

**INFORMATION TECHNOLOGY CAPABILITY AND PERFORMANCE OF
MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA**

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**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE AWARD OF THE DEGREE OF DOCTOR OF
PHILOSOPHY IN BUSINESS (MANAGEMENT INFORMATION SYSTEMS)
TO THE SCHOOL OF BUSINESS, ECONOMICS AND TOURISM OF
KENYATTA UNIVERSITY**

NOVEMBER 2022

DECLARATION

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

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DEDICATION

This work is dedicated to the awesome Gitau's whose moral support and encouragement has been tremendous and outstanding. The thought that you were on my side, made me stay on course.

ACKNOWLEDGEMENT

Am grateful to the Almighty God for the gift of life, good health and material possession. Am deeply indebted to my supervisors, Prof. Felix Musau (PhD) and Dr. David Nzuki (PhD) for their mentorship and immense contribution to this work. Special thanks to Dr. James Kilika for the positive contribution to this study. To my colleagues and classmates, thank you. To my parents and my siblings, you are awesome.

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ABBREVIATION AND ACRONYMS

BSC	Balanced Score Card
CAK	Communications Authority of Kenya
DCT	Dynamic Capability Theory
DV	Dependent Variable
ERPs	Enterprise Resource Planning Systems
GDP	Gross Domestic Product
GOK	Government of Kenya
IV	Independent Variable
IT	Information Technology
IS	Information Systems
KAM	Kenya Association of Manufacturers
KBT	Knowledge based Theory
K-S	Kolmogorov Smirnov
MV	Mediating Variable
NACOSTI	National Commission for Science, Technology and Innovation
RBV	Resource Based View
SPSS	Statistical Package for the Social Sciences
SW	Shapiro-Wilk
UTAUT	Unified Theory of Acceptance and Use of Technology

OPERATIONAL DEFINITION OF TERMS

- Competitive advantage:** Strategies taken up by firms to outperform their competition rivals which include product differentiation, market opportunities and customer relationships
- Firm Performance:** Ability to achieve objectives and outperform rival firms
- IT capability:** Firm's potential in mobilizing multifaceted IT resources to support business activities
- IT infrastructure capability:** Capacity to use IT infrastructure capability to provide network connectivity, hardware and software compatibility as well as modularity
- IT management capability:** This refers to leadership ability to use knowledge and experience in planning and design, investment decision making, coming up with IT standards and controls
- IT personnel capability:** IT Staff with foundational skills of IT elements, professional skills, technology knowledge, technology management and business skills
- IT reconfiguration capability:** The ability to explore, reorganize renew IT resources in order to attain congruence with changes in business needs.

ABSTRACT

Although manufacturing firms support economic development, wealth creation and poverty alleviation, a dismal performance has been reported. In Kenya, the share of gross domestic product (GDP) to manufacturing sector has remained below 10 per cent while its growth rate remained at about 5 percent in the last 10 years. This has been attributed to low innovation and technology diffusion. This study examined the effects of IT infrastructure, personnel, management and reconfiguration capabilities on firm performance. Further, the moderating effect of firm size and the mediating effect of competitive advantage, were explored. The study was anchored on Resource Based View, Unified Theory of Acceptance and Use of Technology, knowledge based and Dynamic Capability Theory and the balanced scorecard. Positivism philosophical approach, descriptive and explanatory research design were adopted. Using stratified and random sampling techniques, a sample of 222 manufacturing firms from Nairobi City County, was obtained from a target population of 526 firms. A semi-structured questionnaire was prepared and used for data collection. The internal consistency test on the data collection tool yielded a Cronbach's alpha coefficient ≥ 0.7 affirming the reliability of the study instrument. Research experts confirmed validity of the study instrument. The data was analysed through descriptive statistics to condense the survey data. To test hypotheses, inferential statistics was used. The results showed a positive significant effect of IT infrastructure capability ($\beta=0.231$, $p=0.005 < 0.05$), IT personnel capability ($\beta=0.165$, $p=0.044 < 0.05$), IT management capability ($\beta=0.183$, $p=0.018 < 0.05$) and IT reconfiguration capability ($\beta=0.288$, $p=0.001 < 0.05$) on performance. The study findings also exhibited a 49.2 per cent explanatory power of IT capability on firm performance. From the study findings, the interaction between IT capability and firm performance was partially mediated by competitive advantage. Firm size did not moderate the relation between IT capability and firm performance. Study findings provide knowledge in IT investment and configuration of IT capability. Subsequently, firms' IT managers and personnel should proactively build relationships with business functions and promote effective use of information technology through shared insights on business-related knowledge. Firm managers should also invest in building IT capability through planning, organizing, coordinating and control of IT use. Such interventions will lead to enhanced firm competitiveness and performance.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Firm performance has been used widely as a criterion of evaluating effectiveness and improvement requirements for highly competitive markets (Kargar & Parnell, 1996); (Arslan & Staub, 2013). Performance is seen as the success of firms in meeting their predefined objectives, targets and goals. Firms not only strive to survive highly competitive markets but to also survive and sustain their existence by improving their performance. In order for enterprises, manufacturing firms included, to meet their set out objectives including growth and progress, sustainable performance is critical.

Globally, the need for a buoyant manufacturing sector as an important driver for industrialization and improvement in the overall welfare of the citizens has been on the rise (Jara & Escaith, 2012). Statistics show that Africa is the least industrialized, accounting for less than 3 per cent of the global manufacturing output (AfDB, 2018). Additionally only 15.8 per cent of the total exports of merchandize were from the continent in 2018 compared to 54.3, 60 and 68 per cent from America, Asia and Europe respectively (AfDB, 2018). This study used performance of manufacturing firms as the dependent variable because of its critical role in promoting sustainable global economic growth and development as acknowledged in the sustainable Development goals (SDGs 2030) and Africa Union (AU) Agenda 2063.

According to Kimani (2015), Information Technology lacks accurate quantitative measures for information systems managers to evaluate IT investments. The research notes a gap in information technology as portrayed, showing negative correlations with performance and return on investment in a variety of manufacturing firms.

Similarly, other academicians had similar problems while assessing the contributions made by new technologies and sometimes reported this as a negative signal of its value. Furthermore, existent literature on the nature of firm's IT capability influencing performance focuses more on developed economies (Makkonen, Pohjola, Olkkonen & Koponen, 2014). This study therefore selected IT capability as the independent variable.

Prior research largely show a positive effect of firm competitiveness on firm performance (Claver-Cortés, 2012). However, some researchers noted that competitive advantage would not always affect performance (Coff, 2011). Hernández-Perlines, Moreno-García, & Yañez-Araque (2016) posited that very few research studies established the mediating effect of competitive strategy. Wanjiru *et al.*, (2019) opined that competitive advantage linking firm strategies to performance was significant while on the other hand Shariff (2017) missed mediation amid innovation and business performance in SMEs. This study used competitive advantage as a mediating variable since it can presumably influence the performance of manufacturing firms indirectly.

Firm size is a contextual variable used in models to control the effect on firm performance. According to De & Nagaraj (2014), firm size may be conceptualized in terms of profits, revenues and employee numbers. Qian, Wang, Geng, & Yu (2017) notes that firm size can improve performance through economics of scope and scale. Causal effects of firm size on financial performance yields ambiguous results (Mutunga & Owino, 2017). Sritharan (2015) opined firm's size as positively related to profitability while Gatete (2015) showed firm size as a moderator in the relationship

between firm size and performance. Further, Kigen (2014) found no linkage between firm size and profitability. From the foregoing findings, this study selected firm size as a moderating variable between IT capability and firm performance to establish its indirect interactions.

1.1.1 Firm Performance

The notion of firm performance is deemed uncertain as it lacks a universal definition. Gavrea, Ilies & Stegorean (2011) defined firm performance in terms of growth and progress while Fairoz *et al.* (2010), defined it as a function of time in an organizational context. Performance is also presumed to be a firm's potential in exploiting its resources in order to achieve its goals and objectives (Cao & Zhang, 2011). Saraf, Langdon & Gosain (2007) described firm performance as organizational effectiveness while Kargar & Parnell (2009) observed that most studies mainly focused on financial performance measures conceptualized as profitability, productivity and cost reduction. Further, Anand (2013) opined that a dearth of IS research studies limited firm performance to firm's financial performance a knowledge gap this study sought to address.

Marketing performance measures profitability in terms customer growth, sales growth and market share. According to Mithas, Krishnan Sambamurthy (2011), customer and market performance focus, enable firms to leverage customers to obtain market intelligence detecting opportunities for new products, attracting new customers, retaining existing customers and targeting new markets. Business performance can therefore be determined through sales growth, market performance and operational performance (Bhatt & Grover, 2005).

Njihia, Obara & Mauti (2013) opined performance measurement as a tool used to motivate, communicate and strengthen accountability. According to Kaplan & Norton (2001), firm performance can be measured from the financial, customer, business, and innovation perspectives. According to Odhuno & Wadongo (2010), financial perspective measure performance using the profit margin and annual sales turnover while from the customers' perspective, performance is associated to brand image, customer satisfaction, retention and profitability. Moreover, Cho & Pucik (2005) operationalized firm performance in terms of profitability, growth and market value while Ali, Mukulu & Kihoro (2016) notes that performance measurements simply determine whether or not an organization achieves its objectives.

Timilsina (2016) observes that company's technological advancements, client's needs, globalization, increased product and service innovations provide opportunities for change in business environment. The researcher notes that firms face challenges in overcoming competition in the market place. These firms continuously integrate resource choice and operations to survive competition and maintain the desired performance which can be achieved through their ability to integrate, reconfigure and redeploy IT resources.

Čater & Pučko (2010) defines firm performance as the ability to sustain competitive position amongst competitors as well as wealth creation. IT-enabled competitive strategies help firms perform better than their competitors. According to Laviolette (2019); Nath *et al.*, (2010) there are concerns on the linkage between firm performance and IT capability. In developing economies, the effect of IT capability on performance is unclear as noted by Liang *et al.*, (2010). Liang (2010) observes that

firms from developing economies have imperfect markets while developed economies use market forces to rate performance. However, Kipyegon, Bett *et al.*, (2018) operationalized firm performance in terms of market measures and customer retention. This study measured firm performance as a dependent variable with sales growth, market focus and customer retention as its constructs.

1.1.2 Information Technology Capability

Bharadwaj (2000) described IT capability as a firm's capacity to assemble, integrate and deploy IT-based resources. Stoel & Mohanna (2011) described IT capability as a package of skills and knowledge that a firm uses to produce desired results. IT capability help firms to plan and integrate IT- based resources in order to capture customers' information, share knowledge and improve business processes. According to Cano & Baena (2015) building IT capability improves performance while Bayo-Moriones Billon & Lera-Lopez, (2013); Yushkova, (2014) assert that using Information Communication Technology would amount to reduced costs, enhanced market share and profit margin.

Ong & Chen (2014) states that firms with superior IT capability yields better performance. Similarly, Chae *et al.*, (2014) opined that firms with high IT capability surpassed the performance of their competitors. Soto-Acosta & Merono-Cerdan (2014) held the view that the largely available data and information, accompanied by competition and market needs, give IT a new strategic role for business. Business enterprises in both global and local arenas have been increasingly going through turbulence times in their environmental orientation over the past decade. According to Gujarati & Porter, (2009), firms employ special techniques to withstand turbulent

business environment by redeploying and reconfiguring their IT resources aligning them with the changing business environment.

Despite the widely held belief that technology plays a key role in firms' performance, considerably less attention appears in the empirical evidence on the interaction between technological capability and firm performance (Bharadwaj & Grover, 2016) ; (Tsai, 2004). Further, previous studies still bawl to specify the fundamental mechanisms that associate technology with firm performance while on the other hand, the relationship between technology and firm performance has been a concern to researchers for decades (Abhijith Wamba & Sharma, 2013). Earlier research studies examined the impact of IT investment on organizational performance at the firm level (Melville & Kraemer, 2004). However, quantitative business value research evolves beyond evaluating productivity paradox to explore how firms use IT to generate value. Moreover returns to IT investment exhibit substantial variations across firms where various studies indicate that investment in technology affects business performance positively (Chen, Wang, Nevo, Benitez-Amado & Kou, 2015). Using IT effectively and efficiently is one way of differentiating between successful firms and their less successful counterparts furthermore, highly competitive global market puts pressure on firms to find ways to create and deliver value to customers.

Associating IT, firm performance and competitive advantage has been under investigation since early 1990s. However, the studies contradict the production paradox confirming IT contribution to firm performance. Augier & Teece (2007) confirms the existence of study gaps in the influence of IT on performance. Lin (2007) refers the interrelation between IT capability and firm performance as a critical subject

which has no conclusive evidence empirically. On the other hand, Bhatt & Grover, (2005a) observed that IT capabilities collectively help firms to acquire and deploy IT resources to support their business strategies. Turulja & Bajgoric, (2016) states that IT capability facilitates innovations which influence firm performance.

Chen & Tsou, (2012) investigated the interactions of IT capability and organizational factors. The study identified three types of IT capabilities namely: IT related resources (infrastructure and human) and IT experience in business. Similarly Karimi, Amini & Latifi (2014) considered the four resources as the key IT capabilities. These dimensions are in tandem with (Bharadwaj, 2000) who conceptualized IT-based resources in the following dimensions: infrastructure, human and IT-enabled intangibles while Tippins & Sohi (2003) considered knowledge, operations and objects as components of IT capability. Panda & Rath (2018) refer IT capability as a multidimensional framework consisting IT infrastructure, business spanning (ability to integrate IT and business strategies) and proactive stance (ability to explore and exploit business opportunities) capabilities. Further, Parida (2016) posit IT capability as a necessity for the survival and growth of firms through internal use, collaboration and communication while Oh, Yang & Kim (2014), were of the opinion that firms need a proper fit amid IT capabilities, IT systems and performance. This study conceptualized IT capability as IT infrastructure, personnel, management and reconfiguration capabilities.

According to Helfat & Peteraf (2003), new configurations of operational capabilities may be implemented through coordination of various tasks and resources. These resources are physical assets which are core to firm's overall technological

Infrastructure namely computers, communication technologies, shared technical platforms and databases which facilitate acquisition, processing, dissemination storage and use of information (Perez-Lopez *et. al.*, 2012). IT infrastructure capability refers to IT range and reach where range represents the type of information shared across systems and services while reach refers to the area of coverage. Firm's Infrastructure is a key business resource used to acquire long term competitive advantage by reducing the cycle time, integrating processes and creating new business opportunities. Ha & Jeong (2010) notes that IT capability literature recognize proficiency in mobilization and deployment of IT-based resources which enhance firm performance.

Firms develop IT infrastructure that span an entire organization in an effort to link suppliers and customers through elaborate hardware, software and other support services. IT infrastructure refers to shared resources consisting of platform technologies such as hardware, operating systems, networks, telecommunication, data and core software applications. IT infrastructure capability enable firms to evolve, spread out and preserve information systems as the business environment and market demands and procedures change. Anand *et al.*, (2013) noted that IT infrastructure capability evolved independently integrating with new technologies to support changes in aligning IT resources to business strategies. Byrd & Turner, (2001) asserted that the flexibility of IT infrastructure capability may be manifested through connectivity, compatibility and modularity. While connectivity refers to internal and external system functions, compatibility refers to information exchange regardless of system and its technical components while modularity refers to addition, modification and removal software components as well as interfacing applications.

Kipyegon, Bett, Oginda (2018) observed that IT infrastructure capability provides a platform for launching shared innovative IT business applications to enable firms to outperform their competitors. Resource based theorists contend that physical assets are drivers of competitive advantage when they overshadow similar assets belonging to their business rivals (Barney, 2015). IT infrastructure capability evolves independently through the integration of developed technologies aligning IT capability to business models. Further, flexible IT capabilities provide a foundation for the existing business processes to support future applications in a firm. Information technology systems purchased by competitors make the physical resources more likely to serve as sources of competitiveness. However, this argument attempts to value infrastructure in terms of its individual components yet IT assets and synergistic benefits of information systems are inseparable. In this study, IT infrastructure capability has been conceptualized in terms of connectivity, compatibility and modularity.

Firms should be equipped with the ability to reengineer business processes, support strategic innovations through application development, information sharing and integration of organizational functions. Platforms for business processes in information access and knowledge transfer is a necessity (Anand 2013). Moreover, IT infrastructure capability requires equipped IT personnel with technical skills and business knowledge to align IT solutions to business strategies.

IT personnel capability is the acquisition of technical knowledge and skillset which enable the staff to undertake assigned roles effectively. Barney (1991) grouped resources into physical, human and organizational where physical aspects reflect on

equipment, human aspects reflect on individual skills or knowledge while organizational aspects reflect on structure, rules and relationships. Barney (2015) defined the knowledge of technology as the awareness of organizational resources which are coordinated and controlled through planning and redeployment for organizational survival and prosperity.

IT personnel capability is the ability to acquire technical skills to provide effective management of Information systems, their synergy and collaboration with users. Kim (2010) notes that growing such a knowledgeable force, progress gradually making it difficult for competitors to imitate such intangible assets over a short life span. Bhatt & Grover (2005b) asserted that firms with strong IT human capabilities effectively integrate IT and business planning processes, conceive and develop reliable and cost effective applications which then support business needs, better than their competitors. Further, Kim, Shin & Kim (2011) opined that competent IT staff could easily identify environmental demands by aligning IT and business strategies. Makhoulfi, Yaacob & Yamin (2018) asserted that firms' high business failure rate and underperformance was occasioned by incompetent IT personnel although efforts to translate organizational capabilities into those germane to IT functions are still lacking.

Kim *et al.*, (2011) further assert that the knowledge of technologies, technical management, business functions and interpersonal relationships aids the advancement of performance and growth of firms. Technology management knowledge refers to the deployment of information technology effectively and profitably meeting firms' strategic goals and objectives, business knowledge help firms identify and interpret

problems and solutions while interpersonal and management knowledge are enablers of planning, organizing and leadership of IT projects. In this study, IT personnel capability is conceptualized in terms of Technical knowledge, technology management, business knowledge and relational knowledge

IT management capability also refers to skills used to align business strategy and IT strategy in terms of planning, coordinating, control and use of information technology. According to Peppard (2007), IT management capability involve managing of personnel, administration of IT resources and development of initiatives to provide sustainable performance. Kim *et al.*, (2011) asserts that IT management capability aligns IT resources to business. Consequently, IT management capability is a key driver of superior performance by aligning IT planning to business strategies, investment decision making and coordination of IT innovations with changes related to business. Muhanna & Dale Stoel (2010) refers IT as an enabler for firms to monitor and envisage changing customer preferences in markets. Additionally, an accurate forecast of products demand could boost sales. According to Ashrafi & Mueller (2015); Mitchell (2008) firms' integrate and coordinate functional units/departments to efficiently process customer information.

IT management capability manifests in planning of IT procedures and operations, investing in decision-making, coordinating and control of IT processes. IT planning attract formal or informal procedures which can support firm's strategic position to identify innovative IT applications in response to changing business environment. Investing in decision making supports and adds value to firm's strategic position. (Ryan & Gates, 2004) notes that differences in decision making amounts to

discrepancies in software adoption while coordination enables firms to synchronize IT management capability units such as reporting systems, task forces and multi-disciplinary teams support. Karimi *et al.* (2001) notes that firms with strong IT coordination, manage IT concerns and encourage formal and informal meetings to discuss pending issues. Additionally, firms with high levels of IT control, prepare budgets, prioritize business functionalities and conduct resource-planning, effectively.

Rothaermel & Hess, (2007) notes that firms with a capacity to change their operational processes in response to changing business environment have an advanced dynamic capability. Such firms cope with changing business environment better than their competitors by giving such firms a competitive edge. Martín-Rojas *et al.*, (2017) states that IT resources and business strategies are interwoven while Pavlou & Sawy (2010) notes that firms renew their current resources and capabilities on demand. Subsequently, firm's management staff should develop and renew resources and engage in innovative activities to deploy the right IT resources in the right business processes (Varis & Littune 2010).

According to Isobe, Makino & Montgomery *et al.*, (2008), firms change asset structures to create new chances in a competitive environment. This is because existing organizational practices with time interfere with firm's ability to adjust to new developments. Further, firms gain competitive advantage if they dominate superior ability to make use of IT assets efficiently. According to Teece (2017), strategic management scholars are of the opinion that dynamic capability is an extension of RBV which supports the possession of IT resources to achieve

competitive advantage. Teece (2017) concur with Wernerfelt (2013) who argue that the best strategy would be to create fairness in existing resources as well as developing new ones. In this regard, management capability is operationalized terms of IT planning, coordination and control, client preferences and synergy.

IT reconfiguration capability refers to firms' ability to creatively recombine resources and technologies building new products and applications. According to Danneels (2007), technology leveraging examines new technologies to gain an understanding on their potential contribution to new business markets and to satisfy customer needs. Isobe *et al.*, (2008) posited that reconfiguration capability would improve long term strategic performance through setting up new base competences to extract new solutions that can satisfy customer needs. However, Protogerou, Caloghirou and Lioukas (2012) found an indirect relationship between IT reconfiguration and performance.

Fleming (2001); Schumpeter (2017) define reconfiguration capabilities as new recombination of existing systems, resources and technologies. New products are creatively connected to solve current problems. Such innovative techniques help firms generate new applications in highly turbulent environments. On the other hand, firms' growth depends on heavy IT investments in innovative ways to create unique competitive advantage. Technological innovation is an organizational ability to boost firms' productivity and growth. IT reconfiguration leverage firm's IT investments for strategic gains although Protogerou, Caloghirou and Lioukas (2012) reported an insignificant linkage between IT reconfiguration capability and firm performance. In this study, IT reconfiguration capability is operationalized in terms of innovation

techniques, corporate orientation and strategic renewal of business processes, products and services. In line with Barney's taxonomy, this current study envisaged IT capability as IT infrastructure capability, IT personnel capability, IT management capability and reconfiguration capability.

1.1.3 Competitive Advantage

Competitive advantage is the position taken by firms to attract buyers and improve market focus in an effort to outperform their competitors (Thompson & Strickland, 1993). According to Barney (1991), deploying a value creating strategy make firms outperform the current and potential competitors. Porter (2008) argued that competitive advantage strategy enhanced the capacity of a firm in outperforming its competitors. Competitive advantage could be something a firm does that is different from its competitors, or superior to its competitors. Furthermore, Wang & Alam (2007) were of the opinion that IT capability differentiates competitive firms from the less competitive ones. However, Coff (2011) posited that competitive advantage did not always affect performance while Hernández-Perlines, Moreno-García, & Yañez-Araque (2016) argue that very few research studies establish the mediating effect of competitive strategy.

Finney, Leug & Campbell (2008) noted that firms created essential competences which sustained competitive advantage. Further, Finney *et al.*, (2008) asserted that firm resources and capabilities add value to the market and overran competitors. Previous studies identified innovation capability, value chain integration and market leadership as the key determinants of competitive advantage (Wanjiru *et al.*, 2019). Kessai & Piget (2014) argue that innovative activities lead to opportunities and provide foundations for new business undertakings.

According to the open system theory Katz & Kahn (1978), the organization is environment dependent and environment serving i.e. the firm gets its raw materials from the environment, processes them into finished goods which are then consumed by the same environment. The environment also presents opportunities and threats such as competition. Firm Performance depends on its ability to achieve predefined goals and perform better than firms in the industry through incremental innovations and improve customer interactions (Roberts & Grover, 2012). The environment in its nature changes frequently hence organizations need to develop competitive strategies (market innovations and product differentiation) to ensure their survival.

According to Roberts & Grover (2012), IT investments assist firms to gain a competitive edge while a growing number of other researchers doubted the direct effect of IT capability to firm's competitive position (Chae, Koh & Park, 2018). Causal mechanisms in the effect of IT capability on firm's competitiveness requires further substantial investigation. According to Ou, Yen & Hung (2009), IT capabilities led to sustainable competitive advantage by mobilizing and deploying IT-related resources and capabilities. Lin (2007) noted that firms with higher IT capability strengthened their avenues by increasing their productivity and decreasing operational costs. Sambamurthy, Bharadwaj , Grover (2003) concur with Lin by describing IT capabilities as antecedents of firm performance by which firms launch competitive actions. In this study, competitive advantage is operationalized as product differentiation, market innovations and customer responsiveness.

1.1.4 Firm Size

Hong & Zhu (2006) refer firm size as the number of permanent employees in a firm. Firm size can also be determined by the total assets, sales or capital owned by a company. OECD (2017) defined firms with less than 10 employees as small firms, medium- size enterprises (SMEs) as those with between 10 and 250 employees while those with more than 250 employees are large firms. According to Rosli Mahmood *et al.*, (2013) firms align their attributes with the characteristics of the environment to perform better than other firms.

Niresh & Velnampy (2014) states that firm size is a primary factor in determining firms' profitability occasioned by the economies of scale in the neo classical view of the firm. According to Akinyomi & Olagunju (2013), firm size is critical to performance due to the phenomenon of economies of scale. Large firms therefore obtain cost leadership as opposed to smaller firms. Large firms have more slack resources to effectively use IT in ways smaller firms cannot match. Dean, Bülent and Christopher (2000) opine firm size as a determinant of performance while Mohd (2005) assert that the overall firm performance is dependent on Firm Size. However, Dean *et al.*, (2000) acknowledged the unclear position of the effect of firm size on performance while Chen & Tsou (2012) observed that large firms tend to have greater financial and labour resources which make them perform better than small ones.

Khallaf (2012) refers firm size as an intervening variable in the linkage between technology and performance. Chae *et al.*, (2018) notes the demand for these variables and justifies the need to understand its impact on performance. Ortega, (2010) posited that firm size affects past firm performance and could also affect the current

performance as well. However; null results have recently been reported. Kim *et al.*, (2011) states that firm size has no effect on firm performance. Heshmati, Usman and Zahid (2011) examined the effect of firm size on sales growth in Swedish firms and notes that larger firms have high sales growth compared to the smaller ones.

Firm size correlates with the firm performance in the capacity to implement online applications. Zhu and Kraemer (2005) argued that firm size represents company's resources while Sarkees (2011) observes that large firms respond quickly to technological usage opportunities than smaller firms. Past empirical evidence show that a new technology can likely be adopted by large companies (Hollenstein & Woerter, 2008). This is because large firms have the ability to invest more on technology infrastructure and system development. However, Norzaidi *et al.*, (2009) finds firm size to have no effect on firm performance. Notably, younger firms are also disadvantaged due to their newness in the market. Niresh & Velnampy (2014); Oladele & Olagunju (2013) posited that firm size determines the profitability of a firm's economies of scale. On the other hand Vij & Farooq (2016) empirically confirms that firm size moderates the correlation of IT orientation and business performance. In this study, firm size is conceptualized in terms of the number of employees.

