MANUFACTURING STRATEGIES AND OPERATIONAL PERFORMANCE OF CEMENT MANUFACTURING FIRMS IN KENYA

BY

KENNEDY MAKANGA KIILU

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DECLARATION

I confirm that this is my original work and has not been submitted for presentation at the University of Nairobi or any other institution of higher learning.

Signature ………………………………. **Date …………………………**

Kennedy Makanga Kiilu

D61/61075/2011

Supervisor

This research project has been submitted for examination with my approval as the University supervisor

Signature ……………………………… **Date …………………………**

Dr. Peterson Magutu

Department of Management Science,

School of Business, University of Nairobi

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Thank you.

DEDICATION

To my Parents, wife and daughter, you have been my biggest fans throughout this journey and am truly blessed to have you guys in my life.

I also wish to dedicate the project to my late brother George – You shined so bright on us and through you we experienced gentleness, care and the best big brother one could ever wish for.

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ABSTRACT

The objectives of the study was to establish the manufacturing strategies commonly used by cement manufacturing firms in Kenya and to determine the relationship between the manufacturing strategies and operational performance of cement manufacturing firms in Kenya.It also aimed at reviewing the increasing body of theoretical and empirical studies that have endeavored to examine the effectiveness of manufacturing strategies in driving operational performance of manufacturing firms. The study employed a hybrid of a descriptive and causal research design. The target population was all the 8 cement manufacturing companies in Kenya. Primary sources of data were employed, and the study was a cross-sectional study done across the 8 cement manufacturing companies in Kenya. The study applied correlation analysis and multiple linear regression equation with the technique of estimation being Ordinary Least Squares (OLS) so as to establish the relationship of internal controls on fraud detection and prevention.

The study established that the most widely used manufacturing strategy by cement firms in Kenya is TQM and the least widely used is kaizen. The study also found out that manufacturing strategies do not have a significant effect on operational performance. The study concluded that that manufacturing strategies are not effective in driving the operational performance of manufacturing firms. Policy recommendations are that the government through the ministry of industrialization and through other trade agencies and regulators can employ the study findings to spur the growth of the cement industry and the manufacturing sector at large since it is one of the main agendas in the current government objectives, Big 4.

The study also recommends that stakeholders in the Kenyan cement manufacturing, which include managers, analysts, and industry experts, as well as the manufacturing sector at large can utilize the manufacturing strategies to drive competitiveness sustainably in order to ensure business continuity over the long term. Venture capitalists can equally be armed with the trends that define this industry and the expected direction in establishing/firming up their investment options, strategies and critical success factors within their intended plants.

CHAPTER ONE: INTRODUCTION

1.1 Background of Study

The ultimate focus for any business firm is guaranteeing a going concern entity, by remaining profitable within the short and long term, through provision of value adding products to its clientele. Due to increased global competition within an increasingly dynamic market environment, organizations have been forced to relook into their operational economics as a critical lever in enhancing their performance at sustained competitiveness.

Companies are forced to both acquire and develop distinct resources and capabilities based on the unique niche customer needs in order to establish a competitive position. This has seen a significant strategic shift in business operating models as organizations seek to stay afloat the existing global red ocean. Varying strategies/ models have uniquely different operating characteristics with each constituting a different set of tradeoffs. The adopted strategies must be customized to illuminate the priorities and inherent tradeoffs of the organization’s own competitive environment, strategic emphasis and industry structure.

Development of sharp and well-focused operational performance measures become critical in driving the adopted manufacturing strategies to ensure effective resources optimization with an ultimate goal of meeting the customer needs at the presumed best value and optimum margins sustainably. To improve the outcome of the organization processes, management need to deploy effectively the performance measures in communicating the directions to the process team (Donovan 2018).

Despite today's business woes, effective strategies implementation has proved elusive. Challenges faced during strategies implementation include; lack of clarity of organization's strategic path or focus, management misaligned/competing priorities, technological integration challenges, inadequate resources, resistance to change, poor workers ownership, ineffective communication, distortion in coordination, weak organizational systems, capability gap, poor reward and remuneration as well as poor management support (Beer and Eisenstat, 2010). Based on the observation by Ashkenas and Francis (2000), and Beer and Nohria (2010), strategy implementation effort of between 50% and 80% fails.

1.1.1 Manufacturing Strategy

Manufacturing strategy is described as a tool in attainment of the corporation's goals and objectives (Swamidass & Newell, 2017). The description illuminates key features of the manufacturing strategy, that is, specific manufacturing goals and the decisions that influence the manufacturing system capabilities and resources deployment/operations.

It also refers to a well-coordinated collective pattern of decisions, processes/models and activities undertaken to exploit and shape certain long-term capabilities/properties/elements/resources of the manufacturing operations function to drive and achieve competitive advantages as well as manage evolving challenges, all of which are linked to supporting the overall business short- and long-term strategies. Slack and Lewis (2008) described manufacturing strategy as well-planned decisions that develop and shape the long-term strategies in operations forming the foundation of the company's operating strategy. Manufacturing strategy is thus concerned with how a company seeks specific competitive options by modifying its internal environment. Leong et al., (2010) summarizes manufacturing strategy into predominantly two categories, namely decision categories and competitive priorities (Dangayach and Deshmuhk, 2011). Under competitive priorities, four dimensions commonly used are; quality, cost, delivery, and flexibility, (Hill, 2010). Competitive priorities are considered as the part of the manufacturing strategy that links the market and manufacturing requirements of the entity (Hill, 2010; Greasley, 2016).

The concept of decision categories was first presented by Hayes and Wheelwright (1984). Various other authors have advanced the concept contributing to the development and establishment of decision categories as well as the policies and guidelines that apply to them. The summary of the decision category framework, for instance, was suggested by the literature and findings of Rudberg and Olhager (2013), which support Hayes and Wheelwright (1984) assessment of dividing the categories based on the infrastructural and structural basis. Decision Categories are thus further categorized to structural decision categories (entails Vertical integration, process choice, facilities and capacity) and infrastructural decision categories, which entail human resources organization systems, quality systems, organization system, resource allocation and capital budgeting systems and control systems.

No one manufacturing strategy is universally superior under all competitive situations and for all companies both within the short and long term. This paper will examine the effectiveness of manufacturing strategies in driving operational performance in the cement manufacturing firms, and in particular the infrastructural category of manufacturing strategies with keen interest on applied models of lean manufacturing (employs various techniques namely workplace management/Genba Kanri (5S, SOPs, Skill Control and visual management), Design for manufacturability (DFM), visual controls, ‘pull production systems (Kanban and Dum-buffer-rope), Total Quality Management (TQM), Just In Time (JIT), Kaizen, business process reengineering, Benchmarking process and six sigma. This helps in establishing a manufacturing strategy framework potency for adoption within the cement manufacturing firms.

Companies all over have invested in adopting manufacturing strategy focusing on specific benefits which enhancing product and process quality, customer satisfaction, dependability, innovativeness, operational flexibility, resource utilization and performance, lead times, dependability, global focus, continuous improvement and productivity towards cost reduction through enhanced effectiveness, efficiency waste reduction. All of which are critical in enhancing the organization’s competitiveness and profitability.

1.1.2 Operational Performance

Often problems which have happened in the processes weeks or months ago are impossible to solve afterwards (Bond 2014). Optimal metrics work as an information source and show areas in production which need improvement and proactive solutions. Metrics help operative managers to notice problems fast and with no effort. They help decision making by bringing factual data to decision making process instead of mere subjective opinions (Arveson, 2009).

O’Brian (2009) argues operational performance as the performance of an organization against its set standards or prescribed indicators, such as quality, effectiveness, cycle time, efficiency, productivity, regulatory compliance, waste reduction, and environmental responsibility. It constitutes measurable aspects of the organization's processes such as cycle time, inventory turnover, production rate, quality, reliability, Return on Investment (ROI), Return on Equity (ROE), Profitability Index (PI), cost, speed, flexibility, among others. Operational performance influences the overall business performance measures like customer satisfaction, market share and size, hence regarded to be the back bone of organizational performance in reaching its core objectives, that is, profitability, quality and service.

Performance measurement process incorporates various measurement frameworks ranging from approaches, metrics, tools systems and processes whether financial or non-financial. With some of approaches or tools employed including balanced scorecard, KPIs conformance analysis, benchmarking, results framework etc. Assessing manufacturing performance fairly is difficult as it is affected by myriad of events both internal and external. The Dimensions deployed coincide conveniently with the common competitive priorities set such as corporate strategy definition, identification of relevant organizational operational performance objectives to measures and environmental configuration to facilitate accomplishment of company operational performance objectives.

Performance measures are categorized from an internal or external perspective. The internal operational performance measurement dimension is fundamental for the internal management and monitoring of the of the company's manufacturing processes, while external measures focus on the measures assessed and evaluated by the customers of the company. Examples of internal and external measures of operational performance include; ***Internal measures:*** reliability, production lead time, durability, serviceability, rework cost, passed quality inspection percentage, quality control costs, inventory status accuracy, set up time/cost, length of fixed production schedule, internal lead times dependability, manufacturing unit cost, inventory turnover, capacity utilization, yield, operating capacity quantity. E***xternal measures include:*** Adopted Specification Conformance, availability of stock, product performance, on time deliveries, Delivery lead time, product selling price, product range, market price, number of products offered, product mix and volume handling ability,

Organizations will measure operations performance citing benefits which include; establishing the ability of the process in producing products as per the predefined specifications reliably and consistently (Slack and Lewis 2002), reduced inventory, lower production lead times through improved delivery reliability, enhanced customer satisfaction, waste reduction, improved flexibility in terms of volume, product variety, process and material handling towards customer value creation, improved cost performance /economic success with regards to increasing revenue, reducing costs and minimizing capital requirements, as well as building capacity and allowing for continuous improvement through performance visibility. Ultimately operational performance measurement helps drive the organizations core objectives and strategies.

1.1.3 Cement Manufacturing Firms in Kenya

Analysis undertaken by AIB Capital indicates that Kenya's cement consumption has continuously experienced a compound annual growth rate of 13.4% between 2009 and 2015, while SIB puts the CAGR in Kenya at an average of 10.2%. Sadly, Kenya still has a low cement per capita of consumption averaging at 150Kgs compared to the global average position of about 510kgs, hence opportunity for growth within the country still immense. The manufacturing sector is expected to be key in both driving and ensuring recovery of the economy, propelling Kenya's competitiveness within a global environment (KNBS, 2017).

The industry's current rapid growth is attributed to increased government spending in heavy infrastructure expansion projects incorporating high value investments with focus on transport (constructing new and upgrading existing roads, railways and port networks), electricity generating industry (increased focus on driving renewable energy as well as reducing historical dependence on thermal/hydro power energy), water collection and reticulation infrastructure (noted secondary focus for governments given that could pose a major threat for cities in the near future), and social amenities driven by the government's ambitious economic growth and development plan - vision 2030. Others trends that have propelled cement uptake over the past decade across the continent include improving economic and political stability, strong GDP growth, increased middle class consumerism trend, population growth, rapid urbanization, increase in financially capable younger demography, strengthening and diverse financial facilities, increasing inward investment with equally expanding Diaspora population, rapid technological adoption and unlocking of the natural resources.

Industrialization forms a key part of the Kenyan's government focus towards revamping the generally subdued economic performance through their economic stimulus roadmap - Vision 2030 and the big four agenda. The sector is expected to drive contribution to the country's GDP to 10% annually. The vision proposes various interventions that will guide the country to global prosperity and competitiveness. The

Public Private Partnerships (PPP) Policy Act has been developed to strengthen the legal infrastructure in facilitating investments in the manufacturing sector by both the private and public entities. The sector planning is designed to provide a road map in making Kenya a competitive location desirable for industrial investment in Africa (Ndung'u, 2017).

