EFFECT OF TOTAL PRODUCTIVE MAINTENANCE ON OPERATIONAL PERFORMANCE OF STAR HOTELS IN COAST REGION, KENYA

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DECLARATION

This research project report is my original work and to the best of my knowledge has not been submitted for examination in this or any university for academic purposes.

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The research project report has been submitted with my approval as the university supervisor.

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DEDICATION

This work is devoted to my family and acquaintances for showing me love, supporting, encouraging and praying with me during this study.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

AM	Autonomous Maintenance
EEM	Early Equipment Management
GDP	Gross Domestic Product
JIT	Just-in-Time
JIPM	Japan Institute of Plant Maintenance
KMO	Kaiser-Meyer-Olkin
KTB	Kenya Tourism Board
OEE	Overall Equipment Effectiveness
PWC	PricewaterhouseCoopers
TPM	Total Productive Maintenance
SHE	Safety Health and Environment
TRA	Tourism Regulatory Authority
TQM	Total Quality Management
WTTC	World Trade Tourism Council

ABSTRACT

The study was meant to establish how Total Productive Maintenance affect operational performance of hotels in the Coast region. Specifically, the study sought to determine the extent of adoption of TPM practices and the effect of TPM practices on their operational performance. Descriptive cross-sectional survey approach was adopted for the study. The study targeted the entire population of 33 3-5 star hotels in the Coast region of Kenya. Primary data was relied upon with the collection being done using a semi-structured Likert-type questionnaire. Reliability, validity, normality, heteroscedasticity, autocorrelation, linearity and multicollinearity tests were conducted. The researcher then computed Pearson bivariate correlation to ascertain how the variables correlate. A multiple regression analysis was then conducted to ascertain the effect of total TPM on operational performance of the 3-5 star hotels located in the coastal region of Kenya. The study found out that 3-5 star hotels in the coast region in Kenya adopt TPM practices. Conclusion of the study was that improved performance in autonomous maintenance, early management, office TPM and health, safety and environment led to an improvement in operational performance. Focused improvement, quality maintenance, training and education and planned maintenance however do not have a significant correlation with operational performance among the 3-5 star hotels in the coast region in Kenya. Further, it was concluded that TPM practices and operational performance are positively related among the 3-5 star hotels in the coast region in Kenya and that TPM practices reliably predict their operational performance. The researcher recommends the need to implement and improve TPM practices among 3-5 star hotels in coastal region, Kenya since they are found to positively influence operational performance. Another recommendation is for the need to formulate policies and regulation of the various activities to ensure adequate competitive environment for the hotels. To avoid the general implication of effect on the entire operational performance, focus should be put on the antecedents of operational performance that are key to survival of the hotels especially during economic turbulence live the effects of the novel covid-19 pandemic.

Keywords: Total Productive Maintenance, Operational performance, 3-5 star hotels, Resource Based View.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

In today's dynamic business environment, fierce competition and the ever changing customer needs have resulted into greater pressures on organizations for them to remain competitive. Managers have been prompted by these trends to proactively implement strategies such as Total Productive Management (TPM) to overcome the challenges knowing that if proper and informed scheduling of equipment maintenance is not done then machinery and equipment will do the scheduling but this time with severe consequences in quality, cost and delivery time (Aspinwall & Elgharib, 2013). TPM is a philosophy of maintaining equipment that brings maintenance into attention as an essential and extremely vital function of an organization for accomplishing organizational goals (Ahuja, Sushil &Wood, 2004). In the past maintenance was considered mandatory and was viewed as nothing but just a cost centre (Cooke, 2003; Zio, 2009). However, that has not been the case lately as managers have realized that maintenance is more of a strategic issue which requires closer attention rather than an overhead expense which at all times needs to be controlled (Waeyenbergh & Pintelon, 2007).

The research was built on two theories namely resource based view and the theory of constraints. According to Barney (1991), resource based view (RBV) is the determination of the core resources that can be exploited to ensure sustainability of competitive superiority which ultimately drives higher returns. The theory of constraints is an approach for strategically locating the most restrictive factor that hampers the organization into the achieving of set goals and then deriving a way of systematically improving that constraint until it ceases to be a hurdle (Goldratt, 1984).

The theory of constraint suggests that priority should be given to the constraint with the ability to bring about the highest and immediate returns to the organization.

The success of hotels relies primarily on meeting and even exceeding customer's expectations at all times. It's all about giving the clients an excellent first impression, great feeling and always leaving them satisfied. This can be achieved through a collection of functions such as having helpful front desks, functional and guest friendly lobbies and great customer service. But very often it's the concealed elements such as maintenance that make all of this possible. In order to offer top notch services and alleviate every process interruption, top level managers have to manage effectively and efficiently facilities like air conditioning, fire services, mechanical ventilation, lifts/escalators, lighting, plumbing, laundry and catering installations (Chan, 2008).

1.1.1. Total Productive Maintenance

Suzuki (1994) posit that TPM derives its holistic approach from the word "Total" and entails a collective approach to equipment maintenance achieved through empowering support personnel and machinists, institutionalizing continuous improvement which represents the overall "lean" culture of an enterprise. In 1971 this approach was conceived in Japan as a productive maintenance method which involved small group activities focusing at ensuring that machinery and equipment are available all the time and operate in full capacity (Nakajima, 1988). TPM aims at fully eradicating defects, accidents, and breakdowns at the workplace. TPM is a maintenance philosophy that is focused so much on the people aspect of an organization and begins by fully taking advantage and exploiting the human cognitive competences which are ordinarily concealed and untapped.

TPM is a very vital tool for achieving excellence in quality, costs and lead times. It seeks to address the entirety of the production process and forms a solid, operator-centered philosophy to help in curbing the numerous industrial losses and wastes. The goal is to achieve a 100 percent availability of the system of production and averting the general deterioration of the organization's machines and equipment to help maximize effective achievement of the goals (Ravishankar, 1992). TPM can be executed through 8 practices which are commonly referred to as the pillars of TPM and form the building blocks of this philosophy. They include autonomous maintenance, focused improvement, planned maintenance, quality maintenance, training and education, early equipment management, office TPM and safety health and environment (Sangameshwran & Jagannathan, 2002). Autonomous maintenance anchors TPM and creates an empowered pool of expert operators responsible for taking care of their own equipment. Continuous improvement involves the formation of cross-functional teams (quality circles) whose responsibility will be to monitor the system with the objective of establishing failures/hitches and continuously coming up with ways to improve the system/process. Planned maintenance focuses on studying the routine characteristics of equipment such as breakdown and failure rates and then coming up with a proper schedule of maintenance activities.

Quality maintenance as depicted by the name refers to achieving the objective of zero defects through maintaining a defect free production process achieved through continuous monitoring, controlling and improvement of processes. Training and education is a facilitating pillar to TPM and involves training and empowering of the workforce with necessary skills for effective implementation of TPM. Early equipment management involves all the efforts put in place in making sure that maintainability, reliability and safety are well considered for a complete prevention of

breakdowns and failures before new equipment is acquired. Office TPM involves aligning of all departmental goals to that of the organization and promoting interdepartmental relations by eliminating all the administrative hassles in processes. Finally, we have the Safety, health and environment pillar which focuses on having the health of the workforce and environment at heart throughout the production process to eliminate accidents, injuries and negative environmental impact.

1.1.2 Operational Performance

As described by Voss, Ahlstrom and Blackmon (2013), operational performance represents all the quantifiable aspects of an organization's production process outcome which revolves around the quality, cost, time and flexibility. Operational performance is fundamental in management of organizations since it involves the very important strategic endeavors of developing organizational goals and objectives, monitoring and controlling the advancement towards achieving the set objectives and making some meaningful adjustments towards effective and efficient accomplishment of those goals.

The study used cost, service quality, delivery, flexibility and employee morale as the key constructs to operational performance. Costs in this case refers to the total operational expenditures consumed in the delivering of hotel services which include labor costs, energy costs, water bills, maintenance costs and all other costs necessary in the fulfillment of consumer needs. Delivery denotes the speed of service innovation and the lead times as adopted by hotels. Flexibility refers to the speed and accuracy at which organizations enforce their internal capabilities to dealing with the several uncertainties in the external environment such as technological changes, changes in consumer preferences and competition. Employee morale explains the attitude,

confidence and satisfaction towards employee working environment which is majorly determined by the management.

1.1.3. Total Productive Maintenance and Operational performance

TPM has been able to revolutionize the way modern day world class enterprises handle maintenance. It represents a complete transformation from the traditional responsive maintenance to a complete new thinking of preventive maintenance. TPM is a strategic approach of managing equipment which focuses on achieving quality products and services. By minimizing ineffectiveness in equipment TPM is able to guarantee these quality products and services. Yamashina (1995) submits that increased worldwide competition has led many organizations to shift away their attention from achieving efficiency through internal specialization and economies of scale to achieving excellence through quality, delivery speed and flexibility. TPM strategies have been having a great influence on bottom-line results, alongside improvement in capacity while at the same time lowering not only the cost of maintenance but keep the total operational cost optimal (Ahuja & Kumar,2009).

The main challenge facing firms has been how to contain costs and at the same time satisfy the ever changing customer needs. Survival in this dynamic business environment to a larger extent depends on the institutions' ability to react to these forces on one side and competition on the other. This has necessitated managers to be on their look out for ways in which costs can be contained without necessarily being a compromise to quality (Kaur, Singh & Ahuja, 2013). Best maintenance practices such as TPM have the ability to not only lower maintenance cost but the general operational cost budget by completely eliminating unnecessary and unprecedented equipment breakdown. A study by McKone, Roger and Cua (1999) also attests to the fact TPM approach has very outstanding results on operational performance.

1.1.4. Star Hotels in Coast Region

The hotel industry falls under the larger sector of hospitality industry and has a very close and mutual relationship with the tourism industry. Travel and tourism contributes immensely to the Kenyan economy as evident in the Travel and Tourism Economic impact 2019-Kenya report by World Trade and Tourism Council (2019), which shows that travel and tourism related activities contribution to the GDP in 2018 was USD 2,750.7 billion (3.2% of GDP) which is forecasted to grow by 3.6% to USD 2,849.2billion in 2019. The industry has witnessed a boom lately due to the several interventions among them introduction of direct flights to the country, a stable economy and the advance in local tourism. A report by PwC (2017) indicates that Kenya's hotel industry is set to grow immensely in a 5-year period (2017-2021) with 13 new hotels set to be established. The new properties which mainly consist of global hotel chains like Sheraton, Ramada, Best Western, Radisson, Marriot, Movenpick and Hilton will add 2,400 guest rooms which is an equivalent of 13 percent of the total Kenya's hotel capacity.