1.1.5 Manufacturing Firms in Kenya

Kenya is the most developed country in East African region yet its manufacturing sector makes a low contribution to its national GDP World Bank, (2018). Wogwu & Hamilton, (2018) notes that despite being a key economic pillar in Kenya's vision 2030, the GDP contribution shrunk from approximately 11.8 per cent in 2011 to 5.4

per cent in 2019 (KAM, 2019) compared to others to SriLanka (22%), South Africa (13%), Malaysia (27%) and Taiwan (32%) (Africa Development Bank 2017). Similarly, the sector experienced fluctuating growth from 3.6 per cent to a low of 0.5 in 2017 then slightly recovered to 4.2 per cent in 2018 (KNBS 2019). This decline is attributed to high production costs, competition from imported goods and ineffective technology (KER 2020).

Manufacturing sector bears a key responsibility in support of economic growth and development, job creation and poverty alleviation. Furthermore, manufacturing sector has to be robust, diversified and globally competitive to increase its economic strength (World Economic Forum, 2018a). The sector is a key player in providing economic benefits to the national economy. Firms which continuously adapt, improve and innovate their resources are more successful in developing new capacities to better their performance (Chen, 2012).

Manufacturing firms are in a state of metamorphosis with several contemporary issues which require a workforce with a global mind set to penetrate the entire organization. These issues include technology advancement, global markets, diverse customer demands, competitive advantage and customer satisfaction. The sector is globally recognised as the engine of overall economic growth and development. Manufacturing firms are important drivers of industrialization and also accelerate growth in other sectors of the economy thereby improving the overall welfare of citizens (Jara & Escaith, 2012). This sector is critical in promoting sustainable economic development, raising capital and creating employment. The sector plays a key role in building competitiveness through exports. Competitive firms diffuse the

economic growth to other activities making the firms lead in poverty alleviation and prosperity.

African countries have shown some stagnation in their manufacturing output with South Africa and Senegal registering a decrease of 3.3 and 0.2 per cent respectively (Economic development in Africa report, 2018) while Egypt and Nigeria indicate a rise by 2.1 and 1.0 per cent respectively (KER, 2018). According to Kariithi (2017), manufacturing sectors' contribution towards GDP was estimated to stand at 11 per cent. However, this was not achieved between 2011 and 2018 with the sector also registering a slow growth rate, at an average of 4.78 per cent.

Kenya's manufacturing sector supports national development, economic diversification and also creates employment (Sessional paper No. 10 of 2012 on Kenya Vision 2030). However, the sector has experienced challenges in its performance which are attributed to reduced productivity, unyielding competition and inefficacious technologies. As a result, manufacturing sector reported low profits (RoK, 2016). Moreover, Nyabiage & Kapchanga (2014) notes that a number of manufacturing firms have opted to either relocate or restructure their operations by importing goods from low-cost manufacturing areas namely: Egypt, South Africa and India thereby causing job losses.

Over 80% of manufacturing firms in Kenya are members of the Kenya Association of Manufacturers, and are located in Nairobi. The remaining percentage is found in other towns and regions including coast, Nyanza/Western, Eldoret, Nakuru, Athi River, Thika and Nyeri. These firms are categorized into small, medium and large firms.

There are 526 manufacturing firms in Nairobi registered with KAM (KAM, 2018). These firms are categorized into 13 sub-sectors based on what they produce. The sub-sectors include Building, Mining & Construction, Chemicals & Allied Sector, Motor Vehicle & Accessories, Paper & Board Sector, Pharmaceuticals & Medical Equipment, Energy, Electrical & Electronics, Food & Beverages, Leather & Footwear, Metal & Allied Sector, Plastics & Rubber, Fresh Produce, Textile & Apparels and Timber, Wood & Furniture.

According to World Economic Forum (2018), manufacturing sector is a key sector in support of Kenya's vision 2030 as envisaged in development blue print. Manufacturing sector in Kenya makes high contribution to GDP although a decline is reported from 11.8 per cent in 2013 to in 2011 to 5.4 per cent in 2019 (KNBS 2019, Kenya Association of Manufacturers, 2019). The decline is largely attributed to globalization, stiff competition, advancing technology, changing customer needs and shortened product lifestyles (Kiraka, 2009; KAM, 2019). The slow growth rate of manufacturing sector has been recognized by the government which has designed raft policy measures such as Kenya Industrial Transformation Programme (KITP), vision 2030, buy Kenya build Kenya, Investment Policy and National Trade policy. These interventions are hoped to revamp the sector (Manufacturing Priority Agenda, 2019).

1.2 Statement of the Problem

A declining trend in the performance of manufacturing firms has been reported. Ideally, the contribution of such firms towards the national gross domestic product (GDP) declined from 11.8 per cent in 2013 to 5.4 per cent in 2019 in Kenya (KAM, 2019). In terms of growth, performance contracted from 3.6 per cent in 2015 to 0.2

per cent in 2017. The dismal performance resulted into restructure or relocation of the firms from Kenya to other countries Nyabiage & Kapchanga (2014).

Lack of consensus in the definition of performance is a critical gap in strategic management (Gavrea, Ilies & Stegorean, 2011). While the notion of performance has mostly been measured using financial performance as its indicator, more research studies in strategic management are needed to identify other indicators as financial metrics are largely inadequate (Qi, 2010).

Likewise, IT capability is not well appreciated by organizational leadership and as such, gaps exist in the alignment of human resource, infrastructure and leaders with superior IT capability (Majhi & Mukherjee, 2019). The ability to discover, develop and exploit information technology resources redefines business processes and relationships (Chae, Koh & Park, 2018). However, the capability of technology in shaping innovation and business strategy is still being debated and requires more consensus given the divergent results (Oliviera & Oliviera, 2012).

Despite considerable research on IT capability, concerns have been raised over the scanty empirical evidence on IT capability and performance relationship. Bharadwaj & Grover (2016) opined the inconsistent empirical evidence to demonstrate the influence of the IT capability on performance. However, Ashrafi & Mueller (2015) asserts that firms with superior IT capability show improved survival and growth implying that they perform better than their rivals. Chae Koh & Prybutok (2014) observed that IT resources cannot create sustainable firm performance on their own. The lack of consensus calls for empirical studies to identify the mechanisms through

which firm's IT capability can develop and sustain superior performance (Chae et al., 2014). The strategic role played by IT capability in shaping business in terms of data and information, customer retention and competition remains inconclusive (Crook, Ketchen, Combs & Todd, 2008; Fink, 2011) yet IT capability is a valuable resource which when managed correctly helps firms perform effectively and efficiently.

Soto-Acosta & Meroño-Cerdan (2008) note that competition, customer retention and the high volumes of data and information enable IT capability to provide a strategic role in shaping business. However, IT capability interaction with firm performance has been underrated while the use of dynamic capability theory remains unclear (Martín-Rojas *et al.*, 2017). Chae *et al.*, (2014) posit the need to expand the knowledge on the role and value of IT by tapping on other theories such as dynamic capabilities perspective other than relying only on resource based theory that doesn't support reshaping and reconfiguring of resources for firm's competitiveness.

Nyachanchu, Chekwony & Bonuke (2017) posited that manufacturing firms in Kenya face changes in consumer requirements, technology advance and competition. The competitive environment shifts from one level to another resulting into high levels of uncertainty which then affect firm performance (Wilden, Gudergan & Nielsen, 2013). The firms that survive are those that are able to create and sustain a competitive position (Wilden *et al.*, 2013).

Existing research studies show the effect of IT capability on organizational performance conducted in developed countries with different economic and cultural settings (Protogerou, Caloghirou & Lioukas 2012). As such, it's difficult to generalize

findings in a Kenyan setup. The need for more empirical studies in developing countries is necessary in order to establish the link between IT and business strategy. This study attempts to reconcile conflicting findings and advance and explore the interaction of IT capability on performance of Kenya's manufacturing firms.

1.3 Study Objectives

1.3.1 The General Objective of the Study

This study sought to explore the effect of IT capability on the performance of manufacturing firms within Nairobi City County, Kenya.

1.3.2 Specific Objectives of the Study

This study's specific objectives sought to:

- i. Determine the influence of IT infrastructure capability on performance of manufacturing firms in Nairobi City County, Kenya.
- ii. Establish the influence of IT personnel capability on the performance of manufacturing firms in Nairobi City County, Kenya.
- iii. Examine the effect of IT management capability on the performance of manufacturing firms in Nairobi City County, Kenya.
- iv. Explore the influence of IT reconfiguration capability on performance of manufacturing firms in Nairobi City County, Kenya
- v. Investigate the mediating effect of firm competitive advantage on IT capability and performance of manufacturing firms in Nairobi City County, Kenya.
- vi. Explore the effect of firm size as a moderating variable in the relation between IT capability and performance of manufacturing firms in Nairobi City County, Kenya.

1.4 Study Hypotheses

From the specific objectives, the null hypotheses below were tracked.

H₀₁: There is no statistical significant relationship between IT infrastructure capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₂: There is no statistical significant relation between IT personnel capability and firm performance.

H₀₃: There is no statistical significant relation between IT management capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₄: There is no statistical significant relation between IT reconfiguration capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₅: Competitive advantage does not significantly mediate the effect of IT capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₆: Firm size has no significant moderating effect on IT capability and firm performance relationship.

1.5 Significance of the Study

The findings provide knowledge to new entrants in the industry on ways of achieving and sustaining high firm performance based on aligning IT strategies to business. The study offers academic; policy and practice implications to help researchers and scholars in their quest to increase general knowledge and provide literature for future studies. This study to a great extent assists the managers when making strategic decisions concerning firm performance with respect to technology. Additionally, the study provides a theoretical foundation to support the value of IT in business.

The Chief Executive Officers and IT managers will benefit from the study outcomes as it addresses the role of IT capability in leveraging performance enhancement. The firm's IT managers and personnel should proactively build relationships with all business functions to promote effective information technology through sharing insights on business knowledge and in building IT capability through better planning, coordination and control of direct IT use. The study informs firm managers on the importance of IT capability and competitive strategies in performance improvement. The study sought to generate information which stakeholders use to gain knowledge on the IT capability in manufacturing firms in Kenya. The study findings fill the knowledge and theoretical gaps in strategic management in relation to IT capability, Firm Size, competitive advantage and firm performance. Previous research studies which attempted to relate IT capability with firm performance were conducted in developed countries and consequently the results remain inconclusive and cannot be generalized. This study explored IT capability and performance relationship in manufacturing firms in a Kenyan context. The mediating effect of competitive advantage and firm size as a moderator of this relationship were validated. Researchers in strategic management stand to benefit from this rigorous and integrated empirical analysis which pursued IT capability and its effect on performance.

1.6 Scope of the Study

The survey was conducted in manufacturing firms located in Nairobi City County since 80 per cent are located in Nairobi City County (KAM, 2018). Moreover, manufacturing sector is a key economic pillar which inspires job creation, generate foreign exchange and attract foreign direct investment for Kenya. As stipulated in the

vision 2030, manufacturing sector is a highly prioritized sector that can raise GDP growth to above 10 per cent.

There is a reasonably high number and diversity of manufacturing firms in Nairobi hence the choice of location. Nairobi City County is a regional hub which is accessible with good roads and well established communication systems making it easy to navigate during data collection. The study used IT infrastructure, personnel, management and reconfiguration capabilities, as independent variables, Competitive advantage as a mediating variable and Firm Size as a moderating variable. The dependent variable is firm performance. Simple and step wise multiple linear regressions were used to explore the effect.

1.7 Limitations of the Study

The researcher informed respondents that the study was purely academic and further assured them that information provided would be confidential (Appendix A). This was necessary especially to the reluctant informants. Further, a research permit from the County director of education and NACOSTI together with a letter of introduction from Kenyatta University, were presented to the informants during data collection for validation. Some informants were not available due to the nature of their work and as such, the researcher emailed the questionnaire purely on request. In case the informants delayed the responses, the researcher sent email reminders and in some cases organized face to face meetings with them.

The results may differ across service industries and enterprises reducing the ability to generalize them since the study involved manufacturing firms within Nairobi City County. The investigation and data collection was conducted at a specific time, the research being cross-sectional however findings may differ in longitudinal variations.

A longitudinal study cross examining the variables would provide more robust results in comparison to those obtained from this study.

1.8 Organization of the Study

This report has five chapters with the first containing the study background, problem statement, research objectives and hypotheses. Additionally, the chapter covers the significance of the study, the scope and limitations. Chapter two holds a critical theoretical and empirical literature review together with the research gaps and conceptual framework. Chapter three covers the research methodology laid out as follows: research philosophy, design, target population, sampling design. This chapter also spells out the operationalization and measurement of variables, data collection report, analysis and report on the findings. The last chapter is five which gives a discussion on the study outcomes, recommendations and study implications.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter comprises of theoretical and empirical reviewed literature organized in various sections. First, theoretical models underpinning the study are presented as well as their contribution to the study. The subsequent section consists of empirical literature organized into the various themes. The penultimate section presents the gaps from reviewed literature. Finally, a conceptual framework is presented to anchor the study.

2.2 Theoretical Literature

The study is informed by resource based view theory used in prior studies to evaluate IT relative to firm value. Second is knowledge-based theory which supports knowledge resource as a key strategic firm resource, third is the unified theory of acceptance and use of technology which anchors Information Systems research studies, fourth balanced score card and finally, dynamic capability theory which evolved from RBV and which emphasizes on IT capability as firm's ability to effectively reconfigure technology-based resources.

2.2.1 Resource-Based View (RBV)

RBV theory proposed by Barney (1991; Wernerfelt (2013) is derived from theory of the growth of firms proposed by Penrose (1996) and theory of expansion of firms proposed by Rubi (1973). RBV states that organizational resources should be rare, valuable and difficult to duplicate and substitute subsequently gaining a competitive edge which makes them perform better than their rivals. Barney (2002) described RBV as a key theoretical perspective which explains the relationship between IT and performance. Further, RBV proponents note that information technology is a firm

resource that detects and acts upon discovered opportunities which increase firm's competitive advantage.

Conner (1991) states that strategic management literature supports firm's characteristics which yield business returns and enhance performance. Resource Based View explains how firms use resources to attain their economic achievements and to compete successfully against their rivals. A firm with valuable but scarce, rare and non-substitutable resources generated has sustainable competitive advantage over its rivals. According to Caldeira & Ward (2003) RBV perspective helps firms achieve sustainable competitive advantage.

According to Crook *et al.*, (2008); Newbert (2008), RBV is a popular theoretical perspective which notes that deployment of rare, imitable and non-substitutable resources supports firm performance. Apparently, strategic management scholars agree with the fundamental arguments that firms deploy resources to enhance and sustain performance. Makhloufi, Yaacob & Yamin (2018) also asserts that scholars largely apply RBV within IT and IS studies to address firm performance and competitiveness. Further Newbert (2008) argues that RBV supports a firm as a pool of resources and capabilities which vary from other firms and which make them better competitors. However, RBV proponents fails to address IT-firm performance linkage in turbulent environments.

Crook *et al.*, (2008) observes the value of building technological capabilities and subsequently enhancing performance. Resource Based View (RBV) is the key view point in leading research on the causal effects. Further, Jardim-Goncalves *et al.*, (2012) notes that technological evolution brought about by the internet made

manufacturing firms migrate towards new technologies which in turn lead to lower operating costs, enhanced productivity and quality. However, criticism is directed to RBV for failing to adequately address competitive advantage achieved through IT capability in unpredictable and unstable environment (Nevo & Wade, 2010). The need to embrace dynamic capability view to adapt to changing market requirements is critical.

According to Peteraf *et al.*, (2013) RBV is the main theoretical foundation in support of success variations among firms competing within the same industry. Protogerou *et al.*, (2012); Teece *et al.*, (2017) note the existence of two categories of IT capabilities, static and dynamic thus classifying firm's daily activities as static while changes in the business environment are dynamic. RBV does not explain IT-performance linkage in turbulent environments.

Barney & Hesterly (2018) argued that Resource Based View (RBV) support firms' specific strategies which improve performance. Drawing upon RBV, firms integrate their resources and capabilities thereby creating competitiveness and superior returns. However, RBV has been criticized due its static nature, failing to address how firms generate valuable resources or refresh and renew resources in response to business environment changes. While Hedman & Kalling (2003) criticized this theory for neglecting the obstacles created by business alterations, Chan, Shaffer and Snape (2004) similarly criticized it for its assumed static equilibrium yet competitiveness and firm performance result from developing current capabilities namely: IT infrastructure capability, IT intangibles and IT reconfiguration capability that are highly effective in responding to firm changes.

Rare and immutable resources give firms a competitive edge enabling such firms to perform better than their rivals. Such resources lead to differential levels of firm performance further improving firms' efficiency and effectiveness. This study uses RBV to inform the independent variables namely: IT infrastructure, management and personnel capabilities.

2.2.2 Knowledge Based Theory (KBT)

KBT weighs in on knowledge as a critical asset for organizations. Advocates of this theory argue that knowledge based assets are communally complex and complicated to emulate. Amongst organizations, knowledge bases hold key elements of competitive advantage and outstanding collective achievement (Decarolis & Deeds, 1999). According to Wogwu & Hamilton (2018), without knowledge, organizations cannot restructure, reconfigure and reshape their products in an effort to gain competitive edge over competitors while McGrath (2013) opined knowledge, know-how, intellectual assets and competencies as main drivers of superior performance in the information age.

Alavi & Leidner (2001) notes that organizations use knowledge to help them attain competitive advantage. Knowledge-based view supporters argue that the RBV does not solely operate sufficiently. Knowledge Based View may be adopted to improve, incorporate and fasten substantial intra and inter organization knowledge management. KBT extends RBV in order to focus on knowledge as a key strategic resource. Bigliardi, Colacino & Dormio (2011); Bos-Brouwers (2010) assert that firms with innovative knowledge introduce innovative products and services becoming market leaders.

This theory informs the study on the need for knowledge to enable firms to be able to restructure, reshape and reconfigure their IT products to improve their performance. This strategic resource is difficult to emulate and gives firms a competitive edge. This study uses knowledge based theory to inform IT reconfiguration capability.

2.2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

The proponent of this theory is Venkatesh (2003) through a systematic review which led to the consolidation of 8 constructs of earlier models namely Theory of Reasoned Action (TRA); Technology Acceptance Model (TAM); Motivational Model (MM); Theory of Planned Behaviour (TPB); the combined TAM-TPB; model of PC usage; Innovation diffusion theory (IDT) and Social cognitive theory (SCT). These theories are largely used in prior studies within the area of technology, innovation and diffusion, the field of information systems, marketing, social psychology and management.

Morris & Venkatesh (2011) notes that TAM explained the usage and application of Information System (IS) in firms. However, TAM is criticized for ignoring critical sources of variation and the failure to consider cost and time that may hinder users from using an Information Systems. TAM does not support usage of new innovations owing to its simplicity.

The main goal of UTAUT model is to offer support to user satisfaction (enhanced performance) as a dependent variable (Navarra & Cornford, 2011) and in this study, the theory is used to analyse firm's perception of technology use. In addition, the UTAUT model offers a higher rate of variance (R^2) in the use of technology as compared to hypothetical models. Yazici *et al.*, (2013) surveyed the unified model

and identified implementation, effort required, social impact and suitable conditions as the important aspects of intent. This study uses UTAUT to inform the indicators of performance which is a dependent variable.

2.2.4 Dynamic Capability Theory

The theory draws its tenets from organizational routine, core competences, capabilities and rigidity. Teece, Pisano & Shuen (1997) proposed the Dynamic Capability Theory to support firm's capacity to deploy, build, renew and reconfigure firm competences and achieve congruence within the business. This theory supports the capacity to respond to changes recognizing the variables which influence performance. The dynamic capability perspective support firm's strategic routines to integrate, reconfigure, gain and release resources to adapt to unpredictable and rapidly changing markets.

Dynamic capability perspective as a framework extends RBV with scholars arguing that a firm will continuously refresh its resources to produce synergetic effects enabling firms compete with rivals. Wilden & Gudergan (2013) notes that some firms change their competitive position when rapid and unpredictable changes occur. Okoth (2013) argued that dynamic capability theory extends RBV domain of evolving capabilities.

Venkatesh et al. (2021); Teece (2014) posited that sustainable performance result from sharpened internal processes and procedures thereby informing the independent variables in the current study. Mathiassen & Vainio (2007) note that recent studies in IS adopt Dynamic Capability perspective to explore firms' use of IT to overcome

market challenges. Anand & Wamba (2013) note that continuous refreshing of bundles of firm resources produce synergetic effects.

DCT informs this study by supporting proprietary assets and their reconfiguration as key sources of firm's competitiveness. The theory informs the study by providing insights on why firms sharpen their organizational, technological and managerial processes. Firms renew and reconfigure their resources to generate synergistic effects which enable the firms to compete with their rivals. However, firms with limited resources are unable to afford to simultaneously own assets and reconfigure the existing asset structure. Therefore, the choice between these two arguments has a critical strategic implication. This study uses dynamic capability theory to provide a lens in support of independent variables.

2.2.5 Balanced Score Card

Kaplan & Norton (1992) proposed the balance score as a measure of performance aligned to four different perspectives: customer, finance, internal process learning and development. The balanced score card measures the effectiveness of an organization towards its strategic objectives. However, Kaplan (2010) introduced non-financial methods to the BSC since the old financial measures were ineffective in modern businesses. Financial performance has limited representation of operational performance and is also limited to a short term focus.

The method of measuring performance is dynamic in the sense that it adapts both internal and external changes. A multi-dimensional view of performance measures are included in the balance score card (Kaplan 2010) which translates organization's vision and strategy into a set of comprehensive performance measures used in

strategic management. The framework aids managers in making erudite decisions, providing linkage between strategic plans and the business units (Davis & Albright, 2004).

BSC framework supports both financial and non-financial performance measurements since it is able to translate firms' mission and strategy. It identifies the function components, sets their goals and comes up with ways of assessing and quantifying the progress towards achieving the overall organizational mission. Financial performance measure is profit related whereby return on capital, equity and sales determine the success of investments, customer performance is measured through new product sales, customer complaints, satisfaction and retention. The operational performance measures the firms' effectiveness and efficiency in producing products or services to customers while employee performance measure is based on innovation and learning (Al-Mawali & Ali 2010).

The BSC framework however has too many unexplained metrics whose linkage are yet to be addressed (Sundin, Granlund, & Brown, 2010). However, balance scorecard provides a lens in this study to choose and advance performance indicators. The BSC framework informed the dependent variable in this study.

2.3 Reviewed Empirical Literature

2.3.1 IT Infrastructure Capability and Performance

The IT infrastructure capability is the capacity to provide sharable platforms which determine the degree of freedom enjoyed by firm. The platform can also be used to launch innovative and sharable IT applications. IT infrastructure capability offers a

shared delivery base for access or link up. Mikalef, Pateli & Wetering (2016) described IT infrastructure capability as a key critical element which facilitates firm's IT-based competitiveness and innovativeness while van de Wetering *et al.*, (2018) argues that IT infrastructure capability is characterised by IT assets and business connectivity.

Lim and Trimi (2014) conducted a study on the effect of IT infrastructure on competitive advantage in SMEs. The study involved 62 firms. Multivariate analysis of covariance was used in data analysis. The study showed significant influence between IT infrastructure and competitive advantage. A limitation from this study is the use of a small sample which makes it impossible to generalize the results. Further, Cano & Baena, (2015) asserted that building IT capabilities using technological and organizational resources significantly influences firm performance. However, Fink (2011) notes that IT infrastructure capability's effect on firm performance is still inconclusive.

Kim, Shin, Kim & Lee (2011) conducted a study on 'strategic role of information technology on performance' and found out that IT infrastructure positively influences performance. Tallon & Pinsonneault (2011) surveyed the "effect of alignment of organizational agility strategy and IT infrastructure on firm performance". The indicators of IT infrastructure were user involvement, connectivity, distributed computing and IT awareness. A descriptive research design was adopted and data collected from business executives from 241 firms. Data was analyzed using SEM a methodology which this study deems inadequate. IT infrastructure capability moderates the link between alignment and agility.

According to Lee (2012), business development can be improved by resources such as IT infrastructure capability, human capital and institutions. The quality of IT infrastructure capability signifies the nature of the hardware and software components. Consequently, human capital signifies well-educated and trained firm employees, while the value of an institution guarantees a managerial system where people and firms collaborate to improve their economic value. However, Chen (2015) in a research on IT capability and organizational performance in China's manufacturing firms notes that IT infrastructure and IT personnel failed to show how IT influences performance and recommended that a multidimensional view of IT capability and its influence on performance was necessary. The study revealed that IT infrastructure significantly predict firm performance. One limitation in the studies is that IT infrastructure capability is a predictor in some and moderator in others.

2.3.2 IT Personnel Capability and Performance

Information technology personnel refer to the skills, knowledge of technology and technology management which enable individuals to effectively carry out assigned tasks. Kim *et al.*, (2011) notes the individual ability to contain technical knowledge, IT resource management, business functions as critical aspects. Bhatt & Grover (2005) argue that firms with competent IT experts compete and align IT capability with business strategies. The study reports that IT experts develop cost effective applications which are reliable and aligned to the business needs.

IT personnel capability is the acquisition of IT skills and interpersonal (relational) knowledge that staffs use in carrying out their tasks effectively. Knowledge of technology enables IT staff to use the firm's IT resources namely: operating systems, computer networks, programming languages and database systems. IT resource

management involves planning and deployment of IT operations. Knowledge of Business functions help IT personnel to understand the business units and their internal environment while interpersonal knowledge enable IT staff to communicate and collaborate with people and business functions. Kim (2010) observed that business operations encounter challenges from the IT infrastructure capability and further posits that IT personnel familiarizes themselves with managerial, relational and business knowledge in formulating IT solutions.

Professional knowledge grows slowly and gradually in a particular organization. It is therefore difficult for competitors to imitate in a limited time span. To align firm's IT and business strategies and build competitive reliable and cost effective systems, skilled personnel are required. Bhatt & Grover (2005b) notes that such IT personnel skills cannot anticipate the need for business services while Wang, Liang, Zhong, Xue & Xiao (2012) asserts that a firm performs better if IT human resources possess technical, business and interpersonal skills.

Bresnahan, Brynjolfsson & Hitt (2002) observes that IT capability and IT investment require skilled workforce. Chae, Koh & Prybutok (2014) posited that the IT personnel capability can exploit the opportunities provided by new products or services. According to Reichert & Zawislak (2014), IT personnel skills, knowledge and experience facilitate existing systems to generate technical changes which enhance performance in firms.