The cement manufacturing firms nonetheless face challenges which include high cost of electricity due to the high tariffs charged on fuel and coal, unreliable poor quality electricity supply, high transportation and freight rates, high taxation on input resources, among others.

1.2 Research Problem

A strong direct link has been established between manufacturing strategies implementation and the firm overall performance. A firm's distinct operational resources, competencies and capabilities provide critical levers in propelling business objectives to meet established niche market needs, as well as considered critical strategic competitive tools in both positioning and sustaining a firm's competitiveness. As such, the role of establishing effective manufacturing strategies in running successful businesses cannot be ignored. The idea that manufacturing strategy supports firm performance has been the focus of several studies (Swamidass and Newell, 1987; Kim and Arnold, 1992; Vickery et al., 1993; Williams et al., 1995; Prajogo and Sohal, 2006).

The Kenyan cement industry has witnessed a shift from primarily an oligopolistic market to fiercely competitive market in nature over the last decade as new and old players move aggressively to acquire a stake of this high value market with noted sustained steady cement demand growth. Consequently, the challenges and opportunities facing the Kenyan cement manufacturers has had serious strategic implications to the industry, all of which cannot be ignored based on the significant role that the industry plays with regard to Kenya's economic performance. Infiltration of cheap imports from relatively cost subdued economies continue to put pressure on the overall margins in the industry as more discerning customers take over the large construction projects putting further pressure on the cement manufacturer's products quality and price offering. This translates to a dire need for the cement manufacturing firm to undertake a complete shift in its operational model if they are to remain operational and profitable. The cement manufacturing sector is expected to be critical in both driving and ensuring recovery of the economy, propelling Kenya's competitiveness within the global stage. Cement consumption per capita has been associated as a critical indicator to a countries economic performance.

There have been several studies linking operations strategies to business performance. Musyimi (2012) researched on manufacturing strategy in small and medium scale enterprises in Kenya and sought to establish the capabilities the firm had at its disposal to explore on its resources, the perspective / approach the firm chose to use to satisfy/meet its customer's requirement, and lastly how it used these capabilities to gain advantage over its competitors. Meroka and Nyamwange (2003) surveyed the operational strategies pursued by the large manufacturing firms in Kenya with focus on driving competitiveness, concluding that the operational strategies that formed basis for competition were on high quality, low cost and time/speed, innovativeness and flexibility as a way of remaining a float in the turbulent environment. Other studies like Kinuthia (2004) examined the relationship between environmental management and manufacturing strategy in Kenyan firms whereas Kanyanya (2013) researched specifically on lean manufacturing practices and performance of organizations listed within the Nairobi Securities Exchange (NSE) with focus on the general business performance concluding that lean manufacturing practices enhance the long term business performance and success. Noble (2014) put forward an argument that an organization can have a good strategy which can fail to bring out superior performance in the event that they are not successfully implemented. He also states that policy regulations, managerial competencies and resource allocations are considered to be very crucial factors that affect the effective strategy implementation. Omondi, Ombui, and Mungatu (2013) on their part argued that for organizations to effectively achieve their laid out strategies, there is great need for such organizations to effectively manage the process of strategy implementation.

It is evident that most of these studies focused on the competitive priorities of cost, flexibility, quality, and dependability and not specific manufacturing strategies and in particular strategies infrastructure in driving operational performance more so within a continuous process manufacturing setup. The continuous process manufacturing has been characterized by low product range at high volumes, relatively inflexible technological infrastructure, lengthy set up systems and product changeovers as well, which are assumed to be designed at optimized efficiency with expected little room for overall operational performance improvements. This however, is relatively not the case within the discrete manufacturing system.

Additionally most of these studies sought to examine the relationship between operational strategies and general business performance and not specifically on operational performance. This study however seeks to examine the role of manufacturing strategies on operation performance in the cement industry in Kenya. This study seeks to look beyond the manufacturing strategy itself by looking at how the strategy is implemented/ adopted model towards achieving operational performance. This study seeks to understand how the Kenyan cement manufacturing firms have adopted and implemented different manufacturing models/strategies in building a set of capabilities in meeting the customer needs and their effectiveness, test theories and paradigms and enhance the field of knowledge by establishing conceptual approach in line with the independent and dependent variables within the subject matter.

1.3 Objectives of the study

The general objective of the study was to establish the effectiveness of manufacturing strategies in driving operational performance of cement manufacturing firms in Kenya. The specific objectives included:

i. To establish the Manufacturing Strategies commonly used by cement manufacturing firms in Kenya ; and

ii. To determine the relationship between the Manufacturing strategies and operational performance of cement manufacturing firms in Kenya.

1.4 Importance of the Study

More than ever, driving competitiveness appears essentially anchored on the effectiveness in managing and optimizing of the primary processes within an organization. The primary processes are basically the activities directly involved in the product/service realization and flow (Andrew and Johnson 1982, Cohen and Zysman 1987).

The study covers significant data with respect to the manufacturing strategies employed within the Kenyan cement manufacturing sector making it a handy resource to managers, analysts, industry experts, the academia, scholars and researchers on manufacturing strategies that firms can use to drive competitiveness sustainably as they ensure business continuity over the long term. It also provides a valuable resource to regulators and policy makers within government institutions with respect to the cement manufacturing industry manufacturing strategies options. Venture capitalists are equally armed with the trends that define this industry and the expected direction in establishing/firming up their investment options, strategies and critical success factors within their intended plants.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This study is embedded within the operations management domain and in particular the manufacturing strategy field. This chapter outlines and analyses other research papers, text books, magazines and journals made by other scholars and authors as regards to the study subject.

2.2 Theoretical foundation of Manufacturing Strategy

Various theories have been advanced that tie the firm's manufacturing strategies to business performance. This project will seek to borrow from three theories in supporting its intended objectives namely; the resource based view, transient proposal theory and relational view theory.

2.2.1 Resource Based View

The resource-based view underpins the importance of an organizations internal environment as the most critical lever in driving competitive advantage and emphasizes the use of the organizations internal resources, capabilities and competencies in competing within the environment it exists. Penrose (1959) is regarded as the pioneer of this view suggesting that resources possessed, deployed and used by an organization being more important than the industry structure, though the term resource-based view was coined much later by Wernerfelt (1984). Barney (1991) also established that a firm's resources are its primary source of competitive advantage; this entails more aggressive focus on the manufacturing/operations strategy in driving desired business performance.

The scope of what defines the organization's resources has been reviewed over time by different researchers (Ansoff 1965, Hoffer & Schendel 1978, Amit & Shoemaker 1993, and Miller & Shamsie 1996). Barney (1991), defined them as 'all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc controlled by an organization, that enable it to conceive and implement strategies that improve its efficiency and effectiveness. The competitive advantage of the firm, including performance and future survival is strongly anchored on its ability to leverage on its unique resources to establish and implement strategies that are not being implemented by its competitors to drive value. These internal resources are considered to be a set of distinctive, valuable, difficult to trade, scarce, appropriable and specialized firm-level resources, competencies and capabilities which the competitors are unable to imitate, substitute or reproduce and that are deployed to enhance the firm's competitive advantage (Barney 1991, Amit & Shoemaker 1993, Prahalad & Hamel 1994, Powel 2001). Grant (1991) as well as Amit & Shoemaker (1993), emphasize that resources are the source of capabilities while capabilities offer the main source for sustained competitive advantage within a firm.

Manufacturing strategy has adopted the concept of internal resources & capabilities optimization from the strategic management literature particularly the resource-based view of the firm (Wernefelt 1984, Barney 1991). As observed by Muthama (2014), resource-based view proves handy to manufacturing strategy in enhancing integration of the strategic advantage sources within a coherent portfolio of optional capabilities (Gagnon, 1999). Ray et al 2004, concludes that the intangible resources are the most critical ones from a strategic point of view, towards offering sustained competitive advantage in comparison to the tangible ones which appear either easily imitable in the long run as well as less flexible in meeting the unique market deliverables over time due to the dynamic nature of the market behavior.

2.2.2 Transient Proposal Theory

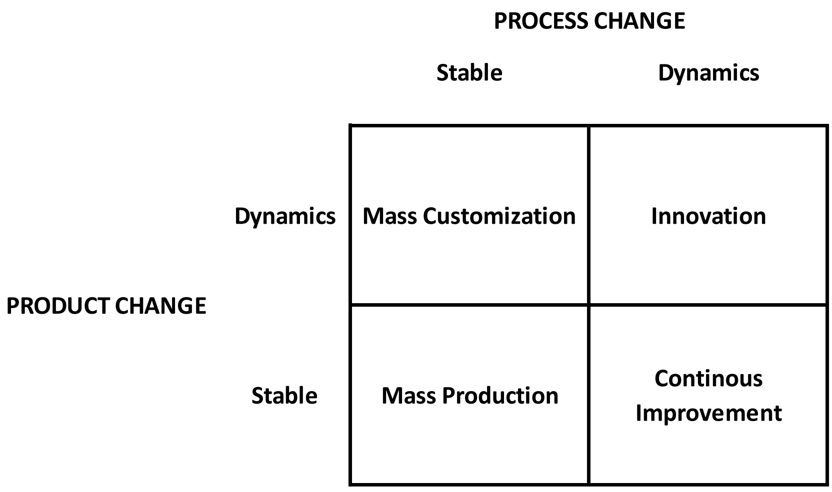
McGrath (2013) overturned the traditional concepts by focusing and introducing a shift with respect to the strategy formulation and execution process and in particular the strategy life cycle. Traditionally, strategies were expected to exist over an extended period of time (months to years) with no or negligible revision expected within this defined period.

With the business environment evolution currently witnessed, the opportunities for leveraging and optimizing an organization's competitiveness are high paced and transient, hence proactive foresight and actions inevitable. This emphasizes important paradigm shift in the way strategies are scoped, designed, implemented, monitored and revised. Fast and effective response to the market dynamics and accurate real-time market and resources advancement intelligence becomes key in addressing the high paced and globalized business environment for the organization's continued survival and sustenance of competitive advantage. The internal organization capabilities and resources are expected to adjust real-time with the new business environment with expected shift in business models and structure involving virtual resources coupled with revolutionary high tech capabilities with a global reach and expanded market niche.

In turbulent market period, the role of strategy is to ensure strategic flexibility. The manufacturing strategies will be expected to be highly flexible, fast paced and global-focused in nature with respect to harnessing the competitive priorities to drive performance. Luftman (1996) emphasizes on the strategic options available to the organizations, in enhancing competitive advantage within the rapidly evolving business environment, as primarily constituting product change and process change.

The figure below underpins the specific manufacturing strategies for changing market environment mix.

Figure 2.1 Luftman's 1996 Competitiveness Strategic Options Model



2.2.3 Relational view (MBV & RBV Integration)

Generally, the concept of 'strategic fit' is a long term balancing and matching act between the external oriented MBV and internally oriented RBV, the link and understanding between the two is critical in proper resource deployment and alignment towards optimizing an organizations strategic competitive advantages. The relational view argues that proper alignment/matching between the firm's resources and capabilities (as advanced by RBV) and critical customer requirements is key in driving sustainable competitive advantage. It also advocates for strategic idiosyncratic partnership between firms within an established network through core sharing strategic resources, assets and capabilities at firm level, market level and interaction-level. Dyer & Singh (1998) revealed vital relational rents to advance this view: complementary capabilities and resources, asset specific relations, sharing routine knowledge, and governance effectiveness.

