is sufficiently flexible to incorporate electronic links to external parties	1	2	3	4	5
ITI3	Data is available to everyone in the Institution in real time	1	2	3	4	5
ITI4	Our user interfaces provide transparent access to all platforms and applications	1	2	3	4	5
ITI5	Our Institution makes intensive use of middleware to integrate key enterprise applications	1	2	3	4	5
ITI6	Legacy systems within our institution incorporates the development of new IT applications	1	2	3	4	5
ITI7	Functionality can be quickly added to critical applications	1	2	3	4	5

6. Digital Agility

6.1 IT personnel capability

ITP1	Our Institution can easily handle variations in data formats and standards	1	2	3	4	5
ITP2	Our IT personnel are cross-trained to support other IT services outside their domain	1	2	3	4	5
ITP3	Our IT personnel are skilled in multiple programming languages	1	2	3	4	5
ITP4	Our IT personnel are skilled in multiple operating systems	1	2	3	4	5
ITP5	Our IT personnel are knowledgeable about our IT projects	1	2	3	4	5
ITP6	Our IT personnel are knowledgeable about the key success factors in our institution	1	2	3	4	5

6.2 IT management capability

ITM1	Our IT Management understand the business environments they support	1	2	3	4	5
ITM2	Our IT management is up to date with the emerging business development	1	2	3	4	5
ITM3	Our IT management evaluates opportunities and risks from emerging technologies	1	2	3	4	5
ITM4	IT management contributes to our institutional strategy	1	2	3	4	5
ITM5	We manage IT strategically	1	2	3	4	5
ITM6	There is a high degree of trust between our IT department and other departments/sections	1	2	3	4	5
ITM7	Critical information and knowledge that affect IT projects are shared freely between departments and IT department	1	2	3	4	5
ITM8	Our IT department and other departments understand the working environments of each other	1	2	3	4	5
ITM9	The goals and plans for IT projects are jointly developed by both the IT department and the other departments.	1	2	3	4	5

7. Competitive Action

7.1 IT support for market and operational competence

ITS1	Our IT management is able to interpret industry problems and develop solutions	1	2	3	4	5
ITS2	Our IT is utilised to redefine the scope of our business	1	2	3	4	5
ITS3	Our IT supports analysing customer needs (i.e. product/services, preferences, costing and quality)	1	2	3	4	5
ITS4	Our IT is utilised to produce quality products /services	1	2	3	4	5
ITS5	Our IT is improving our operational efficiency	1	2	3	4	5
ITS6	Our IT supports our innovation processes	1	2	3	4	5

ITS7	Our IT supports our product development	1	2	3	4	5
ITS8	Our IT supports knowledge-sharing in the institution	1	2	3	4	5
ITS9	Our IT supports cross-functional integration in our institution	1	2	3	4	5

7.2 Adaptive IT capability

ITA1	Our IT is able to adapt quickly to changes in the market and customer demands	1	2	3	4	5
ITA2	Our IT is able to adapt quickly to changes in the institution's products or services	1	2	3	4	5
ITA3	Our IT is able to develop new Institutional products and services	1	2	3	4	5
ITA4	Our IT is able to adapt quickly to changes which can become necessary because of competition	1	2	3	4	5
ITA5	Our IT is utilised to increase the speed of responding to institutional opportunities/ threats	1	2	3	4	5
ITA6	Our IT is able to adapt quickly to changes in business processes and organisational structures	1	2	3	4	5
ITA7	Our IT is able to adapt quickly to changes in knowledge-sharing in the institution	1	2	3	4	5
ITA8	Our IT is able to adapt quickly to changes in product development	1	2	3	4	5
ITA9	Our IT is able to adapt quickly to changes in the cross-functional Integration of our Institution	1	2	3	4	5
ITA10	Our IT is able to enhance strategic business process flexibility	1	2	3	4	5