Kariuki, Obonyo & Ogutu (2018) conducted a study to explore the effect of human resource capability on competitive advantage in firms listed in Nairobi Securities exchange. A census involving 62 firms and data collected from human resource managers. The data put through multiple regression analysis revealed that human

resource capacity creates a competitive edge over competitors. Mathias 2011; Nevo & Wade (2010) noted that IT resources improve business performance in an effective organizational structure with skills that support IT assets for business needs. Chae *et al.*, (2015) recommended that IT resources be factored in future research to better address the gap in the relationship between IT capability and performance. In addition, Muhanna & Stoel (2010) observed that firms with stronger technical and managerial IT skills, made the right decisions on IT spending, investment and development.

Makhloufi, Yaacob & Yasmin (2018) explored IT personnel capability and competitive position in furniture industries in developing countries. This is a different cultural setting and limits results generalization. The study investigated the influence of technical skills and business knowledge to generate and sustain firm competitiveness. The study was anchored upon RBV while the informants were the IT managers. The study findings show IT personnel capability as the main driver of sustainable competitiveness within the furniture firms.

The study findings concurred with Ashrafi & Mueller (2015) observe that the technical skills and business knowledge considerably influence the functional and strategic levels of the firms. However, these studies examined a single dimension of IT capability which the researcher finds inadequate. This study includes all the IT capability types and explores their effects on firm performance.

2.3.3 IT Management Capability and Performance

IT management capability empowers firms to leverage customer orientation and synergy. According to Kim *et al.*, (2011), management capability encompasses the internal coordination within the business units in an organization, integrated external resources and alignment of IT to business. Firms link up separate firm units and share

knowledge and expertise within a firm. Integrating the organizational capabilities can transfer market information across firms.

IT management capability can be described as the capacity for IT functions to dispense resources. Feldman & Pentland (2003) notes that IT management capability helps shape IT infrastructure capability and deploy IT resources for intended outcomes. In addition, IT management capability is more of a business function which provides more elaborate business value (Mckeen & Smith, 2008). According Bhatt & Grover (2005a) and Kim *et al.*, (2011), IT management capability enable firms to manage resources by transforming them into business value through IT planning, decision-making, coordination and control of procedures and protocols which then strengthen firm's strategic position. Jiménez & Zheng (2017) notes that manager's creativity can influence IT innovations decisions running through initiation to implementation. Additionally, organizations with innovative and useful IT applications manage projects and retain formalised long range IT strategies.

Satchawatee (2016) performed a study to establish the influence of IT capability on performance of IT service businesses in Thailand. The study investigated four dimensions of IT capability. IT management capability was operationalized as IT planning, investment decision making, IT coordination and control. While non-financial performance was the dependent variable. 118 IT service firms participated in the study with a response rate of 20.14 per cent. The key participants of the study were managing directors or managing partners of IT service businesses. Data were collected using a questionnaire. The study used ordinary least squares (OLS) regression analysis to establish the relationships of the factors affecting firm performance. The outcome reveals that IT management capability did not affect firm

performance. Two main limitations of the study are low response rate and the study was conducted in the context of a developed country thus the results cannot be reliably generalized.

Kim, Shin, Kim & Lee (2011) conducted a study on IT capability, process-oriented dynamic capability and firm financial performance. The study used subjective financial performance measures which the researcher deems inadequate. The study revealed that IT management capability significantly influenced firm financial performance.

Arokodare, Asikhia & Makinde (2020) in a study on IT capability and performance of oil and gas marketing companies in Lagos State Nigeria, reveals that IT management influences non-financial performance. A survey research design with a target population of 515 retail filling stations owned by 7 firms was deployed. A structured questionnaire was used to collect data from depot/station managers. The study was grounded on resource-based view which the current research finds inadequate.

Nyachanchu, Cheokwony & Bonuke (2017) did conduct a research study to establish the direct impact of dynamic capabilities (management capability, seizing and reconfiguration capability) in Kenya's manufacturing industry. The study was grounded on resource based view (RBV). An explanatory research design was used in the cross-sectional survey. The researchers collected data using a structured questionnaire from the chief executive officers (CEOs). Primary data collected from 279 of the 369 sampled firms from a total population of 1496 manufacturing firms. The three variables yielded 25.9 per cent variance in performance. The findings show a weak management capability and performance relationship. The study was anchored

on RBV theory which the researcher finds inadequate since ordinary capabilities cannot cope with unstable market environments. This study addressed this gap by anchoring it on dynamic capability view.

Anand & Fas Wamba (2013) in a study on “the effects of IT capability on firm performance in IT products and solutions industry” identified three interrelated dimensions of IT capability namely: IT infrastructure capability, IT personnel and IT management capability. Gheysari, Rasli, Roghanian & Jebur (2012) were of the view that IT capability comprised of technology capability and IT management capability. Furthermore, McLaughlin (2017) was of the opinion that dynamic technology capability enabled firms to compete better than their rivals. Tanui, (2016) argued that IT capability influenced firm performance a condition that remained unexplained and inconclusive in manufacturing firms.

2.3.4 IT Reconfiguration Capability and Performance

According to Karim & Capron (2016) defines reconfiguration capability as the capacity to engage in adding, redeploying, recombining or divesting resources. Isobe (2016) observed that a competitive environment changed its combination of assets to create new opportunities. This was attributed to the existing organizational practices and routines which reduce firms’ reaction to changes. Additionally, a firm achieves competitiveness if it is able to make better use of its assets. RBV researchers argued that capabilities were independent sources of competitive advantage and ignored the fact that they could be reconfigured in a way that would influence firm performance.

Hawass (2010) defines reconfiguration capability as the capacity to recombine diverse knowledge based resources and technologies developing new products applications

and innovations that can solve current problems. This sentiment leads to sustainable competitive advantage in firms. Lercerf & Omrani (2020) states that external changes unleash new opportunities where firms use dynamic capabilities to reconfigure and reassign existing capabilities giving enterprises new capacities to pursue new market trends.

Mutsembi (2019) conducted a study examining the effect of reconfiguration capability on performance in the Kenyan manufacturing industry. The study was grounded on dynamic capability view an approach that would establish whether firms influence their performance by integrating, building and reconfiguring their resources and competences. The study adopted descriptive cross sectional design. A structured questionnaire was used to collect primary data from 27 listed manufacturing firms in Nairobi securities exchange. Two dimensions of performance were used namely: product effectiveness and process efficiency. The study reveals that reconfiguration capability reduces firm performance.

Kinuthia & Deya (2019) conducted a study on the influence of dynamic capabilities on competitiveness of organization in telecommunication industry. The underpinning theory used was RBV. The study used descriptive research design with a target population comprising of 56 top, middle and low level managers. This study deems the number of respondents too few and hence not viable to generalize the outcomes. The sample was obtained through stratified random sampling. Both secondary and primary data were collected. The study used descriptive statistical analysis and the results revealed that IT knowledge management (being able to mobilize and deploy

knowledge-based resources) capabilities positively influenced organizational competitiveness.

Kareem & Alameer (2019) conducted a study to investigate the effect of dynamic capabilities to organizational effectiveness in selected Iraq public universities. The study adopted survey method to collect primary data using an online questionnaire. SEM was used to test the hypotheses. A key indicator of dynamic capability was reconfiguration capability. Reconfiguration capability was found to positively influence organizational effectiveness.

Teece (2017) alluded that IT reconfiguration capability had the capacity to adapt innovative opportunities by embracing a firm's capacity to configure the ecosystem it occupied with new processes and services/products. Firms have an opportunity to capture and gain competitive advantage through increased performance. According to Lee (2015); Ortega, (2010) industries which experienced higher dynamism reconfigured and renewed their IT capabilities to improve products and operational processes.

Protogerou, Caloghirou and Lioukas (2012) empirically explored the influence of dynamic capabilities on performance of manufacturing firms in Greece whereby dynamic activities indirectly influenced performance. Helfat (2007) notes that the impact of dynamic capabilities on performance is still open. Abebe (2014); Garg and Choeu (2015), the growth of information technologies employed in both online trade and business leads to high performance. Additionally, changing dynamics of business processes, intensive internet use streamline the supply and distribution chains, enriching the communication amongst different stakeholders leading to effective services in terms of cost and value addition (Almajali, 2016).

Firms combine their resources for better quality products and performance. This enables them to adapt to changing business environment and survive competition. Lim (2012) described IT capability as the capacity by which firms align IT with organizational and managerial processes. According to Muhanna & Stoel (2010) firms with superior IT capability transform IT investment to enhance performance. IT capability therefore helps firms to utilize IT resources efficiently. However, Masli (2011), Leidner & Preston (2011) contend that the strategic fit between IT capability and performance is still unclear.

2.3.5 Influence of Firm's Competitive Advantage on Performance

Potjanajaruwit (2018) conducted a study to investigate the effect of competitive advantage on firm performance of 276 start-ups in Thailand. Competitive advantage was conceptualized in the aspects of cost leadership, differentiation of products and services and responsiveness of customers while performance indicator was conceptualized in terms of reduction of operating costs. The study used mixed research design with the help of in-depth interviews and questionnaires. The respondents were entrepreneurs and executives in the start-ups who were selected by stratified random sampling. The data were analysed using path analysis and the results reveal that technological capability and inter-organizational collaboration have a positive effect on competitive advantage while competitive advantage has a direct effect on performance of start-ups in Thailand. The study was not conducted in a third world country hence the findings may not fit in a Kenyan cultural setting.

Sar (2018) conducted a study which explored the effect of competitive strategies on financial performance of Fast Moving Consumer Goods in India. Performance was conceptualized as ROE while asset turnover, profit margin and leverage were

independent variables. Secondary data collected for ten years was analysed through panel data regression. A direct effect of competitive advantage on performance was reported. The main limitation of the study is the use of financial performance.

Ortega, Jose & Enrique (2010) posited that competitive advantage only mediated the relationship in presence of organizational resources. Further research would test the mediation role of competitive advantage separately. Xiaobu, Shuai & Wei (2010) in a survey conducted in 65 firms asserted that competitive advantage mediated the relationship when linked to a resource otherwise it acted as an independent variable.

One main challenge in many firms is to be able to evolve firm strategies which help them achieve and sustain competitiveness in the face of increasing turbulence in the business environment. Porter (2008) proposes a competitive ‘five-force’ approach to strategic management which formulates the importance of a firms’ competitive strategy to its environment and how the forces determine the profitability of firms. According to this approach the industry structure in which the firm operates strongly influences competition and shapes the strategy of the firm. Micek (2012) building on the competitive strategies approach by Michael Porter, emphasizes the role of firms in responding to environmental changes in business and its effect on performance.

Porter (2008) noted that competitive advantage brings out value that a firm can generate for its clients, which is superior to the costs of creating the value. Porter recognized competitive advantage as dependent on other factors and the justification for this was that the desired performance had a correlation with firm’s competitive position (Defillipi & Reed 1990). Cole, (2008) asserted competitive advantage as an

attribute possessed by a firm that offer customers more value than competitors either by providing additional benefits or lowering prices.

Papulova & Papulova (2006) asserted that real competitive advantage is the firm's ability to satisfy its customers as compared to its competitors. According to Kaur & Mehta (2016b); Li (2014), firm competitiveness enables organizations to address changes in the external environment by providing satisfactory products to customers which outperform other players in the industry. Von Nordenflycht (2010) argue that customer relationship management (CRM) enhances customer relationships while Morgan *et al.*, (2009) notes CRM help expand the customer base and acquired new business partners in an efficient and constructive manner.

Smith and Golden (2003) noted that the forces of globalization, which comprise of privatization, trade liberalization and deregulation profoundly influence the strategic management practices of organizations in many countries. Collectively, these forces bring about a business environment that is more competitive Porter (2008), and also imposes significant economic performance to business organizations. An organization which achieves and maintains successful business operations, continuously ensures that it is dynamically matched to the environment at all times through its ability to reconfigure its resources and strategies. Cho (2013) concurred with the observations made by Teece *et al.*, (2017) that firms develop and sustain competitiveness through building strong strategic IT capability in response to changing business environment.

According to Bharadwaj & Grover (2016), firms constantly take up strategic actions against their competitors to modify the competitive environment. The strategic actions

are dependent on controlled resources thereby managing existing resources and acquiring new resources to cope up with the competitive environment. Jacks, Schilhavy & Wang (2011) postulates that IT capability aids firms to gain advantage over their competitors through increased profits, reduced cost and enhanced sale growth.

2.3.6 Influence of Firm Size on Firm Performance

A study conducted by Rosli Mahmood *et al.*, (2013) posited that firms performed better when certain features were aligned to the environment. Chae *et al.*, (2014) reports a high demand to establish the impact of firm size on performance. However, null results were obtained in a study which posited that firm size affects firm performance Ortega, (2010). Further, Kotha, Zheng, & George (2011) concurs with Ortega that firms which have been in existence for some time likely comprehend their technological domains and realize the need to integrate and reconfigure resources for performance enhancement.

Omenyo & Muturi (2019) conducted a study to explore the effect of firm size on financial performance in manufacturing firms listed on Nairobi Stocks exchange. The target population comprised of manufacturing sector. Secondary data obtained from annual financial statements of all firms prequalified in Kenya and which operated from 2012 to 2018. Data was analyzed by use of panel descriptive statistics. Firm size was operationalized in terms of investments and not the number of employees. One main limitation is the use of secondary data which may be biased because it might not have been collected for research purposes. Firm performance was measured using financial measures.

Isik, Unal A. & Unal Y. (2017) conducted a study to investigate the effect of firm size on profitability in Turkish manufacturing sector. The indicators of Firm size were firm's assets, sales and number of employees in their logarithmic form, while profitability was operationalized as operating return of assets. The study used secondary data collected from 2005 to 2013 which may be biased. The data was collected from 112 manufacturing firms quoted in Istanbul Stock Exchange. The findings showed that as firm gets larger, profitability enhances.

Ali, Mukulu, Kihoro & Nzulwa (2016) conducted a study moderating effect of firm size on management participation and performance relationship in manufacturing firms in a developing country context. Performance was measured using both financial and non-financial indicators. The study used a descriptive survey technique. Data were collected using a structure and semi-structured questionnaire administered in 176 firms. 111 duly filled questionnaires were returned with a response rate of 63 per cent which is adequate for analysis. Multiple regression was used to measure the relationship between the variables. The study reveals that there is a significant relation between management participation and performance. Firm size, however, did not moderate the relationship.

2.4 Empirical Review summary and knowledge Gaps

From the reviewed literature, a number of gaps were revealed hence the need for further exploration of IT capability and firm's performance. IT capability is an emerging concept in strategic management that cuts across all functions of the firms providing a platform for sustainable performance of firms.

The empirical literature reveals that IT capability effects on firm performance are unexplained and inconclusive. Scarcity of empirical evidence in the effect of IT capability as a multidimensional independent variable on performance is noted. Lack of consensus in this relationship especially in Kenya's manufacturing firms is observed. Additionally, most of the reviewed literature (Chen *et al.* (2019); Oliviera and Macada (2017); Gonsel & Tuukel (2011); Timilsina (2016) did not test the indirect-effect of competitive advantage as a mediator. Vicente, Antunes, Malva (2016) and Tuan & Yoshi (2011) considered the indirect relationship but the studies lacked clear mediation analysis a gap this study addressed. Similarly, in some studies firm size is a predictor while in others, it's a moderator Ali, Mukulu, Kihoro & Nzulwa (2016) & Isik, Unal A. & Unal Y. (2017).

Manufacturing firm's minimal contribution to the national GDP at rate of 10 per cent per annum raises concern since it's much lower than the anticipated rate of 20 per cent according to Kenya's vision 2030. Manufacturing sector is a key productive sector for economic growth, poverty alleviation and job creation. Exploring IT capability and firm performance is paramount towards formulation of policies aimed at enhancing the performance of manufacturing firms in Kenya.

Table 2.1 Summarized Literature Review and Gaps

Theme	Author(s)& Year	Survey	Study Variables	Study outcomes	Research Gaps	Gap addressed
IT capability	Kipyegon, Bett et al. (2018)	Influence of IT capability on performance	IT capability as a predictor and performance as a dependent variable	Weak relationship reported	The study was anchored only on RBV and used correlation and survey designs hence theoretical and methodology gaps	This study was anchored on UTAUT, KBT and DCT in addition This study used descriptive and explanatory designs
IT capability	Oliviera and Macada (2017)	Effect of IT capabilities on firm and process level performance in Brazilian large organizations	IT infrastructure capability, human, management and reconfiguration capabilities	A positive effect on process and business performance confirmed. Null results on mediation from company size, lifespan sector dynamism and industry	Data analyzed using structure equation method. This study analyzed data through multiple regressions as SEM was considered inadequate. Survey design was used	This study used descriptive and explanatory design which was cross sectional.
IT capability	Kaur & Mehta, (2016)	Interaction of Dynamic capability on competitive advantage in a comparative study of IT multinationals in India.	Adaptive, absorptive and innovative capabilities	Relationship between innovative capabilities and competitive advantage was positive and significant	Failed to cover the entire scope of IT capability hence a conceptual gap.	The study used wider scope of IT capability
IT capability	Oliveira, Macada and Oliveria (2016)	Interaction of IT capabilities on firm performance	IT infrastructure capability, IT human capability, IT management capability and IT reconfiguration capability were independent variables, firm size, age and dynamism as moderating variables; information quality as mediating variable .	IT capabilities, Information quality showed positive relationship with business performance.	This research anchored on one theory i.e. RBV. The current study is supported by RBV and DCT. DCT was used to operationalize IT reconfiguration capability	The study used DCT and KBT to address reconfiguration and competition respectively.
IT capability	Timilsina (2016)	The interaction of competitive operations, efficient operations and performance	Competitively distinct operations and high efficiency operations as predictor	Competitive operations showed negative effect on firm performance.	Competitive operations' mediating effect was not explored.	The study explored the mediation effect of competitive advantage.

			variables, firm performance as dependent variable.		The sample taken small hence the results cannot be generalized	The study used a large sample size
IT capability	Zhang, Zhao & Kumar (2016)	Investigate the effect of IT governance and IT capability on firm performance	IT governance, IT capability, firm size and firm age	IT governance and IT capability had positive effect on firm performance. Firm size had no moderating effect on performance	Failed to include individual effects of the various IT capability on firm performance Secondary data used to test hypotheses	The study explored the individual effects of IT capability types on performance. Primary data was used in hypotheses testing
IT capability	Chen 2015	Effect of IT capability on organizational performance	IT infrastructure, IT personnel capability	IT infrastructure, IT personnel had no effect on performance	Survey was conducted in Chinas' manufacturing firms	This study was conducted in Kenya manufacturing firms for generalization in developing countries and explored effect of IT capability as a multidimensional factor
IT capability	Ringim <i>et al.</i> , (2015)	Information technology and organizational performance in Nigerian banks	IT a predictor variable and organizational performance a dependent variable Study informed by RBV	A positive effect of IT capability organizational performance.	The underpinning theory was RBV which is inadequate hence a methodology gap	This study was informed by RBV, DCT, and knowledge-based theory. The study was conducted in Kenya a third world setting
IT capability	Gunsel and Tuukel (2011)	IT capability and Bank performance.	IT capability and human capital support were predictor variables performance as dependent variable.	IT capability showed no effect on firm performance while human capital support had a positive effect on firm performance.	A sample of 15 banks was used in the study the sample was small hence the results cannot be generalized.	This study was conducted in manufacturing firms
IT capability	Kim, Shin, Kim & Lee (2011)	The interaction between IT capabilities, process-oriented dynamic capabilities and firm performance	IT capabilities and process capabilities	Relationship between IT capabilities and financial performance observed. IT management capability supports fluctuating business demands	The study failed to address operational (non-financial) performance. IT capability and firm performance had no relation	Non-financial performance indicators were used
	Liang & liu (2010)	Effect of information technology and firm performance: a meta-analysis based on RBV.	IT resources as predictor variable and firm performance (financial performance)	Technology resources had a significant effect on firm performance	Study failed to incorporate dynamic capabilities Meta-analysis involves comparing data from different	This study used primary data

			and organizational efficiency) as dependent variable		sources at different times yielding biased results.	
IT capability	Ravarini (2010)	Influence of IT capabilities on IT expenditure and business performance in SMEs	IT capability is the predictor variable and business performance as dependent variable		This study was exploratory hence the results require further statistical analysis	Descriptive and explanatory research design used to study IT capability and Kenyan manufacturing firms
IT infrastructure capability	Lim & Trimi (2014)	Effect of IT infrastructure on competitive advantage in small medium enterprises(SMEs)	IT infrastructure as the predictor and performance as dependent variable	IT infrastructure influences performance	The study used multivariate covariance analysis	This study used multiple regression for data analysis This study was conducted in manufacturing firms
IT infrastructure capability	Ravichandran & Lertwongsatien, (2005)	Influence of information resources on firm performance anchored on RBV	IT intangible resources and IT capabilities as independent variables and firm performance as dependent variable. Firm size, age and information intensity as control variables.	IT infrastructure capability, human capital and partnership quality had a significant effect on IT support for firm competencies which had positive relationship with firm performance. Control variables had a small effect 4.5 per cent	The study is supported by only one theory which the researcher deems inadequate. Failed to incorporate a wide range of IT capabilities.	The study was grounded on RBV, DCT KBT and UTAUT The study also incorporated reconfiguration capability
IT personnel capability	Kariuki Obonyo & Ogutu (2018)	Influence of human capability on performance in firms listed in Nairobi Securities Exchange	IT human resource as predictor and performance was a dependent variable	IT human resource positively influenced firm performance	The study failed to include all categories of IT capability hence a conceptual gap	This study was conducted in Kenyan Manufacturing firms
IT management capability	Nyachanchu, Cheokwony & Bonuke (2017)	To establish direct impact of dynamic capabilities(management and reconfiguration) on performance in Kenyan manufacturing firms	Management , reconfiguration and seizing as predictors, firm performance as dependent variable	Management capability had a weak relationship with firm performance	Survey anchored on RBV and explanatory research design leading to a theoretical and methodology gap	This study was informed by DCT, UTAUT and KBT in addition to RBV. The study assessed Kenyan manufacturing firms in Nairobi City County .and used additional variables

IT reconfiguration capability	Mutsembi (2019)	Effect of reconfiguration on firm performance listed in Nairobi Securities Exchange	Reconfiguration capability as a predictor and firm performance (product effectiveness and process efficiency)	Effect of reconfiguration capability on firm performance was not observed.	The study was informed by dynamic capability view. Data collected through a census. The study also failed to use explanatory design leading to a methodology gap	Descriptive and explanatory design which was cross sectional in nature used. Other variables were included in the study
IT reconfiguration capability	Protogerou, Caloghirou & Lioukas (2012)	Dynamic capabilities and firm performance	Dynamic capabilities as predictor variable, firm performance as dependent variable, operational capability as a mediator and Firm Size as control variables	Indirect effect of dynamic capability on firm performance. Firm size and age were dropped out of final results because they were insignificant. Environmental dynamism moderated the relationship between dynamic capabilities and firm performance.	Focused on IT reconfiguration capabilities.	IT infrastructure capability, IT human capability and IT management capability were included in the study.
Firm Size	Vij & Farooq, (2016)	Firm size as moderator in relation between IT orientation and firm performance	IT knowledge management, IT infrastructure capability and firm size	IT orientation and business performance was moderated by firm size	Study anchored on RBV and hypotheses tested through SEM	This study tested hypotheses through multiple regression
Firm size	Ali, Kihoro, Nzulwa (2016b)	To find out whether firm size moderates coordination, information sharing and performance of manufacturing and service firms in Nairobi	Coordination, competition and information sharing as independent variable. Firm size as moderating variable	Functional integration and firm performance effect was not moderated by firm size	Regression analysis procedure for the moderating variable adopted from this study	This study focused on manufacturing firms in Nairobi City County
Competitive advantage	Wirda (2018)	Influence of entrepreneurial competency and competitive advantage on business performance	Entrepreneurial competency an independent variable, competitive advantage a mediating variable and business performance a dependent variable	Entrepreneurial competency had a significant effect on firm performance. Competitive effect had mediating effect on the relation between Entrepreneurial competency and business performance	SEM was used for data analysis. The study was not supported by any theory. The study lacked clear mediation analysis.	Multiple regression was used to test the hypothesis. The study used an elaborate mediation analysis
Competitive advantage	Vicente Antunes, Malva (2016)	The impact of marketing capability, technological capability, organizational	Marketing and technological capability are	Marketing and technological capability	The study lacked clear mediation analysis.	The study used a clear elaborate mediation analysis procedure

		innovations on export performance	independent variables; performance dependent variable and organizational innovation a mediator.	had a significant effect on firm performance. Organizational innovation positively mediated the relationship between marketing and technological capabilities.		
Competitive advantage	Tanui (2015)	Interaction between IT capability, environmental conditions and competitiveness of consultancy firms in Nairobi County	Firm competence mediated, environmental conditions moderated and competitiveness as dependent variable.	IT capability positively influenced firm competitiveness, firm competence showed partial mediation. Environmental conditions at high levels influenced both the direct and indirect relationship	The study used low IT users hence it would be important to explore the effect of IT capability on firm performance in heavy IT users such as manufacturing firms.	
Competitive advantage	Wanjau <i>et al.</i> , (2013)	Explore competitive intelligence practices for greater profitability in the Kenyan banking industry	Competitive intelligence was independent variable and financial firm performance was dependent variable	Strategic intelligence practices result into greater profitability with technology intelligence being the highest contributor. A correlation between competitive intelligence, firm performance and enhanced competitiveness was reported	The study focused on financial performance and omitted non-financial performance.	The current study focused on non-financial performance in the manufacturing sector
Competitive advantage	Tuan & Yoshi, (2009)	Interaction between organizational capability, competitive advantage and performance in supporting industries in Vietnam	Performance was dependent variable, organizational capability was independent variable and competitive advantage was a mediator. Firm size, firm age, environmental dynamism and legal status as control variables	The effect of organizational capability on performance mediated by Competitive advantage.	Lacked clear mediation analysis of competitive advantage. A small sample was used and this makes it impossible to generalize the findings.	The study used a large sample size and clearly analyzed mediation

2.5 Conceptual Framework

The theoretical literature, empirical review and the conceptual framework reflect on interaction between research variables. In this study, IT capability is hypothesized as an independent variable. The moderating variable is the Firm Size. Competitive advantage as a mediating variable and firm performance as dependent variable.