Unlike MBV and RBV, the relational view emphasizes the main source of driving and maximizing performance/profitability as holistic internal and external resource alignment as well as the strategic shared knowledge and complementary resources bestowed within the network. This forms the key positioning strategy by established organizations conglomerates, for example the Japanese Keiretsu and Zaibatsu.

2.3 Manufacturing Strategies

A company's manufacturing strategy is instrumental in driving achievement of higher performance as various researchers' points out (Leong et al., 1990; Ward & Durray, 2000; and Kim & Arnold, 1992). According to Amoako-yampah and Acquaah (2013), a direct relationship exists between the company's manufacturing strategy and its performance outcome. Miltenburg (2013) argues that organizations in the manufacturing sector that apply the manufacturing strategy are more likely to excel with a higher return on sales and a high gross income. This research paper focuses on key lean manufacturing strategies that can be adopted in driving operational performance objectives of interest.

2.3.1 Total Quality Management (TQM)

Deming developed the TQM which was primarily introduced in Japan following World War II in helping rebuild the Japanese economy. TQM integrates all organization processes and functions targeting to achieve continuous/progressive improvement of both goods and service quality primarily to attain and sustaining the organizations customer satisfaction levels.

With regard to the manufacturing sector, TQM focuses on conformance to specifications, reliability, performance, features, durability, serviceability, among others. Specific concepts that make up the strategy of TQM include; customer focus, leadership, continuous improvement, employee empowerment system approach, building mutually beneficial supplier relationships, and scientific process approach employing six tools to evaluate performance effectiveness namely; cause and effect diagrams, flow charts, histograms, scatter diagram, control chart, check list and Quality function deployment.

TQM helps reduce or eliminate waste, rework and defects, increase customer satisfaction, faster throughput time, higher perceived value, increase profitability and competitiveness. Acquaah's (2013) research findings indicate that quality influences organizations performance. Also, quality manufacturing quality dimension acts at an instrumental indicator of the company's performance (Flynn et al., 1994; William et al., 1995; Ward & Durray, 2010).

2.3.2 Just in Time (JIT) Strategy

JIT as a strategy originated from Japanese manufacturing with focus on undertaking activities on immediate demand based as such eliminate any form of slack or relief within the production process (Richard *et al.*, 1999). As a flexible manufacturing concept, it fundamentally focuses on cycle time reductions, lot-size reductions, pull systems and quick change over techniques (Hassan et al, 2007). JIT helps enhance organization's productivity and quality, reduce overall holding cost as well as improve customer satisfaction through shorter lead times and route to markets.

2.3.3 Six Sigma

Sir Bill Smith, an engineer in Motorola in the 1970s, is regarded as the father of six sigma which was later perfected by the General electric in 1980s. It is regarded as a quality improvement approach that focuses on eliminating defects through reduction of variation in a process. Six sigma requires a process to generate less than 3.4 defects per million opportunities.

Unlike the other strategies, six sigma relies on highly trained employees to effect its implementation with the senior management being held accountable for its successful implementation. Six sigma employs the DMAIC and DMADV approaches in effective implementation.

2.3.4 Kaizen/Continuous Improvement

Kaizen as a strategy encompasses all parties that support the business objectives realization by focusing on employing continuous improvement throughout the firm's operations in driving quality and efficiency incremental improvement.

Pearce et al, (2000), maps kaizen to systemic approach to improve service rendering, increased responsibility of senior management, shift in business culture, employee empowerment & team workmanship and structured approach to problem solving.

2.3.5 Benchmarking Process

Benchmarking allows organization to measure their position and performance levels by comparing the performance of similar processes of other organizations. Simplified, organizations measure their products, services and practices against the toughest competitors or industry leaders or best practices by a systematic method.

According Kreodi (1999), benchmarking provides a tool for analyzing, comparing and measuring the organizations performance. Depending on the focus, benchmarking is further categorized to process, performance, strategic, internal, competitive, functional and generic benchmarking. The combination to adopt is dependent on the organization's specific objectives and critical success factors in focus, competitive environment, investment options/priorities and available operations infrastructure.

When efficiently implemented, benchmarking helps in timely implementation of ideas, avoiding costly mistakes, allows for quantum-leaps performance, objective goal setting, provides for easy justification for change, provides opportunity for team involvement within the transformational process, helps in instituting best practices/processes, technical networking for performance enhancement, inspires for positive competition, and consequently offer a critical tool in driving efficiency, effectiveness, innovativeness and economic operations.

2.3.6 Total Productive maintenance

The strategy originated from Japan which involves a collection of techniques and practices aimed at optimizing the effectiveness of business facilities and processes at overall least cost performance. It focuses at zero breakdowns/ failures, zero defects and zero accidents.

Total Productive Maintenance (TPM) constitutes 8 pillars namely; continuous improvement, autonomous improvement, preventive maintenance, training & education, 5S, Start-up monitoring, quality management, Safety & Health at work and environmental protection and TPM in administration.

When effectively implemented, TPM results in higher customer satisfaction, enhanced performance, improved machinery/equipments maintainability, reduced set up time & facilities flexibility, reduce maintenance and production cost, increased productivity & running time as well as reduction of defects, interruptions and waste.

2.3.7 Lean Manufacturing

Lean manufacturing, which arose from the renowned (TPS) Toyota Production System by Eiji and Taiichi, aids an organization identify and eradicate every form of waste from the value stream through continuous improvement and innovativeness. The focus is on waste elimination, cost reduction, employee empowerment, continuous improvement, generating capital, driving in more sales and consequently competitiveness in a growing aggressive global market. Organizations must focus on creating high-value low cost products that can reach the customer at the shortest time possible.

It categorizes sources of waste as queuing, underutilized resources, over production, unnecessary inventory, non-value-adding or over processing, transportation, waste motion and defects/rework. Lean manufacturing employs various techniques and tools namely workplace management/Genba Kanri (5S, SOPs, Skill Control and visual management), Design for manufacturability (DFM), Visual controls, 'pull production systems (Kanban and Dum-buffer-rope), single-minute exchange of die (SMED) and Error-proofing (Poka-Yoke).

The strategic and strategy configuration also play an instrumental role in influencing the company's performance along manufacturing strategy (Popovska & Boer, 2013). Of significance importance on financial performance as Butt, (2013) study reveals is the manufacturing strategy dimensions, which encompass flexibility, delivery, quality and cost. Learning capability along with the firm's best practices positively influence the performance of the company while the internal structure is negatively related to the flexibility improvement of the company based on the study of Silveira and Sousa's (2010). According to Popovska and Boer (2008) argument, the company's performance is not 100% dependent of manufacturing strategy as various attributes of performance are associated with strategy and strategic configuration of manufacturing company as well.

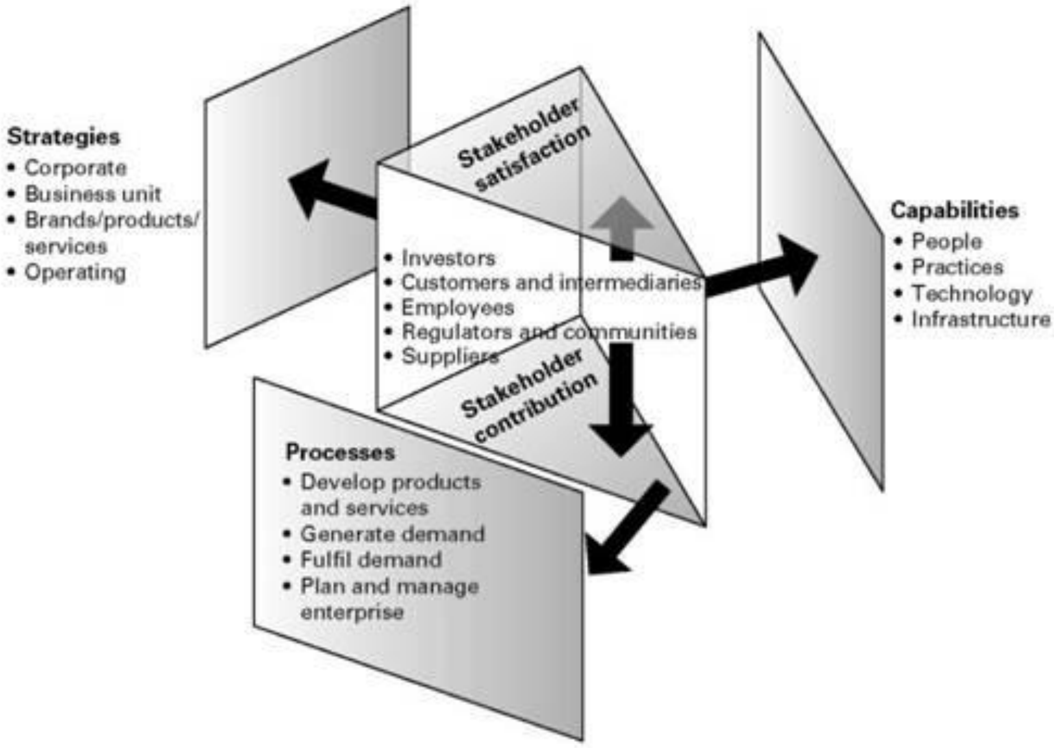
2.4 Operational Performance

An organization's manufacturing arm plays a key role in managing its profitability and productivity. Peter Ducker is widely known for his famous quote 'you can't manage what you can't measure'. Performance monitoring and measurement is the most critical part of actualizing desired individual and organizational objectives (Key performance indicators), defined short and long term strategies as well as towards continuous improvement. Measurement and monitoring of the performance indicators, also regarded as critical success factors, help align the organizational efforts, drive organization controls, focus and activities as well as propel an organization towards its perceived optimum results and strategies sustainably. This ultimately is key in ensuring resources alignment and optimization. Managers are able to set their eyes on daily activities that directly or indirectly influence the results of the adopted performance indicators

An organization's performance measurement is regarded as an evaluation of its actual performance financial and non-financial indicators (which may not necessarily be mutually dependent), improved operational performance is expected to reflect/drive financial measures. Typical against the pre-set goals and objectives (Lebas, 1995). This performance measurement process incorporates various measurement frameworks ranging from approaches, metrics, tools systems and processes whether financial or non-financial. While performance is based on both approaches employed in performance measurements include, balanced scorecard, KPIs conformance analysis, benchmarking, results framework etc.

Lynch & Cross emphasizes the need for internally and externally focused measures as well as additional non-financial performance factors, including customer needs satisfaction, operations flexibility, cycle time, defect rates, organizations productivity, OEE, value creation, product development, return on capital investment, cash flow, profitability/earnings per share etc. Appendix II captures commonly monitored manufacturing performance measures. Neely et al, 2002, established the performance prism emphasizing five integrated facets which identify areas for an organization to focus, namely stakeholder satisfaction, strategies, processes, capabilities and stakeholder contribution.

Figure 2.2 Performance Prism



2.5 Empirical review on Manufacturing Strategy and Operational Performance

The manufacturing strategy literature has proposed a direct link between manufacturing strategy implementation and firm performance. The idea that manufacturing strategy supports firm performance has been the focus of several studies (Swamidass and Newell, 1987; Kim and Arnold, 1992; Vickery et al., 1993; Williams et al., 1995; Prajogo and Sohal, 2006). Some of the studies have examined several individual dimensions of manufacturing strategy on firm performance (e.g. Kekre and Srinivasan, 1990; Wood, 1991; Sluti, 1992; Gupta and Somers, 1996; White, 1996). A quality strategy that allows a firm to achieve both high design and conformance quality will lead to the attainment of a higher reputation in the market place, cost reduction, and higher productivity that can translate into higher sales growth and increased market share.