8. ICT and Competitive Advantage of TVET Institutions

ITCA1	Our IT related innovations have increased the quality of training and quality of our products	1	2	3	4	5
ITCA2	Our IT systems have been seamless and increased access to training	1	2	3	4	5
ITCA3	Our graduates has been widely accepted in the Industries because they poses industry-relevant IT skills.	1	2	3	4	5
ITCA4	Our IT system has led to standardized training acceptable globally	1	2	3	4	5

Section 4: Physical Infrastructural Capabilities and Competitive Advantage of TVET Institutions

9. Physical Infrastructural capability

	My Institution's:					
PI1	Workshops are well equipped with the relevant and modern tools and machinery	1	2	3	4	5
PI2	Laboratories are well equipped with relevant and modern training facilities	1	2	3	4	5
PI3	Library is well stocked with modern facilities and has the capacity to accommodate current students population	1	2	3	4	5
PI4	Has enough space for future expansion	1	2	3	4	5
PI5	Physical aesthetics is outstanding and projects an educational image	1	2	3	4	5
PI6	Recreational facilities are adequate and modern	1	2	3	4	5
P17	Available land has been put into productive use to supplement its budget through income generating activities	1	2	3	4	5
	My Institution ..					

PI8	Has processes to protect knowledge-based innovations from theft	1	2	3	4	5
PI9	Has extensive polices and procedures for protecting intellectual properties	1	2	3	4	5
PI10	Values and protects knowledge embedded in individuals	1	2	3	4	5
PI11	Clearly communicates (create awareness of) the importance of protecting knowledge	1	2	3	4	5

8. Physical Infrastructural Competitive Advantage

	My Institution's Physical Infrastructural Capability:					
PICA1	Has sustained our finances and reduces our dependence on external funding mainly from Income Generating Activities from our farm	1	2	3	4	5
PICA2	Provides room for increased access to training	1	2	3	4	5
PICA3	Has made our products superior in terms of knowledge and skills and thus become relevant to market demands due to the ongoing protection of intellectual properties	1	2	3	4	5
PICA4	Supports quality training particularly from Plants and Equipments which are modern	1	2	3	4	5

Section 5: Curriculum Capabilities and Competitive Advantage of TVET Institutions

9. Curriculum Capabilities

	My Institution:					
CC1	Uses syllabus that is rated highly within the TVET sector and job market	1	2	3	4	5
CC2	Uses syllabus that has been developed in collaboration with the stakeholders	1	2	3	4	5
CC3	Has adopted a learner centered methodology of syllabus coverage	1	2	3	4	5

CC4	Has highly incorporated practical experiencing in students training	1	2	3	4	5
CC5	Has fully integrated ICT in its training delivery	1	2	3	4	5
CC6	Has a broad and progressive content syllabus	1	2	3	4	5
CC7	Has partnered with the Industry to continually review the existing syllabi	1	2	3	4	5
CC8	Uses Modularized syllabus that allows flexible entry and exit modalities	1	2	3	4	5

10. Curriculum Capabilities and Competitive Advantage of TVET Institutions

	My Institution's:					
CCCA1	Curriculum has included soft skills in its content	1	2	3	4	5
CCCA2	Curriculum passes out graduates who meets industry needs in terms of skills and knowledge	1	2	3	4	5
CCCA3	Curriculum leads to standardized skills and knowledge of graduates applicable globally	1	2	3	4	5
CCCA4	Curriculum allows for ease of entry for new admissions	1	2	3	4	5

Section 6: TVET's Macro Environment and Competitive Advantage of TVET Institutions

	The current Government policy on TVET supports:					
CGP1	Acquisition and Development of Physical Infrastructure	1	2	3	4	5
CGP2	Increased funding to the TVET's sub-sector	1	2	3	4	5
CGP3	Acquisition, conversion and application of Knowledge Management Capabilities	1	2	3	4	5
CGP4	The development of ICT infrastructure	1	2	3	4	5
CGP5	Establishment of distinct TVET program from that offered by other higher learning institutions	1	2	3	4	5
CGP6	Partnerships between TVET institutions and the industry players	1	2	3	4	5