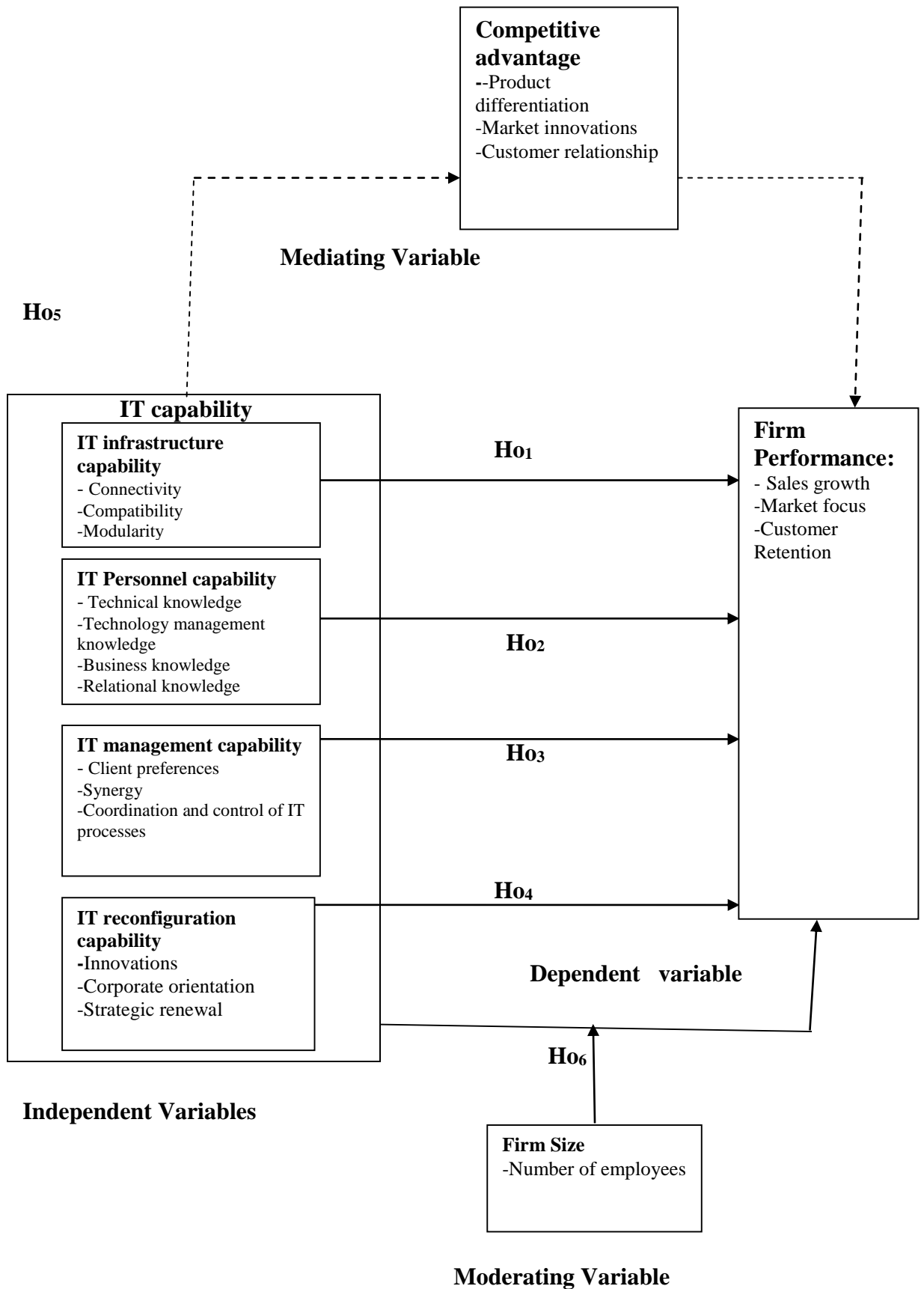


Figure 2.1 The Conceptual Framework

The independent variables corresponding to the IT capability is measured using four constants namely: IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability. The mediating variable is competitive advantage with firm size moderating the correlation. Firm size measured using the number of employees while firm performance is measured by sales growth, market focus and customer retention.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter covers research philosophy, research design, sampling of target population, sampling design, validity, reliability, data collection and analysis, empirical model, diagnostic and hypotheses tests and lastly, ethical considerations.

3.2 Research Philosophy

Positivism postulates that the reality is objectively given and comprises of measurable properties independent of researcher and the instruments that they use. Straub, Gefen & Boudreau (2004) notes that positivistic studies, test theories to increase the predictive understanding of a phenomenon. Positivistic IS research uses a representative sample to quantify variable measures, test hypotheses and draw inferences.

According to Easterby-Smith, Thorpe & Jackson *et al.*, (2015), positivism can be associated to scientific knowledge based on natural phenomena and their properties. It focuses on empirical measurement of facts using quantitative methods followed by statistical analysis of data. Saunders, Lewis & Thornhill, (2016) state that positivism is used in natural sciences as an objective of testing of hypotheses from existing theories. (Mack, 2010) argues that positivism allows the collection of quantitative data using questionnaires for the purpose of testing hypothesis. Mack further notes that positivists lay emphasis on the use of scientific methods, statistical analysis and generalization of research findings in a research study.

Positivism paradigm provides a scientific, systematic approach to research and uses quantitative methodology in hypothesis formulation and collection of numerical data for hypotheses tests. To obtain useful results, the research heavily focus on objective data collection and analysis. This study adopts positivistic philosophy as recommended by Saunders *et al.*, (2016). Consequently, the researcher used empirical literature to formulate hypotheses through measuring observable social realities from existing theories and data collection using semi-structured and validated data collection instrument Eriksson & Kovalainen (2016). Finally, data collected are used to explore the statistical relation between IT capability and firm performance. Moderation by firm size and the mediating effect of competitive advantage are also explored.

3.3 Research Design

According to Saunders, M, Lewis, P & Thornhill (2016) ; Mugenda & Mugenda (2019) an acceptable research design helps achieve in depth responses and understanding of the phenomenon under study. This research study took up descriptive and explanatory research design with a cross sectional survey.

In order to summarize and organize data in an effective manner, descriptive design was used (Mugenda & Mugenda (2019). Eriksson & Kovalainen, (2016) recommends descriptive research design to obtain whole data which are contextual and detailed for testing hypotheses. An explanatory research design explains why an interaction between the aspects of a phenomenon exists. This design also allows generalization of the sample survey. Lastly, cross sectional design requires that questionnaires are administered to a huge number of respondents within a short time.

3.4 Target Population

Mugenda & Mugenda (2019) describes population as a group of objects with common characteristics that conform to certain specifications. The target population consisted of 526 manufacturing firms categorized into 13 sub-sectors namely: Building, Mining & Construction, Chemicals & Allied Sector, Motor Vehicle & Accessories, Paper & Board Sector, Pharmaceuticals & Medical Equipment, Energy, Electrical & Electronics, Food & Beverages, Leather & Footwear, Metal & Allied Sector, Plastics & Rubber, Fresh Produce, Textile & Apparels and Timber, Wood & Furniture. The researcher chose Nairobi City County because it has 80 per cent of manufacturing firms in Kenya and in addition, Nairobi is a regional, economic and financial hub for East Africa (KAM 2018). Moreover, the role played by the manufacturing sector is critical in industrializing Kenya bearing in mind that its output is traded locally, regionally and internationally.

The manufacturing firms forms the unit of analysis in this study and enabled the researcher to explore IT capability and firm performance. The unit of observation are the company managing directors or chief information officers or production managers. These informants are targeted because they are believed to have relevant information about the topic under research within their respective firms (Al-Hawary & Al-Syasneh, 2020). The sampling frame was prepared using the list of categorized firms (Appendix D) obtained from KAM directory and operates in Nairobi City County.

3.5 Sampling Design

The 526 manufacturing firms located in Nairobi City County forms the unit of analysis. The manufacturing firms obtained from KAMs' directory are categorized into 13 subsectors. To select the target manufacturing firms, proportionate random sampling from each subsector was conducted. Mark, Philip & Thornhill (2019) opines that this technique reduces the standard error and provides some control over the variance.

To obtain the correct sample size, Bixley & Yamane (1965) formula was applied on the 526 manufacturing firms in Nairobi City County as per KAM directory (2018).

At 95 per cent confidence, the sample size was computed as per the following formula

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots \text{Equation 1}$$

Where N represents the total population size

n is the sample size

e is the level of precision

Applying the formula to a population of 526 firms, 222 firms were obtained.

$$n = 526 / 1 + 526(0.05)^2$$

The sample size of 222 manufacturing firms, spread through the defined strata based on their individual percentage strength. To obtain the sample, simple random sampling in each stratum resulted into the specific firms where the questionnaires were administered. This sampling technique enhances generalizability of the results and increases the level of accuracy when the estimating parameters (Sekaran & Bougie 2016). Kiveu, Namusonge & Muathe (2019) used this design in a similar

study. A semi-structured questionnaire was administered by five well trained research assistants. The unit of observation was identified as company managing director, chief information officer or production manager obtained through purposive sampling.

Table 3.1 Categories of Manufacturing Firms

SNO.	Sub category	Number of firms per strata	Proportion (No. per strata /526)	Sample size (proportion *222)
1	Building, Mining and Construction	20	0.038	8
2	Chemical and Allied Sector	75	0.142	32
3	Energy, Electrical and Electronics	40	0.076	17
4	Food and Beverages	85	0.0162	36
5	Leather and Footwear	6	0.0114	3
6	Metal and Allied Sector	58	0.110	25
7	Motor vehicle and Accessories	34	0.0646	14
8	Paper and Board Sector	67	0.127	28
9	Pharmaceutical and Medical Equipment	26	0.049	11
10	Plastics and Rubber	57	0.108	24
11	Fresh Produce	5	0.0095	2
12	Textile and Apparels	40	0.076	17
13	Timber, Wood and Furniture	13	0.025	6
Total		526	1.0000	222

Source: KAM (2019)

3.6 Data Collection

A questionnaire submitted to the informants helped the researcher to collect primary data on IT capability, competitive advantage, firm size and performance indicators (Appendix C). The questionnaire which contained semi-structured questions was administered to Company managing director, chief information officer (CIO) or production managers who apparently are in charge of policy formulation and implementation of innovations in the firms. They are considered to be the well

informed and most qualified to provide the most reliable and authentic information about the study (Ramos, Morales & Sanchez, 2012). The data collection tool was adopted from prior studies on strategic management that used similar variables with modifications aligned to the study's specific objectives. The closed-ended questions, formulated on a 5-point Likert scale enabled the researcher attain structured responses which were then used to facilitate quantitative analysis, hypothesis testing and drawing of conclusions. The questionnaire was administered to Chief information officers, company managing directors or production managers in fifteen firms, located in Ruiru, in a pilot test that was used to determine the validity and reliability of the data collection tool. The feedback was used to refine the questionnaire.

3.6.1 Operationalization and Measurement of Variables

There are three categories of variables in the conceptual framework namely: dependent variable (firm performance), independent variables (IT infrastructure, personnel, management and reconfiguration capabilities), mediating and moderating variables namely competitive advantage and firm size respectively. Table 3.4 shows how these variables are operationalized and measured.

Table 3.2 Operationalization and Measurement of Variables

Variables	Variable type	Operational variable definition	Indicators	Measurements of variables
Firm Performance	Dependent variable	How well a firm is able to meet its goals and objectives in order to improve its sales growth market focus and customer retention	<ul style="list-style-type: none"> • Sales growth • Market focus • customer retention 	Appendix A Section 2 Subsection 2.1.1-2.1.3 Likert scale 1-5
IT capability	Independent variable	Ability to mobilize, integrate and deploy IT based resources		
IT infrastructure capability		These are physical IT assets comprising of the computers, communication technologies, technical platforms, applications and databases	<ul style="list-style-type: none"> • Connectivity • Compatibility • Modularity 	Appendix A Section 3 Sub-section 3.1.1-3.1.3 5point Likert scale
IT personnel capability		This refers to technical and managerial and interpersonal skills acquired over time through training, experience, relationships and insights	<ul style="list-style-type: none"> • Technical knowledge • Technology management knowledge • Business knowledge • Relational knowledge 	Appendix A Section 3 Sub-section 3.2.1-3.2.4 Likert scale 1-5
IT management capability		A firm's aptitude, culture, reputation and environmental orientation of IT managers.	<ul style="list-style-type: none"> • Client preferences • Synergy • Coordination and control of IT processes 	Appendix E Section 3 Sub-section 3.3.1-3.3.3 5 point Likert scale
IT reconfiguration capability		Firms' ability to rebuild and redeploy IT assets and gain knowledge of creativity that will enable it to utilize opportunities and survive threats from competitors	<ul style="list-style-type: none"> • Innovations • Strategic renewal • Corporate orientation 	Appendix A Section 3 Sub-section 3.4.1-3.4.3 Likert scale 1-5

Competitive advantage	Mediating variable	Firm's ability to shape up to changing business environment in order to outperform other firms	<ul style="list-style-type: none"> • Product differentiation • Market innovations • Customer relationship 	Appendix A Section 4 Sub-section 4.1.1-4.1.3 Likert scale 1-5
Firm Size	Moderating variable	The current number of permanent employees in a firm	<ul style="list-style-type: none"> • Number of employees 	Appendix A Section 1 Question 8

(Source: Researcher, 2019)

The structured questionnaire made it possible for the researcher to gather in-depth information on the phenomena under investigation (Gall & Borg, 2003). A pilot study was conducted in fifteen manufacturing firms located in Ruiru. These firms were not included in the main study. The questionnaire has four sections: Section 1 comprises of the demographic details containing seven items 1-11; Section 2 consists of 14 items measuring performance. Section 3 54 items used to measure the independent variables using a 5- point Likert scale where the respondents selected the extent to which they agree with statements made. 1 represents “None/does not agree”, 2 represents “very small extent/ low”, 3 represents “medium”, 4 represents “large/high extent” and 5 “very large/high extent”. Likert scale is recommended to express the respondents’ attitudes and feelings in organizational research (Sekaran & Bougie, 2016b) Firm size and sales annual turnover was measured using an interval scale. Section 4 containing 12 items measured the mediating variable adapted from Oliveira *et al.*, (2016). The scales used in various constructs were adopted from reviewed empirical literature Oliviera *et al.*, (2016), Kim *et al.*, (2011) and Protogerou *et al.* (2012).

3.6.2 Research Instrument's Validity Measure

Data from the pilot study confirmed the time taken to fill the questionnaire, clarity of the items and expected observations (Kim, 2014). According to Saunders & Lewis & Thornhill, (2019) validity is a measure of what the data collection instruments intend to measure. The data collection instrument needs to be understood as intended by the researcher, answered in the way it is conceived by the researcher and the responses interpreted by the researcher in the way the respondent intends. Further, reliability and validity reduces the possibility of obtaining wrong answers. To measure validity of the research instrument, the items are supposed to be clear, precise and without any ambiguity. The researcher made sure that the objectives of the study were addressed adequately and the questionnaire was presented to experts and peer reviewers to assess face and content validity of the questions. Any issues raised by peer reviewers and experts were noted and any deficiencies addressed and adjusted before administering the final questionnaire to the informants at the manufacturing firms. Trained research assistants distributed the questionnaires to company managing director, chief information officer or production manager.

Construct validity refers to the study test measures of the intended hypothetical construct (Kimberlin & Winterstein, 2008). This is checked through the interpretation of a particular construct as indicated by the test scores obtained through experimentation. In this study, construct validity is endured by adapting measures validated in previous studies (Oliveira D, Macada & Oliveira G, 2016), (Protogerou Caloghirou & Lioukas, 2012). In addition, the measures from the previous studies were also compared against the theoretical and conceptual literature on each variable. However, some of the items were customized to fit in this study.

External validity affirms whether the results obtained from causal relationships can be generalized to other populations, settings or measurement variables. Content validity was obtained by generating the research constructs from the relevant theories under which this study is underpinned. This was further confirmed by the pilot survey whereby the content validity was gauged and confirmed through experts' opinion as recommended by (Field, 2014). The respondents of the pilot study are experts drawn from IT industry and were not part of the main study (Field, 2014).

In this study, construct validity was checked via testing of research hypotheses (Field, 2014). This test involved validation of the interpretation of a particular construct as indicated by the test scores obtained through experimentation. This study adapted established scales from previous researches with a bit of customization to fit the study environment and study variables (Oliveira *et al.*, 2016). These authors studied IT capability's impact on performance in a developing country. The alpha coefficients were 0.94, 0.87, 0.88 and 0.89 for IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability respectively, confirming construct validity since the alpha values were more than 0.7.

3.6.3 Reliability of the Research Instrument

This is the extent by which research instrument provides consistent results on repeat trials (Mugenda & Mugenda, 2019). Reliability measures internal consistency of items. In this study, reliability was obtained by calculating the composite reliability for each composite independent variable. Reliability was determined by SPSSv23 software by correlating the findings, generating and interpreting the results using Cronbach's alpha statistic. The guidelines by George & Paul Mallery (2003) were adopted in this test, where the Cronbach's alpha statistic above 0.9 is deemed

excellent, an alpha statistic above 0.8 is deemed good, an alpha coefficient above 0.7 is deemed acceptable while an alpha coefficient lower than 0.6 is deemed questionable. According to Field, (2018), Cronbach’s alpha value above 0.7 confirms reliability of the study instrument. A threshold of above 0.7 validated reliability in this study.

Reliability test results, from the pilot survey as well as the main survey are shown in Table 3.3. A sample of 15 manufacturing firms was used in the pilot test recording an alpha coefficient of 0.875. A threshold of 0.7 was surpassed as recommended by (Field, 2013a). Internal consistency was therefore confirmed. The questionnaire items on all the variables are declared reliable. The final Cronbach alpha coefficient for the research instrument was smaller and compared well with the coefficient obtained from the pilot test. The value obtained from the main survey was 0.815. The small sample size in the pilot test explains the slight variation between the Cronbach alpha coefficient of main survey value and the pilot test value. The Cronbach’s alpha is greater than the recommended threshold hence the research instrument was reliable. Appendix C shows the final tool used in the study.

Table 3.3 Pilot Test Results

Variable	Number of items	Cronbach’s alpha	Remarks
Firm performance	14	0.881	Reliable
IT infrastructure	13	0.895	Reliable
IT personnel	17	0.816	Reliable
IT management	12	0.891	Reliable
IT reconfiguration	12	0.920	Reliable
Competitive advantage	12	0.880	Reliable

(Source: Pilot study data 2019)

Table 3.3 shows alpha values with IT reconfiguration capability having the highest reliability, $\alpha = 0.920$. IT infrastructure capability closely follows with $\alpha = 0.895$, IT management capability $\alpha = 0.891$, firm performance $\alpha = 0.881$, competitive advantage $\alpha = 0.880$ and finally, IT personnel capability $\alpha = 0.816$. In this study all the six variables have reliable values with reliability being above 0.7 as recommended by Field (2013b). The overall reliability is 0.815, implying that the measurement instrument has high internal consistency.

3.6.4 Data collection Plan

Before the commencement of data collection, an introduction letter was obtained from Kenyatta University. A research permit was also obtained from NACOSTI and from the office of the Governor, Nairobi City County. Research assistants were engaged to administer questionnaires by dropping and picking them within a period of two weeks. Alternatively, an editable questionnaire was made available on request via email which was submitted back on completion. The data was collected from the manufacturing firms from 15th January to 14th February 2020.

3.7 Data Analysis

The primary data was cleaned through editing to eliminate any errors made by the respondents. Questionnaire responses were coded depending on each variable of the study for accurate and minimum error margin. Two methods of data analysis namely quantitative and qualitative methods were used in the study. Using descriptive statistics namely mean and standard deviation, the basic features of data were described in form of simple summaries of the sample and the measures. Using SPSS, data was tallied and percentages computed in order to describe and interpret the data in conformance with study objectives and hypotheses. The results are presented using

tables and in prose-form for ease of understanding and analysis. Statistical package for social sciences (SPSS) version 23 was used to analyze the data. SPSS has automated data preparation features which provide multiple comparisons and allow table customization.

The dependent variable was continuous therefore linear and stepwise multiple regression models were used. These models helped explore the effects of predictor variable on the dependent variable. Simple and stepwise multiple regressions examined the contributory explanatory variables among the IT capabilities. Step by step linear and multiple regression was used to analyze the mediating and moderating variables influencing the relationship between predictor and dependent variable. The adjusted R squared indicate the variance of the variables accounted for by the study factors. The beta (β) coefficients indicate the direction of change (+ or -), the proportion of the influence and the measure of variation contributed by each independent variable on firm performance. The significance level used in the study is 0.05 as adopted from Alrawabdeh (2014) Broderick *et al.*, (2013). At p-value below 0.05, the null hypothesis is rejected. Pearson's correlation measures how strong the relationship between the variables is while the simple and multiple linear regressions measure the correlation of variables under study.

3.8 Empirical Model

The direct relationship between IT capability and performance was tested using linear and stepwise multiple regression analysis. Objectives 1-4 were addressed using model 3.1. To explore the effect of the IT infrastructure capability (X_1), IT personnel capability (X_2), IT management capability (X_3) and IT reconfiguration capability (X_4) on firm performance (Y) model 3.1 was established.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + e.....3.1$$

This model assesses the effects of IT capability (independent variable consisting of X_1, X_2, X_3, X_4) on firm performance (dependent variable (Y)). The model was presented as a linear equation with constant coefficient (β_0), regression coefficients $\beta_1, \beta_2, \beta_3; \beta_4$ and the ε - Error term. The coefficients measured the effect of independent variables (X_1, X_2, X_3 and X_4) on the dependent variable(Y) while the corresponding β coefficients measured hypotheses specified in chapter one H_{01} through to H_{04} .

To explore mediation ,as per Hypothesis 5 (H_{05}), four models are estimated as recommended by Baron & Kenny (1986). Model (3.2) was used to estimate the base model determining the interaction of IT capability on performance. Model (3.3) estimates the relationship between the competitive advantage (mediating variable) and IT capability. Model (3.4) was used to investigate how the mediator (competitive advantage) and dependent variable (firm performance) relate. Lastly Model (3.5) confirms the presence of full mediation, partial or no mediation of competitive advantage on the predictor and dependent variable.

By performing simple regression with X (IT capability’s Composite index) against Y (Performance), model (3.2) was obtained.

$$Y = \beta_0 + \beta_1X + \varepsilon3.2$$

Simple regression was conducted with X (IT capability’s Composite index) to predict M (competitive advantage’s Composite index), as per model 3.3.

$$M = \beta_0 + \beta_1X + \varepsilon.....3.3$$

By carrying out simple regression with M (Composite index for competitive advantage) to predict Y (Performance), the model 3.4 was obtained.

$$Y = \beta_0 + \beta_1M + \varepsilon.....3.4$$

By performing multiple regressions with X (Composite index for IT capability) and M (composite index for competitive advantage) to predict Y (Performance), the model 3.5 was realized.

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \varepsilon \dots\dots\dots 3.5$$

Where;

M referred to mediating variable (composite index for competitive advantage)

X referred to the composite index for IT capability (independent variable) which is a multi-dimensional variable

Y referred to firm performance (dependent variable)

Where;

M: composite index for competitive advantage

X: composite index for IT capability

Y: Performance

β_1 and β_2 are the slope variables to be estimated, and

ε : Error term

Table 3.4 Criteria for Mediation Decision Making

Step	Nature of the Outcome	Conclusion
1	If one or more of the above relationships (model 3.2,3.3 and 3.4) is non- significant	There is no mediation
2	Assuming models 1-3 are significant, and then proceed to model 4. If effect of M is significant on controlling X. X no longer significant on controlling M	There is full mediation
3	If both X and M significantly predict Y	There is partial mediation

A decision as to whether there is a mediating effect is such that it can either be complete, partial or none (no mediation). The mediation decision criteria is based on the significance of β_4 and β_7 coefficients as adopted from (Hayes, 2009); Baron & Kenny (1986). If β_1 is significant in model 3.2 and 3.4 but insignificant in model 3.5, while β_2 is significant in model 3.5 then a case of complete mediation is confirmed. For partial mediation, β_1 is significant in models 3.2 and 3.4 but β_1 is significant in model 3.3 and 3.5 while β_2 is significant in model 3.5. Mediation is out ruled if β_1 is insignificant in models 3.2 and 3.3; β_1 in model 3.2 is significant and equal to β_1 in 3.5 while β_2 is not significant in 3.5. The coefficients level of significance is determined by the p-value hence the coefficients are insignificant if above 0.05 else significant. The null hypothesis is not rejected and vice versa.

To explore the sixth objective which tests the moderating effect of firm size, the following simple and multiple linear regressions are estimated as adopted from MacKinnon & Fairchild (2009); Hayes (2018) and Kemena Wetering & Kusters (2020).

The model (3.1) explores the influence of IT capability on firm performance. Model (3.6) shows interaction of IT capability, firm size on firm performance.

$$Y = \beta_0 + \beta_8 X + \beta_9 FS + \varepsilon \dots\dots\dots 3.6$$

Where;

X= composite index for IT capability

FS= Firm Size

β_8 =coefficient for IT capability

β_9 =coefficient for Firm size

Lastly model (3.7) provides the direction of change and firm size effect on the independent variable. The interaction term's effect on the dependent variable is estimated as:

$$Y = \beta_0 + \beta_8 X + \beta_9 FS + \beta_{10} FS * X + \varepsilon \dots\dots\dots 3.7$$

Where,

FS*X (interaction term) = Firm Size * composite index for IT capability

β_{10} =coefficient for the interaction term

Firm size being significant when introduced to the model (3.6) explains the first condition of an explanatory variable where all variables are significant MacKinnon & Fairchild, (2009). Model (3.7) is then estimated where the interaction term (product of firm size and composite for IT capability) is used to estimate the moderating effects. There is no moderation if the coefficient in model (3.6) is not significant and firm size in model (3.7) is also not significant. The alternative hypothesis is rejected and the opposite is true if otherwise MacKinnon & Fairchild (2009).