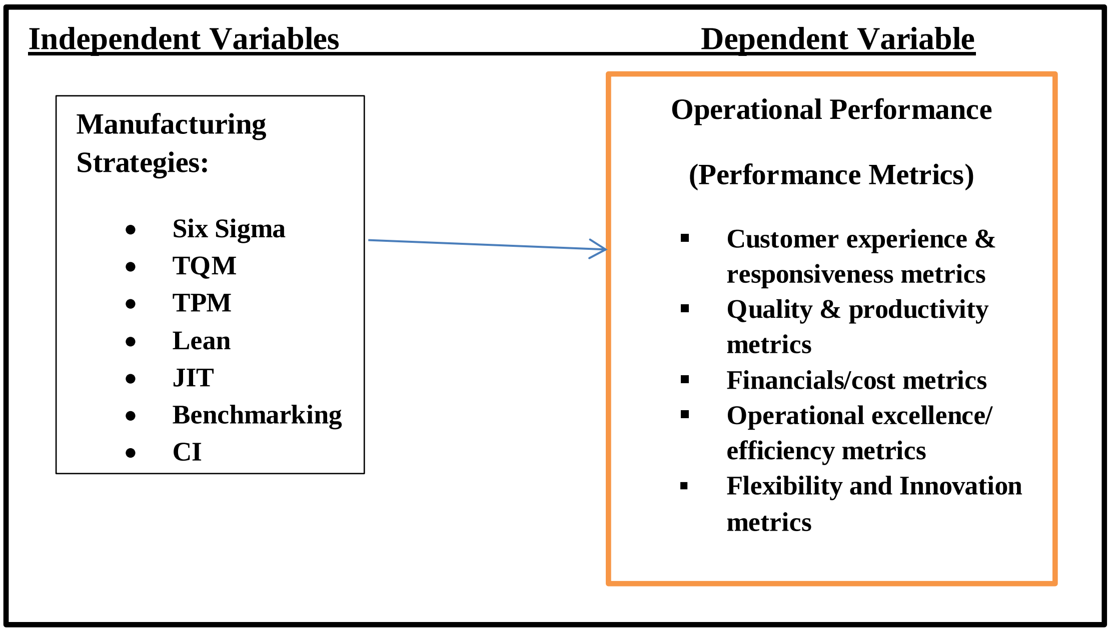
A low cost strategy leads to improvements in efficiencies that a firm can use to reduce its price and all things being equal achieve an increase in sales growth and market share. A firm that develops a strategy that allows it to achieve volume and mix flexibility while keeping costs low and quality high will be able to respond faster to market changes and thus achieve higher performance. And finally, a firm with reliable and on-time deliveries can expect greater customer satisfaction that can potentially lead to increased sales growth and market share.

Avella, Fernandez and Vazquez (2011) focused on analyzing the growing importance of manufacturing strategies for the competitiveness of firms. The aim of their research work was to analyze whether or not there existed a correlation between the manufacturing strategy and the competitive success or business performance of a sample of large Spanish industrial firms. The results obtained revealed that it is not possible to identify a direct relationship between the manufacturing strategy and business performance of the sample of firms analyzed.

2.6 Conceptual Framework

Conceptual framework is the representation of a particular study or survey topic that drives the particular investigation being reported based on the problem statement (Mc Gaghie, 2001).

Figure 2.3: Conceptual Model



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the methods utilized in gathering, analyzing and presenting desired information in addressing the research question and objectives. It contains the research design, population under study & sample size, data collection and its analysis.

3.2 Research Design

A research design provides a conceptual structure constituting the blue print for collection, measurement and analysis of data. According to Saunders, Lewis and Thornhill (2012), Research Design refers to a framework for the collection and analysis of data to answer research question and meet research objectives providing reasoned justification for choice of data resources, collection methods and analysis techniques. This study employed a hybrid of a descriptive and causal research design. It used the descriptive survey method in enabling the researcher use quantitative methods of data analysis in generating reliable results. This study used causal research design to determine the effect of manufacturing strategies on firm performance.

3.3 Target Population

The targeted population of study was eight cement manufacturing companies in Kenya covering 11 manufacturing sites located within the Machakos County, Mombasa County and the Western region of Kenya. Bamburi Cement Ltd, ARM Cement Ltd and EAPCC are publicly listed within the NSE, while the rest are privately owned, namely Mombasa cement Ltd, National Cement Ltd, Savannah Cement Ltd, Ndovu Cement Ltd and Rai Cement Ltd. A census survey was employed due to the relatively small population size in the study.

Three other privately owned companies are expected to be operational within the Kenyan market by 2020 namely Global Choice Ltd, Paddy distributors and Cemtech Ltd.

3.4 Sample Frame

From the population captured above, focus was made to cover both integrated and grinding units for both privately owned as well as publicly listed cement manufacturing companies. Purposive sampling method was used in the study. The targeted respondents were middle and senior manufacturing/operations managers with at least one year of experience in manufacturing function within the cement manufacturing industry. This was so as to help build the level of confidence in the reliability and validity of information provided. Ten respondents were picked from each cement company to also aid in the reliability and validity of information captured from the respondents.

3.5 Data Collection Methods

Primary data was collected by means of both direct and mailed questionnaire consisting of both structured and unstructured questions. The questionnaire consisted of four sections that captured the respondent responses employing open questions, rating and Likert scaling system on majorly a five point scale. The questions were developed from the three research questions to help generate relevant data for analysis in order to aid in deriving conclusions.

3.6 Data Analysis

The survey data collected via the filled questionnaires was reviewed to ensure relevancy, accuracy, completeness and consistency followed by appropriate grouping, coding and tabulation pending final analysis. Quantitative data analysis techniques used were descriptive and inferential techniques. The main descriptive statistics used for this study was measures of central tendency and variability. A correlation analysis (multivariate regression model) has been employed in the study to show the relationship between the adopted manufacturing strategies (Independent Variables) and operation performance (Dependent Variables) for each of the selected measures. Data was presented using both tables and figures to present the findings of the research.

Table 3.1 Summary of Analysis Focus based on Submitted Questionnaire

OBJECTIVES	QUESTIONNAIRE	Q. SECTION ADDRESING OBJECTIVES	STATISICAL ANALYSIS METHOD
To establish the Manufacturing Strategies commonly used by cement manufacturing firms in Kenya	Both structured and unstructured questions	Section I Section II	Descriptive statistics
To determine the relationship between the Manufacturing strategies and operational performance of cement manufacturing firms in Kenya	Structured questions	Section III Section IV	Inferential Statistics

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

In this section, data analysis, interpretation and discussion of the findings have been done. The chapter will be divided into five sections. They included; response rate, background and firm characteristics, descriptive statistics, inferential statistics, and discussion of findings. In summary, the chapter showcases data analysis, presentation, and interpretations of the study. The presentation, interpretation and discussion of the findings was done based on the general objective of the study, which was to establish the effectiveness of manufacturing strategies in driving operational performance of cement manufacturing firms in Kenya and the specific objectives of the study which were; to establish the manufacturing strategies commonly used by cement manufacturing firms in Kenya and to determine the relationship between the manufacturing strategies and operational performance of cement manufacturing firms in Kenya. The chapter therefore presents an analysis and presentation of the findings based on the objective of the study.

4.2 Response Rate

Information on the response rate recorded for the current study is presented in Table 4.1 in the subsequent page.

Table 4.1: Response Rate

Response	Frequency	Percentage
Returned	59	73.75
Unreturned	21	26.25
Total	**80**	**100**

Out of the 80 questionnaires that were issued to the target respondents who were the middle and senior manufacturing/operations managers with at least one year of experience in manufacturing function within the cement manufacturing industry, 59 were filled up and returned. The overall response rate for the study was as presented was 73.75%.

The results indicate an overall successful response rate of 75.17%. Therefore, the response rate documented for the analysis was found fit for analysis since it is supported by Mugenda and Mugenda (2010) that any response rate of 70% and above is considered excellent for analysis and making conclusions.

4.3 Background and Firm Characteristics

Eight cement manufacturing firms were picked for the study. Enumerated below is the summary of their characteristics derived from the Part A of this study's questionnaire.

4.3.1 Education Level of the Respondents

From the questionnaire, the respondents were asked to indicate their education level. It was necessary to indicate the education level because it indicated their level of understanding of the cement firms' strategic management practices and performance metrics. It can also act as an indicator of the management level of the respondent.

Table 4.2 below shows the education level served by the respondents working in the studied cement firms. 69.5% of the respondents have attained an undergraduate degree while 30.35% had a graduate degree. This implies that majority of the respondents have sufficient knowledge of the cement firms strategic management practices and performance. This is because the findings indicate that the respondents work in the level where they encounter strategic management practices. .

Table 4.2: Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate	41	69.5	69.5	69.5
	Graduate	18	30.5	30.5	100.0
	Total	59	100.0	100.0	

4.3.2 Manufacturing Infrastructure and Technology

From the questionnaire, the respondents were asked to state the type of manufacturing set up in their work place and the type of process design/technology employed. It was necessary to indicate these facts because they denoted the efficiency and effectiveness of the manufacturing infrastructure present within the cement firms. The concept of decision categories, which was first presented by Hayes and Wheelwright (1984) entails infrastructural decision categories.

Table 4.3: Type of Manufacturing Set Up in Place in the Site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cement Grinding Unit(s)	59	100.0	100.0	100.0

Table 4.3 above shows the type of manufacturing set up in place in the site. 100% of the cement firms included are cement grinding units, hence do not undertake clinkerisation within the respondent sites. This implies that the firms appear strategic on how they have employed decision categories when making strategic plans as well as overall objectives.

Table 4.4: Type of Process Design/Technology Employed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Open Milling System with a Pre-Crusher	8	13.6	16.0	16.0
	Closed System with a High Efficiency Separator	42	71.2	84.0	100.0
	Total	50	84.7	100.0	
Missing	System	9	15.3		
Total		59	100.0		

84% of the respondents state that the cement firms they work in use a close system with a high efficiency separator, which is the most superior technology. 16% of the respondents revealed that the firms they work in utilize open milling systems with a pre-crusher, which the next best technology. None of the firms use open milling systems which is the most inferior technology. This indicates that the cement firms are keen on focusing on decision categories when making strategic plans.

4.3.2 Number of Employees

From the questionnaire, the respondents were asked to state the number of employees within the organizations they work. It was necessary to indicate the number of employees contained in the cement firms because it showed whether the decision categories aspect of strategic planning being by the firms. A firm wishing to develop decision categories will enhance its capability by engaging new staff.

Table 4.5: Number of Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Between 101 – 300	8	13.6	13.6	13.6
	Between 301 – 500	51	86.4	86.4	100.0
	Total	59	100.0	100.0	

86.4% of the firms have employees between the ranges of 301 – 500, while 13.6% have employees within the range of 101 – 300. Nome of the firms have employees within the range of 10 – 100 or more than 501. This shows that the firms have adopted infrastructural decision categories strategies with regards to optimized labor force as denoted by the number of employees to the scale of operations.

4.3.3 Annual Turnover

From the questionnaire, the respondents were asked to state the annual turnover of the organizations they work. It was necessary to indicate the annual turnover of the cement firms because it denoted performance.