	The current Kenyan Economic Growth :					
CKE1	Supports the establishment of Small and Medium Enterprises that requires manpower from TVET institutions	1	2	3	4	5
CKE2	Has guaranteed a sustainable disposable income to parents in the catchment area of my institution that allows uninterrupted fee payment	1	2	3	4	5
	Existing Partnerships					
EP1	Our Institution has signed a number of collaborative agreements with the Industry to support our core mandate	1	2	3	4	5
EP2	The partnerships have led to quality graduates that meet the labour market requirements	1	2	3	4	5
EP3	The partnerships have been a source of financing to our institution thereby making training accessible	1	2	3	4	5
EP4	Have contributed greatly towards skills and knowledge transfer to our institution	1	2	3	4	5
EP5	Has led to quality of delivery, standardization and the inclusion of soft skills to training	1	2	3	4	5
	Other Institutions of Higher Learning;					
IHL1	Have developed strong dynamic capabilities than our institution	1	2	3	4	5
IHL2	Passes out graduates with more relevant skills and knowledge to the job market than our institution	1	2	3	4	5
IHL3	Has standardized training programs rich in quality than our institution	1	2	3	4	5
IHL4	Has a secure and uninterrupted funding options than our institution	1	2	3	4	5
IHL5	Has admission requirements that erodes our customer base in terms of cut-off grades	1	2	3	4	5

Thank you very much for your time and efforts to complete this survey!

Appendix 2: Interview Guide

DYNAMIC CAPABILITY AND COMPETITIVE ADVANTAGE OF TVET INSTITUTIONS IN KENYA

This study focuses on the perception of TVET Institutional executives on Dynamic capabilities and competitive advantage of these Institutions.

Please note that your responses are anonymous and confidential and will be used by the researcher only for the purposes of research. There is no right or wrong answers. Please answer all questions to the best of your knowledge.

Section 1: Participant & Institutional background Information

Name of Institution: ……

Position held …….....

No of years in that position: …….....

Gender of respondent: ……..

Education level of respondent:

Diploma ☐ Higher National Diploma ☐

Degree ☐ Post Graduate Degree ☐

What is the number of employees in your Institution/Department?

☐ Less than 20 ☐ 50-199 ☐ 300-499

☐ 20-49 ☐ 200-299 ☐ 500 and over

What type of ownership is your Institution?

☐ State-owned

☐ Private Limited

If you would like to receive a copy of the research results, please indicate your mailing or email address below:_____

Section 2: KM Capabilities and Competitive Advantage of TVET Institutions

1. In your various activities to develop new Knowledge for the Institution, how do you Create, Aquire and Capture New Knowledge? ……..

   ……
   ……
   ……

2. Kindly highlight specific Knowledge that your Institution has been able to develop in the recent past……..

3. How do you transform the new Knowledge developed into an organizational capability?
   …….

4. To what extend has the new Knowledge developed been integrated with existing
   Knowledge?.....

5. Describe briefly how the integrated Knowledge has been able to create value to the institution……
   .

Section 3: ICT Capabilities and competitive Advantage of TVET Institutions

6. Kindly describe your Institutional IT Infrastructure…….....

7. What is the status of IT personnel and Management capability in your Institution?.....

8. How has your IT Infrastructure supported market and operational competence? ……

9. How has IT capability help the institution achieve your mandate?.....

Section 4: Physical Infrastructural Capabilities and competitive Advantage of TVET Institutions

10. Kindly assess your institutional capacity in terms of physical facilities……
    …….

11. Does your institution have intellectual properties to your name?.....

12. How have your Institution utilized the physical infrastructural capability to meet your goals?.....

Section 5: Curriculum Capabilities and competitive Advantage of TVET Institutions

13. How relevant is the TVET curriculum you currently use?.....

14. Which organizations were involved in its development?.....

15. What is the depth of the current TVET curriculum your institution use?.....

16. What are some of the notable features of the TVET curriculum that addresses the current student-industry needs…….....