3.9 Hypotheses Tests

Hypotheses tests were conducted using the following empirical models: Table 3.5

Table 3.5 Summary of Hypotheses Testing

Research Objectives	Hypotheses	Statistical Models	Interpretation of Results
1. To determine the influence of IT infrastructure capability on performance of manufacturing firms in Nairobi City County, Kenya.	H ₀₁ : There is no statistical significant relationship between IT infrastructure capability and performance of manufacturing firms in Nairobi City County, Kenya	Regression model for objective 1-4 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \dots \dots \dots \text{Model 3.1}$ Where Y= Firm Performance X ₁ = IT infrastructure capability X ₂ = IT personnel capability X ₃ = IT management capability X ₄ = IT reconfiguration capability β _i =Beta coefficients (0,1,2,3,4) e= error term	The interpretation of results is based on β _i and F value If the p-value < 0.05 Reject the null hypothesis If p-value is > 0.05, Do not reject the null hypothesis
2. To establish the influence of IT personnel capability on the performance of manufacturing firms in Nairobi City County, Kenya.	H ₀₂ : There is no statistical significant relation between IT personnel capability and firm performance.		
3. To examine the effect of IT management capability on firm performance	H ₀₃ : There is no statistical significant relation between IT management capability on firm performance		
4. .Explore the influence of IT reconfiguration capability on performance of manufacturing	H ₀₄ : There is no statistical significant relation between IT reconfiguration		

firms in Nairobi City County, Kenya	capability and performance of manufacturing firms in Nairobi City County, Kenya		
5. Investigate the mediating effect of firm competitive advantage on IT capability and performance of manufacturing firms in Nairobi City County, Kenya.	H ₀₅ : Competitive advantage does not significantly mediate the effect of IT capability and performance of manufacturing firms in Nairobi City County, Kenya	Stepwise regression $M = \beta_0 + \beta_1 X + \epsilon$ $Y = \beta_0 + \beta_1 M + \epsilon$ $Y = \beta_0 + \beta_1 X + \beta_2 M + \epsilon$ Where Y = performance β = intercept X = IT capability's composite index M = competitive advantage's composite index ϵ = the error term	If β_1 and β_2 are significant, there is partial mediation If β_1 is insignificant and β_2 is significant, Full mediation If β_2 is insignificant, No mediation
6. Explore the effect of firm size as a moderating variable in the relation between IT capability and performance of manufacturing firms in Nairobi City County, Kenya.	H ₀₆ : Firm size has no significant moderating effect on the relationship between IT capability and firm performance.	Stepwise regression $Y = \beta_0 + \beta_8 X + \beta_9 FS + \epsilon$3.6 $Y = \beta_0 + \beta_8 X + \beta_9 FS + \beta_{10} FS.X + \epsilon$...3.7 Where Y - performance β_8 = coefficient of the composite index of IT capability β_9 = coefficient of the Firm size β_{10} = coefficient of the interactive term ϵ is the error term	If β_9 and β_{10} are not significant but β_8 is significant the firm size is a predictor variable else it is a moderator If the lower limit confidence level and the upper limit confidence level include zero, the indirect test is insignificant hence do not reject the null hypothesis

(Source: Author 2020)

3.10 Diagnostic Tests

Prior to conducting inferential analysis, tests for data outliers, multicollinearity, normality, and homoscedasticity were carried out to ensure data met the underlying statistical assumptions for both linear and multiple regression analysis (Field, 2018).

The diagnostic tests conducted are Kaiser Meyer Olkin (KMO), Normality, Linearity, Multicollinearity and Homoscedasticity.

3.10.1 Sample Adequacy Test

This test is conducted through Kaiser-Meyer-Olkin statistic to establish the measures of sampling adequacy for each variable and the entire model. KMO values close to 1 and a statistical $p\text{-value} > 0.05$ are recommended Malhotra & Dash (2013).

3.10.2 Normality Test

In statistics, normality refers to the likelihood that a random variable is normally distributed in the sample population Kothari (2018). One way of testing for normality is to plot the histogram of the data sample a test known as Quantile-Quantile test. The empirical distribution of the sample data should yield a bell-shape for normal distribution. Normality test was also conducted by plotting standardized residuals against the dependent/independent variables where the correlation between residuals and the variables measure the goodness of fit. If the probability plot falls nearly along a straight line, then normal distribution is confirmed. This study used Shapiro-Wilk's test for normality to determine the fit for data distribution. According to Garson (2012), a Wilk's test statistic with a $p < 0.05$ implies that the data does not show normal distribution and therefore the hypothesis of normality is not rejected consequently, at 95 per cent confidence, the data does not fit the normal distribution else there is no departure from normality.

3.10.3 Linearity Test

A linear relationship between dependent and independent variables is an assumption that is made in multiple regression. In this study, the Pearson's correlation coefficient confirms compliance as recommended by Hubbard (2009). The correlation coefficient lies between -1 and +1. The value of the correlation coefficient determines the strength and direction of the relationship between the response and predictor variable. A value close to +1 or -1 means the variables have a perfect linear relationship else if close to zero, there is little or no correlation (Lind, Marchal & Wathen, 2017).

3.10.4 Multicollinearity Test

Multicollinearity occurs when explanatory variables are highly linearly related. Its presence causes the estimate regression coefficients to have wrong signs and smaller t-ratios. This leads to incorrect conclusions. Furthermore, multicollinearity reduces the predictive power of individual variables. High linear relation between explanatory variables in multiple regression models result into multicollinearity.

When correlation between two predictors is 1 or -1, perfect multicollinearity exists. According to Field (2018), some correlation exists when correlation coefficient between two predictors is greater than 0.3 while Tabachnick & Fidell (2019) notes that careful consideration is made when two variables hold a correlation of 0.7 or more. Field (2018) recommends correction for multicollinearity when the correlation coefficient is 0.9 or more while Copper & Shindler (2010) argue that a correlation coefficient of 0.8 or more indicates severe multicollinearity.

Multicollinearity can also be detected by examining the tolerance and Variance Inflation Factor (VIF) in SPSS analysis. Tolerance level greater than 0.1 per cent is acceptable (Ooi *et al.*, 2011). This exhibits the absence of multicollinearity hence,

regression analysis can continue. However, if multicollinearity is detected, one of the collinear variables is dropped. VIF is a measure of magnitude of collinearity of variables. VIF greater or equal to 10 indicate the presence of multicollinearity. The explanatory variables were subjected to multicollinearity tests but there is no correlation between them.

3.10.5 Heteroscedasticity Test

To determine the variance of the error term, heteroscedasticity test was conducted. Warner (2008); Garson (2012) notes that the Breush-Pagan test be used to examine heteroscedasticity in a linear regression model. The null hypothesis exhibits a constant variance of the error term for all observations. According to Garson (2012), the probability value above 0.05 meets the homoscedasticity assumption and further allow regression model to be used in inferential analysis.

3.11 Ethical Considerations

In order for the study to be conducted, an introductory letter was obtained from Kenyatta University. Permission was also sought from NACOSTI to conduct the research before any interaction with the informants. Further, ethical clearance and permission to collect data was later sought from Nairobi County's County Commissioner as well as Director of Education Nairobi City County. The introductory letters were then presented to the sampled manufacturing firms at the point of visit. A Google form was prepared to collect data from some of the respondents on request. The informants were assured that the information collected was for academic purpose. The confidentiality of the participating firms and respondents was also highly guarded. Further, the researcher assured the respondents that taking part in the study was voluntary, with no gain or loss.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

Section one presents research findings obtained from descriptive statistics to accentuate the firms' characteristics. The second section presents the research outcomes from inferential statistics. Findings are presented based on research objectives. Also discussed in the chapter are the research outcomes.

4.2 Sample Characteristics

The sample size consists of 222 manufacturing firms located in Nairobi City County. Questionnaires received back were 160 of which 20 were rejected for being incomplete. This corresponds to a response rate of 63.1 per cent. Kothari (2018) recommends above 60 per cent response rate which is good enough to undertake analysis. Notably, Mugenda & Mugenda (2019) recommends a 50 per cent response rate as tolerable for statistical analysis and reporting while Babbie (2010) recommends 60 per cent response rate as acceptable. Subsequently, 63.1 per cent is acceptable for this study's statistical analysis. Strata sample size is shown in Table 4.1.

Table 4.1 Strata Sample Size for Sub-sectors

Sub-category	Sample size (proportion *222)	Frequency	Percent
Building, Mining and Construction	8	6	71.08108
Motor vehicle and Accessories	32	23	72.66066
Timber, Wood and Furniture	17	12	71.08108
Leather and Footwear	36	26	72.47483
Pharmaceutical and Medical Equipment	3	2	78.97898
Fresh Produce	25	17	69.44703
Plastics and Rubber	14	8	55.74987
Textile and Apparels	28	19	67.19107
Energy, Electrical and Electronics	11	4	36.45184
Food and Beverages	24	12	49.88146
Chemical and Allied Sector	2	2	94.77477
Metal and Allied Sector	17	8	47.38739
Paper and Board Sector	6	3	54.67775
Total	222	140	63.06306

(Source: Survey data 2020)

The firms from where the respondents were drawn together with their respective consistent strata are represented in Table 4.1. The respondents were instructed to identify the subsector to which their main products belong. The KAM classifies manufacturing firms into 13 subsectors, namely; building and construction, timber, wood and furniture, pharmaceuticals and medical equipment, fresh produce, plastics and rubber, textiles and apparels, energy, electric and electronics, food and beverages, motor vehicle and accessories, leather and foot wear, metal and allied, chemical and allied lastly, paper and board (KAM, 2018). Table 4.1 also captures the number and percentage of firms from where data was collected.

4.2.1 Respondents Biodata

Table 4.2 contains percentage of respondents who took part in the study. Approximately 12.1 per cent of the respondents hold the position of Company's managing director, 54.3 per cent hold the position of chief information officer, 33.6 per cent the position of production manager. 66.4 per cent of the respondents are of

ages within the range of 30-49 years. The male gender forms the majority respondents in the sampled manufacturing firms. 47.9 per cent informants had worked for 15 years and above, 27.1 per cent for 11-15 years, 18.6 per cent for 5-10 years and 6.4 per cent for less than 5 years. Overall, the respondents had a wealth of experience which is considered adequate to respond to the questionnaire. Further, majority of the respondents are degree holders (90 per cent). The level of education is critical because it influences the way the respondents interpret the questionnaire.

Table 4.2 Respondents' Information

Respondents position	Frequency	Percent
Company Managing Director	17	12.1
Chief information Officer	76	54.3
Production Manager	47	33.6
Total	140	100.0
Age		
18-29	35	25.0
30-39	55	39.3
40-49	38	27.1
50-59	12	8.6
Total	140	100.0
Gender		
Female	17	12.1
Male	123	87.9
Total	140	100.0
Work Experience		
Less than 5 yrs	9	6.4
5-10 yrs	26	18.6
11-15 yrs	38	27.1
Above 15 yrs	67	47.9
Total	140	100.0
Education Level		
Diploma	9	6.4
Degree	113	80.7
Postgraduate	18	12.9
Total	140	100.0

(Source: Survey data 2020)

4.2.2 Respondents Age and Gender Cross Tabulation

Results of a cross tabulation analysis of respondents' age and gender are shown in Table 4.3.

Table 4.3 Cross Tabulation of Respondents Age vs Gender

Age	Gender Types		Total
	Female	Male	
18-29	5	30	35
30-39	8	49	57
40-49	4	35	39
50-59	0	9	9
Respondents' Totals	17	123	140

(Source: Survey Data, 2020)

The results show that 5 female respondents are of age 18-29 years, 8 female respondents within 30-39 years, 4 within the range of 40-49 years and none over 50 years. Male respondents are higher in number compared to the female respondents. 30 males within the age of 18-29 years, 49 within the age of 30-39 years, 30 within the age of 40-49 years and 9 are over 50 years of age. Gender inequality levels with the manufacturing sector is still a concern and this calls for more affirmative action (KER, 2020).

4.2.3 Firm Demographics

Table 4.4 shows the sampled firms categorized in subsectors and other additional firm demographics.

Table 4.4 Firm Demographics

Firm age	Frequency	Percent
Up to 10 yrs	6	4.3
11-20 yrs	33	23.6
21-30 yrs	31	22.1
31-40 yrs	33	23.6
over 40 yrs	37	26.4
Total	140	100.0
Annual Turnover	Frequency	Percent
Less than 100 million	31	22.1
100-500 million	54	38.6
Over 500 million	55	39.3
Total	140	100.0
Level of Automation	Frequency	Percent
Low/Manual	8	6
Semi-automation	105	75
Full Automation	27	19
Total	140	100.0
Installed ERPs		
Yes	88	62.86
No	52	37.14
Total	140	100.0

(Source: Survey Data, 2020)

Approximately 90 per cent of the firms are over 10 years old with 23.6 per cent in the range of 11-20 years, 22.1 per cent from 21-30 years, 23.6 per cent from 31-40 years and lastly 26.4 per cent being in existence for over 40 years. Firm's annual turnover was 22.1 for less than 100 million, 38.6 per cent in the range 100-500 million and 39.3 per cent with an annual turnover of over 500 million. Further, 6 per cent reported no/minimal automation, 75 per cent semi-automation and 19 percent full automation. 62.86 per cent have installed Enterprise Resource Planning Systems (ERPs) while the remaining 37.14 percent have not implying that their internal functions are not integrated leading to inefficient supply chains.

4.2.4 Firm Age and Size Cross Tabulation Analysis

A cross tabulation analysis of firm age and size (measured using number of employees) yielded the following results:

Table 4.5 Firm Age and Size Cross Tabulation Results

Firm Size	Firm Age					Total
	<10 yrs	10-20	21-30	31-40	>40	
Large	1	18	16	18	23	76
Medium	4	9	11	7	7	38
Small	1	6	4	8	7	26
Total	6	33	31	33	37	140

(Source: Survey Data, 2020)

A large number of respondents were drawn from large firms which had been operating for over 20 years while less than 50 per cent were from medium and small firms.

4.2.5 Firm Size and Gender Comparison

Cross tabulation analysis on firm size and gender reveals the statistics shown in table 4.6

Table 4.6: Firm Size and Gender Cross Tabulation Results

Firm Size	Gender		Total
	Female	Male	
Large	10	66	76
Medium	4	34	38
Small	3	23	26
Total Respondents	17	123	140

(Source: Survey Data, 2020)

From table 4.6, 76 respondents (54.29%) are from large enterprises while 64 respondents (45.71 %) are from small and medium firms. 17 of the respondents (12.14

per cent) are females while 123(87.86 per cent) are males working in the manufacturing sector.

Table 4.7: Cross Tabulations between Gender/Annual Turnover and Experience/Firm Age

Years worked	Gender		Total
	Female	Male	
<5	1	8	9
5-10	2	24	26
11-15	8	32	40
>15	6	59	65
Total	17	123	140

Firm Age	Annual Turnover(millions)			Total
	<100	>500	100-500	
<10yrs	2	3	1	6
10-20	14	8	11	33
21-30	2	9	20	31
31-40	5	19	9	33
>40	8	16	13	37
Total	31	55	54	140

(Source: Survey Data, 2020)

55 respondents report a turnover of above 500 million 16 of them having been drawn from firms that had been in existence for over 40 years, 19 in operation for between 31-40 years, 9 operational for 21-30 years, 8 for 10-20years and 3 operational for below 10yrs.65 respondents have experience of over 15 years, 40 with an experience of 11-15 years, 26 with an experience of 5-10 years and 9 below 5 years. This implies that the respondents are well informed and knowledgeable in business operations within the manufacturing firms and further understand the link between IT strategies and business.

4.3 Descriptive Results

The descriptive statistical outcomes summarized the characteristics of the key attributes of the study variables with their respective sample mean and standard deviation Saunders *et al.*,. (2016).

4.3.1 Firm Performance

The descriptive results of the dependent variable (firm performance) are shown in Table 4.8. Firm performance was measured using three constructs namely: sales growth, market focus and customer retention. The descriptive results for the items presented are reflected in table 4.8

Table 4.8 Descriptive Analysis of Dependent Variable (Firm Performance)

Firm Performance	N	Minimum	Maximum	Mean	Std Deviation
Sales growth	140	1	5	3.9911	0.9142
Market focus	140	1	5	4.0342	0.9240
Customer Retention	140	1	5	4.0529	0.8624
	140		Aggregate	4.0181	0.9002

(Source: Survey Data, 2020)

The aggregate parameters for the sub-variables of firm performance are sales growth with a sample mean of 3.9911 and standard deviation of 0.9142, market focus with a sample mean of 4.0342 and standard deviation of 0.9240 and customer retention with a sample mean of 4.0529 and standard deviation of 0.8624. Overall sample mean and standard deviation for the indicators of firm performance were 4.0181 and 0.9002 respectively. Low standard deviation indicated that the mean responses had a low variability. Consequently, the mean of the responses was close to the true mean. Market focus had the highest variability while customer retention had the least variant.

4.3.2 Information Technology capability

IT capability is a composite variable which consists of IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability. IT infrastructure capability had three indicators namely connectivity, compatibility and modularity. IT personnel capability had four indicators namely technical knowledge, technology management, business knowledge and relative knowledge. IT management capability had three indicators namely client preferences, synergy and IT coordination and control. The indicators of IT reconfiguration capability included innovations, corporate orientation and strategic renewal. IT capability was a composite variable in this study, whose effect on performance was explored using four dimensions namely; IT infrastructure capability, IT personnel capability, IT management capability, and IT reconfiguration capability. Table 4.9 reflects on the descriptive statistics of the aggregate mean and standard deviation for each construct.

Table 4.9 IT Capability's Descriptive Statistics

IT infrastructure capability	N	Minimum	Maximum	Mean	Std. Deviation
Connectivity	140	1	5	4.025	0.8466
Compatibility	140	1	5	3.9674	0.8585
Modularity	140	2	5	3.9768	0.8256
	140		Overall Aggregate	3.9897	0.8436
IT personnel capability					
Technical Knowledge	140	2	5	4.1100	0.8087
Technology Management	140	2	5	4.0610	0.9046
Business Knowledge	140	2	5	4.0268	0.8864
Relational Knowledge	140	2	5	4.040	0.5225
	140		Overall	4.0595	0.7806

Aggregate					
IT management capability					
Client Preferences	140	2	5	4.0536	0.7362
Synergy	140	2	5	3.9607	0.8675
IT Coordination and Control	140	2	5	3.8928	0.8610
	140		Overall	3.9690	0.8216
Aggregate					
IT reconfiguration capability					
Innovative Processes	140	2	5	3.9357	0.8029
Corporate Orientation	140	1	5	3.8161	0.9438
Strategic Renewal	140	1	5	3.8911	0.7993
	140		Overall	3.881	0.8467
Aggregate					

(Source: Survey Data, 2020)

The accumulated mean for the attributes of the indicators of IT infrastructure capability are connectivity (sample mean = 4.025; std. deviation= 0.8466), compatibility (sample mean= 3.9674; std. deviation = 0.8585) and modularity (sample mean = 3.9768; std. deviation= 0.8256). Variations within the attributes are largely observed in connectivity while the least variance was seen in compatibility. The combined mean of IT infrastructure capability and the standard deviation are 3.9897 and 0.8436 respectively.

The results are consistent with Makhloufi *et al.*, (2018) who observes that IT infrastructure is the main driver of firm performance in furniture industries. Choi & George (2016) also found a correlation between IT resources and performance while Vij & Farooq (2016) reported that IT infrastructure capability and performance has a direct relationship.

The mean scores for the attributes of second independent variable (IT personnel capability) are technical knowledge (\bar{X} =4.11); technology management (\bar{X} =4.061);

business knowledge ($\bar{X}=4.0268$) and relational knowledge ($\bar{X}=4.04$). Their respective standard deviations are 0.8087, 0.9046, 0.8864 and 0.5225. However, the overall combined mean was 4.0595 while the standard deviation for IT personnel capability was 0.7806. The mean was approximately 4 and corresponds to high magnitude of staff knowledge and competence in the 5 point Likert scale.

The results resonate with those of Ashrafi & Mueller (2015) who posited that technical skills and business knowledge has a significant effect on performance. Muhanna & Dale Stoel (2010) also concluded that technical and managerial skills enhance firms' productivity and efficiency. Similarly, Reichert & Zawislak (2014) concludes that skills, knowledge and experience supports performance while Chae Koh & Park (2018) asserts that IT human capabilities consists of four dimensions namely: technical, business, interpersonal and managerial abilities.

The mean scores for the third independent variable (IT management capability) are client preference ($\bar{X}= 4.0536$; $\sigma=0.7362$), synergy ($\bar{X}= 3.9607$; $\sigma= 0.8675$) and IT coordination and control ($\bar{X}= 3.8928$; $\sigma= 0.8610$) implying a high variability between responses of IT coordination and control and least variability in client preferences. IT management capability with aggregate mean of 3.9690 and 0.8216 standard deviation. The combined mean was 3.9690, which is close to 4 hence corresponds to agree in the 5 point Likert scale.

These results are consistent with observations made by Vij & Farooq (2016) who concludes that IT management capability supports performance. Moreover, Kim *et al.*, (2011) asserted that IS knowledge, business and resource management has reasonable effect on performance while Muhanna & Stoel (2010) concluded that technical and managerial skills enhance firm's productivity and efficiency.

The mean scores for the fourth independent variable (IT reconfiguration capability) are innovative processes ($\bar{X}= 3.9357$; $\sigma=0.8029$), corporate orientation ($\bar{X}= 3.8161$; $\sigma= 0.9438$) and strategic renewal ($\bar{X}= 3.8911$; $\sigma= 0.7993$) implying that there is a high variability between responses in corporate orientation and least variability in innovative processes. The accumulated mean and standard deviation for the indicators of IT reconfiguration capability is 3.881 and 0.8467 respectively.

This result resonates with observations made by Lee *et al.*, (2015) who notes that IT reconfiguration capability improves operational processes. Reichert, Zawislak (2014) states that firms need to accumulate resources and competences in order to acquire higher technological capability than their competitors and as a result enhance their economic efficiency. On the other hand, Ehie & Olibe (2010) argue that investments in research and development increases innovative products and services which enhance firm performance.

4.3.3 Competitive Advantage

Table 4.10 has descriptive statistical results for mediating variable whose indicators are product differentiation, new market opportunities and customer relationship.

Table 4.10 Descriptive Statistics on Competitive Advantage

Competitive Advantage	N	Minimum	Maximum	Mean	Std. Deviation
Product Differentiation	140	1	5	3.9464	0.8743
New Market Opportunities	140	1	5	3.8357	0.9284
Customer Relationship	140	1	5	3.882	0.9011
	140		Aggregate	3.8880	0.9013

(Source: Survey Data, 2020)

The mean scores for the indicators of the mediating variable (competitive advantage) are product differentiation (\bar{X} = 3.9464; σ =0.8743), new market opportunities (\bar{X} = 3.8357; σ = 0.9284) and customer relationship (\bar{X} = 3.882; σ = 0.9011) implying that there was a high variability between responses obtained in new market opportunities and least variability in product differentiation. The accumulated mean for competitive advantage was 3.888 while the standard deviation was 0.9013 respectively. The aggregate mean value for competitive advantage was close to 4 in a five point Likert scale.

The findings are congruent with study conducted by Nybakk & Jenssen (2012) in Norwegian manufacturing firms which used product differentiation to gain competitive advantage. The findings also concur with Pulaj *et al.*, (2015) that construction firms gain competitive advantage from new market opportunities. A study conducted by Arasa (2014) show customer retention as a common approach to competitive advantage in Kenya.

4.3.4 Firm Size

The descriptive statistics for moderating variable are exhibited in Table 4.11. Firm size is determined by the number of employees. Table 4.11 shows the frequency/percentage of employees.

Table 4.11 Firm Size

Number of employees	Frequency/ percentage
1-49	44 (31.4 per cent)
50- 99	46 (32.9 per cent)
Over 100	50 (35.7 per cent)
Aggregate	140 (100)

(Source: Survey Data 2020)

The study sample consisted of 31.4 per cent small firms, 32.9 per cent medium firms and 35.7 per cent large firms.

4.3.5 Overall Descriptive Results for the Study Variables

This section reports the summary for the test scores of the study variables captured in Table 4.12.

Table 4.12 Summary of the Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Firm Performance	140	1	5	4.0181	0.9002
Competitive Advantage	140	1	5	3.8880	0.9013
IT infrastructure capability	140	1	5	3.9897	0.8436
IT personnel capability	140	2	5	4.0595	0.7806
IT management capability	140	2	5	3.9690	0.8216
IT reconfiguration capability	140	1	5	3.8810	0.8467
Valid N (listwise)	140				

Source: Survey Data (2020)

The aggregate mean for IT capability is close to 4 which from the Likert scale used in the study, corresponds to agree to a large extent implying that the respondents are of the opinion that IT capability is a multi-dimensional construct comprising of IT infrastructure capability, IT personnel capability, management and IT reconfiguration capability. This finding concur with Oliveira *et al.*, (2016); Choi & George (2016) and (Cano & Baena, 2015) who noted that IT capability improves business performance.

4.4 Inferential Results

SPSS version 23 software tested hypotheses using both simple and multiple regression models. To determine whether the data met the assumptions of regression, diagnostic tests were conducted.

4.4.1 Diagnostic Tests

Before performing hypothesis tests, assumptions of normality, linearity, internal consistency, heteroscedasticity and multicollinearity were confirmed not to have been violated. Other relevant tests include sample size and linearity. The sample size was 222 manufacturing firms. To establish linearity, the correlation between dependent and independent variables was obtained (Field, 2018). Diagnostic tests for normality, multicollinearity and heteroscedasticity were conducted. From the results, the assumption conditions for regression analysis were met.

4.4.1.1 Sampling Adequacy Test

The adequacy of the responses for each of the thematic areas of the structured questionnaire was determined by Kaiser-Meyer-Olkin (KMO) test. Its statistic value lies between 0 and 1. The KMO test statistic was close to 1 and met the threshold of 0.5. The test results are reported in Table 4.13

Table 4.13 Kaiser-Meyer-Olkin Test

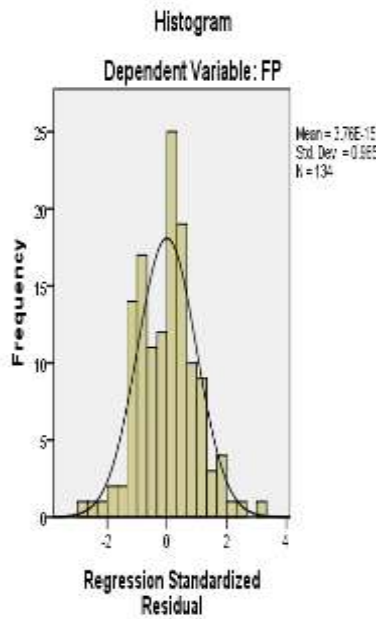
Variable	KMO	
	statistics	Comment
Firm Performance	0.835	Sample adequate for statistical analysis
Competitive advantage	0.818	Sample adequate for statistical analysis
IT infrastructure capability	0.789	Sample adequate for statistical analysis
IT personnel capability	0.726	Sample adequate for statistical analysis
IT management capability	0.779	Sample adequate for statistical analysis
IT reconfiguration capability	0.819	Sample adequate for statistical analysis

(Source: Survey Data, 2020)

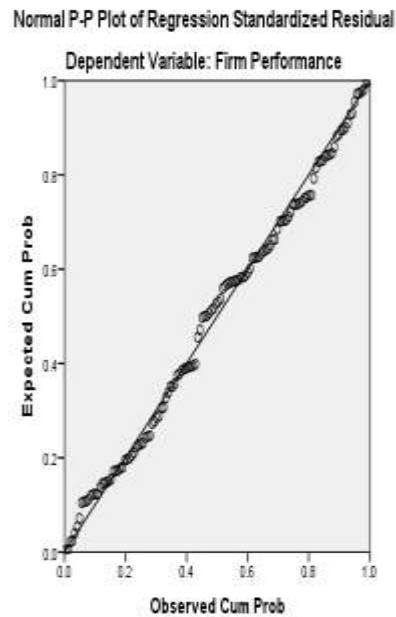
A summary of KMO statistics is shown in table 4.13 where the KMO statistic is above 0.5 as Williams *et al.* (2010); Malhotra & Dash (2013) recommends implying that the proportion of variance in the variables arise from the underlying factors. A KMO test statistic above 0.5 represents the study population meaning that the sampling was adequate and the results can be generalized as true for all manufacturing firms in Nairobi City County.