Table 4.6: Annual Turnover

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Between 0.5M – 1Billion	27	45.8	45.8	45.8
	More than 1Billion	32	54.2	54.2	100.0
	Total	59	100.0	100.0	

54.2% of the firms have a turnover of more than one billion, while 45.8% of the firms have an annual turnover within the range of 0.5 M to 1 billion. None of the firms has a turnover which is less than 0.5 million. This shows that the performance of the cement firms is considerably good with keen focus on annual turnover. This shows that the firms have adopted decision categories strategies.

4.4 Descriptive Statistics

A descriptive study tries to explain or describe a subject frequently by establishing an outline of a collection of problems, individuals, or events, by collecting data and the tabulation of the frequencies of research variables or their relationship. It provides a range of research objectives such as; explanation of an event or characteristics linked with a subject population, approximation of extent of the population that possesses these features, and unearthing of linkages among varying variables (Ngechu, 2004). In this study, descriptive research design was selected since it will enable the generalization of the findings of the population; it will allow analysis and relation of variables. Descriptive statistics in this study were employed to describe analyze the various factors that influence strategic management practices.

4.4.1 Manufacturing Strategies Formulation

Descriptive statistics were derived for manufacturing strategies formulation. The results are presented in Table 4.7 in the subsequent page.

Table 4.7: Official Manufacturing Strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	51	86.4	86.4	86.4
	No	8	13.6	13.6	100.0
	Total	59	100.0	100.0	

86.4% of the respondents indicated that the organizations' in which they worked had an official manufacturing strategy, this denotes presence of decision categories in strategic planning.

Table 4.8: Strategy making Process in Relation to Formality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal	51	86.4	86.4	86.4
	Partially Formal	8	13.6	13.6	100.0
	Total	59	100.0	100.0	

86.4% of the respondents also indicated that the strategy making process in the organizations' in which they worked was formal, 13.6% indicated that it was partially form while none of the respondents indicated that it was informal. This showed the approach of the firms towards strategic planning was mainly structured and in most part rigid.

4.4.2 Strategy Development and Implementation

Table 4.9: Strategy Development

	N	Minimum	Maximum	Mean	Std. Deviation
To what extent is the BOD charged with the responsibility of developing Strategy?	59	4.00	5.00	4.7119	.45678

To what extent is the CEO charged with the responsibility of developing Strategy?	59	4.00	5.00	4.6949	.46440
To what extent is the Senior Managers charged with the responsibility of developing Strategy?	59	3.00	5.00	4.5763	.72405
To what extent is the Middle Level Managers charged with the responsibility of developing Strategy?	59	1.00	5.00	3.5763	1.40447
To what extent is the Sectional Supervisors charged with the responsibility of developing Strategy?	59	1.00	5.00	2.7119	1.41483
To what extent are the Shop Floor Teams charged with the responsibility of developing Strategy?	42	1.00	2.00	1.4048	.49680
To what extent is the Strategy Experts charged with the responsibility of developing Strategy?	59	1.00	5.00	3.7288	1.27077
Valid N (list wise)	42				

Table 4.9 above indicates that Board of Directors are mostly involved in strategic development with a mean of 4.7119 and a standard deviation of 0.45678. Shop floor teams are the least involved in strategic development with a mean of 1.4048 and a standard deviation of 0.49680. This indicates that the cement firms adopt a top down approach where strategic planning is made at the higher levels and then cascaded down to the lower levels.

Table 4.10: Strategy Implementation

	N	Minimum	Maximum	Mean	Std. Deviation
To what extent is the CEO charged with the responsibility of implementing Strategy?	59	4.00	5.00	4.5593	.50073
To what extent are the Senior Managers charged with the responsibility of implementing Strategy?	59	3.00	5.00	4.2712	.71512
To what extent are the middle level managers charged with the responsibility of implementing Strategy?	59	2.00	5.00	3.8475	1.01393
To what extent are the Sectional Supervisors charged with the responsibility of implementing Strategy?	59	1.00	5.00	3.4237	1.32877
To what extent are the Shop Floor Teams charged with the responsibility of implementing Strategy?	59	1.00	5.00	2.8814	1.28767
Valid N (list wise)	59				

Table 4.10 above indicates that CEO's are mostly involved in strategic implementation with a mean of 4.5593 and a standard deviation of 0.50073. Shop floor teams are the least involved in strategic development with a mean of 2.8814 and a standard deviation of 1.28767. This indicates that the cement firms adopt a top down approach where strategic planning is implemented at the higher management levels and then cascaded down to the lower levels.

4.4.3 Manufacturing Strategies commonly used by Cement Manufacturing Firms in Kenya

The first specific objective was to establish manufacturing strategies commonly used by cement manufacturing firms in Kenya. The results are displayed in Table 4.11 below.

Table 4.11: Manufacturing Strategies commonly used by Cement Manufacturing Firms in Kenya

	N	Minimum	Maximum	Mean	Std. Deviation
To what extent has TQM been adopted within your organization?	59	3.00	5.00	4.5763	.72405
To what extent has Benchmarking been adopted within your organization?	59	2.00	5.00	3.8644	1.12123
To what extent has Kaizen been adopted within your organization?	51	2.00	5.00	3.3333	1.12546
To what extent has TPM been adopted within your organization?	59	2.00	5.00	3.8644	1.12123
To what extent has 6 sigma been adopted within your organization?	50	2.00	5.00	3.6800	1.37678
To what extent has JIT been adopted within your organization?	50	2.00	5.00	3.6800	1.37678
To what extent has FiveS been adopted within your organization?	25	2.00	5.00	3.6000	1.29099
To what extent has Poka Yoke been adopted within your organization?	42	2.00	5.00	3.5952	1.38034
To what extent has Design For Manufacturability been adopted within your organization?	51	2.00	5.00	3.4902	1.13794

To what extent has Pull Production been adopted within your organization?	51	2.00	5.00	3.8235	1.09006
To what extent has Single Minute been adopted within your organization?	42	2.00	5.00	3.4048	1.06059
To what extent has KANBAN been adopted within your organization?	42	2.00	5.00	3.7857	1.20032
To what extent have the other manufacturing strategies been adopted within your organization?	0				
Valid N (list wise)	0				

The result findings indicate that the most commonly used manufacturing strategy is TQM, which has a mean of 4.5763 and a standard deviation of 0.72405. The least commonly utilized manufacturing strategy is kaizen with a mean of 3.3333 and a standard deviation of 1.12546.

4.4.4 Lean Manufacturing

Descriptive statistics were derived for the attributes under the component lean manufacturing. The results are presented in Table 4.12 below.

Table 4.12: Lean Management Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Waste Management	59	2.00	5.00	3.5593	1.07111
Enforced least processing time	59	3.00	5.00	3.8475	.84718
Enhanced Turnaround time (Least Queuing)	59	3.00	5.00	4.2542	.90198
Maintaining least stocks possible	59	3.00	5.00	3.9831	.93756
Optimized utilization of resources	59	3.00	5.00	4.2712	.71512
Enhanced products Quality (Lease Defects/rework)	59	3.00	5.00	4.4068	.74553

Producing just as per available order (No overproduction)	59	1.00	5.00	3.5424	1.33031
Enforcing shortest routes/ distance for Equipment and Vehicle movement/motion	59	3.00	5.00	4.4237	.74749
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.4237 of the attribute enforcing shortest routes. It has a standard deviation of 0.74749. The attribute with the lowest mean is producing just as per available order which has a mean of 3.5424, and a standard deviation of 1.33031. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.5 Kaizen

Descriptive statistics were derived for the attributes under the component kaizen. The results are presented in Table 4.13 below.

Table 4.13: Kaizen Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Waste reduction/least possible waste generation	59	2.00	5.00	3.6949	1.28994
Enhanced production capacity	59	3.00	5.00	4.1186	1.00146
Enhanced quality of product	59	3.00	5.00	4.5424	.75022
Best space utilization of facilities	59	3.00	5.00	3.9831	.93756
Least possible errors generated	59	2.00	5.00	3.9661	1.09806
most effective medium of communication	59	2.00	5.00	3.9831	1.31950
Least cycle time	59	3.00	5.00	3.8475	.84718
Least stock /inventory levels	50	2.00	5.00	3.8200	1.10083
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.5424 of the attribute enhanced quality of product. It has a standard deviation of 0.75022. The attribute with the lowest mean is waste reduction which has a mean of 3.6949, and a standard deviation of 1.28994. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.6 Five S

Descriptive statistics were derived for the attributes under the component Five S. The results are presented in Table 4.14 below.

Table 4.14: Five S Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Standardization/seiketsu	59	2.00	5.00	4.1186	1.01853
Simplifying	59	2.00	5.00	3.8305	1.14700
Sorting/seiton	59	3.00	5.00	4.1186	.85268
Sweeping/seiso	59	2.00	5.00	3.6780	1.19540
Self-discipline	59	3.00	5.00	3.9831	.77663
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is a tie of 4.1186 of the attribute standardization and sorting, with standard deviations of 1.01853 and 0.85268 respectively. The attribute with the lowest mean is sweeping which has a mean of 3.6780, and a standard deviation of 1.19540. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.7 SMED

Descriptive statistics were derived for the attributes under the component SMED. The results are presented in Table 4.15 below.

Table 4.15: SMED Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Eliminate waste	51	2.00	5.00	4.1176	1.24334
Least product/ process changeover time	51	3.00	5.00	4.3137	.76132
enhanced Company resources utilization	51	3.00	5.00	4.1569	.70349
Least defects	51	3.00	5.00	3.8431	.70349
Least change over cost	51	4.00	5.00	4.3333	.47610
Enhanced production batch/lot size reduction	51	4.00	5.00	4.5098	.50488
Maintaining least stocks/ inventory	51	4.00	5.00	4.3333	.47610
Making to order - least stocking	51	3.00	5.00	4.1569	.70349
Least lead/cycle time	51	2.00	5.00	3.9804	1.02937
Valid N (list wise)	51				

From the study findings, we can see that the highest mean is 4.3137 of the attribute least product, with standard deviations of 0.76132. The attribute with the lowest mean is least defects which has a mean of 3.8431, and a standard deviation of 0.70349. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.8 Poke Yoke

Descriptive statistics were derived for the attributes under the component Poke Yoke. The results are presented in Table 4.16 in the subsequent page.

Table 4.16: Poke Yoke Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Fool proofing - Manual or automated	51	3.00	5.00	4.4902	.78416
Reduced defects	51	3.00	5.00	3.8431	.70349
Reduced /least recalls/customer complaints	51	2.00	5.00	3.5098	.96690
Enhanced product quality	51	4.00	5.00	4.3333	.47610
Reduced repeat jobs/operations	51	2.00	5.00	3.4902	.98737
Reduced lead time	51	3.00	5.00	4.1569	.70349
Always right the first time	43	2.00	5.00	3.3721	1.23488
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.4902 of the attribute fool proofing, with standard deviations of 0.78416. The attribute with the lowest mean is always right the first time which has a mean of 3.3721, and a standard deviation of 1.23488. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.9 JIT

Descriptive statistics were derived for the attributes under the component JIT. The results are presented in Table 4.17 in below.