17. How often do TVET curriculum get reviewed and who participates in the review?.....

Section 6: TVET's Macro Environment and competitive Advantage of TVET Institutions

18. What is the current state of Government of Kenya's support to TVET sector?....

19. Does the government of Kenya have a policy on: Knowledge Management; ICT, Physical Infrastructure and Curriculum developments in TVET Institutions?.....

    If yes, kindly elaborate……....

20. How does National economic growth affect competitiveness of the TVET program……
    …..

21. How does the competitive Advantage of your Institution get eroded by other higher learning institutions?.....

22. What are the partnership arrangements between your institution and the Industry?.....

23. What has the existing partnerships contributed to your competitive advantage?..

.

THANK YOU VERY MUCH FOR YOUR TIME AND EFFORTS TO COMPLETE THIS SURVEY!

Appendix III: List of TVET Institutions Surveyed

1. Bumbe Technical Training Institute
2. Bushiangala Technical Training Institute
3. Friends College Kaimosi- Institute of Technology
4. Gusii Institute of Technology
5. Keroka Technical Training Institute
6. Kisiwa Technical Training Institute
7. Kisumu National Polytechnic
8. Matili Technical Training Institute
9. Mawego Technical Training Institute
10. Ramogi Institute of Advanced Technology
11. Sang'alo Institute of Technology
12. Shamberere Technical Training Institute
13. Siaya Institute of Technology
14. Sigalagala Technical Training Institute

Appendix IV: Research Permits – NACOSTI & Jkuat Kisii Campus

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
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Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:
10th December, 2014

NACOSTI/P/14/6086/4243

Jared Ooko Deya
Jomo Kenyatta University of Agriculture
And Technology
P.O. Box 62000-00200
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The relationship between dynamic capabilities and competitive advantage of Technical, Vocational and Entrepreneurship Training Institutions in Western Kenya Region,"*** I am pleased to inform you that you have been authorized to undertake research in the **Selected Counties** for a period ending **30th September, 2015.**

You are advised to report to **the County Commissioners and the County Directors of Education of the selected Counties** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. S. K. LANGAT, OGW
FOR: SECRETARY/CEO

Copy to:

The County Commissioners
Selected Counties.

The County Directors of Education
Selected Counties.

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 3853

CONDITIONS: see back page

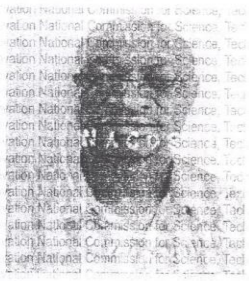
THIS IS TO CERTIFY THAT:
MR. JARED OOKO DEYA
of JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, 0-40100 kisumu,has been permitted to conduct research in *Bungoma , Busia , Homabay , Kakamega , Kisii , Kisumu , Migori , Siaya Counties*

on the topic: *THE RELATIONSHIP BETWEEN DYNAMIC CAPABILITIES AND COMPETITIVE ADVANTAGE OF TECHNICAL, VOCATIONAL AND ENTREPRENEURSHIP TRAINING INSTITUTIONS IN WESTERN KENYA REGION.*

for the period ending:
30th September,2015

.....
Applicant's Signature

Permit No : NACOSTI/P/14/6086/4243
Date Of Issue : 10th December,2014
Fee Recieved :Ksh 2,000



.....
Secretary
National Commission for Science, Technology & Innovation

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Email- kisiicbd@jkuat.ac.ke, website: http://www.jkuat.ac.ke

FROM: THE DIRECTOR **DATE:** 30/09/2014

TO: THE PRINCIPALS TVET **REF:** JKU/10/031

Dear Sir/Madam,

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Thank you.

Yours faithfully,

JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY
DIRECTOR
09 OCT 2014
KISII C.B.D. CAMPUS

PROF. JOHANA SIGEY-Ph.D
DIRECTOR (JKUAT-KISII CBD CAMPUS).