4.4.1.2. Normality Test

To confirm the normality of the sample population for the study, histogram and normal probability plots (P-P) of residuals was used. Figure 4.1 & 4.2 show the results obtained. The histogram shows the residual distribution is approximately normal with the P-P plots falling approximately on a straight diagonal line in figure 4.2. The results confirm normality of the sampled population.



(Source: survey data, 2020)



(Source: survey data, 2020)

Figure 4.1 Histogram of Standardized Residual Figure 4.2 Normal P-P Plot of Residuals

The histogram and normal probability plots in figure 4.1 and 4.2, confirm normality. According to Gujarati & Porter (2009), the results for regression analysis are considered valid only if the normality of the sample data is satisfied. From the scatter plots, the distribution of standardized predicted residuals confirm the normality of the sample data Huizingh (2012). Shapiro-Wilk test was conducted to further verify the normality test and the results are shown in table 4.14. The test was conducted at p-value of 0.05 and the results show that at 95 per cent confidence, p-value of Wilk’s statistic is greater than 0.05 hence the null hypothesis is rejected as recommended by Garson (2012). This implies that the data fits the normal distribution.

Table 4.14 K-S and S-W Normality Test Results

	Tests of Normality				Remarks
	Kolmogorov-Smirnov ^a		Shapiro-Wilk		
	Statistic	Sig.	Statistic	Sig.	
IT infrastructure capability	.065	.065	.973	.083	Normal
IT personnel capability	.066	.075	.971	.115	Normal
IT management capability	.075	.152	.988	.108	Normal
IT reconfiguration capability	.055	.250	.986	.164	Normal

a. Lilliefors Significance Correction

(Source: Survey Data, 2020)

The results show significant Wilk's statistic across all variables with the p-value being greater than 0.05. At 95 per cent confidence, the data shows normal distribution with IT infrastructure 0.973, $p > 0.05$, IT personnel capability 0.971, $p > 0.05$, IT management capability 0.988, $p > 0.05$, IT reconfiguration 0.986, $p > 0.05$, competitive advantage 0.990, p-value 0.185 and firm size 0.954, p-value 0.105. The null hypothesis that the data was obtained from a population which was normally distributed, was therefore not rejected. Consequently, the results of simple and multiple regressions in this study were acceptable.

4.4.1.3. Linearity Test

Linearity test results are in table 4.15. The correlation coefficients of the study variables namely, Firm performance, IT infrastructure capability, IT personnel capability, IT management capability, IT reconfiguration capability and Competitive advantage fell between 0.441 and 0.687 implying that the coefficients are within the recommended range of correlation coefficients between 0.3 and 0.9. In addition, none

of the correlation coefficients are insignificant at 5 per cent level of confidence with all variables having significance of 0.000. Consequently, collinearity is significant at 5 per cent confidence. The independent variable (IT capability) moderately and positively correlate with the dependent variable (firm performance). Regressing performance against all the other variables can be reliably interpreted as recommended by Hubbard (2009).

Table 4.15 Correlations between Study Variables

	Correlations ^b						
	Firm performance	Competitive advantage	IT infrastructure capability	IT personnel capability	IT management capability	IT reconfiguration capability	
Firm performance	1						
Competitive advantage	.687**	1					
IT infrastructure capability	.572**	.604**	1				
IT personnel capability	.552**	.537**	.555**	1			
IT management capability	.526**	.490**	.441**	.500**	1		
IT reconfiguration capability	.619**	.561**	.585**	.578**	.549**	1	
Pearson Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
N		140	140	140	140	140	140

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

b. Listwise N=140

(Source: Survey Data, 2020)

4.4.1.4. Multicollinearity

Additionally, the Tolerance and VIF values of models 3.1 through 3.8 were determined and results are in table 4.16. A VIF value above 10 is an indication of strong multicollinearity between the independent variables while the tolerance statistic of a value less than 0.1 indicates serious multicollinearity problems between independent variables. Multicollinearity test results are exhibited in Table 4.16

Table 4.16 Multicollinearity Statistics

Variables	Tolerance	VIF	Comment
IT infrastructure capability	0.581	1.721	No multicollinearity
IT personnel capability	0.564	1.773	No multicollinearity
IT management capability	0.643	1.1566	No multicollinearity
IT reconfiguration capability	0.510	1.960	No multicollinearity
Competitive advantage	0.539	1.854	No multicollinearity
Firm size	0.584	1.021	No multicollinearity

(Source: Survey Data, 2020)

The tolerance statistic is greater than 0.1 as shown in Table 4.16, hence it is well within a threshold of between 0.1 and 1 as recommended by Agboola (2006); Ooi *et al.* (2011) thus no multicollinearity evidence. A study by Creswell & Poth (2017) recommends the omission of an item whose VIF value is above 10. However, all VIF values of the study variables are less than 10, acceptably within the recommended range Morrison (2003). This indicates that multicollinearity between the independent variables does not exist (Field, 2018; Lindner Puck & Verbeke, 2020) and all the variables were then used in inferential analysis. Further, the requisite assumption was met and the explanatory variables were appropriate for regression analysis.

4.4.1.5. Heteroscedasticity Test

This test was to determine whether the residue values increase with increase in the independent variables using Breusch-Pagan test as recommended by Garson (2012). The probability value above 0.05 meet the homoscedastic assumption and therefore regression analysis proceeded. Independent variables had no effect on the residue values/ presence of constant variation. The null hypothesis states that the error variances are equal or homoscedastic. There was no change in the error variances throughout the data set and the null hypothesis was not rejected.

Table 4.17 Homoscedasticity Test Results

Model	Test statistic	p-value	Conclude
3.2	-1.847	0.067	equal error variance
3.3	0.058	0.954	equal error variance
3.4	1.359	0.176	equal error variance
3.5	0.08	0.994	equal error variance
3.6	-0.945	0.346	equal error variance
3.7	-0.2315	0.498	equal error variance
3.8	-0.115	0.909	equal error variance

(Source: Survey Data, 2020)

The homoscedasticity statistic results are presented in Table 4.17 where the calculated probability values are greater than 0.05 implying homoscedasticity (equal variances) and null hypothesis is not rejected at five per cent for all the study models. The test results demonstrate that the error variances are equal and the assumption for homoscedasticity was therefore confirmed.

4.5 Hypotheses Tests

Primary data obtained from the field were first cleaned and then formatted using Microsoft Excel before subjecting them to inferential statistics. The variable scores

were coded and normalized. The Likert scale scores which determined the extent to which respondents were in agreement with various statements, were coded. The resulting data were then used for statistical analysis. Testing of the hypotheses was conducted as per procedures outlined in chapter three of this thesis. Models 1, 2, 3 and 4 were tested using stepwise linear regression. Hypothesis 5 was tested using a four-step regression analysis. Lastly, hypothesis 6 was tested using two-step regression analysis.

The first test was on the effect of the index of dependent variable regressed on IT infrastructure capability, IT personnel capability, IT management capability and reconfiguration capability. The study makes an assumption that the relationship was mediated by competitive advantage and moderated by firm size. The results are in Tables 4.18- 4.25

Table 4.18 Regression Results for IT capability Variables on Firm Performance

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.619 ^a	.383	.379	.0663942	.383	85.833	1	138	.000
2	.671 ^b	.450	.442	.0629220	.067	16.651	1	137	.000
3	.695 ^c	.482	.471	.0612788	.032	8.446	1	136	.004
4	.706 ^d	.498	.483	.0605809	.015	4.152	1	135	.044

a. Predictors: (Constant), IT reconfiguration capability

b. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability

c. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability, IT management capability

d. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability, IT management capability, IT personnel capability

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.378	1	.378	85.833	.000 ^b
	Residual	.608	138	.004		
	Total	.987	139			
2	Regression	.444	2	.222	56.109	.000 ^c
	Residual	.542	137	.004		
	Total	.987	139			
3	Regression	.476	3	.159	42.254	.000 ^d
	Residual	.511	136	.004		
	Total	.987	139			
4	Regression	.491	4	.123	33.463	.000 ^e
	Residual	.495	135	.004		
	Total	.987	139			

(Source: Survey Data 2020)

a. Dependent Variable: Firm performance

b. Predictors: (Constant), IT reconfiguration capability

c. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability

d. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability, IT management capability

e. Predictors: (Constant), IT reconfiguration capability, IT infrastructure capability, IT management capability, IT personnel capability

Regression Coefficients

Model	Unstandardized coefficient		Standardized coefficient	t	Sig.	Collinearity statistics	
	B	Std. error	β			Tolerance	VIF
(Constant)	.075	.067		1.118	.266		
IT reconfiguration capability	.291	.086	.288	3.374	.001	.510	1.960
IT infrastructure capability	.247	.085	.231	2.885	.005	.581	1.721
IT management capability	.187	.078	.183	2.404	.018	.643	1.556
IT personnel capability	.226	.111	.165	2.038	.044	.564	1.773

(Source: Survey data, 2020)

4.5.1 Influence of IT Infrastructure Capability on Firm Performance

Resulting regression equation is:

$$\text{Firm performance} = 0.075 + 0.231 \text{ IT infrastructure capability} + \epsilon \dots \text{Model 3.1}$$

From Table 4.18, the standardized beta coefficient of IT infrastructure capability was 0.231 and was significant at $p = 0.005$. Hence, one unit change in IT infrastructure capability produce a 0.231 variation in performance. This relationship was significant at $p < 0.05$ indicating that model 3.1 significantly predicts the effect of IT infrastructure capability on performance. Additionally, adjusted R^2 rose to 0.442 up from 0.379 as reflected in Table 4.18 implying that IT infrastructure capability raised the explanatory power by 6.7 per cent. ANOVA reveal an F statistic test value of $F(1, 136) = 42.254$ and $p = 0.000$, indicating statistical significant effect of infrastructure capability on firm performance. Additionally, regression model fitted the data well. The findings show that IT infrastructure capability increases variation

of firm performance by 6.7 per cent at 95 per cent level of confidence. The first null hypothesis one which states that there is no statistical significant effect of IT infrastructure capability on performance of manufacturing firms in Nairobi City County was rejected at 95 per cent confidence denoting a significant relation between IT infrastructure capability and firm performance. Further, IT infrastructure statistically predicts performance by enabling applications to run on flexible operating systems, hardware, communication and other technical equipment.

The outcome concurs with earlier empirical studies by Ahearne (2014); Barney (2015); Bharadwaj (2000) who notes that firms invest heavily in IT resources to influence performance. Makhoulfi, Esmail, Al-Rejal, (2017) opines that IT infrastructure capability is a key strategic resource which provide organizations with a wide variety of strategic benefits namely hardware and software in the business units, information flows across technological platforms, reconfiguring technological devices and upgrading IT applications, to improve performance.

4.5.2 Influence of IT Personnel Capability on Firm Performance

Regression coefficients reflected in Table 4.18, where IT personnel capability $\beta = 0.165$, $p = 0.044 < 0.05$ indicate a positive statistically significant effect of IT personnel capability on performance. The standardized beta coefficient of IT personnel capability is 0.165 while the constant is 0.075 implying that a unit increase in IT personnel capability increases firm performance by a measure of 0.165 units. ANOVA results for model 3.2 shown in Table 4.17 reveal an F statistic of $F(1, 135) = 33.463$, $p = 0.000$ denoting that that the model significantly explain the effect of IT personnel capability on firm performance. R squared change for model 3.2 is 0.015; implying IT personnel capability raises the explanatory power by 1.5 per cent. The

beta coefficient for IT personnel capability (0.165) is positively significant at $p < 0.05$ implying significant relationship between IT personnel capability and firm performance, subsequently, the second null hypothesis was rejected.

The regression model resulting from this test is:

$$\text{Firm performance} = 0.075 + 0.165 \text{ IT personnel capability} + \epsilon \dots \dots \dots \text{model 3.2}$$

The results are consistent with those of Jared, Oloko, Orwa (2015); Byrd *et al.*, (2004) who asserted that IT personnel need to be knowledgeable about the key success factors in their institutions so that they can cope with changing business demands. Makhloufi, Esmail, Al-Erjal (2017) asserts that IT personnel capability is critical in utilizing IT resources for the purpose of enhancing firm competencies, growth, survival and sustainable competitive advantage. Furthermore Makhloufi *et al.*, (2018) notes that IT personnel capability enable intangible IT resources (IT knowledge resources, IT relationship resources and IT governance) support unique firm competencies which lead to superior performance. The personnel who possess sufficient and valuable IT knowledge in terms of technical, business and interpersonal skills interpret customers' needs and competitors' strategies better than their rivals. The study findings reveal that IT personnel require a deep technology management knowledge, business function know-how and good interpersonal skills to positively improve performance.

Gathungu & Mwangi (2012) asserts that IT personnel has the ability to identify and assess opportunities. Wang *et al.*, (2012) affirms that IT personnel play key role in the deployment of IT resources using their technical, business, and interpersonal skills. Furthermore, Bhatt & Grover (2005a) notes that firms with highly competent IT personnel create greater sustainable competitive advantage than those who fail to

regularly hire well informed IT savvy personnel. Moreover, firms with strong IT human resource develop reliable and cost effective applications faster than their competitors.

4.5.3 IT Management Capability's Effect on Firm Performance

The third objective sought to establish whether IT management capability influence performance of manufacturing firms in Nairobi City County, Kenya. The null hypothesis suggests insignificant relation amid IT management capability and performance. To test hypothesis three, IT management capability was regressed on firm performance with results reflected in Table 4.18.

The estimated regression model show that IT management capability is significant at beta coefficient of 0.183, t statistic of 2.404 and probability of 0.018. In conclusion, at 95 per cent confidence, IT management capability has a positive significant effect on performance and by holding IT management capability to constant zero, firm performance value is 0.075. Additionally, a unit increase in IT management capability increases firm performance by 0.183 units. The results show that the relationship between IT management capability and firm performance is statistically significant and positive implying that the alternative hypothesis is not rejected.

Additionally, the adjusted coefficient of determination (R^2) rises from 0.442 to 0.471 implying that IT management capability has an explanatory power of 3.2 per cent. At $F(1, 136) = 42.254$ and $p = 0.000$, the regression results are significant. Additionally, proposed regression model fits the data well. The findings show that IT management capability increases variation of firm performance by 3.2 per cent at 95 per cent level of confidence. The equation for the regression model is expressed as:

$$\text{Firm performance} = 0.075 + 0.183 \text{ IT management capability} + \epsilon \dots \text{model 3.3}$$

This finding further show that IT managers capabilities of formulating planning processes, IT investment decision making, coordination and control of IT processes significantly influence firm performance.

The findings correlate with studies conducted by Jared, Oloko & Orwa (2015); Hines (2006) who concludes that IT management capability offer effective business support to top management enabling them to align business with IT strategies. Mckeen & Smith (2008); Feldman & Pentland (2003) notes that IT management capability helps oversee the deployment of IT resources to provide more elaborate business value. Oh *et al.*, (2014; Reichert; Zawislak (2014) suggests that the management of IT resources is embedded in processes which transform businesses. Arguably, managers invest in time and resources to sustain performance and to align IT resources with business strategies by noting changes in business markets in terms of opportunities and threats. According to Helfat & Peteraf (2015) managers perceive changes in business environment facilitating renewal of processes. Furthermore, how managers interpret the business environment determines the survival and progress of an organization.

4.5.4 Influence of IT Reconfiguration Capability on Firm Performance

This study tests whether IT reconfiguration capability affects performance. The null hypothesis states that there is no significant relationship between IT reconfiguration capability and performance. The hypothesis was tested by regressing IT reconfiguration capability on firm performance. The results are shown in table 4.18. From the results, IT reconfiguration capability is statistically significant at a beta coefficient of 0.288; $t= 3.374$; $p = 0.001$. In addition, IT reconfiguration positively and significantly affects firm performance. At a constant zero, firm performance is

0.075. Subsequently, IT reconfiguration capability significantly affects performance of manufacturing firms in Kenya; hence the null hypothesis is rejected.

From Table 4.18, the adjusted determination coefficient is 0.379. Secondly the model 3.4 reveal Analysis of variance results where the F statistic has a value of $F(1, 138) = 85.833$, calculated probability of 0.000 (<0.05). The proposed model has a good fit and IT reconfiguration capability statistically and significant relationship affects firm performance. Further, the findings indicate that IT reconfiguration capability explains 37.9 per cent variation of performance at 95 per cent confidence. IT reconfiguration capability's explanatory power is 37.9 per cent. Equation for the regression model is expressed as:

$$\text{Firm performance} = 0.075 + 0.288 \text{ IT reconfiguration capability} + \epsilon \dots \text{model 3.4}$$

The results obtained from regression model 3.4 resonate with Jared *et al.*, (2015) that IT reconfiguration capability supports firms to cope with changing business environment by aggravating its impact on firm's IT systems to support development of new products, services and business processes. Moreover, there is a strong credence to adapt and renew IT resources in congruence with sustainable performance Ravichandran & Lertwongsatien (2005). Furthermore, Pavlou & Sawy (2010); Teece (2008) suggests that IT reconfiguration capability positively affect firm performance. Their findings concur with the outcome of this study. According to Gomes & Romão (2018) organizations recombine their resources to adapt to changing and uncertain environment. Further, firm managers should closely follow market changes and in turn reconfigure and redeploy resources to positively enhance firm performance.

4.5.5 Combined effect of IT capability on firm performance

The combined effect of the IT capability as a composite variable, on performance of manufacturing firms is explored. A regression test shows the combined effect of IT

capability on performance as compared to the individual effects of IT infrastructure, personnel, management and reconfiguration capability. The findings are in Table 4.19.

Table 4.19 Regressing IT Capability on Firm Performance

Model Summary						
Model	R	R ²	Adjusted R ²	Std error of estimate	R ² change	Sig.
1	0.704 ^a	0.495	0.492	0.06667	0.495	0.000

a. Dependent Variable: Firm Performance

As reflected in Table 4.19, the adjusted R square is 0.492, indicating that IT capability as a composite variable explained 49.2 per cent of performance variation. An explanatory power of 49.2 per cent is reported indicating that there are other factors which contribute to the variation of firm performance which are not part of this study.

Table 4.20 Analysis of Variance for Regression of IT Capability on Firm Performance

ANOVA						
Model		Sum of squares	df	Mean squares	F	Sig
1	Regression	0.489	1	0.489	135.475	0.000 ^b
	Residual	0.498	138	0.004		
	Total	0.987	139			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), IT capability

Analysis of variance results reflected in Table 4.20 show an F change of F (1, 138) = 135.475, p= 0.000 < 0.05 which is deemed significant at 95 per cent confidence level implying a statistically significant effect of IT capability on firm performance.

Table 4.21 Regression Coefficients for IT Capability on Firm Performance

		Regression Coefficients				
Model		B	Std Error	Beta	t	Sig
1	Constant	0.068	0.063		1.092	0.277
	IT capability	0.959	0.082	0.704	11.639	0.000

a. Dependent Variable: Firm performance

The regression coefficient results in Table 4.21 indicate IT capability ($\beta= 0.704$, $p=0.000 < 0.05$) denoting positive statistical significant effect of IT capability (a combined variable) on firm performance. The regression coefficient of 0.704 indicate that a unit increase in IT capability increases firm performance by 0.704 units. The increase is higher than the individual regression coefficients of IT infrastructure capability ($\beta= 0.231$), IT personnel capability ($\beta= 0.165$), IT management capability ($\beta= 0.183$) and IT reconfiguration capability ($\beta= 0.288$) implying that firms should strive to implement the different IT capability types instead of individual capabilities in order to benefit more in performance. In summary, IT capability positively and significantly influences performance of manufacturing firms in Nairobi City County, Kenya.

The study outcomes resonate Chen & Tsou, (2012) who refers IT infrastructure capability, IT human resource, IT related sources and IT business experience as components of IT capability in training institutions which contribute to growth and prosperity. Further, (Karimi Mazidi *et al.*, 2014) identifies IT infrastructure capability, human IT and IT enabled intangibles as components of IT capability affecting performance. Moreover, (Oliveira *et al.*, 2016) considers IT capability as a multidimensional construct that affects firm performance. However, (Ray *et al.*, 2013)

holds a different opinion that there is no direct effect of IT resources on performance which this study is not consistent with.

4.5.6 Mediation of Competitive Advantage on the Relationship between IT Capability and Firm Performance

Objective six explored mediating effect of Competitive advantage on firm performance. Mediation analysis is conducted in a four stage process as recommended by (Baron & Kenny, 1986). Initially the composite index of IT capability is regressed on firm performance. The results are in table 4.22 indicating a significant relation between IT capability and performance.

Table 4.22 Regressing IT Capability on Firm Performance

a) Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F	df1	df2	Sig. F Change	
1	.704 ^a	.495	.492	.0600667	.495	135.475	1	138		.000
a. Predictors: (Constant), IT capability										
b) Coefficients^a										
Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.			
		B	Std. Error	Beta						
1	(Constant)	.068	.063			1.092	.277			
1	IT capability	.959	.082	.704		11.639	.000			
a. Dependent Variable: Firm performance										
c) ANOVA^a										
Model		Sum of Squares	df	Mean Square	F	Sig.				
1	Regression	.489	1	.489	135.475	.000 ^b				
	Residual	.498	138	.004						
	Total	.987	139							
a. Dependent Variable: Firm performance										
b. Predictors: (Constant), IT capability										

From table 4.22, ANOVA results shows the model is significant at $F(1, 139) = 135.475$, $t = 11.639$ and p -value 0.000 hence a good fit for data in the proposed model.

The IT capability explains 49.2 per cent variation in firm performance at 95 per cent confidence.

$$\text{Firm performance} = 0.068 + 0.959 \text{ IT capability} + \epsilon \dots \text{model 3.2}$$

The estimated regression model (3.2) shows performance variation is statistically significant at $\beta=0.959$; $t= 11.639$; $p=0.000 < 0.05$. In step two, competitive advantage is regressed on IT capability. The results are in table 4.23:

Table 4.23 Regressing Competitive Advantage on IT Capability

a) Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.679 ^a	.461	.457	.0553099	.461	117.800	1	13	.000

a. Predictors: (Constant), IT capability

b. Dependent Variable: Competitive advantage

b) Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0per cent Confidence Interval for B	
		B	Std. Error				Lower Bound	Upper Bound
1	(Constant)	.108	.058		1.883	.062	-.005	.222
	IT capability	.823	.076	.679	10.854	.000	.673	.973

a. Dependent Variable: Competitive advantage						
c) ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.360	1	.360	117.800	.000 _b
	Residual	.422	138	.003		
	Total	.783	139			

a. Dependent Variable: Competitive advantage

b. Predictors: (Constant), IT capability

(Source: Survey Data, 2020)

From Table 4.23, IT capability has adjusted R square of 0.457 which is 45.7 per cent variation in competitive advantage caused by IT capability. The ANOVA results are statistically significant at $F(1, 139) = 117.800$, $t = 10.854$, $p = 0.000 < 0.05$. Subsequently, the proposed regression model fitted the sample data well.

$$\text{Competitive advantage} = 0.108 + 0.823 \text{ IT capability} + \epsilon \dots \text{model 3.3}$$

The estimated regression model (3.3) explicates that the effect of IT capability on competitive advantage is statistically significant at $\beta = 0.853$; $t = 10.854$; $p = 0.000$. At 95 per cent confidence level, the competitive advantage has a positive significant effect on IT capability. At low levels of Competitive advantage (constant zero), IT capability influences competitive advantage by 0.108. Further, an increase of one unit of IT capability increases competitive advantage by 0.823 units indicating a statistical significant effect of competitive advantage on IT capability.

The third step, firm's competitiveness is regressed on firm performance and results are reflected in Table 4.24

Step three: Results of regression for Competitive advantage on firm performance

Table 4.24 Regressing Competitive Advantage on Firm Performance

a) Model Summary^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.687 ^a	.472	.468	.0614382	.472	123.401	1	138	.000
a. Predictors: (Constant), Competitive advantage									
b. Dependent Variable: Firm performance									
Model	Unstandardized Coefficients			b) Coefficients ^a		t	Sig.	95.0 per cent Confidence Interval for B	
	B	Std. Error		Standardized Coefficients	Beta			Lower Bound	Upper Bound
1	(Constant)	.229	.051			4.496	.000	.129	.330
	Competitive advantage	.772	.069	.687		11.109	.000	.634	.909
a. Dependent Variable: Firm performance									
c) ANOVA^a									
Model		Sum of Squares	df	Mean Square	F	Sig.			
1	Regression	.466	1	.466	123.401	.000 ^b			
	Residual	.521	138	.004					
	Total	.987	139						
a. Dependent Variable: Firm performance									
b. Predictors: (Constant), Competitive advantage									

(Source: Survey Data, 2020)

From Table 4.24, the adjusted determination coefficient is 0.468. From ANOVA results, the regression model is statistically significant at $F(1, 138) = 123.401$; $t = 11.109$ and calculated probability of $0.000 < 0.05$. The proposed regression model fitted the survey data well and the results affirm that competitive advantage explains 46.8 per cent variation in manufacturing firms' performance at 95 per cent confidence.

$$\text{Firm performance} = 0.229 + 0.772 \text{ competitive advantage} + \epsilon \dots \dots \dots \text{model 3.4}$$

The estimated regression model (3.4) asserts that competitive advantage significantly affects firm performance at $\beta = 0.772$; $t = 11.109$; $p = 0.000 < 0.05$, competitive advantage significantly influences firm performance. Holding competitive advantage at constant, a measure of 0.229 of firm performance is obtained. Increasing competitive advantage by a unit leads to 0.772-unit increase in firm performance implying a positive significant relationship between competitive advantage and firm performance.

This findings correlate with Setyawati *et al.*, (2017) who posited that competitive advantage influences firm performance positively and significantly. Firms with higher competitive advantage show higher performance as compared to their competitors. Wanjiru *et al.*, (2019) also indicated that competitive advantage positively influences performance of manufacturing firms in Nairobi City County. Significant impact of competitive advantage on performance of telecommunications firms in Kenya is reported by Arasa & Gathinji (2014). The findings also resonate with sentiments of Khan & Haseeb (2019) that a correlation exist between competitive advantage and firm performance.

At step 4 firm performance is regressed on both IT capability and competitive advantage. The mediation results are summarized in table 4.25

Table 4.25 Mediation Results

a) Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.759 ^a	.577	.571	.0552151	.577	93.323	2	137	.000
a. Predictors: (Constant), Competitive advantage, IT capability									
b. Dependent Variable: Firm performance									
b) Coefficients ^a									
Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.	95.0per cent Confidence Interval for B		
	B	Std. Error	Beta				Lower Bound	Upper Bound	
1	(Constant)	.021	.058		.361	.718	-.094	.136	
	IT capability	.600	.103	.440	5.819	.000	.396	.804	
	Competitive advantage	.436	.085	.388	5.130	.000	.268	.604	
a. Dependent Variable: Firm performance									
c) ANOVA ^a									
Model		Sum of Squares	df	Mean Square	F	Sig.			
1	Regression	.569	2	.285	93.323	.000 ^b			
	Residual	.418	137	.003					
	Total	.987	139						
a. Dependent Variable: Firm performance									
b. Predictors: (Constant), Competitive advantage, IT capability									

(Source Survey Data, 2020)

Table 4.25 affirms the adjusted R square of 0.571 implying that both IT capability and Competitive advantage explain 57.1 per cent variation in performance of manufacturing firms at a calculated probability of 0.000. The model is statistically significant at 95 per cent confidence level.

$$\text{Firm Performance} = 0.021 + 0.600 \text{ IT capability} + 0.436 \text{ Competitive advantage} + \epsilon \dots \dots \dots \text{model 3.5}$$

IT capability is statistically significant at $\beta = 0.600$; $t = 5.819$; $p = 0.000$ implying that the composite of IT capability has a positive relationship with firm performance. Subsequently, competitive advantage has a positive statistically significant effect on firm performance at $\beta = 0.436$; $t = 5.130$; $p = 0.000 < 0.05$ indicating that IT capability and competitive advantage explain 57.1 per cent variation in firm performance as compared to 49.2 per cent explained by IT capability alone. In addition, Analysis of variance regression for model 3.5 denotes an F statistic of $F(2, 139) = 93.323$, $p < 0.05$ exhibiting significance effect of IT capability on performance of manufacturing firms.

Four steps are used to test the null hypothesis five (H_{O5}): Competitive advantage does not mediate the effect of IT capability on firm performance. Results obtained from regression model in Step one show that IT capability significantly influence the dependent variable, firm performance. The results from regression in step two show that the mediating variable significantly influence the dependent variable, firm performance. From step three, the outcome regression model implies that IT capability significantly control the mediating variable, competitive advantage. The regression model for step four indicates that competitive advantage significantly controls the relation between IT capability and firm performance. The adjusted determination coefficient value increased by 7.9 per cent in the mediated model, eluding that the

explanatory power of IT capability increases significantly in presence of competitive advantage. Hence, the interaction of IT capability and firm performance depends on a significant magnitude of competitive advantage implying that competitive advantage mediates the relationship between IT capability and firm performance. The null hypothesis is rejected. Summary observations from the four steps are shown in figure 4

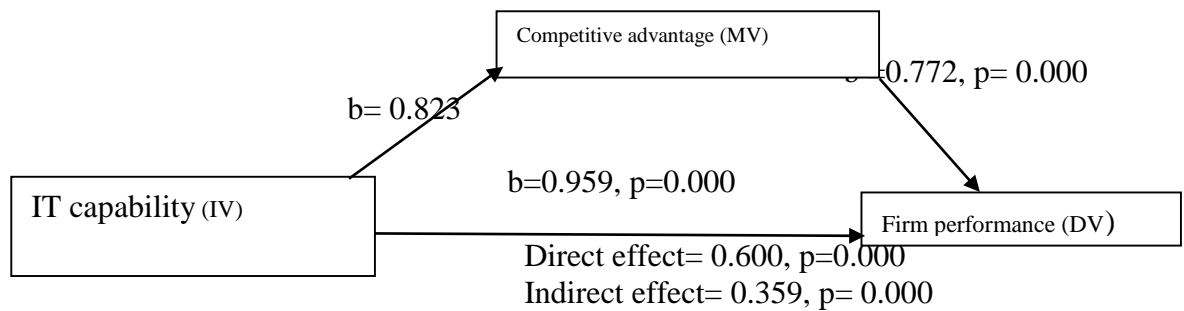


Figure 4.3 Mediation Model

Using the criteria recommended by Hayes (2018); MacKinnon & Fairchild (2009) to evaluate the mediating effect, observations made from regression models used in testing hypothesis five indicate that firm's competitive advantage partially mediate the interaction of IT capability and firm performance. Sobel test corroborate the mediator being significantly different from zero Hayes (2018). β_1 is significant in regression models 3.3, 3.4 and 3.5 hence mediation is confirmed. Models 3.3 to 3.5 are statistically significant implying that mediation exists (MacKinnon & Fairchild, 2009). β_1 and β_2 are significant in model 3.5 implying that controlling for the mediator, the explanatory variable (IT capability) still significantly predicts firm performance. Both IT capability and the mediator (competitive advantage) predict firm performance through partial mediation. Further, the bootstrap results for indirect effect show that the lower and upper bound confidence intervals, 0.268 and 0.604 respectively are

positive and do not intersect with zero. The beta value is also positive. Hayes (2018) confirmed mediation from similar findings.

Table 4.26 shows the changes made by the mediator (competitive advantage)

Table 4.26 Mediation Outcome for Hypothesis 5

Parameter	Step 1	Step 2	Step 3	Step 4	Difference (step 4- step1)
Adjusted R ²	0.492	0.457	0.468	0.571	7.90
F value	135.475	117.800	123.401	93.323	-42.152
Sig	0.000	0.000	0.000	0.000	
β constant	0.068	0.108	0.229	0.021	-0.047
β IT capability	0.959	0.823	-	0.600	-0.359
β Competitive advantage	-	-	0.772	0.436	0.436

Dependent = Firm performance, Predictor=IT capability, mediating variable= Competitive advantage, values significant at p<0.05

(Source: Survey data 2020)

The mediation effect of competitive advantage decreases the beta coefficient of IT capability by a magnitude of 0.359 (0.959 to 0.600) indicating that one unit change in IT capability decreases firm performance by 0.359 units in presence of competitive advantage at a confidence level of 95 percent. The explanatory power of IT capability increases by 7.9 per cent. The null hypothesis is rejected meaning that competitive advantage mediates the correlation of IT capability and performance of manufacturing firms in Nairobi City County, Kenya.

The results are in congruence with Pulaj, Kume & Cipi (2015) who noted that competitive advantage statistically and significantly affects performance. Mahmood & Rosli Mahmood, (2013) in a study on relationship between entrepreneurial orientation and performance, found competitive advantage as a partial mediator. Wanjiru *et. al.*, (2019); Ong & Ismail, (2012) assert the mediation effect of competitive advantage on the link between firm strategies and performance. Chahal & Bakshi (2015) asserts that competitive advantage is achieved when firms successfully mobilize their strategic capabilities. Gomes & Romão (2018) asserts that competitive strategies are fundamental in strategic management.

4.5.7 Moderating Effect of Firm Size

The sixth specific objective explores the moderating nature of firm size in the correlation of IT capability on performance. The analogous research hypothesis posits no moderating effect of firm size. Hypothesis six results are reported in table 4.27. When IT capability is regressed on performance, the estimated model is significant at $\beta=0.959$; $t=11.639$; $p= 0.000<0.05$.

Firm performance = 0.068 + 0.959 IT capability + ϵmodel 3.2

In model 3.7, IT capability, Firm size and an interaction term (Firm size * composite IT capability) are regressed against firm performance using PROCESS macro SPSS (Hayes, 2018). Table 4.27 shows the outcomes

Table 4.27 Regression Test for Moderation

Model Summary						
R	R-sq	MSE	F	df1	df2	p
.7106	.5049	.0036	46.2349	3.000	136.000	.000

Model						
	coeff	se	t	p	LLCI	ULCI
Constant	-.0899	.1492	-.6027	.5477	-.3850	.2052
IT capability	1.1474	.1996	5.7476	.0000	.7526	1.5421
Firm size	.0813	.0675	1.2048	.2304	-.0522	.2148
Interaction term	-.0984	.0898	-1.0957	.2751	-.2759	.0792
Interaction term IT capability * Firm Size						

Source: Survey, 2020

The table shows an adjusted R square coefficient of determination of 0.5049 implying that IT capability, Firm size and interaction term explain a variance of 50.49 per cent in performance of manufacturing firms in Kenya with calculated probability $0.000 < 0.05$. This p-value is less than 5 per cent, implying that the model is significant at 95 per cent level of confidence. Further, difference in adjusted R squared is only 0.0129 meaning the effect of firm size on performance is very low.

Firm Performance = -0.0899 + 1.1474 IT capability+ 0.0813 Firm size -0.0984 Interaction term (IT capability *Firm size)model 3.7

From regression model 3.7, IT capability is statistically significant at $\beta= 1.1474$; $t= 5.7476$ and $p=0.000$ implying that at 95 per cent confidence, IT capability positively influence firm performance. The firm size and interaction term are statistically insignificant, Firm size at $\beta= 0.813$; $t=1.2048$; $p= 0.2304 > 0.05$ while the interaction term at $\beta= -0.0984$; $t= -1.0957$; $p = 0.2751 > 0.0$ implying that at 95 per cent level of confidence, firm size failed to moderate IT capability and firm performance relationship. This further validates the view that firm size does not moderate IT capability and firm performance relationship. Hence, firm size is a predictor variable

The results are contrary to what is reported by Kim, Shin, Kim and Lee (2011); Chen et al. (2010) & Norzaidi *et al.* (2009). However, the outcomes are congruent with a study conducted by Ali, Nzulwa & Kihoro (2016b) where firm size did not moderate the correlation of management capability and performance of manufacturing firms in Nairobi and its surroundings. This implies that an increase in firm size has an equal impact on large, medium and small firms.

Table 4.28 Hypothesis Tests Results Summary

Hypothesis	Findings/Results	Decision	Implications
H₀₁: Hypothesis one IT infrastructure capability has no significant effect on firm performance	$\beta=0.231$ $p= 0.005$ $p<0.05$ hence significant	Rejected hypothesis one. (H ₀₁) Conclude that IT infrastructure capability has a significant effect on firm performance	Increasing IT infrastructure capability by a unit leads to an increase in firm performance
H₀₂: Hypothesis two IT personnel capability has no significant effect on firm performance	$\beta= 0.165$ $p= 0.044$ $p<0.05$ hence significant	Rejected hypothesis two (H ₀₂) Conclude that IT personnel capability has a significant effect on firm performance	Increase in IT personnel capability results into an increase in firm performance
H₀₃: Hypothesis three IT management capability has no significant effect on firm performance	$\beta= 0.183$ $p=0.018$ $p<0.05$ hence significant	Rejected hypothesis three (H ₀₃) Conclude that IT management capability has a significant effect on firm performance	Increase in IT management capability leads to an increase firm performance
H₀₄: Hypothesis four IT reconfiguration capability does not significantly affect firm performance	$\beta=0.288$ $p=0.001$ $p<0.05$ hence significant	Rejected hypothesis four (H ₀₄) Conclude that IT reconfiguration capability has a significant effect on firm performance	A unit increase in IT reconfiguration capability results into an increase in firm performance
H₀₅: Hypothesis five Competitive advantage does not mediate the interaction of IT capability and firm performance	$\beta= 0.436$ $p= 0.000$ $p<0.05$ hence significant Showed a mediating power of 7.9 per cent	Rejected hypothesis five (H ₀₅) In conclusion, a partial mediating effect of competitive advantage on the relationship between IT capability and firm performance is confirmed	An increase in competitive advantage leads to increase in performance. Competitive advantage partially mediates the relationship.
H₀₆: Hypothesis six Firm Size has no moderating effect on firm performance	$\beta= -.0984$ $p= .2751$ $p>0.05$ hence not significant	Did not reject hypothesis six. (H ₀₆) Conclude that firm size does not moderate effect of IT capability on firm performance. It is an explanatory variable in this this relationship.	Interaction of firm size on IT capability and firm performance does not exist. Firm size does not moderate the relation.

(Source: Survey data, 2020)

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

A summary, conclusion, recommendations and limitations for the study are presented in this chapter. This study explored the influence of the IT capability on the performance of manufacturing firms in Nairobi City County Kenya.

5.2 Overview of the study

Manufacturing firms in Sub Saharan Africa have shown a decline in performance leading to a low GDP of between 3.8 to 11 per cent. The manufacturing firms in Kenya reported dismal performance even after heavily investing in information technology. This study investigated the effect of IT capability on firm performance. It also explored mediating effect of competitive advantage on the relationship between IT capability and firm performance. Lastly, the study explored moderating effect of firm size on the relationship between IT capability and firm performance.

A conceptual framework was developed and tested empirically in this study. The study used descriptive and explanatory design in a cross-sectional nature. Quantitative data was collected using a questionnaire which was edited for completeness and consistency. The questionnaires were administered to the respondents in the sampled manufacturing firms. The key respondents were mainly the IT managers/ chief information officers Head of IT department. The responses obtained from the respondents were statistically analyzed both descriptively and inferentially.

5.2.1 IT Infrastructure Capability and Performance

First objective explores the effect of IT infrastructure capability on performance. IT infrastructure capability raised the explanatory power in the variation of firm performance, by 6.7 per cent. Further, increasing IT infrastructure capability by a single unit, increased firm performance by 0.231 units. The result confirms significant relationship between IT infrastructure capability and firm performance. The findings concur with RBV proponents who assert that organizations develop resources which enable them to outperform their rivals.

5.2.2 IT Personnel Capability and Performance

The second objective explore IT personnel capability influence on firm performance. Technology knowledge, technical management, business knowledge and relational knowledge are the indicators used to investigate the relation. A rise by 1.5 per cent of variation of firm performance was explained by IT personnel capability. Additionally, a change in a single unit of IT personnel capability, increases firm performance by 0.165. Manufacturing firms can therefore heavily invest in hiring skilled personnel to enhance and sustain their performance.

5.2.3 IT Management Capability and Performance

The third objective investigates whether there is a relation between IT management capability and firm performance. IT management capability contributed 3.2 per cent of the variance in the performance of manufacturing firms in Kenya, as explained by the model. In addition, a unit change in IT management capability, increases firm performance by 0.183 standard deviations. The results support significant contribution by IT management capability on the firm performance.

5.2.4 IT Reconfiguration Capability and Performance

Study findings from objective four, exhibit a positive statistical significant effect of IT reconfiguration capability on performance. The highest effect on performance amongst the four IT capabilities was exhibited by IT reconfiguration capability. IT reconfiguration capability explains 37.9 per cent variance in firm performance. A single unit increase in IT reconfiguration capability caused an increase in firm performance by 0.288. This implies that manufacturing firms should engage more on reshaping, reconfiguring and upgrading IT resources to provide and sustain superior performance.

From this study, the four IT capabilities together have a higher positive significant effect on performance variance compared to their individual effects. Manufacturing firms should therefore invest in enhancing the four IT capabilities for sustenance of superior performance. From dynamic capability theory perspective, firms that can configure their resources faster than their rivals have greater market opportunities and can achieve superior performance.

5.2.5 Mediating effect of Competitive Advantage on IT Capability and Firm

Performance

The fifth objective explored the intervening effect of competitive advantage on IT capability and performance. The regression results exhibited that competitive advantage has a mediation effect. These results are consistent with the theoretical and empirical predictions which guided the conceptualization of this study. Moreover, Sobel test results validates mediating effect of competitive advantage which was significantly different from zero. Additionally, complementarity of competitive

strategies on IT capability and firm performance is confirmed by raising the explanatory power of IT capability by 7.9 per cent. The study further indicates the mediation effect of competitive advantage in manufacturing firms is different from zero. This study contributes towards cognizance of the role of competitive strategies on firm performance. Moreover, competitive advantage raises firm performance both directly and indirectly as a mediator.

5.2.6 Moderating effect of Firm Size on IT Capability and Firm Performance

The last objective was to establish whether firm size moderates the relationship between IT capability and performance. However, firm size didn't moderate the relation. The study resonates with some theoretical and empirical predictions which had been used in the study conceptualization indicating that firm size is an explanatory variable. This finding is different from other studies which corroborate that the number of employees moderates the relation between IT capability and firm performance. Firm size did not moderate this relationship.

5.3 Conclusion

This study concludes that IT capabilities namely, IT infrastructure, IT personnel capability, IT management capability and IT reconfiguration capability positively influence firm performance. The study further concludes that competitive advantage partially and significantly mediates the effect of IT capability on firm performance. Moreover, firm size becomes an explanatory variable and not a moderating variable. Firm size failed to moderate this relationship.

5.4 Contributions to the Body of Knowledge

This research contributes to literature on effects of IT capability on performance in various ways. First, the study findings portray IT capability as an important

determinant of firm performance. Secondly, the study is helpful to industrial players since it provides a deeper understanding of the role played by IT capability in enhancing and sustaining superior performance. This knowledge can be used in policy formulation in the manufacturing sector. Third, it is imperative for firms to employ IT capability to be able to reconfigure business processes and capture high performance gains. Firms should have proactive managers and personnel who can build relationships with all business functions promoting effective use of IT through sharing insights on business knowledge. Firm IT managers should also strive to build IT capability through better planning, coordination and control of IT use in business. Fourth, competitive advantage mediated the interaction of IT capability and performance. Fifth, IT capability studies are better anchored on dynamic capability view because firm performance is not only determined by resource ownership but on reshaping, modification and reconfiguration of IT resources as well. Lastly, the results of multiple regression resulted in a conclusive evidence that firm size is a significant explanatory variable. Firm size failed to moderate the relationship. This finding implies that increasing the firm size has an equal impact on small, medium and large firms. Firm size is a predictor variable not a moderating variable in this study.

5.5 Contribution of the Study to Policy

From the study results, IT infrastructure capability has a positive significant effect on performance of respondents' firms. The management of manufacturing firms should therefore equip firms with sharable and reusable IT assets that can be integrated with new technologies in order to effectively align IT resources to business strategies and support future applications. The study revealed that IT infrastructure should facilitate integration and modularity among and within information systems.

Secondly, IT personnel capability positively and significantly influence performance hence firms' IT personnel should be competent in aligning IT strategies with business strategies in order to develop reliable cost effective systems. The study further reveals that IT personnel should be equipped with knowledge of IT elements, knowledge of technology management and business knowledge to build effective IT solutions. Moreover, firms should leverage IT personnel experts to gain competitiveness and to avoid quick fixes in outsourcing due to the fast changes and advanced complexities of technology innovations.

Third, the study found that IT management capability has a positive and significant effect on performance. Firm owners and managers should therefore proactively share insights in business-related knowledge as they invest in effective planning, coordinating, and control of IT capability. The study recommends that IT managers should take leadership in building relationships with all business functions and promote effective use of information technology.

Fourthly, IT reconfiguration capability was found to significantly influence firm performance. The study therefore recommends that managers focus more on the integration and redeployment of IT resources in order to overcome environmental turbulences and achieve superior sustainable performance. Moreover, the study findings support dynamic capability theory which suggests that the ability to integrate, build, deploy and reconfigure resources results into firm success in the long-term.

Fifth, the study found that competitive advantage partially and significantly mediates the interaction between IT capability and firm performance. The study recommends

that sustainability of firm's competitive position is more critical than mere performance. Such interventions will lead to firm growth, competitive advantage and performance.

Sixth, firm size does not moderate the interaction between IT capability and firm performance. However, firm size is a predictor in IT capability and performance relationship and there is a possibility that there are other moderators not dealt with in the study. The study recommends that policy interventions on building IT capability should not be pegged on the size of the manufacturing firms. Finally, the study provides a framework for IT capability and firm performance research studies.

5.6 Areas for Further Research

The study explored IT capability and its effect on performance of manufacturing firms in Nairobi City County, Kenya. IT capability consists of IT infrastructure capability, IT personnel capability, IT management capability and reconfiguration capability. The four IT capabilities contributed 49.2 per cent variance of firm performance. This implied that 50.8 per cent represent other factors not included in the study and which affect firm performance. Further research may be conducted to identify these other factors. This warrants the attention of future researchers. Moreover, this study involved four constructs namely IT capability, Competitive advantage, firm size and firm performance hence the findings and inferences only apply to firms in Nairobi City County. Future empirical studies may be conducted in other Kenyan counties/ countrywide to validate the findings.

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APPENDIX A: LETTER OF INTRODUCTION

LUCY M. GITAU
Department of Computing and Information Technology
School of Engineering and Technology
P.O. BOX 43844-00100
Nairobi-Kenya
Email: gitau.lucy@ku.ac.ke

Dear respondents,

Currently, am conducting a research study entitled “**Information Technology Capability and performance of manufacturing firms in Nairobi City County, Kenya**” The study outcomes are hoped to help managers in decision making within the context of IT capability and performance of manufacturing firms.

Your participation in this survey is voluntary and your work will not be affected in anyway by either participating in the survey or not.

You only need about 20 minutes to complete this survey. Please fill free to complete the questionnaire. All information will be treated confidently and the responses will only be treated as group data in the final report.

The time spent to complete this survey is greatly appreciated. In case you wish to get a copy of the final report of the study, please fill free to indicate at the top of the questionnaire.

Yours faithfully
GITAU LUCY

APPENDIX B: RESEARCH LICENSE

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 556858	Date of Issue: 09/September/2019
RESEARCH LICENSE	
	
<p>This is to Certify that Ms. Lucy Gitau of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: Dimensions of Information Technology Capability and Performance of Manufacturing Firms in Nairobi City County, Kenya for the period ending : 09/September/2020.</p>	
License No: NACOSTEP/190185	
Applicant Identification Number 556858	
Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION	
Verification QR Code	
	
<p>NOTE: This is a computer generated license. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	



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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D86/CTY/22870/12

Date: 19th August, 2019

The Director General,
National Commission for Science, Technology & Innovation,
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS.LUCY GITAU- REG. NO. D86/CTY/22870/12

I write to introduce Ms. Gitau who is a Postgraduate Student of this University. She is registered for a Ph.D. degree programme in the Department of Management Science in the School of Business.

Ms. Gitau intends to conduct research for Ph.D. thesis entitled "Dimensions of Information Technology Capability and Performance of Manufacturing Firms in Nairobi City County, Kenya".

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

EM/cao

NAIROBI CITY COUNTY

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CITY HALL ANNEXE
P.O. BOX 30250 GPO - 00100
NAIROBI, KENYA

EDUCATION, SOCIAL SERVICES & GENDER

Ref: GL/NC/142/VOL VI/325

28th October, 2019


Lucy Gitau
Kenyatta University
P.O. Box
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application to carry out Research and Subsequent approval by National Commission for Science, Technology and Innovation vide letter Ref: **NACOSTI/P/19/1185** dated **9th September, 2019**.

I am pleased to inform you that authority has been grant to you to carry out research on *"Dimensions of Information Technology Capability and Performance of Manufacturing Firms " in Nairobi County.*

On conclusion of the study, you are expected to submit a copy of the research findings to the undersigned:


George P. Leterna
Ag. DEPUTY DIRECTOR QUALITY ASSURANCE & STANDARDS

Copy to: Chief Officer – Education, Social Services & Gender
Director City Education

"The City of Choice to invest, Work and Live in"

APPENDIX C: QUESTIONNAIRE

TOPIC: Information Technology Capability and performance of manufacturing firms in Nairobi City County, Kenya

This questionnaire is guide for identifying IT capabilities that your firm has put in place to gain and sustain better performance as well as competitive advantage. The responses obtained from it will be put together in an academic report for the research being undertaken. All your responses both personal and your firms' will be kept in confidence and shall only be used for developing an academic report.

The questionnaire is made up of two sections. Section one request for demographic details while section two explores the IT capabilities in your firm and the measures the firm has taken to gain and sustain performance.

Kindly do not provide your personal information such as names, telephone number or any other information that might reveal your identity.

Answer the questions correctly and as accurately as possible.

SECTION 1: Demographic Details

1. Tick on the subsector where your main product belongs to:

1	Building, Mining and Construction	
2	Chemical and Allied Sector	
3	Timber, Wood and Furniture	
4	Motor vehicle and Accessories	
5	Pharmaceutical and Medical Equipment	
6	Fresh Produce	
7	Plastics and Rubber	
8	Textile and Apparels	
9	Energy, Electrical and Electronics	
10	Food and Beverages	
11	Leather and Footwear	
12	Metal and Allied Sector	
13	Paper and Board Sector	

2. Respondents

position.....

3. Age *please tick (√) appropriately*

- i) 18-29 yrs ()
- ii) 30-39 yrs ()
- iii) 40-49 yrs ()
- iv) 50-59 yrs ()

v) Above 59 yrs ()

4. Gender *please tick (√) appropriately*

Male ()

Female ()

5. Highest level of education *please tick (√) appropriately*

Diploma ()

Degree ()

Postgraduate ()

Others (please specify).....