Hotel classification is conducted for analysis of the market sector which aids in comparison, performance analysis, market gaps identification, strategies in marketing and consumer demands. Tourism Regulatory Authority (TRA) is the Kenya's official body assigned with the responsibility of ranking the hotels, the classification follows the star ratings which are benchmarked with the international standards. Johanna (2010) suggests that there is no one universal way in which the hotels are classified and that each country has its own criteria of doing it, but key to the attributes are hotel facilities offered and the service quality. Hotels which are star rated 3-5 are known to having higher maintenance cost due the push by top management to maintain higher standards and quality services.

The total number of 3-5 star hotels in the Coast region as documented by TRA (2018) stands at 33. Conducive warm temperatures, weather patterns and the well-endowed beaches in the Kenyan coast have always been the main reasons why both international and domestic tourists prefer the Coast as their main destination. Fierce competition from other destinations that offer more or less similar natural attractions like Algeria, Tunisia Mauritius, South Africa and Zanzibar have provided a constant threat to the performance of all tourism dependent businesses such as hotels in the Kenyan Coast. This has propagated hotel managers to seriously engage in activities such as TPM that have the ability to foster higher quality services and service delivery through equipment maintenance which forms the major attributes towards attracting, satisfying and retaining clients which will go ahead into complimenting the natural attractions tourists enjoy at the Coast.

1.2. Research Problem

TPM builds on the people element of an organization and starts by fully taking advantage of the human logical competences normally hibernating within the workforce and untapped in most organizations (Ahuja & Khamba, 2007). Modern day consumers have become super sensitive to both price and quality and will always look around for substitute products and services that will be both affordable and of good quality. This has necessitated operational managers to work round the clock so that they can get answers to this puzzle of reducing the cost without necessarily sacrificing the required quality standards. McKone,Roger and Cua (1999) suggests that the outstanding results of TPM application on the operational performance has been the driving force behind many firms facing stiff competition embracing it.

The hotel industry is one vital industry in the Kenyan economy by socially and economically contributing to increased growth of the economy. Hotel operating costs

have always been on the increase attributed by higher food product costs, escalating energy bills, increase in labor rates, ever increasing maintenance expenses and also the thrive to maintain the star rating. The country has also recently witnessed some heavy investments in the industry which has led to the number of hotel rooms to more than double. This has been driven by several interventions by the government in the tourism industry such as increased air connectivity, government's directive on visa-on-arrival for African nationals, enhanced security, infrastructural developments like the SGR and a steady macroeconomic environment. With all these factors coming into play, competition in this industry has been so intense requiring managers to attend to hotel services that bring about a lasting impression with regard to satisfaction of customers' needs thereby building customer loyalty and retention.

Numerous studies have been conducted relating TPM to the general organizational performance. Modgil and Sharma (2016), in their study on TPM practices in the Indian pharmaceutical industry revealed that TPM had a substantial influence on plants operational performance and can assist the industries in improving products and services innovation speed which makes the industry increase productivity that is key in the industry. Ahuja and Kumar (2009) conducted a study on TPM implementation on an Indian manufacturing facility and found out that TPM practices have more outstanding results on manufacturing performance advancements as compared to customary maintenance practices of breakdown maintenance. Locally, Matuga (2013) did a case study at Uniliver Kenya Limited on the contribution TPM strategy has on competitive advantage and found out that TPM had resulted to growth in profits, low workplace accidents and complaints from customers. He went further to recommend that further studies on TPM implementation be carried out in non-manufacturing or service firms. This study hence pursued to address the contextual

gap by researching on implementation of TPM in the hotel industry. The study was therefore aimed at the determination of how TPM affects operational performance of 3-5 star hotels in the Coast region. The study pursued into finding answers to the following questions; What are the TPM practices implemented by 3-5 star hotels in the Coast region? What is the effect of TPM practices on the operational performance of 3-5 star hotels in the Coast region?

1.3. Research Objectives

The general objective of this study was to establish the effect of total productive maintenance on operational performance of hotels in the Coast region. The specific objectives are:

i. To determine the extent of adoption of TPM practices adopted by 3-5 star hotels in the Coast region.
ii. To determine the effect of TPM practices on the operational performance of 3-5 star hotels in the Coast region.

1.4. Value of the Study

It offers some valued insights with respect to theory, policy and practice. It shows the industrial tools like TPM can be borrowed and used in the service industry to achieve operational performance. The study will enable policy makers to evaluate how well they can improve the performance of the sector through appropriate maintenance strategies. Policy makers would be in a position to make reliable and relevant decisions on strategies that can enhance the standards of our hotels for superior performance of the sector in the country and to be able to maintain leadership in the region.

The study would contribute immensely to the standing literature as regards to TPM implementation and its relationship to the operational performance of the Kenyan hotel industry. It would be a good source of reference on the subject of TPM in service industry and will provide some insight for further researches and improvement to the present study as the gaps will be well highlighted.

This study would particularly be important to hotel managers and supervisors who will be interested in aligning maintenance strategies to their strategic and long-term plans so that the whole organization can work towards optimizing operational costs and achieving a sustainable competitive advantage in the long run. Managers can also relate to the findings of this study to their maintenance planning activities and the day to day maintenance activities in order to enjoy the returns of implementing the TPM tool.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The section concentrated on review of studies conducted regarding TPM practices and operational performance. It presents an analysis of the theories on which the study was anchored, followed by a profound discussion into the pillars of TPM. Knowledge gaps were also highlighted later in the chapter and finally the conceptual framework that relates the constructs of TPM and operational performance.

2.2. Theoretical Foundation of the Study

The research was built on two theories namely; Resource based view and the theory of constraints.

2.2.1. Resource Based View

Barney (1991) posit that resource based view (RBV) is a managerial instrument which is used in the determination of strategic resources that an organization can take advantage of to attain sustainable competitive advantage which can yield to a stronger lasting performance. Of interest to RBV is focusing on the organization's internal resources as a way of organizing processes and obtaining competitive advantage. For resources to derive sustainable competitive advantage then they should possess the following four attributes; Valuable, rare to find, costly to imitate and not substitutable (Barney, 1991). The theory assumes that ownership of strategic resources by an organization is at the core of being very competitive. Strategic resources derive improved efficiency and effectiveness in an organization and have the ability to safeguard the organization against threats from competitors (Muhittin & Reha, 1990).

How well a hotel utilizes its resources such as human resource, information technology, brand image, maintenance and many others can be the distinguishing attribute which makes one hotel to stand-out from the others. There exist fierce competition not only among local players but also from global brands that have also set their foot into the market. The cutthroat competition together with the ever changing customer demands have called upon managers to critically analyze their organization's functions and identify strategic resources which are necessary in achieving sustainable competitive advantage.

2.2.2. Theory of Constraints

It is a theory for strategically finding the most limiting factor (constraint) impeding the accomplishment of a set objective and then deriving a way of improving systematically that limiting factor until it ceases to be a hurdle (Goldratt, 1984). According to the theory, a firm is an operating system that consists of interdependent processes in which the output of one process becomes the input of another. Goldratt (1984) insists that in any complex system there are only some few constraints which have the capability to give significant immediate returns if well taken care of. The theory of constraint also suggests that priority should be given to the constraint with the ability to bring about the highest and immediate returns to the organization. Goldratt (1988) further reiterate that every complex system is made up of multiple related activities and at any given time one of them or an attribute in the activity can be that limiting factor inhibiting the organization from achieving the system's full capacity.

From the theory it's evident that, in hotels for every service offered there are a number of precedence processes and activities among them maintenance which have been so vital in the customer satisfaction process. It should hence be given some

special attention by managers if organizations are to achieve efficiency and effectiveness which will eventually lead to improved profitability. Hotels are known to operate 24 hours round the clock throughout the year making operational cost to be so high. TPM strategies have been having a great influence on bottom-line results, alongside improvement in capacity while at the same time bringing down operational expense budget in general.

2.3. Total Productive Maintenance Pillars

TPM philosophy is coined on the eight important elements or pillars, this is according to Sangameshwran and Jagannatha (2002).

2.3.1. Autonomous Maintenance

AM is the keystone of the TPM pillars and maintains that frequent activities in maintenance like dusting, cleaning, tightening, oiling, greasing and inspection should be performed by operators in order to free maintenance staff to dealing with issues that require a higher technical ability (Robinson & Ginder,1995). According to Shirose (1996) the underlying concept behind AM is the creation of empowered pool of expert operators who will be responsible for taking care of their own equipment. Tajiri and Gotoh (1992) asserts that in the process of carrying out these maintenance activities worker's responsibility towards their tools and equipment would have been achieved and any deflection from the optimal can be easily detected and hence minimize downtime.

AM is the foundation of the eight TPM pillars, meaning that full benefits of TPM cannot be achieved if this pillar is not well executed. Rushing into the execution of the other pillars will be insufficient if the ground is not set by AM. The main objective therefore is to empower the operator with knowledge of all activities at their

disposal in order for him to have the capability of detecting abnormalities in good time and act on them before their consequences become severe.

2.3.2. Focused Improvement

Focused improvement suggests a continuous, structured and team based systematic approach to the determination and eradication of loses in manufacturing/production processes. This pillar is entrenched in the idea that minor continuous improvements are way better than one single big improvement which is not continuous (Ojanga, Muteshi &Okelo, 2019). It involves the formation of cross-functional teams (quality circles) with the objective of continuously and systematically identification of problematic areas or quality problems and discussing the various ways the problems can be handled and the processes improved. As suggested by Suzuki (1994) this pillar focuses in all activities that will at all cost eliminate inspection, as the team of experts will be able to predict and list all the possible failures which are likely to occur and even going further into preventing it from occurring in the first place.

Nakajima (1988) asserts that the goal of this pillar is to achieve zero losses by bringing the chances of process failure, defects and other equipment prone failures to zero. The business environment is ever dynamic characterized by customer demanding for more individualized products, advancement in IT, globalization and fierce competition, this calls for organizations to put all their efforts in coming up with different strategies to remain competitive. This pillar believes that improvements in processes are necessary to match these changes in the external environment.

2.3.3. Planned Maintenance

Planned maintenance advocates for scheduled activities in maintenance based on the observed routine characteristics of the machine or equipment such as breakdowns and

failure rates. The cycles of breakdowns and failures are always broken down when scheduling of maintenance is based on such metrics. The objective of this pillar maintenance is to make sure equipment and machinery are always available whenever needed, maintenance costs are minimized and also spares inventory is at all cost minimized (Venkatesh, 2007).