JOMO KENYATTA UNIVERSITY
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AGRICULTURE AND TECHNOLOGY
KISII CBD CAMPUS
P.O. BO
X 268 (40200). Tel. 020-05831129, +254 0722795482. Fax no. 05831129.
Email- kisiicbd@jkuat.ac.ke, website: http://www.jkuat.ac.ke

KISUMU POLYTECHNIC
DEPUTY PRINCIPAL
14 OCT 2014
RECEIVED
SIGN

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DIRECTOR
09 OCT 2014
KISII C.B.D. CAMPUS
P.O. BOX 268 - 40200 KISII

GUSII INSTITUTE OF TECHNOLOGY
P. O. Box 222, KISII. TEL: 058 31958
PRINCIPAL
RECEIVED
05 NOV 2014
SIGN.....

Permitted to Conduct Survey.

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DIRECTOR (JKUAT-KISII CBD CAMPUS).

DIRECTOR 09 OCT 2014 KISII C.B.D. CAMPUS

Accepted 6/11/2014

REGISTRARS OFFICE

Permission granted.

REGISTRAR
TECHNICAL TRAINING INSTITUTE
P.O. Box 4 KERUGOYA
04.11.14

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KISII CBD CAMPUS
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09 OCT 2014
KISII C.B.D. CAMPUS
P.O. BOX 268 - 40200 KISII

PROF. JOHANA SIGEY-Ph.D.
DIRECTOR (JKUAT-KISII CBD CAMPUS).

DEPUTY PRINCIPAL
SHIANGALA T. T. I.
28 OCT 2014
P. O. Box 2227 – 50100 KAKAMEGA

Allowed to carry out the research.
28/10/2014

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
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PROF. JOHANA SIGEY-Ph.D
DIRECTOR (JKUAT-KISII CBD CAMPUS).

Received and permission granted
12/10/2014
PRINCIPAL
MAWEGO TECHNICAL TRAINING INSTITUTE
P. O. Box 389 - 40222, OYUGIS.

Registrar:
Please assist Mr. Deya to accomplish this exercise.
Xo

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
KISII CBD CAMPUS
P.O. BO
X 268 (40200). Tel. 020-05831129, +254 0722795482. Fax no. 05831129.
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PRINCIPAL
RAMOGI INSTITUTE OF ADVANCED TECHNOLOGY
P. O. Box 1738, KISUMU
13/10/2014.

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09 OCT 2014
KISII C.B.D. CAMPUS

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JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY
DIRECTOR
09 OCT 2014
KISII C.B.D. CAMPUS

Mr Deya is allowed to carry out the research. 28/10/2014
Sirelwasa.

THE DEPUTY PRINCIPAL
FRIENDS COLLEGE KAIMOSI
P. O. BOX 150 - 50309, KAIMOSI.
TEL: 0704686363 / 0735818311
Email: friendscollegekaimosi@yahoo.com

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JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY DIRECTOR 09 OCT 2014 KISII C.B.D. CAMPUS P.O. BOX

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JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY DIRECTOR 09 OCT 2014 KISII C.B.D. CAMPUS

SIGALAGALA POLYTECHNIC REGISTRAR 29 OCT 2014 P.O. Box 2966-50100, KAKAMEGA

Received and Permission granted.

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KISIWA TECHNICAL TRAINING INSTITUTE PRINCIPAL 11 FEB 2015 P.O. Box 648, BUNGOMA

PROF. JOHANA SIGEY-Ph.D
DIRECTOR (JKUAT-KISII CBD CAMPUS).

APPROVED
Research & innorations co-ordinator
Facilitate the research.

Mr. Chirringi

Received.

DEPUTY PRINCIPAL
Matili Technical Training Institute
P. O. Box 76 – 50204, KIMILILI
Tel: 0720-021552 / 0735-932220
email: matilitechnical@yahoo.com

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Permission Granted

SANG ALLO INSTITUTE OF SCIENCE & TECHNOLOGY TOWN CAMPUS 11 FEB 2015 P. O. Box 158, BUNGOMA

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ATT. REGISTRAR
Please assist the Person.
DEPUTY PRINCIPAL
BUMBE TTI
SIGN:.....
DATE: 11/12/2015

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OF
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