6. How old is your firm? *please tick (√) appropriately*

Less than 10 yrs ()

10-20 yrs ()

21-30 yrs ()

31-40 yrs ()

Over 40 yrs ()

7. Approximate period you have worked in the firm: *please tick (√) appropriately*

Less than 5yrs ()

5-10yrs ()

11-15yrs ()

More than 15 yrs ()

8. How many permanent employees in total does your organization have? *Tick on the correct answer.*

1-49 ()

50-99 ()

Over 100 ()

9. What is the size of your firm in terms of the annual turnover?

Tick appropriately:

Less than 100 million	100-500 million	Over 500 million

10. Indicate the current level of automation in your firm

Low/minimal () Semi-automated () Full Automation ()

11. Indicate whether your firm has installed an Enterprise Resource System (ERP)

Yes () No ()

SECTION 2:

2.1 Company Performance

2.1.1 Sales growth

By using the scale of: 1= none; 2= low; 3= Medium; 4= High; 5= very High

Identify the extent to which you agree with the following in relation to your firms' sales growth in the last 3 years:	1	2	3	4	5
Sales growth has been outstanding					
We have been more profitable than our competitors					
The operating costs have reduced over time					
Sales growth has exceeded our competitors					

2.1.2 Market focus

Using the scale of: 1= very low; 2= low; 3= medium; 4= high; 5= very high

From your firm's perspective, please rate your firm's the level of:	1	2	3	4	5
Customer acquisition and retention					
Customer support					
Creating new improved products and services					
Technology use in marketing and advertisement					

2.1.3 Customer Retention

By using the scale of: 1= none; 2= low; 3= medium; 4= high; 5=very high

From your firm's perspective, how would you rate the following statements	1	2	3	4	5
Customer loyalty is a priority in our firm					
The number of customer complaints impacts on our firm performance					
Customer satisfaction is of great value to our firm					
Customer retention has increased the performance of our firm					

SECTION 3:

3.1 IT infrastructure capability

3.1.1 Connectivity

Using the scale of: 1= Not at all; 2= very small extent; 3= medium extent; 4= large extent; 5= very large extent

Specify the extent to which you agree with the following in relation to your firm:	1	2	3	4	5
Our firm has leading IT systems and connections					
All remote, branch and mobile offices are connected to the central office.					
Our organization uses open systems network mechanisms to boost connectivity					
Our firm has very few communication bottlenecks					

3.1.2 Compatibility

Using the Key: 1= Not at all; 2= very small extent; 3= medium extent; 4= large extent; 5= very large extent

Identify the extent to which you are in agreement with the following sentiments with regard to accessibility of customers and business partners to in-house systems	1	2	3	4	5
Software applications can easily be transported and used across multiple platforms					
Our firm provides multiple interfaces for external end users					
Business transactions such as sales, marketing and distribution are conducted across the internet					

Our user interfaces offer transparent access to all platforms and applications.					
Information is shared seamlessly across our organization regardless of the location					

3.1.3 Modularity

Using the Key: 1= Not at all; 2= very small extent; 3= medium extent; 4= large extent; 5= very large extent

Point out the extent to which you agree with the following statements in relation to software architecture:	1	2	3	4	5
Reusable software modules are in wide use in system development.					
Our IT infrastructure capacity supports addition, removal and modification of systems and software components					
Legacy systems within our organization restrict the development of new systems					
Use of object oriented technologies reduce system development time for new applications.					

3.2 IT personnel capability

3.2.1 Technical knowledge

By using the scale of: 1= Not at all; 2= very small extent; 3= medium; 4= large extent; 5= very large extent

To what extent can you rate IT personnel in your firm:	1	2	3	4	5
They possess advanced skills in distributed computing					
They can effectively manage project life cycles					
They have advanced programming skills eg OOP, CASE tools, web-based application etc.					
They manage and maintain data and networks					
They can create advanced decision support systems eg. Expert systems, artificial intelligence, data warehousing, mining, marts etc.					

3.2.2 Technology management

By using the scale of: 1= Not at all; 2= very small magnitude; 3= medium magnitude; 4= large magnitude; 5= very large magnitude

Kindly rate the magnitude of IT staff competence in:	1	2	3	4	5
Emerging technological trends					
The ability to learn new technologies					
Identifying critical IT factors for the success of the firm					
View IT as a means not an end					

3.2.3 Business knowledge

By using the scale of: 1= Not at all; 2= very small magnitude; 3= medium magnitude; 4= large magnitude; 5= very large magnitude

Kindly rate the magnitude of IT staff competence in the following areas:	1	2	3	4	5
IT policies and plans					
Interpretation of business problems and development of appropriate technical solutions					
Reengineering business processes					
Aligning IT and business objectives					

3.2.3 Relational knowledge

By using the scale of: 1= Not at all; 2= small magnitude; 3= medium magnitude; 4= large magnitude; 5= very large magnitude

Kindly rate the magnitude of IT staff awareness in:	1	2	3	4	5
Planning, organizing and leading IT projects					
Handling IT resources effectively					
Conducting trainings on new systems					
Handling customer complaints and maintaining productive relationships					

3.3 IT management capability

3.3.1 Client Preferences

Using the scale of: 1= Not at all; 2= small extent; 3= medium extent; 4= large extent; 5= very large extent

Specify the extent to which you agree with these statements:	1	2	3	4	5
I am capable of collecting and analyzing market information on customers via computer-based systems					
We maintain a set procedures for collecting customer data from online sources.					
We use computer systems to acquire, store and process customer data					
We use clients ideas and suggestions in firm's strategic agility					

3.3.2 Synergy

Using the Scale of: 1= Not at all; 2= very small extent; 3= medium extent; 4= large extent; 5= very large extent

Specify the extent to which you agree with the following statements with regard to your day to day operations:	1	2	3	4	5
We coordinate IT innovations in response to changes related to business.					
We frequently evaluate opportunities and risks in the use of technology					
We are fully aware of emerging issues in business development					
We contribute immensely to the institutional strategy					

3.3.3 IT coordination and control

Using the scale of: 1= Not at all; 2= very small extent; 3= medium; 4= large extent; 5= very large extent

Please indicate the magnitude you can rate the following IT managerial roles:	1	2	3	4	5
We lay out IT budgets					
We prioritize IT functions in our firms					
We control IT resource planning					
We define roles and responsibilities of IT staff (rules, policies and procedures)					

3.4 IT reconfiguration capability

3.4.1 Innovative processes

By using the scale of: 1= Not at all; 2= very small extent; 3= medium extent; 4= large extent; 5= To a very large extent

Identify the extent to which you would rate the following assertions:	1	2	3	4	5
We need to focus on competitors in commercial application of technologies to end market					
We are more successful than competitors in diversifying into new markets					
Consistent IT application portfolios should be aligned with business processes					
We are more successful than competitors in adapting and reconfiguring our IT resources					

3.4.2 Corporate orientation

By using the scale of: 1= none; 2= very small magnitude; 3= medium magnitude; 4= large magnitude; 5= very large magnitude

Please indicate the magnitude of positive impact the following assertions will make on the firm:	1	2	3	4	5
Focus on information communication technologies to strengthen customer relationships.					
In-house learning and knowledge development					
Flexible adaptation of human resources to technological and competitive changes					
We integrate internal and external technologies more successfully than competitors					

3.4.3 Strategic renewal

By using the scale of: 1= none; 2= very small magnitude; 3= medium magnitude; 4= large magnitude; 5= very large magnitude

Indicate the magnitude of positive impact from the following actions:	1	2	3	4	5
Frequently restructuring business work processes					
Constantly renewing information technology, system softwares and related tools					
Creating new products and services					
Quick response to competitive strategic moves					

SECTION 4:

4.1 Competitive Advantage

4.1.1 Product differentiation

By using the scale of: 1= none; 2= low; 3= medium; 4= high; 5= very high

Please indicate your firm's extent of:	1	2	3	4	5
Newly innovated products and services					
Response to changes in business through innovation					
Aligning product's benefits to your target audience					
Promoting brand loyalty through research and development					

4.1.2 Market innovations

Using the scale of: 1= none; 2= small; 3= medium; 4= high; 5= very high

Indicate the magnitude of positive impact resulting from the following:	1	2	3	4	5
Introduction of new software applications					
Expanding to new regional and international markets					
Adopting new technologies for information services					
Increase market innovations					

4.1.3 Customer Relationship

Using the scale of: 1= none; 2= low; 3= medium; 4= high; 5= very high

Please indicate the extent to which the following actions would affect your firm:	1	2	3	4	5
Low customer loyalties					
Conducting frequent surveys through electronic links with customers					
Inventing barriers for potential competitors					
Buyer's decision to switch to competitors' products					

THANK YOU FOR YOUR CO-OPERATION

**APPENDIX D: List of manufacturing firm in Nairobi City County as at
January, 2018**

	Name
1	ARM Cement Ltd
2	Bamburi Cement Ltd
3	Bamburi Special products ltd
4	Boyama Building Materials
5	Central Glass Industries
6	Flamingo Tiles(Kenya) Ltd
7	Glenn Investment ltd
8	International Energy Technik Ltd
9	Manson Hart Kenya ltd
10	Kenbro Industries Ltd
11	Kenya Buliders & Concrete Ltd
12	Orbit Enterprises ltd
13	Saj Ceramics Ltd
14	Savannah Cement
15	Space and Style ltd
16	Tile & Carpet Centre Ltd
17	Vallem Construction ltd
18	Anffi Kenya Ltd
19	Basco Products ltd
20	Bayer East Africa ltd
21	Beierdorf East Africa Ltd
22	BOC Kenya ltd
23	Blue Ring Products ltd
24	Buyline Industries Ltd
25	Chemicals and Solvents (EA) Ltd
26	Canon Chemicals ltd
27	Carbacid ltd
28	Continental Products Ltd
29	Crop Nutrition Laboratory Services ltd
30	Crystal Africa ltd
31	Crown Gases Ltd
32	Cooper K-Brands ltd
33	Crown Paints Kenya ltd

34	Decase Chemicals Ltd
35	Deluxe Inks ltd
36	Desbro Kenya ltd
	Name
37	Doric Industries Ltd
38	Elex Products ltd
39	Enviro-Hub Holdings ltd
40	Eveready Batteries East Africa Ltd
41	Galaxy Paints and Coating Co. ltd
42	Grand Paints ltd
43	Haco Tiger Brands (E.A) Ltd
44	Henkel Kenya Ltd
45	Henkel Polymer
46	Hi-Tech Inks and Coatings
47	Interconsumer Products Ltd
48	Johnson Diversey East Africa ltd
49	Kamili Packers ltd
50	Ken Nat Ink and Chemicals
51	Kel Chemicals Ltd
52	Kip Melamine Co. ltd
53	Kridha Ltd
54	L'Oreal East Africa ltd
55	Maroo Polymers Ltd
56	Match Masters ltd
57	MEA ltd
58	Metoxide Africa Ltd
59	Murphy Chemicals ltd
60	Norbrook Kenya ltd
61	Odex Chemicals Ltd
62	Orbit Chemicals Industries ltd
63	Osho Chemicals Industries ltd
64	Polychem East Africa
65	PZ Cussons E.A Ltd

66	Procter and Gamble East Africa Ltd
67	Reckitt Benckiser (E.A) Ltd
68	Revolution Stores Ltd
69	Rok Industries Ltd
70	Rumorth Group of Companies Ltd
71	Rutuba Bio Agri and Organic Fertilizers Co. Ltd
72	Sanergy
73	Sadolin Paints Ltd
74	Seweco Paints Ltd
75	SC Johnson and Son Kenya
76	Shreeji Chemicals Ltd
77	Soilex Prosolve Ltd
78	Supabrite Ltd
79	Supafoam Ltd
80	Strategic Industries Ltd
81	Synresins Ltd
82	Syngenta East Africa Ltd
83	Twiga Chemicals Industries Ltd
84	Tri-Clover Industries Ltd
85	Tropical Brand Ltd
86	Unilever East Africa
87	Vitafoam Products Ltd
88	Waridi Creations Ltd
89	Westminister Paints and Resins Ltd
90	Murphy Chemicals Ltd
91	Milly Glass Works Ltd
92	African Retail Traders
93	Kenya Wood Ltd
94	Panesar's Kenya Ltd
95	Fine Woods Works Ltd
96	Furniture International Ltd
97	Kenya Wood Ltd
98	Neo Interior Decorators Ltd
99	Newline Ltd
100	Panesar's Kenya Ltd
101	PGBison Ltd
102	Rosewood Furniture Manufacturers Ltd
103	Shamco Industries Ltd
104	Timsales Ltd

105	Shah Timber Mart Ltd
106	Wood Makers Ltd
107	Woodtex Kenya Ltd
108	Alamdar Trading Company Ltd
109	Auto Ancillaries Ltd
110	Banbros Ltd
111	Bhachu Industries Ltd
112	Choda Fabricators Ltd
113	Ace Motors Ltd
114	Associated Battery Manufacturers Ltd
115	Foton East Africa Ltd
116	Kenya Coach Industries Ltd
117	Labh Singh Harnam Singh Ltd
118	Auto Industries Ltd
119	Auto Springs Manufacturers Ltd
120	Master Fabricators Ltd
121	BMG Holdings Ltd
122	Chui Auto Spring Industries Ltd
123	Cica Motors
124	Mutsumoto Company Ltd
125	CMC Motors Group Ltd
126	Dodi Autotech Ltd
127	General Motors East Africa Ltd
128	Soroya Motors Spares
129	Honda Motorcycle
130	Impala Glass Industries Ltd
131	Kenya Grange Vehicle Industries Ltd
132	King Bird Ltd
133	Mann Manufacturing Co. Ltd
134	Master Fabricators Ltd
135	Toyota Kenya Ltd
136	Megh Cushion Industries Ltd
137	Mobius Motors
138	Pipe Manufacturers Ltd
139	Sohansons Ltd
140	Unifilters Kenya Ltd
141	Scania East Africa Ltd

142	Songyi Motoercycle International ltd
143	Varsani Brakelinings Ltd
144	Theevan Enterprises ltd
145	Toyota Tshusho East ltd
146	African Cotton Industries Ltd
147	Alpha Medical Manufacturers ltd
148	Autosterile ltd
149	Beta Healthcare International ltd
150	Biopharm ltd
151	Biodeal Laboratories Ltd
152	Dawa ltd
153	Cosmos Ltd
154	Glaxo Smithkline Kenya ltd
155	Elys Chemicals Industries ltd
156	Gesto Pharmaceuticals ltd
157	Global Merchants ltd
158	Laboratory and Allied ltd
159	Manhar Brothers ltd
160	Novelty Manufacturing ltd
161	KAM Industries
162	Pharmaceutical Manufacturing Co. ltd
163	Medivet Products Ltd
164	Regal Pharmaceuticals ltd
165	Pharm Access Africa Ltd
166	Skylight Chemicals ltd
167	Questa Care Ltd
168	Scales & Software(K) Ltd
169	Osschemie (K) Ltd
170	Zain Pharmaceuticals
171	Aquila Development Co. Ltd
172	Avoken ltd
173	From Eden
174	Mahee Flowers
175	Kankam Exporters Ltd
176	ACME Containers Ltd
177	Bobmil Industries Ltd
178	Betatrad ltd
179	Brush Manufacturers Industries ltd

180	Afro Plastics ltd
181	Complast Industries Ltd
182	Caaaneast Company ltd
183	Coninx Industries Ltd
184	Dune Packaging ltd
185	Dynaplas ltd
186	Elgitread (Kenya) Ltd
187	Elgon Kenya ltd
188	Eslon Plastics of Kenya ltd
189	Five Star Industries Ltd
190	Flair Kenya ltd
191	General Plastics ltd
192	Hi-Plast Ltd
193	Jamlam Industries ltd
194	Jumbo Chem
195	Jumbo Quality Products ltd
196	Kenpoly Manufacturers Ltd
197	Kentainers ltd
198	Kenrub ltd
199	Kamba Manufacturing ltd
200	Kinpash Enterprises Ltd
201	L.G Harris & Co. ltd
202	Laneeb Plastics Industries ltd
203	Malplast Industries Ltd
204	Metro Plastics Kenya ltd
205	Nairobi Plastics ltd
206	Ombi Rubber Rollers Ltd
207	Packaging Masters Ltd
208	Packaging Industries ltd
209	Plastics Electricons
210	Plastics and Rubber Industries ltd
211	Premier Industries ltd
212	Polyflex Industries Ltd
213	Polyblend ltd
214	Polythene Industries ltd
215	Princeware Africa Kenya Ltd
216	Prosel ltd
217	Rubber Products ltd
218	Safepak Ltd
219	Sanpac Africa ltd
220	Sameer Africa ltd

221	Signode Packaging Systems Ltd
222	Silpack Industries ltd
223	Singh Retread ltd
224	Solvochem East Africa Ltd
225	Sumaria Industries Ltd
226	Styroplast Ltd
227	Springbox Kenys ltd
228	Super Manufacturers ltd
229	Thermopak Ltd
230	Techpak Industries Ltd
231	Top Pak Ltd
232	Treadsetters Tyres Ltd
233	Uni-Plastics Ltd
234	Vectus Kenya ltd
235	Wonderpac Industries ltd
236	Adpack Ltd
237	Alpha Knits Ltd
238	Dharamshi & Co. Ltd
239	Insight Kenya
240	Kenya Trading (EPZ) Ltd
241	Kikoy Co. Ltd
242	New Wide Garments(K) Ltd
243	Royal Garment Industries Ltd
244	Spinners & Spinners Ltd
245	Tarpo Industries Ltd
246	TSS Spinning and Weaving Ltd
247	Vajas Manufacturers Ltd
248	Ngecha Industries Ltd
249	Midco Textiles(EA) Ltd
250	Penny Galore Ltd
251	Oriental Mills Ltd Old
252	Spin Knit Ltd
253	Amedo Centre Kenya Ltd
254	Assa Abloy East Africa Ltd
255	Asano International ltd
256	Avery East Africa Ltd
257	Centurion Systems Ltd
258	Digitech East Africa
259	Aucma Digital Technology Africa ltd

260	Farm refrigerators & Electrical Systems Ltd
261	Pentagon Agencies
262	Ibera Africa Power (E.A) Ltd
263	Karan Biofuel Ltd
264	Baumann Engineering ltd
265	Socabelec(E.A) Ltd
266	Daima Energy Services ltd
267	East African Cables ltd
268	Manufacturers & Suppliers(K) Ltd
269	Metlex International Ltd
270	Mustek East Africa Ltd
271	Oilzone(E.A) Ltd
272	Optimum Lubricants ltd
273	Holman Brothers ltd
274	International Energy Technik ltd
275	PCTL Automation Ltd
276	Kenwest Cables ltd
277	Kenya Power ltd
278	Power Technics Ltd
279	Synergy Lubricants Solutions
280	Libya Oil Kenya ltd
281	Marshall Fowler Engineers
282	Vivo Energy Kenya Ltd
283	Metsec ltd
284	Nationwide Electrical Industries ltd
285	Powered Lubricants
286	Protel Studios
287	Reliable Electricals Engineers ltd
288	Repelectric ltd
289	Scales and Software ltd
290	Specialized Power Systems ltd
291	synergy-Pro
292	Virtual City ltd
293	Aquamist Ltd
294	Africa Spirits Ltd
295	Al-Mahra Industries Ltd

296	Belfast Millers Ltd
297	Bio Food Products Ltd
298	Agriner Agricultural Development
299	Agri Pro-Pak Ltd
300	British American Tobacco
301	Alpha Fine Foods ltd
302	Alpine Coolers ltd
303	Bakers Corner ltd
304	Cadbury Kenya Ltd
305	Beverage Services ltd
306	Coca-cola East & Central Africa Ltd
307	Bounty ltd
308	DPL Festive Ltd
309	Break Fast Cereal Company ltd
310	C, Dormans ltd
311	East African Sea Food Ltd
312	C.Czarnikow Sugar East Africa ltd
313	Candy Kenya ltd
314	Elekea Ltd
315	Chirag Kenya ltd
316	Danone Baby Nutrition Africa and Overseas
317	Farmers Choice Ltd
318	Deepa Industries ltd
319	Tropical Brand Africa ltd
320	Giloil Company Ltd
321	East African Breweries ltd
322	East African Malt ltd
323	Gonas Best Ltd
324	East African Seed Co. ltd
325	Heritage Foods Kenya Ltd
326	Edible Oil Products
327	Ennsvalley Bakery ltd
328	Europack Industries ltd
329	Jambo Biscuits(K) Ltd
330	Erdemann Co, ltd
331	Kenafriic Industries Ltd
332	Excel Chemicals ltd

333	Fresh Produce Exporters Association of Kenya
334	Kenya Nut Company Ltd
335	Frigoken ltd
336	Kenya Wine Agencies Ltd
337	Graciers Product
338	Global Fresh ltd
339	Kuguru Food Complex Ltd
340	Manji Food Industries Ltd
341	Mini Bakeries(Nbi) Ltd
342	Nairobi Flour Mills Ltd
343	Nairobi Bottlers ltd
344	Nordar Industries Ltd
345	Nutro Manufacturers EPZ Ltd
346	Patco Industries Ltd
347	Palmhouse Diaries ltd
348	Pembe Flour Mills Ltd
349	Premier Flour Mill ltd
350	Premier Food Industries ltd
351	Pristine International Ltd
352	Proctor and Allan ltd
353	Rafiki Millers Ltd
354	Selecta Kenya Gmbh & Sons KG
355	Sigma suppliers Ltd
356	Green Forest Foods ltd
357	Highlands Cannery ltd
358	Kamili packers ltd
359	Kapa Oil Refineries ltd
360	Kenchic ltd
361	Kevian Kenya ltd
362	Kenya sweets ltd
363	Kenya Tea Development Agency
364	Koba Waters ltd
365	Insta Products ltd
366	Trufoods Ltd
367	Kwality Candies and Sweets ltd
368	London Distillers ltd
369	Mastermind Tobacco ltd
370	Melvin Marsh International

371	Miritini Kenya ltd
372	NAS Airport Services ltd
373	Nestle Foods Kenya ltd
374	United Distillers and Vintners
375	Pearl Industries ltd
376	Promasidor Kenya ltd
377	W.E. Tilly (Muthaiga) Ltd
378	Winnie's Pure Health
379	New Kenya Co-operative Creameries ltd
380	Salim Wazarani Kenya ltd
381	SBC Kenya ltd
382	Spice World ltd
383	Unga Group ltd
384	Usafi Services ltd
385	Valuepak Foods
386	Wrigley Company(E.A) Ltd
387	Wanji Food Industries
388	Alpharama Ltd
389	Budget Shoes Ltd
390	C & P Shoe Industries
391	Sandstorm Africa ltd
392	Zingo Investment
393	Agro-Irrigation & Pump
394	Alloy Steel Casting Ltd
395	Allied Esat Africa ltd
396	Apex Steel ltd
397	ASP Company Ltd
398	ASL LTD-Steel division
399	Ashut Engineers ltd
400	Athi River Steel Plant ltd
401	City Engineering Works(K) Ltd
402	Corrugated Sheets ltd
403	Davis & Shirliff ltd
404	Devki Steel Mills Ltd
405	East Africa Glassware Mart Ltd
406	East Africa Spectre ltd
407	East African Foundry ltd
408	East African Glassware Mart ltd

409	East Clean Africa ltd
410	Elite Tools ltd
411	Farm Engineering Industries ltd
412	Hobra Manufacturing ltd
413	Friendship Container Manufacturers ltd
414	General Aluminum Fabricators Ltd
415	Insteel ltd
416	Iron Art ltd
417	Khetshi Dharamshi & Co. Ltd
418	Kens Metal Industries
419	Load Trailers
420	Marvel Lifestyle Ltd
421	Khetshi Dharamshi & Co. ltd
422	Mitsubishi Corporation
423	Napro Industries Ltd
424	Mecol ltd
425	Metal Crowns ltd
426	Mitsubishi Corporation
427	Module Engineering Systems ltd
428	Nail & Steel Products ltd
429	Northstar Packaging ltd
430	Orbit Engineering ltd
431	Rolmil Kenya Ltd
432	Richfield Engineering ltd
433	St. Theresa Industries
434	Steel Structures Ltd
435	Steelmakers ltd
436	Steelwool Africa ltd
437	Sheffield Steel Systems ltd
438	Siya Industries ltd
439	Specialized Engineering Co. ltd
440	Superfit Steelcon ltd
441	Technoconstuct Kenya Ltd
442	Technosteel Industried ltd
443	Tononoka Steel Ltd
444	Tonoka Rolling Mills ltd
445	Warren Enterprises Ltd

446	Welding Alloys ltd
447	Wire Products ltd
448	Zenith Steel Fabricators Ltd
449	Viking Industries Ltd
450	Heavy Engineering Ltd
451	Fine Engineering
452	Kaluworks Ltd
453	Mabati Rolling Mills Ltd
454	Towertech Africa ltd
455	Mecol Ltd
456	Adpak International Ltd
457	Autolitho Ltd
458	Allpack Industries ltd
459	Associated Paper & Stationery ltd
460	Bag and Envelop Converters
461	Brand Printers Ltd
462	Bags & Balers Manufacturers ltd
463	Chandaria Industries Ltd
464	Carton Manufacturers ltd
465	Cempack Solutions ltd
466	D.I.Patel Press Kenya Ltd
467	Chandaria Industries ltd
468	Colour Labels ltd
469	Dodhia Packaging Ltd
470	Colour Packaging ltd
471	Colour Print ltd
472	Elite Offset Ltd
473	De la Rue Currency and Security ltd
474	Essential Manufacturing
475	D. L. Patel Press Kenya ltd
476	Ellams Products
477	Dune Packaging ltd
478	East Africa Packaging Industries ltd
479	Economic Industries ltd
480	Franciscan Kolbe Press
481	English Press ltd
482	Euro Packaging ltd
483	Guaca Stationers Ltd

484	Fortunes Printers & Stationers ltd
485	General Printers ltd
486	International Paper & Board Supplies Ltd
487	Kenya Litho Ltd
488	Graphics & Allied ltd
489	Kul Graphics Ltd
490	Guaca Stationers ltd
491	Icons Printers ltd
492	MFI Ultra Print Ltd
493	Interlabels Africa ltd
494	Kartasi Industries ltd
495	Palmy Enterprises
496	Kenafic Diaries Manufacturers ltd
497	Kenya Stationers ltd
498	Paper House of Kenya Ltd
499	Kim-Fay East Africa ltd
500	Label Converters
501	Printing Services Ltd
502	Manipal International Printing Press ltd
503	Modern Lithographic ltd
504	Punchlines Ltd
505	Sintel Security Print Solutions Ltd
506	Mufindi Paper ltd
507	Nation Media Group ltd- Printing Plant
508	Paper Bags ltd
509	Standard Group Ltd
510	Tetra Pak Ltd
511	The Rodwell Press Ltd
512	Twiga Stationers & Printers Ltd
513	United Bags Manufacturers Ltd
514	Vakharia International Paper Mills Ltd
515	Press Master ltd
516	Print Multi Packaging
517	Printwell Industries
518	Taws Ltd

519	Colour Labels Ltd
520	Ramco Printing Works Ltd
521	Regal Press Kenya Ltd
522	Sketchers Design Promoters Ltd

523	Solo Worldwide Inter-Enterprises Ltd
524	Stallion Stationary Manufacturers Ltd
525	Statpack Industries Ltd
526	Soy Ceramics

Source:(Kenya Association Of Manufacturers, 2018)