A proper implementation of planned maintenance reduces incidences of unplanned downtime significantly and enables maintenance activities to be slated during the time when the machines and equipment are not being used. It also reduces piling of spare parts to enable effective controlling of faulty and unreliable parts (Vorne, 2013). Planned maintenance has three elements as suggested by JIPM (1996) including disciplined maintenance planning, trailing of equipment and processing of information and submission regarding scheduling of maintenance.

2.3.4. Quality Maintenance

Quality maintenance pillar advocates for a defect free production process. Zero defects are achieved by setting objective standards and maintaining conditions to specified standards, conducting process inspection and monitoring in order to control deviation and always implement preventive actions before process/equipment failure. This pillar suggests that focus should be on the equipment measures and processes essential for the quality of products and services.

Quality maintenance pillar ingrains into the organization the routine of digging deep into the source of a problem rather than rushing into some quick fixes. The key note in this pillar is its emphasis on preventive action rather than reactive measures (JIPM, 1996). Of importance here is the prevention of defect products and services from going down the value chain to the customer which have some serious consequences in

customer complains/loss, reworks and eventually tarnishing the image of the organization.

2.3.5. Training and Education

It is a facilitating agent of TPM and emphasis on employees to be trained and empowered in skills deemed critical by management for effective application of TPM and in line with the general accomplishment of organizational goals and objectives (Marofi, 2014). There is no success in the implementation of TPM if essential knowledge and skills are not imparted into the workforce as it will provide the organization with a reliable, knowledgeable team that can be at the driving seat of TPM success.

Training and education provides the organization with a revitalized, motivated, and a multi-skilled team which has the capacity to form quality circles to help achieve TPM objectives. The importance of training cannot be overemphasized at this point as it serves as the driving force behind confidence and authority in the execution of duties and employees are not only required to understand the philosophy and practice it but should also be able to pass the same to other employees (Venkatesh, 2007).

2.3.6. Early Equipment Management

Early Equipment Management (EEM) can also be dubbed as the approach of preventing maintenance (Suzuki 1994). It means all the efforts in making sure that equipment setting up decision is right in the first place with regard to matters maintenance. Management and team should go for decisions imparting new equipment that are highly reliable, operationally friendly, maintainable, flexible, economical and safe (Shirose, (1996). EEM therefore brings lean principles into

design and manufacture that significantly reduce costs and improve operational excellence.

EEM emphasizes on the working together of the operating department, maintenance department and equipment design team right from idea generation to capacity planning so that loses due to initial set up can be minimized. It can also include operators and maintenance team sharing their previous experience with regard to existing equipment weaknesses and feeding the information back to manufactures so that new equipment can be improved and customized for easy maintainability and prevention of possible failures and losses (Suzuki, 1994). It is important that manufactures use this information in the customization of machinery/equipment to avoid some predetermined failures and defects.

2.3.7. Office TPM

Office TPM pillar is aimed at improving the general administration of organizations and help in managing of support functions by reinforcing their elementary competences and building an organization that can respond well to change while still observing the essential principles. Office TPM is aimed at achieving healthy collaborations between departments and processes, eliminating unnecessary administrative complications in processes such as procurement, Order handling and scheduling and concentrating on cost optimization activities. Once an organization embraces TPM as its maintenance strategy, it becomes the obligation of Office TPM to organize the departments and aligning the individual department goals to the organization's mission and vision.

It also focuses on coming up with office versions of the other 7 pillars such as putting 5S tool in practice in both offices and working areas so that efficiency can be

achieved all through the organization. Patra, Tripathy and Choudhary (2005) suggest that Office TPM is undertaken to boost productivity, increase efficiency in technical and administration functions and also help in the identification and elimination of losses. This pillar brings into perspective that TPM objectives cannot be fully achieved when maintenance department is working in isolation.

2.3.8. Safety, Health and Environment

It is aimed at achieving significantly reduced workplace accidents and injuries as well as reduction in negative effects on the environment. The assertion is that defective and unreliable equipment are always hazardous to the operator/user and a threat to the environment (JIPM, 2009).

Suzuki (1994) suggests that managing reliability in equipment, averting operator fault, and a complete eradication of accidents and environmental contamination are the vital canons of TPM. Implementing SHE in TPM revolves around the determination and eradication of incidents relating to safety, health and environmental. It also includes all efforts put in the minimization consumption of energy and abolition of contaminated waste.

2.4. Empirical Review

Various research work has been carried out relating TPM practices and performance. Ahuja and Kumar (2009) conducted a study on TPM implementation in the Indian manufacturing industry, a case study of Precision tube mills. The study adopted a descriptive approach. The study revealed that observing TPM initiatives can considerably enhance manufacturing performance enabling the firm to attain competitive advantage for competing in the global market place. Their research however limited the generalizability to the entire population. This study will therefore

take a cross sectional approach by studying the effects of TPM in the entire population of 3-5 star hotels in the Coast region.

A study by Modgil and Sharma (2016) in the Indian pharmaceutical industry relating TPM, TQM and operational performance and revealed that, whenever TPM and TQM philosophies are implemented hand in hand with the objective of enhancing operational performance, it was evident that TPM's influence on operational performance was much stronger than that of TQM. The scholars conducted a survey in 410 pharmaceutical plants and used factor analysis, path model and structural equation modeling to analyze their framework. The study however did not focus so much on the direct relationship between TPM and performance but instead on a combined effort between TQM and TPM and their interrelationships.

An attempt in the service industry was by Haddad and Jaaron (2012) who conducted a study on the applicability of TPM for healthcare facilities in Jordan. Their study was a case study conducted in one of the leading hospitals in Jordan. They adopted a qualitative approach and their findings revealed that TPM adoption was likely to bring substantial radical changes to workers' attitudes towards work in comparison to the traditional maintenance philosophies as practiced by the majority departments, which leads to improvement in productivity and service quality. This study hence shifts the focus into the hotel industry and this time in Kenya.

Locally, a number of researchers have examined the application of TPM practices in the Kenyan industries. Yusuf (2013) undertook a study on adoption of TPM practices as practiced by companies in the food processing industry in Kilifi County. The study was a census and covered all the 20 food processing firms in Kilifi County with descriptive research design adopted for analysis. The findings of the study revealed

that the level of adoption of TPM in the food processing firms in Kilifi was moderate and to a larger extent has influenced performance.

Ngugi (2015) explored how the TPM practices were implemented and its effect on the effectiveness of the equipment at Bamburi Cement Limited. The study used a longitudinal case study design and used secondary data for both the predictor and predicted variables. The findings of the research were that there was a significant effect of implemented TPM practices at Bamburi Cement Limited on performance. The research however employed a longitudinal case study which presents a gap in which the present study will seek to address by conducting a cross-sectional one so that results can be compared across institutions.

Another study is by Ojanga, Muteshi and Okelo (2019) who did a study on the effect of TPM on manufacturing performance of food and non-alcoholic beverage firms in Nairobi County. The research used a descriptive survey design. It targeted all the 43 food and non-alcoholic beverage companies in Nairobi County. The research adopted a multivariate regression model to help in the establishment of the relationship between the independent and the dependent variables. The study revealed that improvement in equipment optimization and strategic employee empowerment practices leads to a significant improvement in manufacturing performance of the food and non-alcoholic beverage firms in Nairobi County. Their study however concentrated on the two broad terms in TPM that is, equipment optimization and strategic employee empowerment in the food and beverage industry and therefore both conceptual and contextual gaps exist.

2.5. Literature Review Summary and Knowledge Gap

Studies reviewed indicate attempted an investigation of how TPM practices benefits the different industries with different contextual backgrounds. Despite the similarities in the study variables, gaps still exist and can take the three different forms of conceptual, contextual or methodological. The studies reviewed consist of both studies done nationally and locally too. Table 2.1 gives the analysis.

Table 2.1: Summary of the Literature and Knowledge Gaps

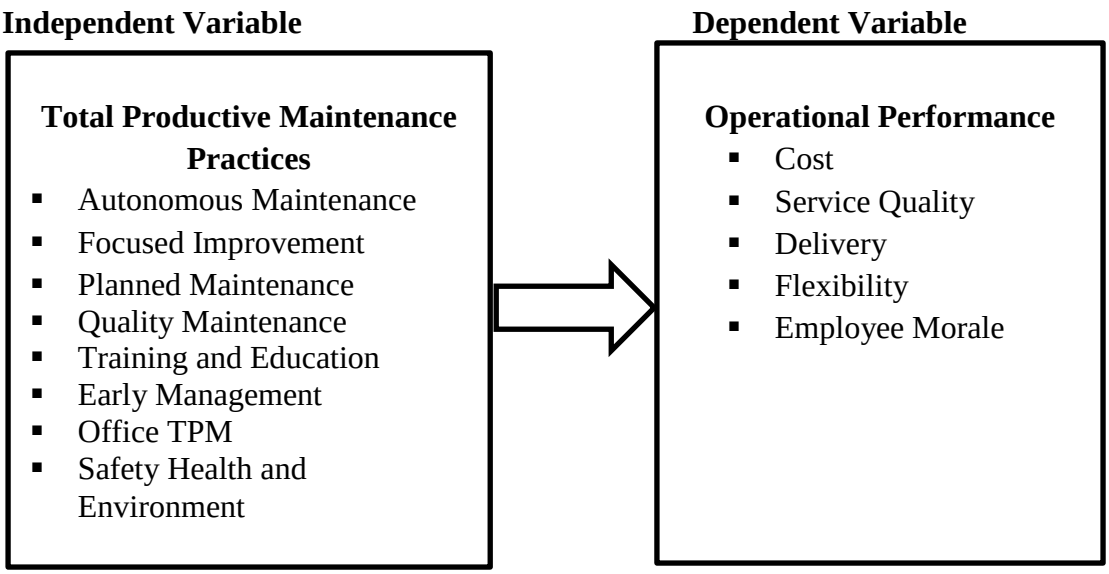
Study by	Study Focus	Methodology	Study Results	Knowledge Gap	Current Study Focus
Ahuja and Kumar (2009)	Total Productive Maintenance implementation in the Indian manufacturing industry	Descriptive research design-a case study	TPM initiatives considerably enhance manufacturing performance enabling firm attaining competitive advantage	A case study focused on manufacturing industry	Will focus on the hotel industry and Will use census study Technique
Modgil and Sharma (2016)	Total Productive Maintenance, Total Quality Management and operational performance	Used factor alalysis,path model and structural equation modeling	TPM's influence on operational performance is much stronger than that of TQM	Focused on a combined effort between TQM and TPM and their interrelationships	Will focus only on the relationship between TPM and operational performance
Haddad and Jaaron (2012)	Applicability of Total Productive Maintenance for healthcare facilities	Study used a qualitative approach	TPM adoption likely to bring substantial radical changes to workers attitudes towards work	Focus on the heath sector in Jordan	Will focus on the hotel industry in Kenya
Ngugi (2015)	Implementation of TPM practices and its effects on equipment effectiveness at Bamburi Cement Limited	Longitudinal case study design and used secondary data	TPM practices have a significant effect on availability, performance and overall equipment effective rates	Employed a longitudinal case study	Will employ a cross-sectional census study
Ojanga, Muteshi and Okelo(2019)	Effects of Total Productive Maintenance on manufacturing performance on food and non-alcoholic beverage firms in Nairobi County	Used a descriptive survey study	Improvement in equipment optimization and strategic employee empowerment practices leads to a significant improvement in manufacturing performance	Their study was skewed to equipment optimization and strategic employee empowerment	Will focus on all the 8 TPM practices and its relationship on operational performance

Source: Research Data (2020)

2.6. Conceptual Framework

Figure 2.1 presents the framework which outlines the relationship between Total Productive Maintenance practices and operational performance. TPM practices represent the independent variable while operational performance represents the dependent variable. Operational performance can assume many dimensions but for the sake of this study the model used costs, service quality, delivery, flexibility, and employee morale. The framework is as given in Figure 2.1:

Figure 2.1: Conceptual Framework



CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This section concentrates on the approach to be embraced in undertaking of this study so as to accomplish the research objectives. Discussed in detail here in was the research design, study population and how useful data was collected and analyzed.