Table 4.17: JIT Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Least product/ process changeover time	51	3.00	5.00	4.1765	.68428
Making to order - least stocking	51	2.00	5.00	3.8039	1.09580
Maintaining least stocks/ inventory	51	2.00	5.00	3.6863	.94848
Least cycle time	51	2.00	5.00	3.4902	.98737
Least equipment setup time	51	2.00	5.00	3.9608	1.18255

Reduced manufacturing costs	51	4.00	5.00	4.4706	.50410
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.4706 of the attribute reduced manufacturing costs, with standard deviations of 0.50410. The attribute with the lowest mean is always least cycle time which has a mean of 3.4902, and a standard deviation of 0.98737. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.10 Pull Product

Descriptive statistics were derived for the attributes under the component pull product. The results are presented in Table 4.18 below.

Table 4.18: Pull Product Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Least Turn Around time	51	3.00	5.00	4.1569	.70349
Enhanced product and process quality	51	3.00	5.00	4.0000	.82462
Demand driven production	51	3.00	5.00	4.1569	.70349
Maintaining least stocks/ inventory	51	3.00	5.00	4.1569	.70349
Valid N (listwise)	51				

From the study findings, we can see that the highest mean is a tie of 4.1569 of the attributes; least turnaround time, demand driven production, and maintaining least stocks. They have a standard deviations of 0.70349 respectively. The attribute with the lowest mean is enhanced product and process quality which has a mean of 4.000, and a standard deviation of 0.82462. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.11 KANBAN

Descriptive statistics were derived for the attributes under the component KANBAN. The results are presented in Table 4.19 below.

Table 4.19: KANBAN Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Enhanced communication/information transfer	51	2.00	5.00	3.8039	1.09580
Reduced cost of information processing	51	2.00	5.00	3.9804	1.02937
Maintaining least stocks/ inventory	51	2.00	5.00	3.9804	1.02937
Most Effective mode of communication/ information transmission	51	3.00	5.00	4.4706	.78366
Least cycle time	51	3.00	5.00	4.3137	.76132
Best space utilization of facilities	51	3.00	5.00	4.3137	.76132
Enhance visual control of production	51	4.00	5.00	4.6471	.48264
Making to order - least stocking/ eliminate over production	51	3.00	5.00	4.3137	.76132
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.6471 of the attributes enhance visual control of production. It has a standard deviations of 0.48264. The attribute with the lowest mean is enhanced communication which has a mean of 3.8039, and a standard deviation of 1.0958082462. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.12 TQM

Descriptive statistics were derived for the attributes under the component TQM. The results are presented in Table 4.20 below.

Table 4.20: TQM Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Waste reduction/elimination	51	3.00	5.00	4.0000	.82462
Enhanced products Quality (Least Defects/rework)	51	4.00	5.00	4.3333	.47610
Enhanced unit cost of production	51	4.00	5.00	4.3333	.47610
Optimized utilization of resources	51	4.00	5.00	4.3333	.47610
Enhanced customer service	51	3.00	5.00	4.1373	.91694
Enhanced continuous improvement/innovation	51	2.00	5.00	4.1373	1.09580
Enhanced product profitability	51	5.00	5.00	5.0000	.00000
Effective communication	51	2.00	5.00	3.7843	1.37570
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 5.0000 of the attributes enhanced product profitability. It has a standard deviations of 0.00000. The attribute with the lowest mean is effective communication which has a mean of 3.7843, and a standard deviation of 1.37570. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.13 Six Sigma

Descriptive statistics were derived for the attributes under the component Six Sigma. The results are presented in Table 4.21 below.

Table 4.21: Six Sigma Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Waste reduction/elimination	51	3.00	5.00	3.8235	.91007
Enhanced products Quality (Least Defects/rework)	51	4.00	5.00	4.3333	.47610
Enhanced unit cost of production	51	3.00	5.00	4.3137	.76132
Optimized utilization of resources	51	3.00	5.00	3.9804	.83643
Enhanced customer service	51	2.00	5.00	4.1373	1.09580
Enhanced continuous improvement/innovation	43	3.00	5.00	4.3721	.81717
Enhanced product profitability	51	4.00	5.00	4.4902	.50488
Effective communication	43	3.00	5.00	3.9767	.91257
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.4902 of the attribute enhanced product profitability. It has a standard deviations of 0.50488. The attribute with the lowest mean is waste reduction which has a mean of 3.8235, and a standard deviation of 0.91007. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.14 Bench Marking

Descriptive statistics were derived for the attributes under the component bench marking. The results are presented in Table 4.22 below.

Table 4.22: Bench Marking Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Enhanced Technical networking	51	3.00	5.00	4.0000	.82462
Timely implementation of innovative ideas	51	3.00	5.00	4.0000	.82462

Best industry practice implementation	51	3.00	5.00	4.0000	.60000
Goal setting influenced by industry performance	51	3.00	5.00	4.0000	.60000
Positive competition through knowledge sharing	51	4.00	5.00	4.1765	.38501
Operational transformation through emulating successful industry strategies	51	4.00	5.00	4.5098	.50488
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.5098 of the attribute operational transformation. It has a standard deviations of 0.50488. The attribute with the lowest mean is a tie of 4.0000 and standard deviations of 0.82462 and 0.60000 respectively. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.4.15 TPM

Descriptive statistics were derived for the attributes under the component TPM. The results are presented in Table 4.23 below.

Table 4.23: TPM Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Continuous Improvement	51	4.00	5.00	4.6667	.47610
Autonomous Maintenance	51	3.00	5.00	4.3137	.76132
Preventive maintenance	51	4.00	5.00	4.4902	.50488
Start-up monitoring	51	4.00	5.00	4.4902	.50488
SHE Enforcement	43	2.00	5.00	3.7907	1.18639
Awareness – Training and education	51	3.00	5.00	4.3137	.76132
Reduced set up time	43	3.00	5.00	4.3721	.81717
Reduction of defects	42	2.00	5.00	4.1667	1.20804

Reduced breakdowns through enhanced overall equipment efficiency	51	3.00	5.00	4.1373	.91694
Any other (please indicate)	0				
Valid N (list wise)	0				

From the study findings, we can see that the highest mean is 4.6667 of the attribute continuous improvement. It has a standard deviations of 0.47610. The attribute with the lowest is the attribute SHE enforcement with a mean of 3.7907 and a standard deviation of 1.18639. All the attributes had a mean of between 3 and 5 which implies that they are applied to a large extent and to a very large extent.

4.5 Inferential Statistics

Inferential statistics include correlation analysis and regression analysis. The main aim of the inferential statistics is to establish the second specific objective; the relationship between the manufacturing strategies and operational performance of cement manufacturing firms in Kenya.

The attributes denoting the independent variables and the dependent variable were summarized to create whole variables. This was achieved by estimating the mean and median values of all the attributes.

4.5.1 Correlation Analysis

Correlation analysis establishes whether there exists an association between two variables lying between (-) strong negative correlation and (+) perfect positive correlation. Pearson correlation was employed to analyze the level of association between stock returns and real interest rates. The analysis was done both for the null lag and one period lag data. The study employed a Confidence Interval of 95%, as it is the most utilized in social sciences. A two tailed test was utilized.

Table 4.24: Correlation Analysis

		Perfomance	Lean_Man	Kaizen_Man	Five_S	SMED	Poke_Yoke	JIT_Man	Pull_Prod	KANBAN	TQM_Man	Six_Sigma_Man	Bench_Mark	TPM_Man
Perfomance	Pearson Correlation	1	.053	.079	.103	.035	.118	.106	.162	.081	.120	.042	.092	-.002
	Sig. (2-tailed)		.688	.552	.440	.809	.408	.459	.255	.574	.401	.771	.520	.988
	N	59	59	59	59	51	51	51	51	51	51	51	51	51
Lean_Man	Pearson Correlation	.053	1	.489**	.777**	.846**	.900**	.842**	.642**	.767**	.532**	.961**	.608**	.901**
	Sig. (2-tailed)	.688		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	59	59	59	59	51	51	51	51	51	51	51	51	51
Kaizen_Man	Pearson Correlation	.079	.489**	1	.851**	.286*	.745**	.704**	.814**	.476**	1.000**	.549**	.670**	.372**
	Sig. (2-tailed)	.552	.000		.000	.042	.000	.000	.000	.000	.000	.000	.000	.007
	N	59	59	59	59	51	51	51	51	51	51	51	51	51

Five_S	Pearson Correlation	.103	.777**	.851**	1	.524**	.864**	.800**	.854**	.682**	.932**	.769**	.624**	.586**
	Sig. (2-tailed)	.440	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	59	59	59	59	51	51	51	51	51	51	51	51	51
SMED	Pearson Correlation	.035	.846**	.286*	.524**	1	.774**	.844**	.547**	.877**	.286*	.682**	.505**	.736**
	Sig. (2-tailed)	.809	.000	.042	.000		.000	.000	.000	.000	.042	.000	.000	.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
Poke_Yoke	Pearson Correlation	.118	.900**	.745**	.864**	.774**	1	.966**	.856**	.767**	.745**	.839**	.808**	.745**
	Sig. (2-tailed)	.408	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
JIT Man	Pearson Correlation	.106	.842**	.704**	.800**	.844**	.966**	1	.821**	.809**	.704**	.736**	.821**	.704**
	Sig. (2-tailed)	.459	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51

Pull_Prod	Pearson Correlation	.162	.642**	.814**	.854**	.547**	.856**	.821**	1	.784**	.814**	.534**	.558**	.316*
	Sig. (2-tailed)	.255	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.024
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
KANBAN	Pearson Correlation	.081	.767**	.476**	.682**	.877**	.767**	.809**	.784**	1	.476**	.573**	.330*	.476**
	Sig. (2-tailed)	.574	.000	.000	.000	.000	.000	.000	.000		.000	.000	.018	.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
TQM_Man	Pearson Correlation	.120	.532**	1.000**	.932**	.286*	.745**	.704**	.814**	.476**	1	.549**	.670**	.372**
	Sig. (2-tailed)	.401	.000	.000	.000	.042	.000	.000	.000	.000		.000	.000	.007
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
Six_Sigma_Man	Pearson Correlation	.042	.961**	.549**	.769**	.682**	.839**	.736**	.534**	.573**	.549**	1	.626**	.935**
	Sig. (2-tailed)	.771	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51

Bench_Mark	Pearson Correlation	.092	.608**	.670**	.624**	.505**	.808**	.821**	.558**	.330*	.670**	.626**	1	.670**
	Sig. (2-tailed)	.520	.000	.000	.000	.000	.000	.000	.000	.018	.000	.000		.000
	N	51	51	51	51	51	51	51	51	51	51	51	51	51
TPM_Man	Pearson Correlation	-.002	.901**	.372**	.586**	.736**	.745**	.704**	.316*	.476**	.372**	.935**	.670**	1
	Sig. (2-tailed)	.988	.000	.007	.000	.000	.000	.000	.024	.000	.007	.000	.000	
	N	51	51	51	51	51	51	51	51	51	51	51	51	51

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

*. Correlation is significant at the 0.05 level (2-tailed).

The study findings in Table 4.24 above indicates that no predictor variable selected for the study is significantly correlated at the 5% significance level to the performance.

4.5.2 Regression Analysis

The variables of the study were analyzed using regression model. The firms' performance was regressed against the manufacturing strategies selected for the study. The regression analysis was undertaken at 5% significance level. The results are displayed in the next page.

Table 4.25: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.190[a]	.036	-.071	.06618

a. Predictors: (Constant), TPM_Man, Pull_Prod, Bench_Mark, SMED, TQM_Man

R square, being the coefficient of determination indicates the deviations in the response variable that is as a result of changes in the predictor variables. From the outcome in Table 4.25 above, the value of R square was 0.036, a discovery that 3.6% of the deviations in firm performance are caused by the predictor variables included in the study. Other variables not included in the model justify for 96.4% of the variations in performance of cement firms in Kenya.