3.2. Research Design

The study employed a descriptive cross-sectional survey as it seeks to study the relationship between the constructs. Descriptive research design helps the researcher in describing the characteristics and behavior of the population under study (Cooper & Schindler, 2006). Descriptive research design has been selected for the advantages it offers among them being less time consuming than quantitative experiments and also gives researchers the opportunity to integrate the qualitative and quantitative methods of data collection. A cross-sectional study was selected because it helps the researcher collect a considerable amount of data within a short time and also at a low cost as the data is collected across the subjects within the same time.

3.3. Population of the Study

It denotes the entireness of the group of people, elements or objects from which a generalization of research findings is to be reached by the researcher (Kothari, 2004). The study targeted the entire population of 33 3-5 star hotels in the Coast region as given by TRA (2018) as per the list given in appendix II. This study used a census survey in data collection as the population of study is considerably small (Zhang, 2009).

3.4. Data Collection

The research used primary data which was collected by the use of a semi structured likert-type questionnaires. Questionnaires are a preferred data collection tool since they enable researchers to obtain more information within a short period (Orodho & Kombo, 2002). Structured questionnaire helped the researcher in getting responses which was uniform across the hotels under study. The questionnaire had three sections. Section A of the questionnaire composed of data on the organization; section B contained TPM practices and section C had data on operational performance.

The unit of observation comprised of the general managers, maintenance personnel and human resource managers in the hotels and the questionnaire was administered through a one on one engagement with the respondents. However, in cases where the respondent was not available, then the questionnaire was dropped to be collected later. The advantage of having face to face engagements is that it provided a more relaxed atmosphere to respondents when giving their feedback (Boyce & Neale, 2006).

3.5 Operationalization of Study Variables

It involves the definition of the study elements into some observed and measured aspects which can be expressed either quantitatively or qualitatively. This study had the total productive maintenance practices as the independent variable and operational performance as the response element. The constructs were operationalized as per Table 3.1.

Table 3.1: Operationalization of Study Variables

Variable	Sub Variables	Indicators	Source
Independent variable **Total Productive Maintenance Practices**	Autonomous Maintenance	▪ Program for routine maintenance. ▪ Ownership of machines by operators. ▪ Availability of spare parts. ▪ Training in equipment & machinery inspection procedures	Ahuja I.P.S & Kumar.(2009)
	Focused Improvement	▪ Small group activities (quality circles). ▪ Recording of maintenance equipment history. ▪ Appraisal & review of maintenance program. ▪ Action plan for analysis of bottlenecks.	Aspinwall. E., & Elgharib,M. (2013)
	Planned Maintenance	▪ Inspection & calibration program for equipment. ▪ Reports on inspection submitted, filed & acted upon. ▪ Periodic inspection & examination of machinery & equipment. ▪ Optimal spare parts inventory levels.	Modgil, S & Sharma S. (2016)
	Quality Maintenance	▪ Standard values for machinery &equipment ▪ Defects identified & classified. ▪ Stipulated frequency of interval inspection. ▪ System for recording maintenance.	
	Training & Education	▪ Trainings & seminars in relation to maintenance &TPM. ▪ Instructors from within the hotel. ▪ TNA constantly done. ▪ HRM participation in TPM	
	Early Management	▪ Technicians and operators' role in procurement & installation of machinery & equipment. ▪ Experience in controlling & monitoring of devices. ▪ Program for preventive maintenance. ▪ Training on new equipment before use.	
	Office TPM	▪ Coordination among departments. ▪ Tussles removed in procurement processes. ▪ 5S adopted in offices. ▪ Proper filing system and easy retrieval of information.	

Variable	Sub Variables	Indicators	Source
	Safety, Health & Environment	▪ A program for occupational safety. ▪ Annual medical checkups and insurance cover for staff. ▪ A policy for recycling materials & waste disposal. ▪ Training in first aid 7 systems for emergency procedures.	
Operational Performance **Dependent Variable**	Cost reduction	▪ Decrease water bills. ▪ Lower cost of energy. ▪ Reduction in maintenance cost. ▪ Reduction in inventory levels ▪ Reduction in additional capital expenditure	Gunasekaran, Patel and Tirtiroglu (2001)
	Service quality	▪ Repeat clients ▪ Increase in referral business. ▪ Reduction in customer complaints. ▪ Improved profit levels. ▪ High customer loyalty	Lee (2002)
	Delivery	▪ Reduced service delivery time. ▪ Enhancement of productivity. ▪ Reduction in lead time. ▪ Reduction of setup time.	Harland, Telgen, Knight, Callendar and Thai (2009)
	Flexibility	▪ Improved service innovativeness. ▪ Fast response. ▪ Reduced customer complaints. ▪ More customized services.	
	Employee morale	▪ Minimal staff turnover rate. ▪ Reduction in accidents. ▪ Reduction in absenteeism at work. ▪ Increased productivity.	

Source: Researcher (2020)

3.6 Reliability and Validity Tests

Reliability test was conducted in research to ascertain the consistency of the research instrument adopted for data collection. Reliability test to the Likert scale questionnaire was conducted using the Cronbach's alpha test which gives results of values from 0-1 with the general rule of thumb being a cronbach's alpha of 0.7 and above being good. Gall, Gall and Borg (2007) describes validity as the credibility, conformity or dependency of qualitative research. External validity was ensured by

conducting a census study while the internal validity was assured by conducting a factor analysis to ascertain whether all the question items measure the same construct.

3.7 Diagnostic Tests

To test normality of the data, Shapiro-wilk Test was used because the population was less than 50 units. The null hypothesis that data was normally distributed was not rejected if the p-value was found to be greater than 0.05. Correlation between the predictor variables (multicollinearity) was assessed using the variance inflation factor (VIF) with the rule of thumb considering a VIF greater than 10 to be too much multicollinearity. In testing heteroscedasticity, there was the use of Koenker test with accepted value being above 0.05. Durbin-Watson test was used to test autocorrelation to tell whether the adjacent residuals were correlated. Durbin-Watson statistic assumes values from 0-4, with a value of 2 indicating a lack of serial correlation. To test linearity, there was the need to help in establishing how the constructs relate and whether they are linear or not with values being greater than 0.05.

3.7. Data Analysis

Descriptive statistics was used to measure central tendency and variability which were considered key in analyzing the data on the TPM practices adopted by the hotels. The simple summaries provided by descriptive statistics measures provided a quick description and understanding of the basic characteristics of the elements under study which addressed objective one. Multiple regression analysis was used in analyzing how TPM practices relate to operational performance in the 3-5 star hotels in Coast region and the determination of how the variables correlate.

Multiple regression analysis model was used to assess how TPM practices affect operational performance as shown:

$$Y = \beta_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$$

Where the variables are defined as:

Y- Operational performance index (dependent variable)

$ß_0$ = Constant

X_1 = Autonomous maintenance

X_2 = Continuous improvement

X_3 = Planned maintenance

X_4 = Quality maintenance

X_5 = Training and education

X_6 = Early management

X_7 = Office TPM

X_8 = Safety Health and Environmental

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ = Variables coefficients

ε = Error term

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This section is an emphasis on data analysis and the study findings. The focus was on the research objectives. The focus of the study was meant to find out how TPM affect operational performance of hotels in the Coast region. The specific objectives included the determination of how the TPM practices were adopted by the 3-5 star hotels in the Coast region and to determine how TPM practices affect operational performance of 3-5 star hotels in the Coast region. Out of the thirty-three (33) 3-5 star hotels targeted, 26 responded. This indicated a response rate of 78.8%. The adequacy of the response rate was verified since it was above 50% as recommended by Mugenda and Mugenda (2012).

4.2 General Information

The analysis included name of the hotel, department/ function, position held in the hotel, how long the hotel has been operating, the total number of workers in the hotel, the length of service in the current position and guest rooms the hotel has. The respondents were the general managers, maintenance personnel and human resource managers. These persons were deemed to be knowledgeable regarding total productive maintenance practices adopted by the hotels making the data reliable.

Table 4.1 indicates descriptive analysis of the general information. It was found out that majority of the hotels making up 42.3% had operated for more than 15 years while 30.8% had operated for between 10-15 years. 15.4% of the hotels had however operated for between 0-5 years' while 11.5% had operated for between 6-10 years. The implication is that the longer the duration of operations, the more

possibility that the hotels have put in place total productive maintenance practices for efficiency and cost effectiveness.

The study also found out that 42.3% of the respondents had been in the positions for between 10-15 years, 23.1% for between 6-10 years, 19.2% for between 0-5 years while the least representing 15.4% having been in their positions for over 15 years. The implication was that a number of the respondents were in such positions for a reasonable period of time to provide the requisite information needed on the subject matter of research. This offers a further reflection that the data gathered was credible, valid and good to be analyzed to examine the intended objectives.

Regarding the total number of workers, it was established that majority of the hotels making up 46.2% had employees ranging between 151-200 with 34.6% having employees of between 100-150 and 7.7% had between 51-100 and above 200 employees. Only 3.8% of the hotels had the least number of between 1-50 employees. Most of the hotels had many employees that justify the need for total productive maintenance practices and the fact that there are enough employees to see through successful total productive maintenance practices.

Finally, information was sought regarding the number of guest rooms that the hotels have. It was established that 69.2% had above 100 guest rooms while 30.8% of the hotels had between 51-100 guest houses. The implication of the findings is that the many guest rooms justify the need for total productive maintenance practices. The analysis is as given in Table 4.1:

Table 4.1: General Information

Number of Years in Operation	**Frequency**	**Percent**	**Valid Percent**
0-5 years	4	15.4	15.4
6-10 years	3	11.5	11.5
10-15 years	8	30.8	30.8
over 15 years	11	42.3	42.3
Total	26	100.0	100.0
Duration in the Current Position	**Frequency**	**Percent**	**Valid Percent**
0-5 years	5	19.2	19.2
6-10 years	6	23.1	23.1
10-15 years	11	42.3	42.3
Over 15 years	4	15.4	15.4
Total	**26**	**100.0**	**100.0**
Total Number of Employees	**Frequency**	**Percent**	**Valid Percent**
1-50	1	3.8	3.8
51-100	2	7.7	7.7
100-150	9	34.6	34.6
151-200	12	46.2	46.2
Above 200	2	7.7	7.7
Total	**26**	**100.0**	**100.0**
Number of Guest Rooms	**Frequency**	**Percent**	**Valid Percent**
51-100	8	30.8	30.8
Above 100	18	69.2	69.2
Total	**26**	**100.0**	**100.0**

Source: Research Data (2020)

4.2 Reliability and Validity Test

4.2.1 Reliability Test

Reliability test to the Likert scale questionnaire was conducted using the Cronbach's alpha test. Cronbach's alpha coefficient was used to establish whether the variables fall within the required range of between 0 and 1 (Mugenda & Mugenda, 2012). The result of the test is given in Table 4.2:

Table 4.2: Reliability Test

Part of the Questionnaire	Variable	Number of Items	Cronbach's Alpha if Item Deleted	Remarks
PART II	Autonomous maintenance	4	.772	Reliable
PART II	Focused improvement	4	.733	Reliable
PART II	Planned maintenance	4	.814	Reliable
PART II	Quality maintenance	4	.760	Reliable
PART II	Training and education	4	.721	Reliable
PART II	Early management	4	.730	Reliable
PART II	Office TPM	4	.701	Reliable
PART II	Safety health and environment	4	.714	Reliable
PART III	Operational performance	22	.686	Reliable

Source: Research Data (2020)

This study used values of 0.6 and above as a cut-off point for the items. The analysis carried out revealed that Cronbach's Alphas for all the variables used in this study were above 0.6 leading to a conclusion that the scale was very reliable.

4.2.2 Validity Test

The questionnaire used satisfied face and content validity since it was developed through a review of literature in consultation with academic experts of the management science department. External validity was ensured by conducting a census study while the internal validity was assured by conducting a factor analysis to ascertain whether all the question items measure the same construct. As argued by Gall, Gall and Borg (2007) validity refers to the credibility, conformity or dependency of qualitative research. Kaiser-Meyer-Olkin (KMO) test and Bartlett's Sphericity test were used to assess if the items were fit for factor analysis. It was observed that all the constructs used in the research instruments had KMO values above 0.7 and all the values of chi-

square in Bartlett's Sphericity test were significant at a level less than 0.05. This therefore meant that the data was valid.

4.3 Extent of Adoption of TPM Practices by 3-5 Star Hotels

To establish whether TPM practices were adopted by the 3-5 star hotels, the response was analyzed using the scale of (1) Very low (2) Low (3) Average (4) High (5) Very high. The summary was expressed as follows:

4.3.1 Autonomous Maintenance

The study found out that the hotels implemented autonomous maintenance to a high level with an average mean of 4.2596 as given in Table 4.2. The indication was that the hotels had a well stipulated program for first level (routine) maintenance and a clear schedule for maintenance activities in place with a mean of 4.4615 while it was also found out that spare parts and all maintenance inventory for machinery and equipment were always available when required with a mean of 4.2308. The hotels were also found to have put in place training in inspection procedures for equipment and machinery for operators and that there were operators responsible for making sure machines and equipment are cleaned, lubricated, tightened and maintained regularly each having a mean of 4.1923 and 4.1538 respectively. The standard deviations indicate variations in response by the respondents such that a higher standard deviation was an indication of a higher variation as given in Table 4.3:

Table 4.3: Autonomous Maintenance

Variables	N	Mean	Std. Deviation
A well stipulated program for first level (routine) maintenance and a clear schedule for maintenance activities in place	26	4.4615	.58177
Operators responsible for making sure machines and equipment are cleaned, lubricated, tightened and maintained regularly	26	4.1538	.78446
Spare parts and all maintenance inventory for machinery and equipment always available when required	26	4.2308	.65163
Training in inspection procedures for equipment and machinery for operators (users of equipment)	26	4.1923	.74936
Average Mean Value		**4.2596**	

Source: Research Data (2020)

4.3.2 Focused Improvement

The study found out that focused improvement practices were practiced at an average level with an average mean of 3.8366. Specifically, it was found out that there was recording of maintenance equipment history for future improvement and use and that the hotels had action plan highlighting schedule for analysis of bottlenecks and predicted counter measures each with a mean of 4.1154. It was also established that there was appraising and reviewing of maintenance program in line with change management with a mean of 4 and there was equally a problem solving multidisciplinary team to achieve maintenance quality and work in achieving hotel's set targets with a mean of 3.1154 (SD=.95192). The analysis is given in Table 4.4:

Table 4.4: Focused Improvement

Variables	N	Mean	Std. Deviation
Problem solving multidisciplinary team (small group activities) to achieve maintenance quality and work in achieving hotel's set targets	26	3.1154	.95192
Recording of maintenance equipment history for future improvement and use	26	4.1154	.71144
Appraising and reviewing maintenance program in line with change management	26	4.0000	.93808
Action plan highlighting schedule for analysis of bottlenecks and predicted counter measures.	26	4.1154	.76561
Average Mean Value		**3.8366**	

Source: Research Data (2020)

4.3.3 Planned Maintenance

The study found out that planned maintenance was practiced by the hotels to a higher extent with a mean of 4.3654. Specifically, the study established that the hotels put in place inspection and calibration program for machinery and equipment as well as the existence of reports on inspection exercise that were submitted, filed and acted upon with a mean of 4.5 (SD=.64807) and 4.4231 (SD=.64331) respectively. It was also established that the hotel kept optimal spare parts inventory levels and that there was periodic inspection and examination of machinery and equipment for monitoring the conditions to ascertain trends in downtime or complete failure each having a mean of 4.3462 (SD=.74524) and 4.1923 (SD=.69393). Table 4.5 indicates the analysis of what was found out:

Table 4.5: Planned Maintenance

Variables	N	Mean	Std. Deviation
Inspection and calibration program for machinery and equipment	26	4.5000	.64807
Reports on inspection exercise are submitted, filed and acted upon	26	4.4231	.64331
Periodic inspection and examination of machinery and equipment for monitoring the conditions to ascertain trends in downtime or complete failure	26	4.1923	.69393
The hotel keeps optimal spare parts inventory levels	26	4.3462	.74524
Average Mean Value		**4.3654**	

Source: Research Data (2020)

4.3.4 Quality Maintenance

The study established that the hotels practiced quality maintenance to an average extent with an average mean of 3.8750. The hotels had stipulated frequency of interval inspection of importance features in the hotel value chain and a system for recording maintenance of machinery and equipment each with a mean of 3.9615. The study also established that there are standard values of machinery and equipment established and evaluation of the results by means of measurement with a mean of 3.8077 (SD=.80096) and that defects are identified and classified in the way in which they occur, their effects and the rate of recurrence with a mean of 3.7692 (SD=.86291). The implication is that the hotels are keen on ensuring that quality is attained and sustained over time. The analysis is given in Table 4.6:

Table 4.6: Quality Maintenance

Variables	N	Mean	Std. Deviation
Standard values of machinery and equipment established and evaluation of the results by means of measurement.	26	3.8077	.80096
Defects identified and classified in the way in which they occur, their effects and the rate of recurrence.	26	3.7692	.86291
Stipulated frequency of interval inspection of importance features in the hotel value chain.	26	3.9615	.91568
A system for recording maintenance of machinery and equipment.	26	3.9615	.91568
Average Mean Value		**3.8750**	

Source: Research Data (2020)

4.3.5 Training and Education

The study found out that on an average basis, the hotels conducted trainings and education with an average mean of 3.8846. Specifically, the study found out that the hotels developed instructors from within the hotel staff to offer maintenance skills and there is HRM participation in the whole idea of TPM each with a mean of 4.1538 (SD=.67482) and 3.9615 (SD=.91568) respectively. It was also established that Training Need assessment (TNA) were constantly done to ascertain the gap of knowledge and skills to be filled with a mean of 3.8462 (SD=.92487). Finally, it was established that trainings and seminars were conducted in relation to maintenance and TPM implementation having a mean of 3.5769 (SD=.85665). Table 4.7 indicates the study outcomes:

Table 4.7: Training and Education

Variables	N	Mean	Std. Deviation
Trainings and seminars conducted in relation to maintenance and TPM implementation.	26	3.5769	.85665
Developing instructors from within the hotel staff to offer maintenance skills.	26	4.1538	.67482
Training Need assessment (TNA) constantly done to ascertain the gap of knowledge and skills to be filled.	26	3.8462	.92487
HRM participation in the whole idea of TPM	26	3.9615	.91568
Average Mean Value		**3.8846**	

Source: Research Data (2020)

4.3.6 Early Management

The study found out that the hotels adopted early management as a practice to a higher basis having a mean of 4.0192. It was further established that the hotels have programs in place for preventive maintenance and that maintenance department have a role in procurement and installation of equipment and machinery each having a mean of 4.1538 (SD=.83390) and 4.0385 (SD=.82369) respectively. The study also established that the hotels have experience in controlling and monitoring of devices while at the same time training workers on new equipment and machinery before commencement of real work and also the use of prototypes each with a mean of 3.9615 (SD=.87090) and 3.9231 (SD=.79614) respectively. The analysis is given in Table 4.8:

Table 4.8: Early Management

Variables	N	Mean	Std. Deviation
Maintenance department (both technicians and operators) role in procurement and installation of equipment and machinery.	26	4.0385	.82369
Experience in controlling and monitoring of devices	26	3.9615	.87090
Program for preventive maintenance i.e. using experiences with old equipment to acquire a new one.	26	4.1538	.83390
Training on new equipment and machinery before commencement of real work and also the use of prototypes.	26	3.9231	.79614
Average Mean Value		**4.0192**	

Source: Research Data (2020)

4.3.7 Office TPM

Table 4.9 indicates that the hotels adopted office TPM to a high extent having a mean of 4.0193. It further show that there is coordination among operations, maintenance and planning and that the hotels maintain the right and pleasant office environment by clearing away sources of worker fatigue and demonstrate importance of 5S and existence of proper filing system and easy retrieval of information each with a mean of 4.0769 (SD=.79614), 4.0385 (SD=.77360) and 4.0385 (SD=.82369) respectively. The study also established that there exists a procurement process made smooth and shortened with maintenance team being key in coming up with specifications having a mean of 3.9231(SD=.74421).

Table 4.9: Office TPM

Variables	N	Mean	Std. Deviation
Coordination among operations, maintenance and planning.	26	4.0769	.79614
Procurement process made smooth and shortened with maintenance team being key in coming up with specifications.	26	3.9231	.74421
Bright and pleasant office environment by clearing away sources of worker fatigue and demonstrate importance of 5S.	26	4.0385	.77360
Proper filing system and easy retrieval of information	26	4.0385	.82369
Average Mean Value		**4.0193**	

Source: Research Data (2020)

4.3.8 Safety, Health and Environment

The findings in Table 4.10 indicate that on average, the safety, health and environment-based practice was adopted at average level by the hotels as indicated by the average mean of 3.8366. Further, it established that there exist annual medical checkups and insurance cover for staff and that a policy exists for reusing recycled materials and waste disposal mechanism-waste bins for normal waste each with a mean of 4 (SD=.93808) and 3.8462 (SD=.92487) respectively. The study also established that the hotels undertake training in first aid and systems for emergency procedures and there is a program for occupational safety and measures for failure of not using protective gears and equipment-safety standard operating procedure across the organization given by a mean of 3.7692 (SD=.99228) and 3.7308 (SD=.96157) respectively.

Table 4.10: Safety, Health and Environment

Variables	N	Mean	Std. Deviation
A program for occupational safety and measures in place for failure of not using protective gears and equipment-safety standard operating procedure across the organization.	26	3.7308	.96157
Annual medical checkups and insurance cover for staff	26	4.0000	.93808
A policy for reusing recycled materials and waste disposal mechanism-waste bins for normal waste (NEMA certification).	26	3.8462	.92487
Training in first aid and systems for emergency procedures	26	3.7692	.99228
Average Mean Value		**3.8366**	

Source: Research Data (2020)

4.4 Operational Performance

The researcher sought information on the level of operational performance of the hotels as a result of adoption of the TPM practices. The result is as given in Table 4.11:

Table 4.11: Operational Performance

Operational Performance Variable	N	Mean	Std. Deviation
Cost Reduction	26	4.1231	.36694
Service Delivery	26	3.9769	.39730
Delivery Time	26	3.8942	.60899
Flexibility	26	3.9808	.45784
Employee Morale	26	3.8654	.46492
Average Mean Value		**3.9681**	

Source: Research Data (2020)

Table 4.11 show that operational performance was experienced by the hotels moderately having an average mean of 3.9681. The study established that the greatly

achieved operational performance measure was cost reduction, followed by flexibility and then service delivery each having a mean of 4.1231 (SD=.36694), 3.9808 (SD=.45784) and 3.9769 (SD=.39730) respectively. The study also established that there was realization of effective delivery time and improved employee morale each having a mean of 3.8942 (SD=.60899) and 3.8654 (SD=.46492).

4.5 Effect of Total Productive Maintenance on Operational performance

Table 4.12 is a summary of the independent and dependent variable.

Table 4.12: Total Productive Maintenance and Operational Performance

Respondents	AM	FI	QM	TE	EM	OTPM	SHE	PM	OP
1	3.75	3.25	3.75	4.25	4.25	4	4	4.75	4.08
2	4.75	3.5	4	4	4.25	4.5	4	4.75	4.67
3	4.25	3.75	4	3.75	4.75	4.5	4.5	4.75	4.47
4	4.15	3.75	4.25	4.5	4.75	4.25	4.25	4.75	4.32
5	4.25	3.75	4	4.25	4.75	4.25	4	4	4.22
6	3.65	3.75	3.75	4.25	4.25	3.5	4.25	4	4.19
7	3.7	4.75	4.5	4.25	4	4.5	4	5	4.04
8	3.55	4.25	3.25	4	3.5	4.25	4.75	4.25	3.85
9	4.75	4.75	4	3.5	4.25	3.5	4.25	4.5	4.16
10	3.25	4	3.75	4	3.75	4	4.5	4	3.88
11	3.8	3.25	3.25	3.25	4.75	4	4.5	4.25	3.87
12	4	3.5	3.75	3.75	3.75	4	3.5	3.75	3.94
13	4	3.75	3.5	3.5	4	3.25	2.5	4.5	3.49
14	3	4.25	4.25	3.75	3.5	3.5	3.5	4	3.51
15	3.1	3.75	4.25	3.75	3	3.25	3.5	4.25	3.69
16	4	3.75	4.25	3	3.5	4.25	3.75	3.75	3.79
17	4.75	4.75	4	3.25	3.75	3.75	3.75	4.75	3.9
18	4.25	3.75	4.25	3	4.75	4.5	3.25	4	4.01
19	4	3.5	3.25	3.75	4.25	3.75	3.25	4.5	3.96
20	3.2	2.25	3.25	4	4	4	3.25	4.75	3.55
21	3.35	4	4.25	4	3.75	4.5	3	4.75	3.84
22	4	4.5	3.5	3.75	3.5	4	4.25	4.5	4
23	3.75	4	4.5	4.5	3.75	4.25	3.5	4.25	3.81
24	3.8	3.5	3.75	4	3.75	4	3.75	4	3.86
25	4	4.25	3.5	4.75	4	4.25	4	4.5	4.01
26	4	3.5	4	4.25	4	4	4	4.25	4.06

Source: Research Data (2020)

Table 4.12 summarizes the antecedents of independent variable TPM and the antecedents of the dependent variable operational performance. The summary formed the basis of computation of diagnostic statistics. The researcher computed Pearson bivariate correlation to ascertain how the variables correlate.

4.5.1 Diagnostic Test

The tests helped to confirm non-violation of significant regression assumptions. The extent to which the data was normal is given in Table 4.13. It indicates normality of data since Shapiro Wilk values were above 0.05. Shapiro Wilk values were considered superior than Kolmogrov-Smirnov test in the assessment of data normality.

Table 4.13: Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Autonomous Maintenance	.204	26	.007	.886	26	.008
Focused Improvement	.179	26	.032	.917	26	.037
Quality Maintenance	.165	26	.068	.923	26	.053
Training and Education	.151	26	.130	.957	26	.339
Early Management	.140	26	.200*	.926	26	.064
Office TPM	.211	26	.004	.904	26	.019
Safety Health and Environment	.160	26	.086	.963	26	.444
Planned Maintenance	.168	26	.056	.920	26	.045
Operational Performance	.110	26	.200*	.963	26	.456

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The testing of heteroscedasticity was done using Koenker test. Here, a p-Value > 0.05 indicated existence of homoscedasticity. The researcher conducted the test beginning with, the macro syntax by Gwilym Pryce on Breusch-Pagan and Koenker which was run to generate the results therein:

Breusch-Pagan and Koenker test statistics and sig-values

	LM	Sig
BP	3.954	.861
Koenker	5.979	.650

Null hypothesis: heteroscedasticity not present (homoscedasticity)

Based on the null hypothesis a sig-value of less than 0.05 means the residuals are normally distributed.

A smaller sample of 26 was involved and therefore the Koenker Test for Heteroscedasticity was deemed appropriate. At a level of significance of 0.05, the data was found to be homoscedastic ($p>0.05$).

Durbin-Watson test was used to test autocorrelation to tell whether the adjacent residuals were correlated. The analysis in Table 4.13 show that Durbin-Watson value of $d = 2.270$ falls between the required values of $1.5 < d < 2.5$. Therefore, it was assumed that there was no auto-correlation in the data.

Table 4.14: Autocorrelation Test

Model	**Durbin Watson Test**
Safety health and environment, planned maintenance, quality maintenance, autonomous maintenance, early management, training and education, office TPM, focused improvement and operational performance	2.270

Source: Research Data (2020)

The evaluation of multicollinearity was done through the use of VIF and tolerance values. VIF values should fall below 10 but above 1 (O'Brien, 2007). Table 4.15 established that the values were less than 10 while the tolerance values were above 0.20. The indication was that multicollinearity did not exist among the independent variables under study.

Table 4.15: Multicollinearity Test

	Collinearity Statistics	
Variables	**Tolerance**	**VIF**
Autonomous Maintenance	.547	1.828
Focused Improvement	.525	1.906
Quality Maintenance	.682	1.466
Training and Education	.755	1.324
Early Management	.520	1.921
Office TPM	.706	1.416
Safety Health and Environment	.676	1.480
Planned Maintenance	.790	1.265

a. Dependent Variable: Operational Performance

Finally, the data was found to be linear because the p-values were higher than 0.05. This is indicated in Table 4.16 where $p<0.05$ thus indicating existence of linearity.

Table 4.16: Linearity Test

Variable	**Deviation from Linearity**	**Significance Level**
Operational Performance and Planned Maintenance	0.379	0.821
Operational Performance and Autonomous Maintenance	1.649	0.208
Operational Performance and Focused Improvement	0.896	0.518
Operational Performance and Quality Maintenance	2.780	0.055
Operational Performance and Training and Education	0.163	0.983
Operational Performance and Early Management	1.198	0.343
Operational Performance and Office TPM	0.710	0.595
Operational Performance and Safety, Health and Environment	1.393	0.271

Source: Research Data (2020)

4.5.2: Pearson Correlation Co-efficient

Table 4.17 indicate that autonomous maintenance, early management, office TPM and safety, health and environment had a positively moderate and significant correlation with operational performance given by r = .640; p=.000; r = .587; p=.002;

r = .482; p=.013 and r = .541; p=.004 respectively. The implication is that improved autonomous maintenance, early management, office TPM and safety, health and environment leads to significant improvement in operational performance.

The study also found out that focused improvement, quality maintenance, training and education and planned maintenance have a weak positive and insignificant correlation with operational performance as given by r = .086; p=.678; r = .170; p=.406; r = .255; p=.209 and r=.274; p=.176 respectively. This implies that, despite improved operational performance arising from improved focused improvement, quality maintenance, training and education and planned management, the effect was not significant.

Table 4.17: Pearson Correlation Co-efficient

		Autonomous maintenance	Focused improvement	Quality maintenance	Training & education	Early management	Office TPM	Safety health & environment	Planned maintenance	Operational performance
Autonomous maintenance	Pearson Correlation	1								
	Sig. (2-tailed)									
	N	26								
Focused improvement	Pearson Correlation	.250	1							
	Sig. (2-tailed)	.219								
	N	26	26							
Quality maintenance	Pearson Correlation	.064	.373	1						
	Sig. (2-tailed)	.757	.061							
	N	26	26	26						
Training and education	Pearson Correlation	-.222	-.039	.043	1					
	Sig. (2-tailed)	.277	.848	.835						
	N	26	26	26	26					
Early management	Pearson Correlation	.487*	-.252	-.069	.035	1				
	Sig. (2-tailed)	.012	.213	.739	.866					
	N	26	26	26	26	26				
Office TPM	Pearson Correlation	.204	-.033	.237	.204	.349	1			
	Sig. (2-tailed)	.318	.874	.244	.317	.081				
	N	26	26	26	26	26	26			
Safety health and environment	Pearson Correlation	.154	.234	-.128	.212	.205	.252	1		
	Sig. (2-tailed)	.451	.250	.534	.298	.315	.213			
	N	26	26	26	26	26	26	26		
Planned maintenance	Pearson Correlation	.203	.102	.000	.260	.211	.205	-.002	1	
	Sig. (2-tailed)	.321	.621	1.000	.200	.300	.315	.992		
	N	26	26	26	26	26	26	26	26	
Operational performance	Pearson Correlation	.640**	.086	.170	.255	.587**	.482*	.541**	.274	1
	Sig. (2-tailed)	.000	.678	.406	.209	.002	.013	.004	.176	
	N	26	26	26	26	26	26	26	26	26

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

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

4.5.3 Regression Analysis

Table 4.18 indicates the outcome of how independent and dependent variables are related. R^2 is the coefficient of determination.

Table 4.18: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.905[a]	.819	.734	.14078

a. Predictors: (Constant),
b. Dependent Variable: operational performance

The findings in Table 4.18 indicate R = 0.905 implying that TPM practices and operational performance are positively related. The adjusted R^2 of .734 imply that 73.4% of variations in operational performance is caused by variations in the TPM practices studied. The indication is that only 26.6% of variations in operational performance is caused by factors not included in the variable that formed the study. The general implication is that there are other certain factors affecting operational performance other than TPM practices.

Table 4.19 indicates a significant relationship between TPM practices and operational performance at 0.00 ($p<0.05$). This implies that TPM practices reliably predict operational performance by the 3-5 star hotels in coastal region, Kenya. It was found out that the model was reliable enough to help predict the relationship between TPM practices and operational performance by the 3-5 star hotels in coastal region, Kenya.

Table 4.19: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.524	8	.190	9.612	.000[b]
	Residual	.337	17	.020		
	Total	1.861	25			

a. Dependent Variable: operational performance

b. Predictors: (Constant)

Table 4.20 regarding regression coefficients indicates individual relationship between the various predictor variables with operational performance by the 3-5 star hotels in coastal region, Kenya.

Table 4.20: Regression Coefficients

Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	.227	.550		.413	.685
Autonomous maintenance	.323	.080	.562	4.027	.001
Focused improvement	.108	.072	.215	1.507	.150
Quality maintenance	.176	.088	.251	2.007	.061
Training and education	.136	.072	.224	1.889	.076
Early management	.077	.083	.133	.927	.367
Office TPM	.059	.088	.082	.665	.515
Safety, health and environment	.228	.065	.441	3.515	.003
Planned maintenance	.061	.089	.080	.687	.502

a. Dependent Variable: Operational performance

The findings in Table 4.20 indicate that autonomous maintenance and safety, health and environment have positive and significant effect on operational performance as given by β=.562 ($p<0.05$) and β =.441 ($p<0.05$) respectively. The findings also indicate that focused improvement, quality maintenance, training and education, early management, office TPM and planned management have positive effect on operational performance though their effect is not significant as given by β=.215

(p=0.150); β =.251 (p=0.061); β=.224 (p=0.076); β =.133 (p=0.367); β=.082 (p=0.515) and β=.080 (p=0.502) respectively.

Based on the findings, the multiple regression analysis model can be constituted as follows:

$Y= 0.227 + .562X_1 + .215X_2 + .080X_3 + .251X_4 + .224X_5 + .133X_6 + .082X_7 + .441X_8 + \varepsilon$

Where the variables are defined as:

Y- Operational performance index (dependent variable)

β_0 = Constant

X_1 = Autonomous maintenance

X_2 = Focused improvement

X_3 = Planned maintenance

X_4 = Quality maintenance

X_5 = Training and education

X_6 = Early management

X_7 = Office TPM

X_8 = Safety Health and Environmental

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ = Variables coefficients

ε = Error term

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section covers the research findings, conclusions and recommendations reached. Further, it comprises of the insights regarding limitations of the study and areas for future research based on the current findings.

5.2 Summary of Findings

The study found out that the hotels implemented autonomous maintenance to a high level with an average mean of 4.2596. The indication was that the hotels had a well stipulated program for first level (routine) maintenance and a clear schedule for maintenance activities in place with a mean of 4.4615 while it was also found out that spare parts and all maintenance inventory for machinery and equipment were always available when required having a mean of 4.2308. The study also found out that the hotels had put in place training in inspection procedures for equipment and machinery for operators and that there were operators responsible for making sure machines and equipment are cleaned, lubricated, tightened and maintained regularly each having a mean of 4.1923 and 4.1538 respectively.

The study also found out that focused improvement practices were practiced at an average level with an average mean of 3.8366. Specifically, the study established that there was recording of maintenance equipment history for future improvement and use and that the hotels had action plan highlighting schedule for analysis of bottlenecks and predicted counter measures each with a mean of 4.1154. It was also established that there was appraising and reviewing of maintenance program in line with change management with a mean of 4 and there was equally a problem solving

multidisciplinary team to achieve maintenance quality and work in achieving hotel's set targets with a mean of 3.1154 (SD=.95192). Equally, the hotels had planned maintenance practiced by the hotels to a higher extent with a mean of 4.3654. Specifically, the study established that the hotels put in place inspection and calibration program for machinery and equipment as well as the existence of reports on inspection exercise that were submitted, filed and acted upon with a mean of 4.5 (SD=.64807) and 4.4231 (SD=.64331) respectively. It was also established that the hotel kept optimal spare parts inventory levels and that there was periodic inspection and examination of machinery and equipment for monitoring the conditions to ascertain trends in downtime or complete failure each having a mean of 4.3462 (SD=.74524) and 4.1923 (SD=.69393).

The study equally found out that the hotels practiced quality maintenance to an average extent with an average mean of 3.8750. The hotels had stipulated frequency of interval inspection of importance features in the hotel value chain and a system for recording maintenance of machinery and equipment each with a mean of 3.9615. It also found out that there are standard values of machinery and equipment established and evaluation of the results by means of measurement with a mean of 3.8077 (SD=.80096) and that defects are identified and classified in the way in which they occur, their effects and the rate of recurrence with a mean of 3.7692 (SD=.86291). The implication is that the hotels are keen on ensuring that quality is attained and sustained over time.

Regarding the practice of training and education, it was found out that the hotels conducted trainings and education with an average mean of 3.8846. The study specifically established that the hotels developed instructors from within the hotel

staff to offer maintenance skills and there is HRM participation in the whole idea of TPM each with a mean of 4.1538 (SD=.67482) and 3.9615 (SD=.91568) respectively. It was also established that Training Need assessment (TNA) were constantly done to ascertain the gap of knowledge and skills to be filled with a mean of 3.8462 (SD=.92487). Finally, it was established that trainings and seminars were conducted in relation to maintenance and TPM implementation having a mean of 3.5769 (SD=.85665).

It also found out that the hotels adopted early management as a practice to a higher extent with an average mean value of 4.0192. It was further established that the hotels have programs in place for preventive maintenance and that maintenance department have a role in procurement and installation of equipment and machinery each having a mean of 4.1538 (SD=.83390) and 4.0385 (SD=.82369) respectively. The study also established that the hotels have experience in controlling and monitoring of devices while at the same time training workers on new equipment and machinery before commencement of real work and also the use of prototypes each with a mean of 3.9615 (SD=.87090) and 3.9231 (SD=.79614) respectively. Equally, the hotels adopted office TPM to a high extent with an average mean of 4.0193. It further show that there is coordination among operations, maintenance and planning and that the hotels maintain the right and pleasant office environment by clearing away sources of worker fatigue and demonstrate importance of 5S and existence of proper filing system and easy retrieval of information each with a mean of 4.0769 (SD=.79614), 4.0385 (SD=.77360) and 4.0385 (SD=.82369) respectively. The study also established that there exists a procurement process made smooth and shortened with maintenance team being key in coming up with specifications having a mean of 3.9231(SD=.74421).

On the basis of safety, health and environment-based practice, the hotels were found to adopt them at average level as indicated by the average mean of 3.8366. Further, it established that there exist annual medical checkups and insurance cover for staff and that a policy exists for reusing recycled materials and waste disposal mechanism-waste bins for normal waste each with a mean of 4 (SD=.93808) and 3.8462 (SD=.92487) respectively. The study also established that the hotels undertake training in first aid and systems for emergency procedures and there is a program for occupational safety and measures for failure of not using protective gears and equipment-safety standard operating procedure across the organization represented by a mean of 3.7692 (SD=.99228) and 3.7308 (SD=.96157) respectively.

In the determination of the effect of TPM practices on the operational performance of 3-5 star hotels in the Coast region, the bivariate correlation coefficient established that autonomous maintenance, early management, office TPM and health, safety and environment have a positively moderate and significant correlation with operational performance given by $r = .640$; $p < 0.05$; $r = .587$; $p < 0.05$; $r = .482$; $p < 0.05$ and $r = .541$; $p < 0.05$ respectively. The implication is that improved performance in autonomous maintenance, early management, office TPM and health, safety and environment leads to significant improvement in operational performance. The study also found out that focused improvement, quality maintenance, training and education and planned management have a weak positive and insignificant correlation with operational performance as given by $r = .086$; $p > 0.05$; $r = .170$; $p > 0.05$; $r = .255$; $p > 0.05$ and $r = .274$; $p > 0.05$ respectively. This implies that, despite improved operational performance arising from improved focused improvement, quality

maintenance, training and education and planned management, the effect is not significant.

Regression analysis results on the other hand found out that R = 0.905 implying that TPM practices and operational performance are positively related. The adjusted R^2 of .734 mean that 73.4% of variations in operational performance are caused by variations in the TPM practices studied. The indication is that only 26.6% of variations in operational performance is caused by factors not included in the variable that formed the study. The general implication is that there are other certain factors affecting operational performance other than TPM practices. It was also found out that a significant relationship exists between TPM practices and operational performance at 0.00 ($p<0.05$). The implication is that TPM practices reliably predict operational performance by the 3-5 star hotels in coastal region, Kenya.

Regarding regression coefficients, it was found that autonomous maintenance and safety, health and environment have positive and significant effect on operational performance as given by $\beta=.562$ ($p<0.05$) and $\beta=.441$ ($p<0.05$) respectively. The findings also indicate that focused improvement, quality maintenance, training and education, early management, office TPM and planned maintenance have positive effect on operational performance though their effect is not significant as given by $\beta=.215$ ($p=0.150$); $\beta=.251$ ($p=0.061$); $\beta=.224$ ($p=0.076$); $\beta=.133$ ($p=0.367$); $\beta=.082$ ($p=0.515$) and $\beta=.080$ ($p=0.502$) respectively. Based on the findings, the multiple regression analysis model was constituted as follows:

$$Y= 0.227 + .562X_1 + .215X_2 + .080X_3 + .251X_4 + .224X_5 + .133X_6 + .082X_7 + .441X_8 + \varepsilon$$

5.3 Conclusion of the Study

The study concluded 3-5 star hotels in the coast region in Kenya adopt all the eight TPM practices. It also concluded that improved performance in autonomous performance, early management, office TPM and health, safety and environment lead to an improvement in operational performance. Focused improvement, quality maintenance, training and education and planned maintenance however do not have a significant correlation with operational performance among the 3-5 star hotels in the coast region in Kenya. The conclusion is consistent to the findings by Yusuf (2013) who revealed that the level of adoption of TPM in the food processing firms in Kilifi was moderate and to a larger extent influenced performance.

Further, it was concluded that TPM practices and operational performance are positively related among the 3-5 star hotels in the coast region in Kenya and that TPM practices reliably predict their operational performance. The conclusion is consistent with the study by Ojanga, Muteshi and Okelo (2019) who established that improvement in equipment optimization and strategic employee empowerment practices leads to a significant improvement in manufacturing performance of the food and non-alcoholic beverage firms in Nairobi County. Further, it concurs with the conclusion reached by Ahuja and Kumar (2009) which revealed that observing TPM initiatives can considerably enhance manufacturing performance enabling the firm to attain competitive advantage for competing in the global market place.

5.4 Recommendations of the Study

The managers of the 3-5 star hotels should establish strategies to improve TPM practices since they are found to positively influence operational performance. Emphasis should be made on autonomous maintenance, early management, office

TPM and health, safety and environment practices because they have significant effect on operational performance of the hotels. Another recommendation is for the need to formulate policies and regulation of the various activities to ensure adequate competitive environment for the hotels.

Based on this research, the focus of the managers should be on the extent to which the TPM practices add to quality of goods and services. To avoid the general implication of effect on the entire operational performance, focus should be put on the antecedents of operational performance that are key to survival of the hotels especially during economic turbulence live the effects of the novel covid-19 pandemic.

5.5 Limitations of the Study

First of all, the scope of the research was reduced to only the 3-5 hotels in the coastal region of Kenya. A focus on all hotels in this category in the entire country would give a more commanding valid outcome. The sample may therefore be presumed to be small and may not provide a good generalization for the entire sector. The findings may have therefore been different if a larger sample was included.

Another limitation was based on timing of the study. It was undertaken at a time when the hotel industry was hardly hit by the effect of the covid-19 pandemic. This affected data collection as the researcher had to rely on mailed questionnaire from the respondents. At the same time, most of the hotels were closed down or operated at minimal scale making it difficult for the respondents to give a valid reliable response on some of the TPM practices that were significantly affected.

5.6 Suggestions for Further Studies

The research presents the findings of the effect of TPM practices on operational performance of 3-5 hotels in the coast region of Kenya. Future research should focus on the provision of some extra facts on precise TPM practices that can foster an improvement in operational performance in various environmental and organizational situations.

Studies in future should also attempt to expand the scope and study this class of hotels across the country to assess whether the results would be consistent. TPM practices are applicable to all sectors and a study should be undertaken to assess how effective the practices would be in those sectors.

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APPENDICES

Appendix 1: Questionnaire

Declaration

This study anticipates finding the effects of Total Productive Maintenance on the operational performance of 3-5 star rated hotels in Coast region and therefore focuses on identifying the TPM practices as adopted by these hotels. All the information filled here in shall be treated with utmost confidentiality and the findings thereafter used strictly for the intended purpose which is purely academic.

PART I: GENERAL INFORMATION

Name of the hotel

…….

Department/Function

……...

Position held in the hotel

……

5 How long has the hotel been in operation? (select by ticking in the box)

i. 0-5 years [ ]
ii. 6-10 years [ ]
iii. 10-15 years [ ]
iv. Over 15 years [ ]

6 Please indicate the total number of employees in the hotel?

i. 1-50 [ ]
ii. 51-100 [ ]
iii. 100-150 [ ]
iv. 151-200 [ ]
v. Above 200 [ ]

7 How long have you been in the current position? (select by ticking in the box)

v. 0-5 years [ ]

vi. 6-10 years [ ]

vii. 10-15 years [ ]

viii. Over 15 years [ ]

8 How many guest rooms does the hotel have?

i. Below 50 [ ]

ii. 51-100 [ ]

iii. Above 100 [ ]

PART II: TOTAL PRODUCTIVE MAINTENANCE PRACTICES

9 To what extent has your hotel implemented the following Total Productive Maintenance practices?

Scale ranges from (1) Very low (2) Low (3) Average (4) High (5) Very high

	TPM Practices	**1**	**2**	**3**	**4**	**5**
A	**Autonomous maintenance**					
1.	A well stipulated program for first level (routine) maintenance and a clear schedule for maintenance activities in place					
2.	Operators responsible for making sure machines and equipment are cleaned, lubricated, tightened and maintained regularly					
3.	Spare parts and all maintenance inventory for machinery and equipment always available when required					
4.	Training in inspection procedures for equipment and machinery for operators (users of equipment)					
B	**Focused improvement**					
5.	Problem solving multidisciplinary team (small group activities) to achieve maintenance quality and work in achieving hotel's set targets					
6.	Recording of maintenance equipment history for future improvement and use					

7.	Appraising and reviewing maintenance program in line with change management					
8.	Action plan highlighting schedule for analysis of bottlenecks and predicted counter measures.					
C	**Planned Maintenance**					
9.	Inspection and calibration program for machinery and equipment					
10.	Reports on inspection exercise are submitted, filed and acted upon					
11.	Periodic inspection and examination of machinery and equipment for monitoring the conditions to ascertain trends in downtime or complete failure					
12.	The hotel keeps optimal spare parts inventory levels					
D	**Quality Maintenance**					
13.	Standard values of machinery and equipment established and evaluation of the results by means of measurement					
14.	Defects identified and classified in the way in which they occur, their effects and the rate of recurrence.					
15.	Stipulated frequency of interval inspection of importance features in the hotel value chain					
16.	A system for recording maintenance of machinery and equipment					
E	**Training and Education**					
17.	Trainings and seminars conducted in relation to maintenance and TPM implementation					
18.	Developing instructors from within the hotel staff to offer maintenance skills					
19.	Training Need assessment (TNA) constantly done to ascertain the gap of knowledge and skills to be filled.					
20.	HRM participation in the whole idea of TPM					
F	**Early Management**					
21.	Maintenance department(both technicians and operators) role in procurement and installation of					

	equipment and machinery					
22.	Experience in controlling and monitoring of devices					
23.	Program for preventive maintenance i.e. using experiences with old equipment to acquire a new one					
24.	Training on new equipment and machinery before commencement of real work and also the use of prototypes.					
G	**Office TPM**					
25.	Coordination among operations, maintenance and planning					
26.	Procurement process made smooth and shortened with maintenance team being key in coming up with specifications					
27.	Bright and pleasant office environment by clearing away sources of worker fatigue and demonstrate importance of 5S					
28.	Proper filing system and easy retrieval of information					
H	**Safety, Health and Environment**					
29.	A program for occupational safety and measures in place for failure of not using protective gears and equipment-safety standard operating procedure across the organization					
30.	Annual medical checkups and insurance cover for staff					
31.	A policy for reusing recycled materials and waste disposal mechanism-waste bins for normal waste(NEMA certification)					
32.	Training in first aid and systems for emergency procedures					

PART III: OPERATIONAL PERFORMANCE

10 Please indicate the level of operational performance in your hotel.
Scale ranges from (1) Not at all (2) Small extent (3) Moderate extent (4) Great extent (5) Very great extent

	Not at all	Small extent	Moderate extent	Great extent	Very great extent
	1	2	3	4	5
Cost reduction					
Decrease in water bills					
Lower cost of energy					
Reduction in maintenance costs					
Reduction inventory levels					
Reduction in additional capital expenditure					
Service quality					
Repeat clients					
Increase in referral business					
Reduction in customer complains					
Improved profit levels					
High customer loyalty					
Delivery					
Reduced service delivery time					
Enhancement of productivity					
Reduction in lead time					
Reduction of set up time					
Flexibility					
Improved service/product innovativeness					
Fast response					
Reduced customer complains					
Customizes services					
Employee morale					
Minimal staff turnover rate					
Reduction in accidents					
Reduction in absenteeism at work					
Increased productivity					

Thank you

Appendix II

List of 3-5 star Hotels in Coast region

S/NO	Hotel Name
1.	PrideInn Paradise-Mombasa
2.	Leopard beach Resort and spar
3.	Hemingways Watamu
4.	Diani Reef Beach Resort
5.	Swahili Beach Resort
6.	Medina Palms Suites and Villas
7.	Baobab Beach Resort and Spar
8.	Sarova White Sands Beach Resort and Spar
9.	Leisure Lodge Beach and golf Resort
10.	Voyager Beach Resort
11.	Severin Sea Lodge
12.	Diani Sea resort
13.	Serena Beach resort and spar
14.	Turtle Bay beach club
15.	Lantana Galu beach
16.	Silver Palm Spa &Resort
17.	Diamond Dream of Africa
18.	Marina English Point
19.	Msambweni Beach House and private villa
20.	Sandies Tropical village
21.	Bahari Beach Hotel
22.	Indian Ocean Beach Resort
23.	Kenya Bay Beach Hotel
24.	Royal court hotel
25.	Mnarani Club
26.	Crystal Bay Beach Resort
27.	Isinya Resorts Limited
28.	PrideInn Mombasa
29.	Azul Margarita Beach Resort
30.	Jacyjoka Apartments
31.	Bollywood Bites
32.	Sentrim Tsavo East Camp
33.	Ashnil Aruba Lodge