Table 4.26: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	5	.001	.338	.887[b]
	Residual	.197	45	.004		
	Total	.204	50			

a. Dependent Variable: Perfomance

b. Predictors: (Constant), TPM_Man, Pull_Prod, Bench_Mark, SMED, TQM_Man

The significance value obtained from the study is greater than the α set at the 5% level of significance. Thus, the model developed in the study is insignificant in prediction future performance of cement firms in Kenya.

Table 4.27: Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.575	.108		5.351	.000
	SMED	-.012	.031	-.134	-.392	.697
	Pull_Prod	.032	.040	.314	.785	.437
	TQM_Man	-.020	.048	-.159	-.423	.675
	Bench_Mark	.016	.041	.096	.388	.700
	TPM_Man	-.001	.040	-.008	-.025	.980

a. Dependent Variable: Perfomance

The significance values of all the predictor variables included in the model are greater than the α (0.05). The none of the predictor variables selected in the study impacts cement firms performance in Kenya.

Table 4.28: Excluded Variables

Model		Beta In	T	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Lean_Man	.[b]	.	.	.	.000
	Kaizen_Man	.[b]	.	.	.	.000
	Five_S	.[b]	.	.	.	.000
	Poke_Yoke	.[b]	.	.	.	.000
	JIT_Man	.[b]	.	.	.	.000
	KANBAN	.[b]	.	.	.	.000
	Six_Sigma_Man	.[b]	.	.	.	.000

a. Dependent Variable: Perfomance

b. Predictors in the Model: (Constant), TPM_Man, Pull_Prod, Bench_Mark, SMED, TQM_Man

The predictor variables listed in Table 4.28 were excluded when performing regression analysis because of the presence of multicollinearity. A significant correlation at the 5% significant level between the predictor variables is referred to as multicollinearity. It is a statistical phenomenon in which there exists a perfect or exact relationship between the predictor variables. When there is a perfect or exact relationship between the predictor variables, it is difficult to come up with reliable estimates of their individual coefficients. Thus, it will result in incorrect conclusions about the relationship between outcome variable and predictor variables. Thus, the independent variables strong audit function and separation of duties can be dropped when conducting regression analysis.

4.6 Discussion of Findings

The first specific objective was to establish the manufacturing Strategies commonly used by cement manufacturing firms in Kenya. The study establish that the most widely used manufacturing strategy is TQM and the least widely used is kaizen.

The second specific objective was to determine the relationship between the manufacturing strategies and operational performance of cement manufacturing firms in Kenya. The study found out that no manufacturing strategy selected for the study significantly impacts operational performance.

The study findings are in contrast to proposition by manufacturing strategy literature that a direct link exists between manufacturing strategy implementation and firm performance. It is in opposition to studies conducted by Kekre and Srinivasan, 1990; Wood, 1991; Sluti, 1992; Gupta and Somers, 1996; White, 1996 that posited that a quality strategy that allows a firm to achieve both high design and conformance quality will lead to the attainment of a higher reputation in the market place, cost reduction, and higher productivity that can translate into higher sales growth and increased market share.

However, the study findings are in agreement with the study conducted by Avella, Fernandez and Vazquez (2011) that revealed that it is not possible to identify a direct relationship between the manufacturing strategy and business performance of the sample of firms analyzed.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This section discusses the summary of the study findings and offers conclusions and recommendations of the study on the effectiveness of manufacturing strategies in driving operational performance of cement manufacturing firms in Kenya. It offers a summary on the results of the two specific objectives; to establish the Manufacturing Strategies commonly used by cement manufacturing firms in Kenya and to determine the relationship between the Manufacturing strategies and operational performance of cement manufacturing firms in Kenya. It further goes on to state the limitations of the study and provide suggestions for further research.

5.2 Summary of Findings

The manufacturing strategies that affect operational performance which were hypothesized in the study included; SMED, pull production, JIT, TQM, TPM, kaizen, lean manufacturing, five s, poke yoke, KANBAN, Six Sigma, and bench marking. It was a crosssectional study done across several institutions in one time period. Primary method of data collection was utilized where questionnaires were administered to ten respondents in each of the eight cement manufacturing companies. The study employed the use of descriptive statistics, correlation analysis, and regression analysis to establish manufacturing strategies commonly used by cement manufacturing firms in Kenya and the relationship between the manufacturing strategies and operational performance of cement manufacturing firms in Kenya.

The study established through descriptive statistics that the most widely used manufacturing strategy by cement firms in Kenya is TQM and the least widely used is kaizen. The study through regression analysis exhibited that none of the manufacturing strategies significantly impacts operational performance.

5.3 Conclusion

From the above findings, it can be concluded that manufacturing strategies are not entirely effective in driving business operational performance of the cement manufacturing firms in Kenya. Manufacturing strategies do not significantly impact on operational performance.

This is in agreement with the study conducted by Avella, Fernandez and Vazquez (2011) that revealed that it is not possible to identify a direct relationship between the manufacturing strategy and business performance of the sample of firms analyzed.

Further conclusions are that the most widely used manufacturing strategy by cement firms in Kenya is TQM and the least widely used is kaizen.

5.4 Recommendations

Policy recommendations are that the government through the ministry of industrialization and through other trade agencies and regulators can employ the study findings to spur the growth of the cement industry and the manufacturing sector at large since it is one of the main agendas in the current government objectives, Big 4, notwithstanding the fact that the impact of the construction industry on the economy cannot be ignored.

Stakeholders in the Kenyan cement manufacturing, which include managers, analysts, and industry experts, as well as the manufacturing sector at large can utilize the manufacturing strategies to drive competitiveness sustainably in order to ensure business continuity over the long term. Venture capitalists can equally be armed with the trends that define this industry and the expected direction in establishing/firming up their investment options, strategies and critical success factors within their intended plants.

5.5 Limitations of the Study

Due to time and cost limitations, the scope of the study has been limited to cement firms in Kenya. Thus, it has not been determined if the result findings would hold for the rest of the manufacturing sector. Furthermore, it is uncertain whether similar findings would be replicated in other countries. Since the study employed primary sources of data through the use of questionnaires, there was the challenge of non-response of some of the questions in the questionnaire or even the respondents not returning the entire questionnaire. The data could also not be used in its raw form, and had to be coded into Statistical Packages for Social Sciences. Thus, delays were imminent as data was to be edited and processed further before the researcher could be able to compile it.

5.6 Suggestions for Further Studies

On the basis of information gathered and the knowledge gained in this study, the researcher has suggested some areas for further research. The current study's scope was limited to the cement industry in Kenya, a similar study can be done on the rest of the manufacturing sector and this can be helpful to confirm or disapprove the findings of this study. The scope of the study was also limited to the Kenyan context, researchers in other East African, African, and other countries can also conduct a similar study to ascertain whether the current study findings would hold.

The R squared determined that other factors not included in the study largely influence operational performance. Studies can be conducted to identify these factors. Primary data was solely utilized in the study, alternative research can be employed using secondary sources of data. This can then approve or disapprove the current study findings. Multiple linear regression and correlation analysis were used in this research, further research can incorporate other analysis methods like factor analysis, Granger causality, cluster analysis, and discriminant analysis.

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APPENDICES

Appendix I: Typical Manufacturing metrics and Critical Success Factors/ KPIs

MANUFACTURING METRICS/ PERSPECTIVE	PERFORMANCE OBJECTIVES/INDICATORS
Customer Experience & Responsiveness Manufacturing Metrics	Customer fill rate/ On-Time in full delivery /TAT
	Manufacturing Cycle Time/ Takt Time
	Net Promoter score
	Billing Accuracy
	Number of customers/customer churn rate
	Time taken to Make product Changeovers
Quality Manufacturing Metrics	First time through/Yield /Scrap Ratio
	Non-conformance/ Customer Rejects/Return/ complaints
	Defects per thousand
	Supplier's Incoming Quality
Efficiency Manufacturing Metrics	Throughput /Output/Production Rate
	Capacity Utilization
	Utility Cost - Power, Water, compressed air, sewer cost etc
	Overall Labour Effectiveness (OLE)
	Downtime in Proportion to Operating Time
	Overall Equipment Effectiveness (OEE)
	Percentage Planned vs. Emergency Maintenance Work Orders
	Schedule or Production Attainment
Inventory Metrics	WIP Inventory/Turns
	GMROI
	Carrying/holding cost
	ETA
Compliance Metrics	Statutory environmental operating limits
	Reportable Health and Safety Incidents
	Reportable Environmental Incidents
	Number of Non-Compliance Events / Year
Flexibility & Innovation	Rate of New Product Introduction
	Research & Development targets
	Continuous improvement projects target compliance
	Engineering Change Order Cycle Time
Costs & Profitability Manufacturing Metrics	Total Manufacturing Unit Cost
	Manufacturing Cost as a Percentage of Revenue
	Overhead costs
	Net Operating Profit
	Supply Chain finance costs
	Productivity in Revenue per Employee
	Average Unit Contribution Margin
	Return on Assets/Return on Net Assets
	Energy Cost per Unit
	Cash-to-Cash Cycle Time
	EBITDA

Appendix II: Introduction Letter

UNIVERSITY OF NAIROBI

SCHOOL OF BUSINESS

P.O BOX 30197 – 00100

NAIROBI, KENYA

Dear Sir/Madam,

RE: A RESEARCH SURVEY ON THE MANUFACTURING STRATEGIES AND OPERATIONAL PERFORMANCE WITHIN THE CEMENT MANUFACTURING INDUSTRY IN KENYA – REQUEST FOR RESPONSE

I am a postgraduate student at the University of Nairobi undertaking a Master of Business Administration (MBA). I am currently carrying out a research on the manufacturing strategies adopted and Operational performance within the cement manufacturing industry in Kenya.

Your organization has been selected to take part in this research survey by virtue of fitting within the defined research scope. I wish to request for your humble assistance in completing the attached questionnaire in order to enable me complete the research conclusively. I wish to confirm that all the information provided within the questionnaire will be treated with utmost confidentiality and objectivity, solely for the purpose of this research /academics.

Your assistance in filling the questionnaire will be greatly appreciated.

Yours Faithfully,

Kennedy M. Jackson

Appendix III: Research Questionnaire

Research Questionnaire

This interview guide is designed to acquire information on cement manufacturing firms within Kenya to help in answering the research questions and objectives. All the information gathered in this research shall be treated with utmost objectivity and confidentiality in addressing the subject matter and will not be used for any other purpose other than academic.
Your contribution will be of great assistance to the compilation and successful completion of this research.
Thank you, Date…………………………………

Section I: FIRM DEMOGRAPHICS (BACKGROUND)

1. **Name of your Organization**…………………………………………
2. **Your Title/ Position**…………………………………………………
3. **Educational level of respondent : Undergraduate ( ) Graduate ( ) Doctorate ( )**
   Other (Specify) …………………………………………………….
4. **What department do you work …**…………………………………
5. **Your years of experience within department above**………………
6. **How many manufacturing lines does this plant unit have?**………
7. **What type of manufacturing set up is in place in this site** (Please tick one)

Cement Grinding Unit(s)	Fully Integrated Plant

8. **What type of process design/technology is employed in this site? What is its installed capacity? Please confirm the number of years that the process has been operational** (Please tick as appropriate and indicate number of lines employing that particular technology)

Process Design	Open Milling System				Open milling system with a pre-crusher				Closed system with a high efficiency separator			
Number of Lines												
Combined Years in Operation	≤ 5Yrs	5 - 10 Yrs	10 - 15 Yrs	> 15 Yrs	≤ 5Yrs	5 - 10 Yrs	10 - 15 Yrs	> 15 Yrs	≤ 5Yrs	5 - 10 Yrs	10 - 15 Yrs	> 15 Yrs
Combined Capacity Rating	0 - 0.5M	0.5 - 1.0M	1 - 1.5M	> 1.5M	0 - 0.5M	0.5 - 1.0M	1 - 1.5M	> 1.5M	0 - 0.5M	0.5 - 1.0M	1 - 1.5M	> 1.5M

9. No. of Employees within the organization (Please tick one)

Between 10 – 100	Between 101 – 300	Between 301 – 500	More than 501

10. What is the annual turnover for this business unit (Please tick one)

Between 0 – 100 Million	Between 100 – 500 Million	Between 0.5M – 1Billion	More than 1Billion

Section II: MANUFACTURING STRATEGIES FORMULATION

1. Has your organisation defined an official Manufacturing Strategy? ……………………..

2. How would you describe strategy making process in your organization in relation to formality?(Please tick one)

Formal	Partially formal	Informal

3. **To what extent are the roles captured below involved and are charged with the responsibility of developing Strategy?** (Please tick the most appropriate)

Role	**Not involved at all**	**Involved to a small extent**	**Medium involved**	**Involved to a high extent**	**Highly involved**
Scale	1	2	3	4	5
Board of Directors	1	2	3	4	5
The C.E.O./MD	1	2	3	4	5
Senior Managers	1	2	3	4	5
Middle /Line Managers	1	2	3	4	5
Sectional supervisors	1	2	3	4	5
Shop-floor teams	1	2	3	4	5
Strategy experts/ Consultants	1	2	3	4	5

4. **Who is responsible and to what extent in implementing the Manufacturing strategy?**(Please tick one)

Role	Not involved at all	Involved to a small extent	Medium involved	Involved to a high extent	Highly involved
Scale	1	2	3	4	5
The C.E.O./MD	1	2	3	4	5
Senior Managers	1	2	3	4	5
Middle /Line Managers	1	2	3	4	5
Sectional supervisors	1	2	3	4	5
Shop-floor teams	1	2	3	4	5

5. **To what extent have the following manufacturing strategies been adopted within your organization? On a scale of 1 to 5 where 5 = to a very large extent, 4 = large extent, 3 = moderate extent, 2 = small extent, 1 = very small extent).(Please tick one)**

MANUFACTURING STRATEGIES	TOOLS	5	4	3	2	1
TOTAL QUALITY MANAGEMENT						
BENCHMARKING PROCESS						
KAIZEN / SYSTEMIC CONTINOUS IMPROVEMENT						
TOTAL PRODUCTIVE MAINTENANCE						
SIX SIGMA						
JUST IN TIME (JIT)						
LEAN MANUFACTURING	FIVE (5) S					
	POKA YOKE (ERROR PROOFING)					
	DESIGN FOR MANUFACTURABILITY					
	PULL PRODUCTION CONTROL SYSTEM					
	SINGLE MINUTE EXCHANGE OF DIE (SMED)					
	KANBAN INFORMATION TRANSPERANCY					
ANY OTHER (Please specify)						

Section III: MANUFACTURING STRATEGIES IMPLEMENTATION

1) **Below are some of the characteristics of the Manufacturing Strategies/ Practices adopted by firms. Please rank by a tick in the appropriate box the nature and extent to which the organization has implemented in driving operational performance using the following rating; 5 = to a very large extent, 4 = Large extent, 3 = Moderate extent, 2 = Small extent, 1 = Very small extent**

LEAN MANUFACTURING	5	4	3	2	1
Waste Management					
Enforced least processing time					
Enhanced Turnaround time (Least Queuing)					
Maintaining least stocks possible					
Optimized utilization of resources					
Enhanced products Quality (Lease Defects/rework)					
Producing just as per available order (No overproduction)					
Enforcing shortest routes/ distance for Equipment and Vehicle movement/motion					
Any other (please indicate)					
KAIZEN	5	4	3	2	1
Waste reduction/least possible waste generation					
Enhanced production capacity					
Enhanced quality of product					
Best space utilization of facilities					
Least possible errors generated					
most effective medium of communication					
Least cycle time					
Least stock /inventory levels					
Any other (please indicate)					
FIVE (5) Ss	5	4	3	2	1
Standardization/seiketsu					
Simplifying					
Sorting/seiton					
Sweeping/seiso					
Self-discipline					
Any other (please indicate)					
SMED	5	4	3	2	1
Eliminate waste					
Least product/ process changeover time					
enhanced Company resources utilization					
Least defects					

Least change over cost					
Enhanced production batch/lot size reduction					
Maintaining least stocks/ inventory					
Making to order - least stocking					
Least lead/cycle time					
POKA YOKE (ERROR PROOFING)	5	4	3	2	1
Fool proofing - Manual or automated					
Reduced defects					
Reduced /least recalls/customer complaints					
Enhanced product quality					
Reduced repeat jobs/operations					
Reduced lead time					
Always right the first time					
Any other (please indicate)					
JUST IN TIME (JIT)	5	4	3	2	1
Least product/ process changeover time					
Making to order - least stocking					
Maintaining least stocks/ inventory					
Least cycle time					
Least equipment setup time					
Reduced manufacturing costs					
Any other (please indicate)					
PULL PRODUCTION CONTROL SYSTEM	5	4	3	2	1
Least Turn Around time					
Enhanced product and process quality					
Demand driven production					
Maintaining least stocks/ inventory					
KANBAN INFORMATION TRANSPERANCY	5	4	3	2	1
Enhanced communication/information transfer					
Reduced cost of information processing					
Maintaining least stocks/ inventory					
Most Effective mode of communication/ information transmission					
Least cycle time					
Best space utilization of facilities					
Enhance visual control of production					
Making to order - least stocking/ eliminate over production					
Any other (please indicate)					
TOTAL QUALITY MANAGEMENT	5	4	3	2	1
Waste reduction/elimination					
Enhanced products Quality (Least Defects/rework)					

Enhanced unit cost of production					
Optimized utilization of resources					
Enhanced customer service					
Enhanced continuous improvement/innovation					
Enhanced product profitability					
Effective communication					
Any other (please indicate)					
SIX SIGMA	5	4	3	2	1
Waste reduction/elimination					
Enhanced products Quality (Least Defects/rework)					
Enhanced unit cost of production					
Optimized utilization of resources					
Enhanced customer service					
Enhanced continuous improvement/innovation					
Enhanced product profitability					
Effective communication					
Any other (please indicate)					
BENCHMARKING PROCESS	5	4	3	2	1
Enhanced Technical networking					
Timely implementation of innovative ideas					
Best industry practice implementation					
Goal setting influenced by industry performance					
Positive competition through knowledge sharing					
Operational transformation through emulating successful industry strategies					
Any other (please indicate)					
TOTAL PRODUCTIVE MAINTENANCE	5	4	3	2	1
Continuous Improvement					
Autonomous Maintenance					
Preventive maintenance					
Start-up monitoring					
SHE Enforcement					
Awareness – Training and education					
Reduced set up time					
Reduction of defects					
Reduced breakdowns through enhanced overall equipment efficiency					
Any other (please indicate)					

2) **To what level of emphasis has the organisation placed on the following activities over the last five years to remain competitive.** (Please tick appropriately)

Operational Performance Measures	Manufacturing Strategy Objectives	Not critical	Least critical	Ok to have	Critical to an extent	Most critical
Total Sales	Quality	1	2	3	4	5
Number of Customer complaints captured per year		1	2	3	4	5
Quantity of returns per year in tons		1	2	3	4	5
Defects per ton		1	2	3	4	5
Annual Production	Operations Excellence	1	2	3	4	5
Capacity Utilization		1	2	3	4	5
Overall Equipment Effectiveness (OEE)		1	2	3	4	5
Overall plant Downtime as a percentage of total Operating Time		1	2	3	4	5
Percentage breakdown to Planned maintenance time		1	2	3	4	5
Reportable Health and Safety Incidents per year		1	2	3	4	5
Reportable Environmental Incidents		1	2	3	4	5
Overall Plant Reliability		1	2	3	4	5
Overall Manufacturing Unit Cost	Financial	1	2	3	4	5
Return on Assets		1	2	3	4	5
Overall Kilowatt Hour per Ton (Energy Unit Cost)		1	2	3	4	5
Inventory/Holding cost		1	2	3	4	5
Overall Clinker to cement ratio		1	2	3	4	5
Number of orders received year to date	Customer Experience	1	2	3	4	5
Number of orders served year to date		1	2	3	4	5
Cement collection Trucks Turnaround Time		1	2	3	4	5
Order lead time		1	2	3	4	5
Number of customers per year		1	2	3	4	5
Number of customers at the start of the year		1	2	3	4	5
Number of customers at the End of the year		1	2	3	4	5
Time taken to Make Capacity/volumes Changeovers	Flexibility & Innovation	1	2	3	4	5
Introduction of new products each year		1	2	3	4	5
Time taken to Make Capacity/volumes Changeovers		1	2	3	4	5
Technological and system upgrade as per best industry practice						
Established R & D targets		1	2	3	4	5

3) **To what extent have the challenges listed below hampered the effective implementation of manufacturing strategies in your organization?** (Please tick appropriately)

Factors affecting implementation of Manufacturing Strategy	**Not influential**	**Less influential**	**Medium**	**More Influential**	**Highly influential**
Lack of organization's clear strategic focus	1	2	3	4	5
Lack of commitment from management	1	2	3	4	5
Lack of /inadequate resources	1	2	3	4	5
Lack of proper coordination	1	2	3	4	5
Technological challenges/incompatibilities	1	2	3	4	5
Poor reward and remuneration program	1	2	3	4	5
Employees resistance to change	1	2	3	4	5
High cost of input resources	1	2	3	4	5
Lack of support by key players	1	2	3	4	5
Competency/skill gap	1	2	3	4	5
Data accuracy challenges	1	2	3	4	5
Poor infrastructure	1	2	3	4	5
Any other (please indicate)	1	2	3	4	5

Section IV: Operational Performance Measures data collection

1. To assist link the adopted manufacturing strategies to the operational performance, kindly provide the data of the operational performance measures captured below over the last four years.

Operational Performance Measures	**Manufacturing Strategy Objectives**	**2015**	**2016**	**2017**	**2018 (Year to date)**
Total Sales	Quality				
Number of Customer complaints captured per year					
Quantity of returns per year in tons					
Defects per ton					
Annual Production	Operations Excellence				
Capacity Utilization					
Overall Equipment Effectiveness (OEE)					
Overall plant Downtime as a percentage of total Operating Time					

Percentage breakdown to Planned maintenance time					
Reportable Health and Safety Incidents per year					
Reportable Environmental Incidents					
Overall Plant Reliability					
Overall Manufacturing Unit Cost	Financial				
Return on Assets					
Overall Kilowatt Hour per Ton (Energy Unit Cost)					
Inventory/Holding cost					
Overall Clinker to cement ratio					
Number of orders received year to date	Customer Experience				
Number of orders served year to date					
Cement collection Trucks Turnaround Time					
Order lead time					
Number of customers per year					
Number of customers at the start of the year					
Number of customers at the End of the year					
Time taken to Make Capacity/volumes Changeovers	Flexibility & Innovation				
Number of new products introduced each year					
Time taken to Make Capacity/volumes Changeovers					
Technological and system upgrade as per best industry practice					
Established R & D targets					

THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY