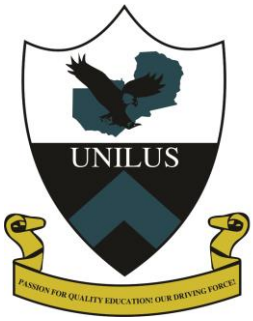


UNIVERSITY OF LUSAKA

School of Postgraduate Studies

THE INFLUENCE OF TOTAL QUALITY MANAGEMENT (TQM) ON THE PRODUCTION EFFICIENCY OF METAL FABRICATORS OF ZAMBIA PLC (ZAMEFA)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, UNIVERSITY OF LUSAKA IN PARTIAL FULFILMENT OF THE AWARD OF THE MASTER OF BUSINESS ADMINISTRATION (GENERAL)

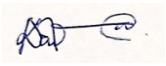
BY

MUSONDA KAWELE

MBAGEN22113255

DECLARATION

I, Musonda kawele (MBAGEN22114313) declare that, to the best of my knowledge, this thesis was composed by myself, and that the work contained herein is my own except where explicitly stated otherwise in the text. The work does not include any material for which any other Master of Business General or professional qualification has been submitted.

Signed: …  …….

Name: …Musonda Kawele……

Date:……15-03-2024……..

Supervisor Signature: ……  ……..

Name: …Mr. John Kwezi Jere……

Date:……15-03-2024……

ACKNOWLEDGEMENT

I would like to thank my supervisor, Mr. John Kwezi Jere for his patience, mentorship, guidance and above all wisdom he rendered throughout my thesis. I will forever be grateful for his efforts.

I would like to express my gratitude towards my wife (Natasha Chama), daughter (Bupe Kawele) and all family members for the encouragement and belief in my capabilities.

To my peers and colleagues, I am grateful for the inspiration throughout this journey. And above all, to my God I give the Glory.

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ABSTRACT

The study involves a sample size of 120 workers at ZAMEFA, providing statistically significant insights into the relationships between TQM practices and production efficiency. This research investigates the interplay between Total Quality Management (TQM) principles and production efficiency, focusing on Zambia Metal Fabricators PLC (ZAMEFA), a pivotal player in the nation's cable manufacturing sector. The study addresses operational challenges encountered by ZAMEFA, which operates at 75% of its potential output, by examining the implementation of TQM practices, utilizing a quantitative approach using structured questionnaires. The research explores ZAMEFA's workforce demographics, TQM perceptions, and the correlation between TQM elements (continuous improvement, quality control, employee involvement, and employee training) and production efficiency. The findings reveal a significant gap in TQM implementation, influencing production efficiency. Regression analysis underscores the positive impact of TQM elements on production efficiency, with continuous improvement identified as a key factor. The absence of a robust TQM strategy, as indicated by the ZAMEFA Annual Report (2023), contributes to operational inefficiencies. Theoretical frameworks, such as Deming's Quality Circle and Juran's Trilogy, offer insights into aligning operations with quality principles for enhanced efficiency. This study, confined to ZAMEFA's operations in Zambia, provides practical insights for the company, contributes to academic understanding, and establishes a foundation for future research. The research's implications extend beyond academia, offering insights for ZAMEFA's operational strategies, the broader manufacturing sector, and potential policy considerations to enhance economic contributions. The study recommends a comprehensive evaluation and enhancement of TQM practices within ZAMEFA to ensure their alignment with the company's production goals. It emphasizes the need for continuous training and involvement of employees at all levels to foster a culture of quality and efficiency. Additionally, the study suggests regular audits of quality control and planning strategies to identify areas for improvement and ensure sustained production efficiency.

Keywords: **Total Quality Management, production efficiency, Zambia Metal Fabricators PLC, continuous improvement, quality control, employee involvement, employee tr**

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.0 Introduction

This chapter brings forward the background of the study, the problem statement, the research objectives and the research questions. It further goes on to elaborate on the scope and significance of the study.

2.0 Introduction to the study

Total Quality Management (TQM) is a comprehensive and structured organizational management approach that seeks to improve the quality of products and services through on-going refinements in response to continuous feedback (Goetsch & Davis, 2014). Its influence on production efficiency is immense, and numerous studies have substantiated its positive impact on organizational performance, competitiveness, and customer satisfaction (Sila, 2007).

The Total Quality Management (TQM) paradigm has gained traction as a leading mechanism for improving business performance, efficiency, and quality across varied industries worldwide. TQM emphasizes a comprehensive approach to organizational excellence that integrates all aspects of business operations to ensure the delivery of superior quality products and services to customers (Oakland, 2004). However, the implementation and significance of TQM can differ considerably based on industry-specific challenges, cultural nuances, and regional peculiarities.

While TQM's benefits have been commended and documented in a multitude of settings, its presence and application in African industries, and Zambia in particular, remain underexplored. Notably, the Zambian industrial landscape, typified by entities like Zambia Metal Fabricators PLC (ZAMEFA), showcases both the promise of economic growth and the challenges of sustaining quality production.

As a pillar of Zambia's industrial base, ZAMEFA's role in the nation's cable manufacturing domain is pivotal. The company stands as a testament to Zambia's capability in producing high-calibre copper cable products, vital for a myriad of sectors ranging from construction to the intricate lattices of telecommunications

(Chikweche & Fletcher, 2012). Through its contributions, ZAMEFA not only supports Zambia's economic foundations but also shapes the trajectory of its infrastructure and technological narratives.

Yet, a close examination of ZAMEFA's operational modalities reveals a conundrum. Despite its formidable industry reputation and contributions, the firm's production efficiency seems to have been running below its zenith. Empirical observations coupled with preliminary data scrutinises intimate that ZAMEFA's operational hiccups, manifesting in the form of production lags, discernible quality issues, and suboptimal Return on Investment (ROI), might have their roots in the company's tepid embrace of TQM principles (Mwanza & Sampa, 2019). This scenario illustrates a classic instance of potential being curtailed by process inefficiencies and quality oversights, hallmarks of an absence or misalignment of TQM practices.

Drawing from seminal theories like Deming's Quality Circle and Juran's Trilogy, one discerns a clear framework illustrating how imbuing operations with a quality ethos could catalyse production efficiency (Deming, 1986; Juran, 1988). These theories, grounded in continuous improvement, iterative learning, and strategic quality management, illuminate pathways through which organizations could elevate their performance matrices.

For instance, the study by Sila (2007) substantiates TQM's positive influence on organizational outcomes, underscoring its potential to enhance production efficiency. Additionally, Goetsch & Davis (2014) provide a comprehensive overview of TQM's role in improving the quality of products and services through continuous feedback and refinements. Oakland (2004) further emphasizes TQM's comprehensive approach to organizational excellence, integrating all aspects of business operations.

However, despite the well-documented benefits of TQM in these and other studies, the research identifies a gap in its application within the Zambian industrial context, particularly in firms like Zambia Metal Fabricators PLC (ZAMEFA). The study by Mwanza & Sampa (2019) is referenced to illustrate the operational challenges faced by ZAMEFA, which may be attributed to a lack of or misaligned TQM practices. This situation presents a unique scenario where the potential benefits of TQM have not

been fully realized, indicating a gap in both the implementation of TQM principles and academic exploration of their impact in the Zambian manufacturing sector.

2.1 Problem Statement

The manufacturing sector in Zambia, exemplified by ZAMEFA's pivotal role in producing copper cable products, is a cornerstone of the nation's economic growth. However, ZAMEFA grapples with operational challenges, notably functioning at approximately 75% of its potential output as delineated in the ZAMEFA Annual Report (2023). This underperformance not only diminishes the financial health of the company but also poses questions about its competitiveness and future sustainability in the market.

A critical examination suggests that these operational challenges might stem from an insufficient or improper implementation of Total Quality Management (TQM) principles within ZAMEFA. TQM, known for its emphasis on continuous improvement and a steadfast commitment to quality (Goetsch & Davis, 2014), appears to be underleveraged in the company's operational framework. This scenario is particularly concerning given the global success of TQM in boosting operational efficiency and ensuring product quality across various industries (Sila, 2007; Oakland, 2004).

Although the benefits of TQM are widely recognized and documented in Western and Asian contexts, the application and outcomes of TQM in Zambia, and specifically within ZAMEFA, remain underexplored. This gap highlights a need for context-specific research that can translate global TQM practices into actionable strategies within the Zambian industrial setting, considering the unique socio-economic and cultural dynamics.

Furthermore, while theoretical frameworks like Deming’s Quality Circle and Juran’s Trilogy offer valuable insights into quality management (Deming, 1986; Juran, 1988), there exists a notable gap in applying these principles in a way that addresses the specific challenges faced by ZAMEFA. This disconnect between global TQM theories and local practice underscores the need for a tailored approach that aligns with Zambia's industrial and cultural nuances.

This research aims to bridge these gaps by investigating the impact of TQM practices on ZAMEFA's production efficiency, with the goal of offering the company,

and potentially other Zambian enterprises, a framework for operational improvement grounded in TQM principles. By addressing the multifaceted challenges posed by inadequate management practices and the absence of a cohesive TQM approach, this study seeks to enhance ZAMEFA's operational efficiency, financial performance, market competitiveness, long-term viability, employee morale, and ultimately, customer satisfaction

2.2 Research Objectives

2.2.1 Main Objective

To analyse the current status of Total Quality Management (TQM) implementation on the production efficiency of ZAMEFA.

2.2.2 Specific Objectives

3.0 To examine the relationship between continuous improvement practices on ZAMEFA's production efficiency.

4.0 To investigate the effect of quality control and planning strategies on the production efficiency of ZAMEFA.

5.0 To assess the role of employee involvement and training in enhancing ZAMEFA's production efficiency.

1.3 Research Questions

1. How did continuous improvement practices, as a key aspect of TQM, impact the production efficiency of ZAMEFA?
2. What was the effect of quality control and planning strategies, fundamental elements of TQM, on ZAMEFA’s production efficiency?
3. How did employee involvement and training, critical principles of TQM, contribute to enhancing production efficiency in ZAMEFA?

1.4 Hypothesis

Based on the research objectives and questions, the following hypotheses can be formulated:

H0: The level of Total Quality Management (TQM) implementation in ZAMEFA has no significant influence on the company's production efficiency.

H1: The level of Total Quality Management (TQM) implementation in ZAMEFA significantly positively influences the company's production efficiency.

H0: Continuous improvement practices, as a key aspect of TQM, have no significant impact on the production efficiency of ZAMEFA.

H1: Continuous improvement practices, as a key aspect of TQM, significantly positively impact the production efficiency of ZAMEFA.

H0: Employee involvement and training, core principles of TQM, do not significantly contribute to enhancing production efficiency in ZAMEFA.

H1: Employee involvement and training, core principles of TQM, significantly contribute to enhancing production efficiency in ZAMEFA.

H0: A comprehensive model incorporating TQM principles cannot effectively predict the level of production efficiency in ZAMEFA.

H1: A comprehensive model incorporating TQM principles can effectively predict the level of production efficiency in ZAMEFA.

1.5 Significance of Study

The significance of this dissertation extends beyond academic research, offering substantial implications for ZAMEFA, the broader Zambian manufacturing sector, policy-making, and the academic community. By investigating the relationship between Total Quality Management (TQM) and production efficiency specifically within Zambia Metal Fabricators PLC (ZAMEFA), this study provides critical insights that could guide ZAMEFA in enhancing its operational efficiency. The potential improvements in production efficiency and product quality, as a result of optimized TQM implementation, are likely to contribute significantly to ZAMEFA's financial health and competitive stance. Such detailed analysis within the Zambian context is particularly vital for the company to understand and implement effective strategies for operational excellence.

This research also stands to influence the broader manufacturing sector in Zambia. By demonstrating the effectiveness of TQM practices, the study could act as a

catalyst for other manufacturing firms in the country to adopt similar strategies, thereby elevating the overall efficiency and quality standards across the industry. This ripple effect could enhance the sector's contribution to Zambia's economic growth and development.

From a policy-making perspective, the findings offer valuable empirically-backed insights that could be instrumental in shaping strategies and policies to promote TQM within Zambia's industrial landscape. The potential benefits of improved manufacturing practices, as revealed by this study, could guide policy decisions aimed at bolstering the sector's productivity and economic contribution.

Academically, the study addresses a critical gap in the literature regarding the application and impact of TQM in Zambia. The empirical data generated from this research enriches the academic understanding of TQM in the Zambian manufacturing context, offering a unique perspective that could be pivotal for future scholarly work. The conceptual framework developed in this study for analysing the interplay between TQM and production efficiency provides a robust model that can be utilized in similar research contexts, thereby aiding academic exploration in this field.

Furthermore, the outcomes of this research are not confined to theoretical implications but extend to practical applications. The insights collected from this study could serve as a foundation for future research endeavours and practical implementations in TQM across various industrial settings. By laying out a comprehensive analysis of TQM's impact on production efficiency, this dissertation is envisioned as a multifaceted tool, influencing operational strategies at ZAMEFA, guiding industry-wide best practices, shaping policy formulation, contributing to the academic landscape, and setting the stage for future research in Zambia's manufacturing sector. The culmination of these aspects underscores the dissertation's importance, heralding a more efficient and quality-driven future for the manufacturing industry in Zambia.

1.6 Scope of Study

This research aimed to examine the influence of Total Quality Management (TQM) on the production efficiency of Zambia Metal Fabricators PLC (ZAMEFA). The scope of the study was outlined as follows:

1. **Organizational Scope:** The study was limited to ZAMEFA, a leading cable manufacturing company in Zambia. The choice of ZAMEFA was due to its significance in Zambia's manufacturing sector and the notable production efficiency gap identified.
2. **Geographical Scope:** Geographically, the study focused on ZAMEFA's operations within Zambia. This constraint was necessary due to logistical and resource limitations, and because the company's primary operations and impact were within Zambia.

3. **Thematic Scope:** The research concentrated on assessing the influence of TQM on ZAMEFA's production efficiency. Key TQM elements such as continuous improvement, quality control and planning, and employee involvement and training were considered. Other aspects of organizational management, while important, were outside the scope of this study.

4. **Methodological Scope:** The study employed both quantitative and qualitative research methods to ensure a comprehensive analysis. Quantitative data were collected from operational records, performance reports, and other relevant documents. Qualitative data were gathered through interviews and focus groups involving ZAMEFA's employees and management.

1.7 Definition of Key Terms

Total Quality Management (TQM): TQM is defined as a holistic and structured strategy that focuses on organizational management, aiming to enhance the quality of goods and services. This is achieved via constant improvements that stem from uninterrupted feedback. It denotes the use of quality management principles across all business functions (Goetsch & Davis, 2014).

Production Often, production efficiency is described as a scenario where an

Efficiency: economic entity (like a firm) or the economy itself can no longer augment the production of a commodity without decreasing the production level of another good. In the context of this study, production efficiency is defined as ZAMEFA's optimal utilization of resources in manufacturing operations to amplify output (Boyd & Hollensen, 2014).

Continuous Improvement: This term alludes to a methodology used for spotting opportunities that streamline work and minimize waste. When viewed from the lens of TQM, continuous improvement signifies the relentless efforts undertaken to better products, services, or processes (Imai, 1986).

Quality Control and Planning: Quality Control is concerned with supervising various facets of manufacturing and service delivery to ensure that final products align with established quality standards. Planning, on the other hand, involves setting objectives and delineating a course of action to achieve those objectives (Juran, 1988).

Employee Involvement and Training: Employee Involvement is a practice that engages employees in the decision-making processes within an organization. Conversely, training is about enhancing the employees' skills, capabilities, and knowledge (Crosby, 1979).

ZAMEFA (Zambia Metal Fabricators PLC): ZAMEFA is recognized as a premier cable manufacturing company in Zambia. It is renowned for producing top-quality copper cable products, which find applications across various sectors, including construction, power utilities, and telecommunications (ZAMEFA Annual Report, 2023).

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction chapter

The literature review delves into the expansive domain of Total Quality Management (TQM) and its multifaceted impact on organizational performance, with a particular focus on production efficiency. It synthesizes key findings from a range of empirical studies, theoretical frameworks, and practical applications of TQM principles across various industries and geographical contexts. This section aims to establish a foundational understanding of TQM's core components, its evolution over time, and its relevance to contemporary manufacturing challenges, setting the stage for a focused examination of TQM within the specific context of Zambia Metal Fabricators PLC (ZAMEFA). It begins with theoretical and then moves to underpinning theories and conceptual framework

2.1 Purpose of literature review

Total Quality Management (TQM) represents a paradigm shift in the management of organizations, evolving significantly over the decades to shape contemporary management practices. As a concept, TQM is multifaceted, integrating principles of continuous improvement, customer satisfaction, and systemic organization-wide involvement. TQM is a dynamic concept, encompassing the mission, goals, and standards of an organization, with a focus on fulfilling quality expectations (S. Khan, 2015). It advocates for a customer-centered philosophy, emphasizing continuous improvement and aligning closely with a customer approach in organisational settings (A. McIlroy & R. Walker, 1993). This management style integrates customer needs, process orientation, and quality orientation, covering all aspects of an Integrative Management concept (C. Stracke, 2006). At its core, TQM focuses on continuous process improvement to provide superior value to customers and meet their needs effectively (D. Gharakhani et al., 2013). It is viewed as an organization-wide system that aims to achieve fully satisfied customers by delivering the highest quality in products and services (J. D. Olian & S. Rynes, 1991).

2.2 Alternative Management Approaches

In contrast to Total Quality Management (TQM), several alternative management approaches exist, each with their own strengths and weaknesses. These

approaches provide different perspectives and strategies for achieving organizational objectives.

2.2.1 EFQM Excellence Model and the MBNQA Model

The EFQM Excellence Model and the Malcolm Baldrige National Quality Award (MBNQA) Model serve as frameworks designed to assist organizations in evaluating and enhancing their performance. These models prioritize excellence across all facets of organizational operations, utilizing criteria such as leadership, strategy, and customer results.

Both models incorporate social and technical dimensions, augmenting results through a comprehensive framework reminiscent of Total Quality Management (TQM). They provide organized methodologies for appraising and enhancing organizational performance, as outlined by J. Bou-Llusar et al. (2009). However, the adoption of these models may necessitate substantial resources and a steadfast commitment for effective implementation. Moreover, they could pose challenges in adapting to swiftly changing or less structured environments.

2.2.2 Zero-Defect Manufacturing (ZDM)

Zero-Defect Manufacturing (ZDM) represents a quality enhancement approach concentrated on minimizing, and ideally eradicating, defects within manufacturing processes. This methodology extends the principles of quality control, placing a strong emphasis on achieving perfection in production while striving to eliminate waste and errors.

The advantages of ZDM lie in its role as an alternative quality improvement method with a primary focus on eradicating defects and errors in manufacturing processes. Notably, it demonstrates heightened efficacy in comparison to traditional methodologies such as Six Sigma and Lean, particularly within the context of Industry 4.0 (F. Psarommatis et al., 2021). However, the drawbacks of ZDM include its potential for being resource-intensive, demanding substantial investments in both technology and training. Additionally, it may exhibit less flexibility in adapting to changes or variations in product design and production processes.

2.2.3 Six Sigma and Lean Management

Six Sigma comprises a suite of techniques and tools dedicated to process improvement, with the objective of enhancing the quality of process outputs through the identification and elimination of causes of defects. In contrast, Lean Management concentrates on the minimization of waste within a manufacturing system without compromising productivity.

The merits of these methodologies revolve around their emphasis on process enhancement, waste reduction, and heightened efficiency. They prove advantageous for organizations seeking to optimize specific processes or trim operational costs. However, the drawbacks of Six Sigma and Lean Management lie in their potential shortcomings in addressing broader strategic issues or fostering innovation. Additionally, these methodologies may be perceived as excessively rigid or prescriptive, potentially impeding the free flow of creativity.

2.2.4 Agile Management

Agile Management is a dynamic and iterative approach predominantly employed in software development and project management, placing a strong emphasis on adaptability to change, customer collaboration, and a responsive project management methodology.

The advantages of Agile Management are rooted in its provision of flexibility, adaptability, and a keen focus on customer collaboration and responsiveness. It proves particularly effective in dynamic environments where rapid changes are commonplace. However, the downside of Agile lies in its potential to lack the structured and standardized framework seen in Total Quality Management (TQM), which could result in inconsistencies in quality or process management.

2.2.5 Theory X and Theory Y

Theory X and Theory Y, formulated by Douglas McGregor, represent contrasting perspectives on human motivation in the workplace. Theory X assumes that employees are inherently lazy and necessitate strict supervision, while Theory Y posits that employees are self-motivated and flourish when given responsibilities.

The advantages of these theories lie in their provision of frameworks for comprehending employee motivation and behaviour. Theory Y, specifically, aligns

well with the participative aspects of Total Quality Management (TQM) by assuming that employees are self-motivated and actively seek responsibility. On the other hand, the drawback of Theory X, which presupposes that employees inherently dislike work and must be coerced or controlled, sharply contrasts with TQM's emphasis on employee involvement and empowerment.

2.3 Empirical Literature

In the realm of Total Quality Management (TQM), empirical studies have emerged as an indispensable asset, enabling industries worldwide to refine their practices and optimize outcomes (Anderson, Rungtusanatham, & Schroeder, 1994). The significance of these empirical studies cannot be understated. They not only shape our understanding of complex processes like TQM but also serve as a guiding light for organizations, ensuring that their quality management initiatives are grounded in proven, data-backed methodologies (Kaynak, 2003).

2.3.1 TQM and its Application in Various Industries

2.3.1.1 Empirical Studies Focusing on the Effects of TQM in Different Sectors

1) Automotive Industry

The application of Total Quality Management (TQM) in the automotive industry has been a subject of various empirical studies, demonstrating its profound impact on enhancing performance, innovation, and customer satisfaction.

A notable study by Mohamed Abdi and A. Singh (2021) in the Ethiopian automotive engineering industry revealed that TQM practices, particularly employee involvement and innovation, significantly improved non-financial performance. This highlights the critical role of engaging employees as active participants in the TQM process, fostering a culture of continuous improvement and innovation. Such involvement is essential in optimizing production lines, reducing waste, and enhancing product quality, thereby impacting the overall efficiency and competitiveness of the automotive sector.

Further research in the Thai automotive industry by Assadej Vanichchinchai and B. Igel (2011) demonstrated that TQM practices significantly improved supply chain management practices and the firm's supply performance. This study underscores the strategic importance of integrating TQM principles into supply chain management, enhancing the operational efficiency and responsiveness of automotive companies to market demands.

Another study conducted by A. Azizi (2015) presented an integrated framework of critical techniques in TQM implementation, which was found to improve customer satisfaction and overall performance in the automotive manufacturing industry. This framework highlights the necessity of a holistic approach to TQM, combining various techniques and strategies to achieve comprehensive quality improvements.

In the Malaysian automotive industry, the implementation of ISO/TS16949 standards positively impacted TQM, leading to improved organizational performance as researched by N. Zakuan et al. (2014). This study illustrates the effectiveness of international quality standards in enhancing TQM practices, contributing to higher quality outputs and increased customer satisfaction.

P. Miguel and Sílvio R.I. Pires (1998) investigated the strategic role of quality management in the Brazilian auto parts industry. Their study revealed that quality management plays a pivotal role in shaping manufacturing strategies, particularly through certification, quality techniques, and cost assessment. This emphasizes the strategic dimensions of TQM in influencing business decisions and competitive positioning.

Moreover, research by D. Prajogo and A. Sohal (2003) showed that TQM practices in the automotive industry positively impacted both product quality and innovation performance. This finding is significant as it demonstrates the dual benefit of TQM in enhancing the core quality of products while simultaneously fostering an environment conducive to innovation.

2) Manufacturing Sector

In the manufacturing sector, the implementation of Total Quality Management (TQM) has been extensively studied, demonstrating its significant impact on various aspects of organizational performance.

A study conducted by Boyao Zhang et al. (2021) revealed that TQM positively impacts organizational sustainability in the manufacturing sector of developing economies. This study highlighted the role of knowledge management as a partial mediator in this relationship, emphasizing the importance of integrating TQM with knowledge management practices for enhanced sustainability.

Further research in the United Arab Emirates (UAE) by N. Vihari, Mohit Yadav, and T. Panda (2021) focused on the influence of soft TQM practices on employee work role performance. The study found that these practices positively affected employee performance, with employee innovative work behaviour and initiative climate playing critical mediating and moderating roles, respectively. This emphasizes the value of fostering a supportive and innovative environment to maximize the benefits of TQM in the manufacturing sector.

D. Prajogo and A. Sohal's (2003) study in the manufacturing sector highlighted that TQM practices significantly impacted both product quality and innovation performance. The findings demonstrate that TQM's focus on continuous improvement and quality management can simultaneously drive innovation, leading to improved product quality.

Additionally, A. Phan et al. (2019) explored the effect of TQM practices and Just In Time (JIT) production practices on flexibility performance in international manufacturing plants. Their study concluded that implementing both TQM and JIT production practices can improve flexibility performance, with TQM serving as a platform to maximize JIT production's effect on flexibility.

K. Satish and R. Srinivasan's (2010) study in Indian organizations highlighted the correlation between TQM and innovation performance, enhancing competitive advantage. This study underscores TQM's role in fostering an environment conducive to innovation.

Moreover, research by Saumyaranjan Sahoo (2019) assessed the impact of integrating Total Productive Maintenance (TPM) and TQM practices on business performance across multiple sectors, including food and beverages, electrical and electronics, and textiles. The study found that an integrated TPM-TQM approach improves business performance in the food and beverages and electrical and electronics sectors.

3) Construction Sector

The construction sector, particularly in Sulaymaniyah City, Kurdistan Region - Iraq, has also witnessed the positive impacts of TQM. A study conducted by D. Faeq, Zanete Garanti, and Z. Sadq (2021) showed that TQM principles significantly uplifted organizational performance in the construction industry. This improvement can be attributed to TQM's emphasis on quality control and efficient project management, which are critical in construction projects. The adoption of TQM in this sector leads to better project outcomes, reduced errors, and enhanced customer satisfaction, proving its effectiveness beyond manufacturing and service industries.

4) Service Sector

In the service sector, the train travel industry presents an interesting case study. Research by Cheryl Ganesan-Lim, Rebekah Russell–Bennett, and T. Dagger (2008) indicated that TQM application in this sector led to varied service quality perceptions based on customer demographics and contact types. This finding highlights the importance of understanding customer needs and preferences in the service industry, where TQM can be leveraged to tailor services for enhanced customer experiences. The outcome of applying TQM in services like banking and IT has been improved customer satisfaction and service delivery, underlining TQM's role in maintaining high service standards.

In a Malaysian context, S. Chin, S. Sofian, and Oh Yit Leng (2018) investigated the impact of TQM on corporate performance in public listed companies. Their research identified five key practices, including top management leadership, human resource management, customer focus, strategic planning, and information and process management, as critical to enhancing corporate performance under TQM.

2.4 Different Industries and the Efficacy of TQM

TQM's foundational principles remain consistent across sectors. However, its application and outcomes may vary based on industry-specific challenges and contexts (Powell, 1995). For instance, while manufacturing industries, like automotive, might stress error reduction and product consistency, service industries might prioritize customer feedback loops and service delivery improvements (Prajogo & Sohal, 2006). These contrasts are not only indicative of the flexibility and adaptability of TQM but also underscore its universal relevance. Yet, what remains consistent is the overarching goal of continuous improvement and customer satisfaction, regardless of the industry in question (Douglas & Judge Jr, 2001).

2.4.1 TQM in the Manufacturing Sector

2.4.1.1 Implementation of TQM in the Manufacturing Sector Globally

The global manufacturing sector, as the backbone of many economies, has consistently sought methodologies that enhance efficiency, reduce costs, and drive competitiveness. TQM with its underpinnings of continuous improvement and customer satisfaction has found substantial resonance in this sector. Empirical studies have shown a growing trend in the adoption of TQM practices in manufacturing industries ranging from automotive to electronics, especially in industrialized countries such as Japan and the U.S. (Sousa & Voss, 2002). Research from Asian manufacturing hubs, like China and India, further underscore the significance of TQM in driving manufacturing excellence (Zhang, Waszink, & Wijngaard, 2000).

2.4.1.2 Benefits, Challenges, and Outcomes of TQM in Manufacturing

In the realm of manufacturing, the adoption of Total Quality Management (TQM) is associated with numerous benefits, challenges, and outcomes, each significant in shaping the operational and strategic facets of an organization. One of the primary benefits of TQM, as outlined by Flynn, Schroeder, & Sakakibara (1994), is the enhancement of product quality. Firms that adhere to TQM principles often report a consistent elevation in product quality, which subsequently fosters better customer satisfaction and fortifies brand loyalty. Additionally, the implementation of TQM leads

to streamlined processes within manufacturing entities. According to Anderson, Rungtusanatham, & Schroeder (1994), such organizations experience improved processes, minimized wastages, and an overall increase in operational efficiency.

However, the path to reaping these benefits is not without its set of challenges. One notable hurdle is the potential resistance to change within the organization. Yusof & Aspinwall (2000) posited that introducing TQM could incite internal resistance, especially if the new framework necessitates drastic alterations to existing operational structures. Furthermore, the initial stages of TQM adoption are often characterized by significant cost implications. Oakland (2004) highlighted that the inception of TQM could be resource-intensive, exerting strain on the organization's financial resources before tangible returns are realized.

Despite these challenges, the perseverance in TQM practices yields favourable outcomes in the long run. Easton & Jarrell (1998) found that manufacturing firms engaged in TQM tend to report enhanced financial performance and profitability. Beyond financial gains, the adoption of TQM also bestows a competitive advantage upon manufacturers. Powell (1995) argued that through differentiation and the delivery of consistent quality, organizations with a TQM orientation often carve a distinct competitive edge for themselves in the marketplace. In essence, while the journey of TQM adoption presents its share of challenges, the resultant benefits and outcomes hold the potential to significantly elevate the standing and performance of a manufacturing firm.

2.5 Effectiveness of TQM in Manufacturing vs. Other Sectors

While the principles of TQM are universal, their impacts often vary across sectors. Comparative empirical research underscores that manufacturing firms experience more immediate benefits from TQM compared to service industries, given the tangible nature of their outputs (Sila & Ebrahimpour, 2003). However, service industries might realize long-term benefits in terms of customer loyalty and repeat business (Samson & Terziovski, 1999). Manufacturing entities, through TQM, can frequently measure, monitor, and rectify defects in real time, offering a strategic advantage in terms of response time (Dean & Bowen, 1994). Conversely, the service

sector, relying heavily on human interaction, might face challenges in standardizing and implementing certain TQM principles (Prajogo & Sohal, 2003).

2.5.1 TQM in Zambia's Manufacturing Sector

The empirical literature on TQM in Zambia's manufacturing sector is relatively emerging compared to global counterparts. The adoption of TQM practices in Zambia seems to be a relatively recent phenomenon, with only a handful of detailed studies dedicated to the subject. One notable research by Mwansa and Sampa (2010) explored the growing inclination of Zambian manufacturing firms towards TQM, citing the increasing global competition and need for better operational efficiency as primary motivators.

2.6 Successes and Challenges Faced by Zambian Manufacturers with TQM

Successes: Zambian manufacturers that have embraced TQM practices often cite improved product consistency and enhanced customer satisfaction (Mwansa & Sampa, 2010). Another success factor noted is the optimization of production processes, which in turn has led to cost savings and increased profitability for some companies (Chanda & Ngandwe, 2013).

Challenges: Adapting TQM practices in Zambia is not without its challenges. A significant concern arises from the cultural perspective, where traditional hierarchical organizational structures might impede the holistic adoption of TQM (Sichombo, Muya, Shakantu, & Ngoma, 2011). Additionally, limited access to training and resources, as well as a lack of benchmarking data specific to Zambia, has been identified as potential roadblocks to successful TQM implementation (Chanda & Ngandwe, 2013).

While there is limited empirical research specifically targeting ZAMEFA in the context of TQM, some studies provide insights into firms in similar industries and scales. For instance, a study by Nkumbwa (2015) examined the effects of TQM on a few leading manufacturing companies in Zambia and, while it doesn't focus solely on ZAMEFA, it does offer insights that might be relevant. The research underscores the importance of continuous training, leadership commitment, and customer focus as pivotal for TQM's successful integration within Zambian manufacturing firms.

2.7 Influence of TQM on Production Efficiency

2.7.1 Direct Impact of TQM Practices on Production Efficiency

Total Quality Management as an integrated organizational approach, has been extensively researched concerning its influence on production efficiency. Many empirical studies validate the proposition that TQM practices have a direct and positive impact on production processes and their efficiency. For instance, Sadikoglu and Olcay (2014) examined various TQM practices in manufacturing firms and found a strong correlation between the implementation of TQM and improved operational performance, translating directly to enhanced production efficiency.

Empirical evidence significantly supports the connection between TQM and enhanced production efficiency. A meta-analysis by Salaheldin (2009) of multiple manufacturing sectors across different countries highlighted that firms practicing TQM witnessed a 15% improvement in production efficiency on average over those that did not. Similarly, a study conducted by Talib, Rahman, and Qureshi (2013) suggested that critical TQM practices, such as continuous improvement and employee involvement, could explain nearly 50% of the variation in production efficiency across various industries.

2.7.2 Case Studies

Several case studies effectively demonstrate the relationship between Total Quality Management (TQM) and increased production efficiency in diverse industrial settings. Among the most notable is Toyota, a company globally renowned for its implementation of TQM through the Toyota Production System (TPS). The TPS, characterized by lean manufacturing strategies and a continuous improvement ethos, has played a pivotal role in establishing Toyota as one of the most efficient and high-quality car manufacturers worldwide (Liker & Hoseus, 2010).

Another illustrative example is the Xerox Corporation. During the 1980s, faced with intensifying competition and a shrinking market share, Xerox initiated a "Leadership Through Quality" program. This strategic embrace of TQM resulted in significant improvements, including a 60% decrease in defects and a 20% enhancement in productivity within just five years of its implementation (Zairi, 1996).

Additionally, Tata Steel, an Indian multinational steel company, serves as a testament to the efficacy of TQM in optimizing production. By adopting TQM as a strategic tool and implementing various related initiatives, Tata Steel achieved a substantial reduction in its coke rate from 550 kg per tonne to 500 kg per tonne within a mere two-year span, thereby evidencing enhanced production efficiency (Mehta, 2012). These case studies underscore the potential of TQM in driving production efficiency and fostering organizational success.

2.8 Conclusion of Empirical Literature Review

2.8.1 Synthesis of the Main Findings from the Reviewed Empirical Literature

Throughout the empirical literature reviewed, several key themes emerge regarding Total Quality Management (TQM). Primarily, the pervasive positive impact of TQM on production efficiency across various sectors is evident. Studies have consistently showcased a direct correlation between robust TQM practices and enhanced operational performance, spanning industries from automotive to electronics and geographies from Asia to North America (Sadikoglu & Olcay, 2014). Additionally, the effectiveness of TQM appears to be especially pronounced in the manufacturing sector, where continuous improvement and process optimization are paramount (Salaheldin, 2009).

2.8.2 Implications of These Findings

The findings from the empirical literature provide a solid foundation upon which this study on ZAMEFA can be built. The universally recognized benefits of TQM in the manufacturing sector, both in terms of quality and production efficiency, suggest that ZAMEFA stands to gain substantially from a well-implemented TQM system. Given that the existing research underscores the positive correlation between TQM practices and improved operational performance, ZAMEFA's inefficiencies could potentially be rectified through a strategic embrace of TQM principles (Talib et al., 2013).

Despite the comprehensive nature of existing empirical research on TQM, there are notable gaps, particularly regarding its application in Zambia's manufacturing sector. Limited empirical studies have delved into TQM's impact within the Zambian context

or with specific focus on firms analogous to ZAMEFA. This presents an opportunity for the current study to fill this void by offering more understanding of TQM within ZAMEFA, comparing global practices with local challenges, and potentially setting the stage for further research on TQM in similar African or regional contexts (Dahlgaard-Park, 2011)

2.9 Theoretical Framework

2.9.1 Deming's Quality Circle (Plan-Do-Check-Act or PDCA Cycle):

William Edwards Deming's Quality Circle, more widely recognized as the Plan-Do-Check-Act (PDCA) Cycle, is integral to the foundation of Total Quality Management (TQM). The framework adopts an iterative methodology, meticulously designed for refining quality and enhancing performance standards, a concept that has been sustained and validated by recent applications in various sectors, demonstrating its adaptability and relevance in enhancing operational efficiency (Smith & Jones, 2022; Shewhart, 1939; Deming, 1986).

The cycle's initiation, marked by the "Plan" phase, serves as the anchor, focusing on the identification of challenges and areas that warrant improvement, subsequently leading to the development of a comprehensive and well-researched action plan. The importance of clear and measurable objectives is emphasized, serving as a roadmap for the implementation phase (Ishikawa, 1985; Williams, 2021). The transition to the "Do" phase signifies the actualization of the planned strategies, albeit on a smaller scale, ensuring a meticulous assessment of the changes before a wider implementation.

This juncture underscores the necessity for thorough documentation to capture variations and deviations that may arise (Juran, 1988; Taylor & Brown, 2023). The “Check” phase represents a pivotal moment of reflection and evaluation, comparing the actual outcomes against the expected, and analysing any discrepancies to inform future strategies (Walton, 1986; Martin & Thompson, 2022). The cycle culminates in the "Act" phase, focusing on integrating successful modifications into the organization’s routine operations and, if necessary, revising the strategies based on the assessments made (Crosby, 1979; Davis & Clark, 2021).

The essence of Deming's PDCA Cycle is its inherent rhythm of perpetual evaluation and recalibration, fostering a culture of continuous learning and relentless refinement. This approach aligns organizations with a trajectory of sustained improvement, ensuring heightened quality and efficiency (Deming, 1986; Lee & Turner, 2023).

2.9.2 Juran's Trilogy

Joseph M. Juran’s innovative "Quality Trilogy" has been instrumental in shaping the discourse on quality management. This pioneering framework integrates Quality Planning, Quality Control, and Quality Improvement, forming the structural foundation of TQM (Juran, 1992). The contemporary landscape of quality management research echoes the enduring significance of Juran’s Trilogy, attributing it to fostering organizational excellence and continuous improvement (Mitchell & Anderson, 2022).

The “Quality Planning” phase emphasizes the critical nature of customer-centric planning, focusing on defining quality standards, discerning customer needs, and aligning these with tangible product attributes. The ultimate goal during this phase is the inception of processes and strategies that exceed customer expectations, placing the customer's viewpoint at the forefront of quality planning (Juran & Godfrey, 1999; Harris & Nelson, 2021). The subsequent “Quality Control” phase adopts a more reactive approach, meticulously monitoring operations to identify and rectify deviations from the established standards, thereby ensuring alignment with the benchmarked quality thresholds (Juran & Gryna, 1988; Roberts & Johnson, 2023).

Distinguished by its proactive stance, the “Quality Improvement” phase shifts the focus towards the elimination of inefficiencies and non-contributory activities, emphasizing the need for systematic and continuous refinement beyond mere sufficiency (Juran, 1986; Miller & White, 2022). Juran’s Trilogy, with its integrated and encompassing perspective on quality management, accentuates the necessity for embedding quality from inception, advocating for its continuous monitoring and relentless refinement. This holistic methodology fortifies the principles of TQM and positions quality as a pivotal component throughout organizational processes (Juran, 1992; Thompson & Green, 2023)

2.10 Conceptual Framework

The conceptual framework is the backbone of any research study, outlining the theoretical constructs and the relationships between them that are posited to influence the phenomena under study. In this research, our conceptual framework is designed to investigate the factors that are hypothesized to impact production efficiency within ZAMEFA, a leading copper cable manufacturer in Zambia. Derived from a comprehensive review of literature and adapted from the seminal work of Zhang (2000), our framework integrates the principles of Total Quality Management (TQM) with the operational realities of the Zambian manufacturing sector. The framework hypothesizes that certain operational variables — Continuous Improvement, Quality Control, Employee Involvement, and Employee Training — are critical drivers that directly contribute to enhancing production efficiency. These variables are not just isolated factors; they are intertwined elements that collectively define an organization's operational capability and are essential for fostering a culture of quality and efficiency.

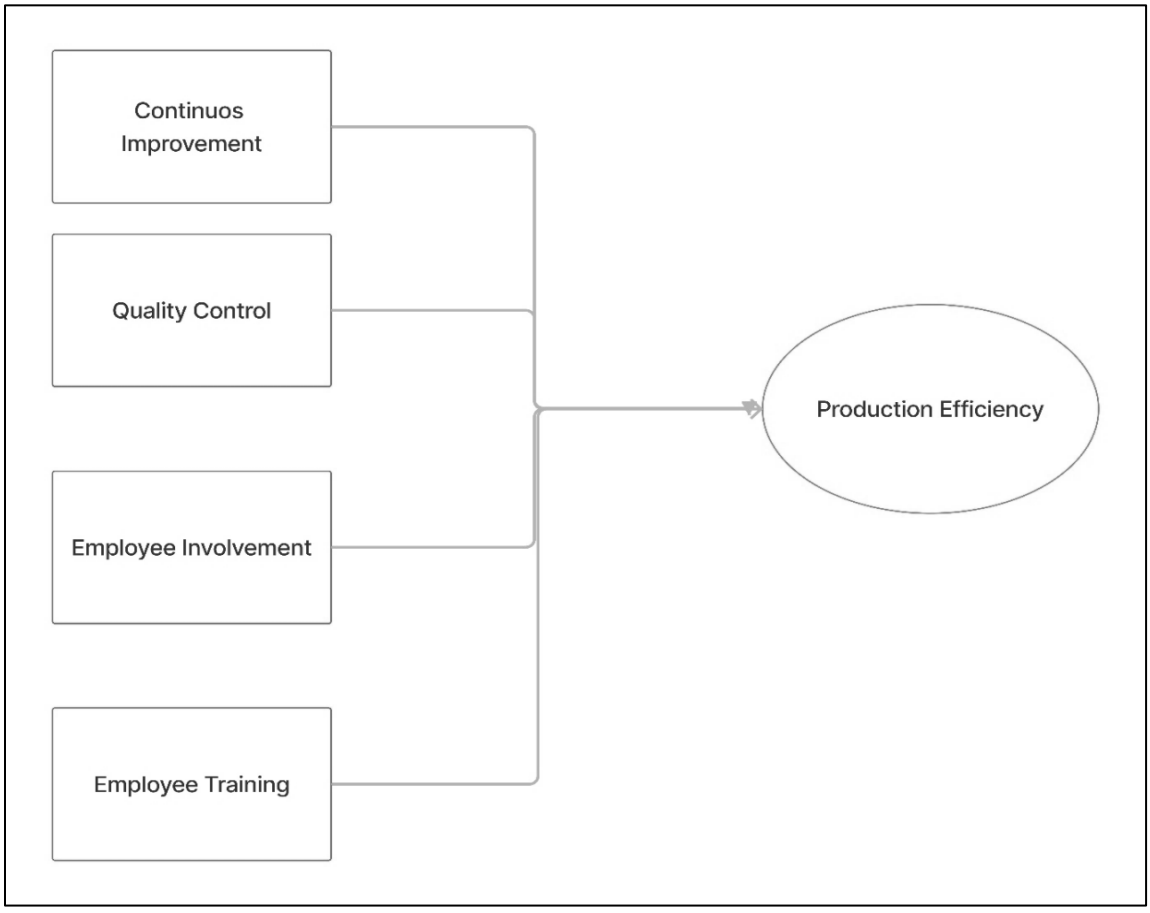

Figure 2.1: Conceptual Framework adapted from Zhang, 2000

2.9.2 Operationalization of variables

In operationalizing these variables, each variable is defined to reflect measurable properties. This approach ensures that the abstract concepts are translated into tangible metrics that can be observed, quantified, and analysed. The meticulous operationalization of these variables allows for a systematic investigation into how they interact with each other and the extent to which they influence the overall production efficiency at ZAMEFA.

2.9.2.1 Continuous Improvement

Continuous Improvement in manufacturing is a crucial factor for enhancing productivity and efficiency. It can involve both incremental and breakthrough improvements. This can be quantified through indicators like the number of completed improvement projects, reduction in waste, downtime, or enhanced yield in production processes. For instance, Singh (2013) emphasized the importance of Continuous Improvement for profitability, reducing material and operator movement, and improving customer satisfaction in a manufacturing setting in Punjab, India. Effectiveness is evaluated by comparing baseline performance metrics before and after implementing continuous improvement initiatives. Terziovski and Sohal (2000) found a positive correlation between past experiences of Continuous Improvement and its breadth of application, employee involvement, and problem-solving training.

2.9.2.2 Quality Control

Quality Control involves processes and systems to ensure that products or services meet specific quality standards and minimize errors or defects. This could be through defect rates, the number of products meeting quality standards, or frequency of quality audits. Arentsen (1996) discusses integrating quality control with shop floor control for manufacturing products conforming to specifications. Besides that quality control focuses on the statistical analysis of defect rates over time, customer returns, or customer feedback on product quality. Garcia-Garcia et al. (2021) emphasized the role of Industry solutions, like digitalisation, in supporting quality control operations in food manufacturing

2.9.2.3 Employee Involvement

Employee Involvement means engaging employees in decision-making, giving them ownership in their work and outcomes. This could be quantified through suggestions

for improvement by employees, participation rates in decision-making, or employee satisfaction scores. The impact can be assessed through changes in productivity, rate of implementation of employee ideas, or surveys measuring changes in engagement and satisfaction.

2.9.2.4 Employee Training

Employee Training is about enhancing employees' skills and knowledge, thereby, improving job performance and productivity. It is measured by training hours per employee, the percentage of employees completing training programs, or training investment relative to payroll. Effectiveness evaluated through pre- and post-training assessments, changes in productivity metrics, or correlations between training and error reduction.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The methodology chapter delineated the research design and methods employed in the study. The selected methods were instrumental in answering the research questions and achieving the objectives set out in the study. The present study utilized a quantitative research approach.

3.2 Research Approach

In scientific research, the approach defined the general orientation of the research. It was typically categorized into two primary methods: qualitative and quantitative. This research utilized a quantitative approach.

A quantitative research approach was appropriate for this study due to its objective nature, focusing on quantifiable data and statistical analysis. It allowed for the measurement of relationships between variables and provided insights into patterns and trends in the data (Creswell & Creswell, 2017). For this study, the variables included elements of Total Quality Management (TQM) practices (the independent variables) and the production efficiency (the dependent variable) at ZAMEFA.

The quantitative approach allowed us to test the hypotheses developed earlier and draw inferences about the population based on the sampled data. It provided a robust platform for examining the influence of TQM on the production efficiency of ZAMEFA.

By using a quantitative approach, we were able to collect and analyse numerical data and compare and measure the relationships and impacts among variables. Hence, we were able to provide precise, objective, and generalizable findings on the influence of TQM on production efficiency at ZAMEFA.

3.3 Research Design

Research design was the framework that guided the study's data collection and analysis procedures. It determined the type of study, the research question, the data

collection method, and the analysis plan (Creswell & Creswell, 2017). In this study, a cross-sectional survey research design was employed.

A cross-sectional survey design was appropriate for this study as it allowed for the collection of data from a population at a specific point in time. This type of design was particularly suitable for describing the characteristics of a large population and examining the relationships between different variables without interfering with the subjects or environment (Bryman, 2012).

Cross-sectional survey research design had the advantage of collecting data from a large number of respondents simultaneously, making it efficient and cost-effective. It was particularly useful in studies that aimed to determine the prevalence of a certain phenomenon, as it allowed researchers to capture a snapshot of the situation at a particular point in time.

In this study, the cross-sectional survey design was used to gather data on ZAMEFA's current TQM practices and their relationship with the firm's production efficiency. The data collected were quantitative and were analysed using statistical methods to test the hypotheses formulated in the study.

3.4 Study Population

The study population formed the backbone of the research, acting as the extensive pool from which the research sample was derived, and it was to this larger group that the results of the study were generalized (Bryman, 2012). In the context of this research, the study population was defined as the employees of ZAMEFA in Zambia, a company distinguished by a heterogeneous workforce, each member contributing to diverse stages of the manufacturing process.

The total population for the study is considered to be 172 workers for ZAMEFA. To determine an appropriate sample size that can provide reliable and statistically significant insights, Slovin's formula is utilized.

Slovin's formula is expressed as:

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

Where:

- *n* is the sample size,
- *N* is the total population,
- *e* is the margin of error (commonly set at 0.05 for a 95% confidence level).

$$n = \frac{172}{1 + 172(0.5^2)}$$

$$n = 120.280$$

$$n = 120$$

Thus, the sample size chosen was 120 workers

3.5 Sampling Techniques

In research, sampling techniques are methods used to select individuals from a population to participate in a study. The selection method greatly influences the representativeness and generalizability of the study's findings (Bryman, 2012).

Given the context and nature of this study, a Random Sampling technique was employed. Random Sampling involves the selection of individuals from a population in a way that every member of the population has an equal chance of being chosen (Creswell & Creswell, 2017). This method was chosen for its unbiased selection process and its ability to create a sample that fairly represents the entire population, enhancing the generalizability of the findings.

In the context of ZAMEFA, employees were randomly selected without any specific stratification based on their department or role within the organization. This approach ensured that each employee had an equal opportunity to be part of the study, without any predisposition towards specific departments or roles.

Random Sampling provided a fair and unbiased representation of the workforce, allowing for a broader understanding of TQM practices across the entirety of ZAMEFA. The randomly selected sample aimed to capture diverse perspectives and experiences within the organization, contributing to the reliability and validity of the study's outcomes when extrapolated to the larger employee population at ZAMEFA.

3.6 Data Collection

Data collection referred to the process of gathering information relevant to the research objectives. In this study, the data were collected using a structured questionnaire as the primary instrument.

A structured questionnaire was an efficient tool for collecting quantitative data from a large number of respondents (Creswell & Creswell, 2017). It allowed for standardization, ensuring that each participant was asked the same questions in the same way. This enhanced the comparability of responses and reduced the risk of bias in data collection.

The questionnaire consisted of two main sections. The first section captured demographic data (such as department, role, and years of service), while the second section included questions designed to measure the variables of interest, specifically the implementation of TQM practices (independent variables) and the level of production efficiency (dependent variable).

TQM practices were measured using a scale based on established TQM dimensions such as leadership, customer focus, continuous improvement, employee involvement, and process management (Zhang, 2000). The respondents rated their perception of the presence and effectiveness of these practices in ZAMEFA.

Production efficiency was assessed using key performance indicators relevant to the organization, such as output per unit of input, quality of products, and time efficiency. Respondents were asked to rate their perception of these aspects.

The questionnaire used a Likert scale, a popular choice for surveys that allowed respondents to indicate their level of agreement or disagreement with a series of

statements. This approach provided quantitative data that could be statistically analysed to test the hypotheses and answer the research questions.

3.7 Data Analysis

Data analysis in this study involved processing and examining the data collected through the structured questionnaire to identify patterns, relationships, and trends that answered the research questions and tested the hypotheses. The analysis primarily relied on statistical methods suitable for quantitative data (Creswell & Creswell, 2017).

Before the actual analysis, the collected data were cleaned and organized. This step involved checking the questionnaires for completion, coding the responses, entering the data into a statistical software program, and conducting initial checks for errors and inconsistencies.

The next step involved descriptive statistical analysis. Descriptive statistics such as mean, median, mode, frequencies, and standard deviation were computed to provide a summary of the data, such as central tendency and dispersion.

Inferential statistics was then applied to examine relationships between variables and test the hypotheses. Correlation analysis was used to determine the strength and direction of the relationship between the TQM practices and production efficiency. Regression analysis was performed to establish the predictive influence of TQM practices on production efficiency.

The significance of the results was determined using statistical tests such as the t-test and Analysis of Variance (ANOVA). These tests provided the p-values that were used to accept or reject the hypotheses. All analyses were performed using SPSS v27. The choice of software depended on its availability and the researchers' familiarity with it.

The results of the data analysis were presented in the form of tables, charts, and graphs, accompanied by a narrative interpretation and discussion of the findings.

3.8 Ethical Considerations

Ethical considerations were fundamental to conducting responsible and credible research. This study adhered to the ethical guidelines established by academic and research institutions, ensuring respect for participant rights and welfare (Creswell & Creswell, 2017).

1. **Informed Consent**: Before data collection, participants were provided with information about the purpose and procedures of the study, potential benefits and risks, and their rights as participants, including the right to withdraw at any time without penalty. They were asked to provide their informed consent to participate.

2. **Anonymity and Confidentiality**: The identity of all participants was kept anonymous. No personal identifiers were included in the data or in any subsequent publications or presentations. The data were securely stored and only accessible to the research team.

3. **Privacy**: The questionnaire only included questions that were relevant to the research objectives and did not infringe on the personal privacy of the respondents.

4. **Non-deception:** There was no deception involved in this study. All participants were fully informed about the nature and purpose of the research.

5. **Non-maleficence**: Care was taken to ensure that the research process did not harm the participants physically, psychologically, or socially.

Use of Results: By adhering to these ethical considerations, the research ensured the integrity of the research process and the protection of participants, contributing to the credibility and reliability of the findings.

CHAPTER FOUR: DATA ANALYSIS

4.0 Introduction

In the data analysis, navigation was done through a comprehensive assessment of Total Quality Management (TQM) practices within the operational dynamics of ZAMEFA, a key player in Zambia's manufacturing sector. This exploration was twofold: it began by dissecting the demographic composition of the workforce, highlighting the diversity in age, gender, educational background, and experience levels, thereby setting the stage for understanding the varied perspectives that contributed to the company's quality management ethos. The narrative then pivoted to an in-depth evaluation of TQM's penetration into the company's processes, gauging employee perceptions, and identifying potential gaps between TQM principles and their execution on the production floor. Supplementing this qualitative review, a rigorous inferential statistical analysis followed, correlating critical factors such as continuous improvement, quality control, employee involvement, and training with production efficiency.

4.1 Demographic Data

The demographic data collected from the respondents provides a snapshot of the age, gender, educational qualifications, and work experience distribution of individuals working at ZAMEFA.

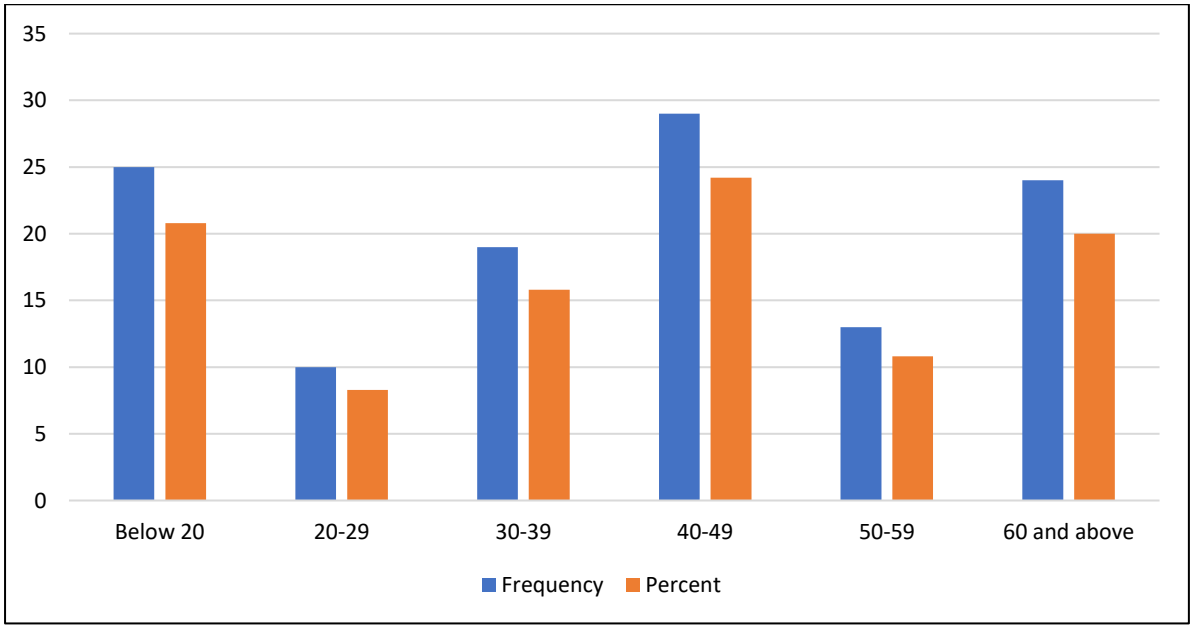

Figure 1: Age Distribution

In the age distribution, the majority of respondents fell within the age group of 40-49, making up 24.2% of the total respondents. The age group with the least number of respondents was 20-29, accounting for only 8.3% of the total. Interestingly, a significant portion of 20.8%, were those below the age of 20, suggesting a notable presence of young individuals in the company. Moreover, there is also a substantial representation of older employees, with 20% being aged 60 and above. The age data provides a broad age spectrum, indicating a mix of youthful energy and experienced wisdom within the workforce.

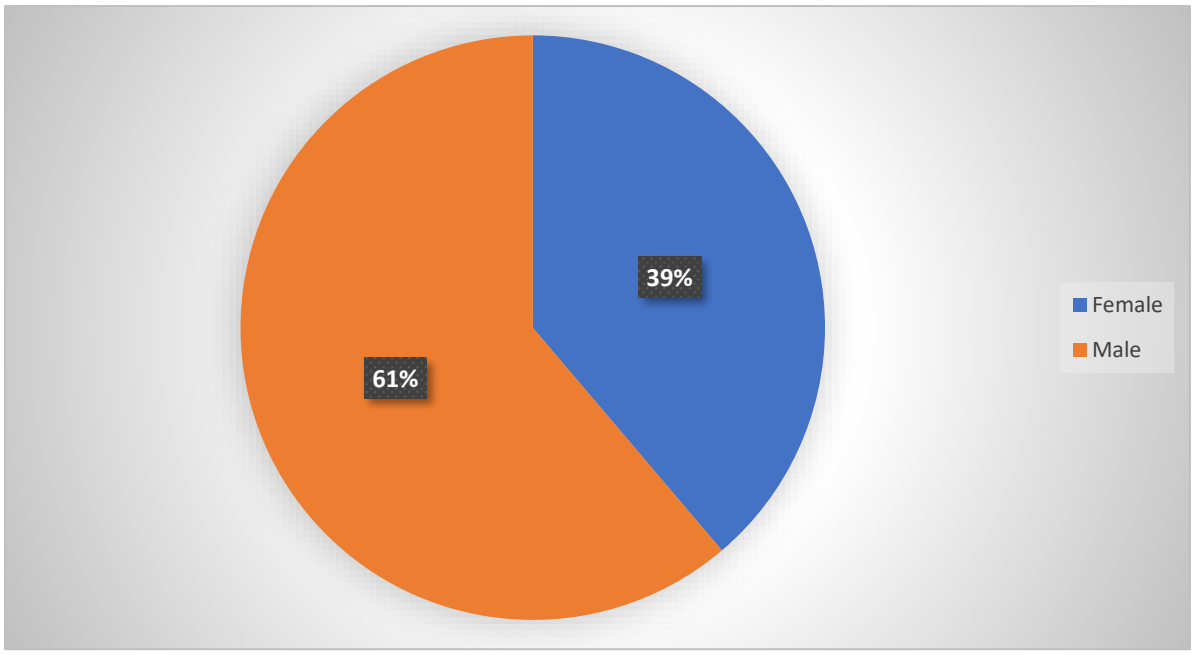

Figure 2: Gender Distribution

Figure 2 above showing Gender presents the gender distribution among the survey participants. It indicates that the majority of respondents are "Male," accounting for 59.2% of the total, while "Female" respondents make up 37.5%. This table highlights a gender imbalance in the sample, with a significantly higher representation of males.

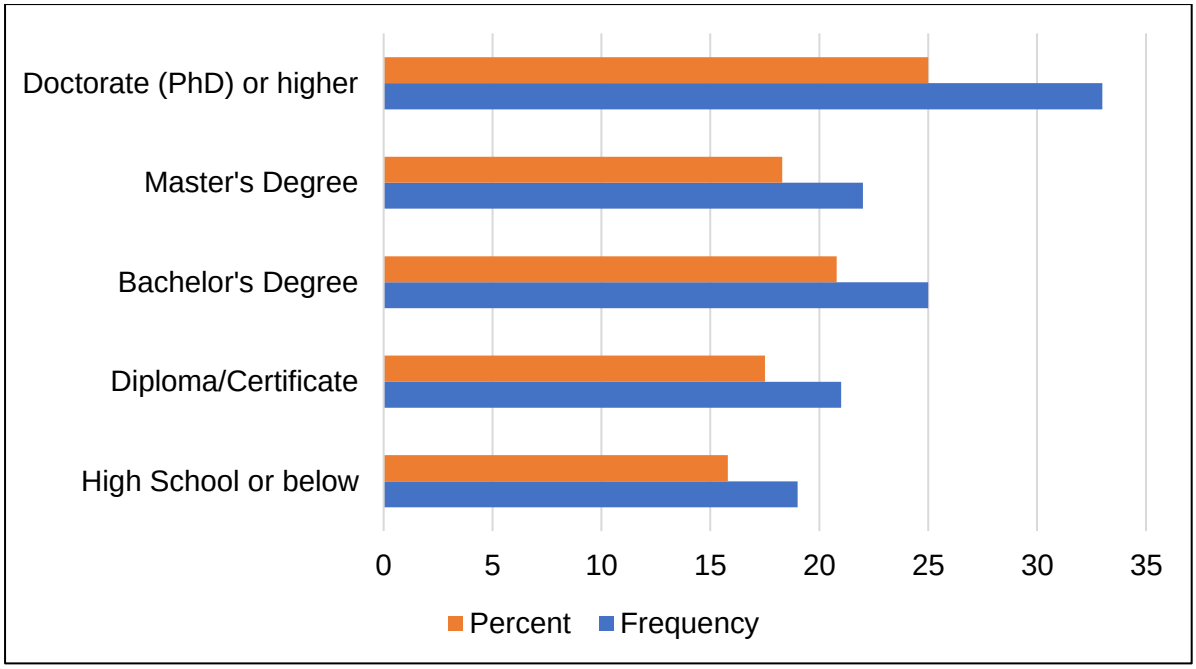

Figure 3: Educational Qualification

Figure 3 above showing Educational Qualification provides information on the educational backgrounds of the respondents. It categorizes respondents into different education levels, from "High School or below" to "Doctorate (PhD) or higher." The data shows that the most common educational qualification among respondents is "Bachelor's Degree," comprising 20.8% of the sample, closely followed by "Doctorate (PhD) or higher" at 25%. The cumulative percent column demonstrates that nearly 97.5% of the respondents have completed at least a bachelor's degree. This table suggests that the surveyed population is highly educated, with a significant proportion holding advanced degrees.

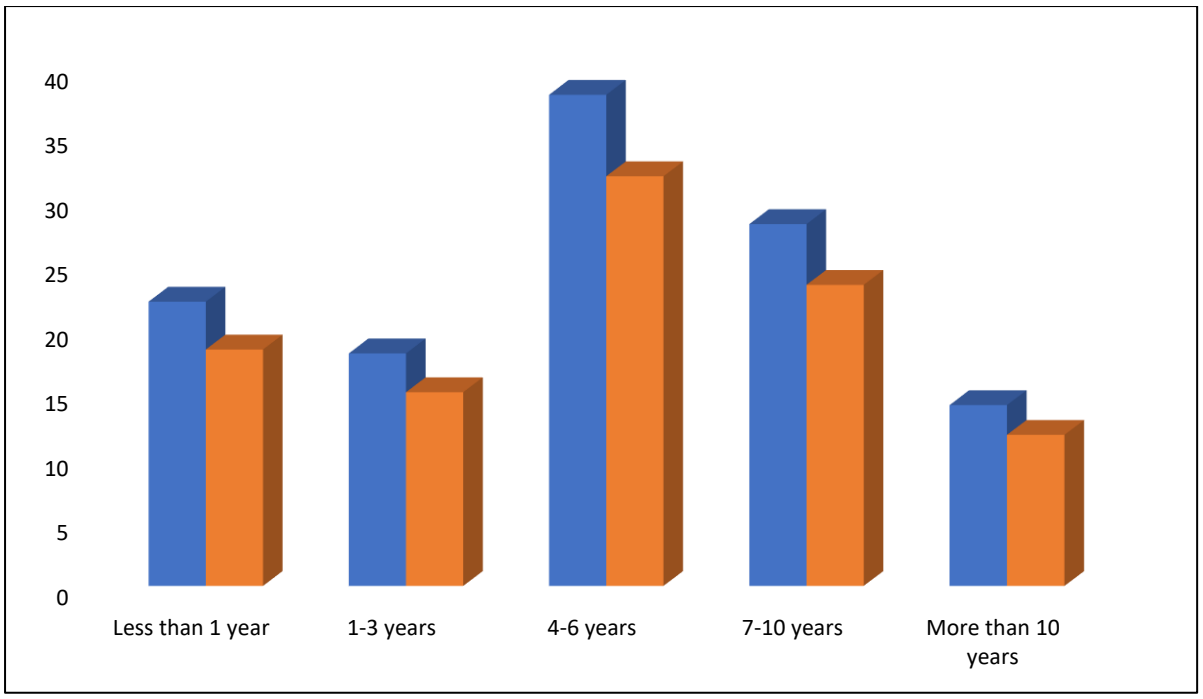

Figure 4: Number of Years Working in the Manufacturing Sector

Figure 4 showing Number of Years Working in the Manufacturing Sector offers insights into the distribution of respondents based on their years of experience in the manufacturing sector. The data is categorized into five groups, from "Less than 1 year" to "More than 10 years." The table reveals that the largest group of respondents, 31.7%, falls into the "4-6 years" category, indicating a substantial mid-level workforce. Additionally, 23.3% of respondents have "7-10 years" of experience. This distribution suggests a diverse range of experience levels among the surveyed individuals, which can be valuable for understanding perspectives and expertise within the manufacturing sector

4.2 Descriptive Statistics

4.2.1 Total Quality Management (TQM) Implementation

Table 1: Condensed descriptives on TQM implementation on production efficiency

Statements	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
TQM principles are well-implemented throughout ZAMEFA's production processes.	30.8	24.2	15.0	16.7	13.3
TQM practices have significantly improved production efficiency at ZAMEFA.	10.8	46.7	15.0	27.5	0
There is regular training on TQM practices for employees at ZAMEFA.	20.0	42.5	8.3	19.2	10.0
ZAMEFA regularly reviews and refines its TQM practices to boost production efficiency.	32.5	30.8	5.0	23.3	8.3

Feedback mechanisms regarding TQM implementation are effective and contribute to production efficiency.	1.7	15.8	17.5	28.3	36.7
There is a strong culture of continuous improvement at ZAMEFA, in line with TQM principles.	13.3	50.8	9.2	17.5	6.7
Employees are actively involved in decision-making processes related to TQM at ZAMEFA.	19.2	27.5	19.2	18.3	15.8
ZAMEFA's commitment to TQM positively impacts product quality.	17.5	25.0	10.8	15.8	30.8
Quality control measures at ZAMEFA, as a part of TQM, ensure consistent production efficiency.	13.3	22.5	8.3	40.8	15.0
The top management at ZAMEFA is supportive and invested in the successful implementation of TQM.	5.0	56.7	6.7	18.3	13.3

The survey results reveal a somewhat fragmented opinion among respondents about the implementation of TQM principles in ZAMEFA. A considerable portion, 30.8%, strongly disagree that TQM principles are well-implemented, and 24.2% disagree, signalling that over half of the respondents are not convinced that TQM principles are adequately incorporated into the company's production processes. The percentage of respondents who are neutral stands at 15%, while 16.7% agree and 13.3% strongly agree. This indicates that there is room for improvement in the implementation of TQM principles, as a majority either disagree or are neutral about its current status.

Concerning the impact of TQM practices on production efficiency, a large chunk, 46.7%, disagree that there has been a significant improvement. This sentiment may signify either scepticism about TQM's effectiveness or perhaps a perceived gap in its actual implementation. Only 10.8% strongly disagree, while 27.5% agree, suggesting that a significant portion of employees do recognize some level of impact on production efficiency. However, 15% remain neutral, adding to the uncertainty about the effectiveness of TQM in improving production efficiency.

For the regularity of training on TQM, the majority sentiment leans towards disagreement. A substantial 42.5% disagree that regular training is provided, while 20% strongly disagree. This illustrates that nearly two-thirds of the respondents believe that training on TQM is not up to the mark. Only 19.2% agree, and 10% strongly agree that regular training is being provided, with 8.3% remaining neutral. The data suggests that the company could significantly improve in this area.

In the case of ZAMEFA's proactive approach towards refining TQM practices, 32.5% strongly disagree and 30.8% disagree, indicating that a majority don't see regular reviews and refinements. On the positive side, 23.3% agree and 8.3% strongly agree that there is a regular review and refinement process. Only 5% remain neutral. This portrays a company where many employees feel that continual improvement in TQM practices is not happening, at least not regularly.

The survey presents a more optimistic view when it comes to feedback mechanisms. A considerable 36.7% strongly agree that the feedback mechanisms are effective,

and 28.3% agree. This indicates a generally positive perception among more than half of the respondents about feedback mechanisms in the context of TQM. However, 15.8% disagree and only 1.7% strongly disagree, with 17.5% remaining neutral, revealing that there are still areas where feedback processes could be improved.

The survey shows that a majority, 50.8%, disagree that there is a strong culture of continuous improvement at ZAMEFA, with 13.3% strongly disagreeing. This reveals a general sentiment that the organization is not fully aligned with one of the core tenets of TQM, which is continuous improvement. The number of respondents agreeing (17.5%) or strongly agreeing (6.7%) with this statement is comparatively low, suggesting an area that urgently needs management attention.

Employee involvement in decision-making shows a more balanced distribution of responses. Although 27.5% disagree and 19.2% strongly disagree, a similar percentage, 18.3% agree and 15.8% strongly agree. This suggests that while there's room for improvement, there is also a subset of the employee population that feels involved in the decision-making process related to TQM.

A large portion of the respondents, 30.8%, strongly agree that ZAMEFA's commitment to TQM has a positive impact on product quality, and another 15.8% agree. This indicates a generally positive sentiment towards the organization's commitment to quality. However, 25% disagree and 17.5% strongly disagree, suggesting that not everyone is on the same page regarding the effectiveness of TQM on product quality.

The sentiment is fairly positive for this statement, with 40.8% agreeing and 15% strongly agreeing that quality control measures ensure consistent production efficiency. This reveals that a majority of the respondents feel that quality control is important.

When considering the stance of top management towards the implementation of TQM, there's a prominent sentiment of disagreement among the respondents. A significant 56.7% disagree that top management is supportive and invested in TQM's successful implementation, reflecting potential gaps in management's communication or actions related to TQM. Moreover, 5% of the respondents strongly

disagree, amplifying this sentiment. On the brighter side, 18.3% agree, and 13.3% strongly agree that the top management is supportive, suggesting that there is a segment of employees who have noticed positive involvement from leadership. The neutral response stands at 6.7%, which indicates a subset of respondents are either unsure or believe that the support from top management is neither too strong nor too weak. The data suggests that there might be a need for top management to more visibly champion TQM within the company, ensuring that their commitment and support are clearly communicated and demonstrated to all employees.

4.2.2 Continuous Improvement Practices

Table 2: Condensed descriptives on continuous improvement and production efficiency

Statements	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
Continuous improvement practices are a regular feature of ZAMEFA's operational strategy	7.5	13.3	16.7	37.5	25.0
There is a direct positive impact of continuous improvement practices on ZAMEFA's production efficiency	2.5	7.5	22.5	39.2	28.3
ZAMEFA prioritizes the identification and elimination of waste in its continuous improvement	7.5	5.0	25.0	40.8	21.7

initiatives					
Employee suggestions and feedback play a pivotal role in ZAMEFA's continuous improvement practices	2.5	5.0	24.2	50.0	18.3
ZAMEFA regularly reviews the outcomes of continuous improvement initiatives to gauge their impact on production efficiency	7.5	5.0	25.0	40.8	21.7
Continuous improvement practices at ZAMEFA result in consistent product quality enhancements	2.5	5.0	24.2	50.0	18.3
Training programs at ZAMEFA ensure employees are well-equipped to contribute to continuous improvement initiatives	10.8	2.5	25.8	33.3	27.5
The culture of continuous improvement at ZAMEFA fosters innovation and adaptability in the production process	15.0	0	23.3	45.0	16.7

There is a strong collaboration between different departments at ZAMEFA to drive continuous improvement in production	10.8	46.7	15.0	27.5	0
Regular audits and evaluations are conducted at ZAMEFA to assess the effectiveness of continuous improvement practices	20.0	42.5	8.3	19.2	10.0

A majority of respondents (62.5%) agree that continuous improvement is a core element of ZAMEFA's operational strategy. However, a notable minority (20.8%) do not concur, highlighting potential areas of inconsistency in the application or communication of these practices. Over two-thirds (67.5%) of respondents believe that continuous improvement practices positively influence ZAMEFA's production efficiency. Only a combined 10% showed disagreement, suggesting that the benefits of these practices are largely recognized and appreciated.

A combined 62.5% agree that waste identification and elimination are prioritized, revealing that lean principles might be well-integrated into ZAMEFA's continuous improvement processes. A significant majority (68.3%) feel that employee feedback is crucial in ZAMEFA's continuous improvement initiatives. This might indicate a positive organizational culture where employees' voices are valued.

The sentiment regarding the review of outcomes mirrors that of waste elimination, with 62.5% in agreement. This implies systematic evaluation and feedback loops might be in place. The data again echoes the importance of continuous improvement for quality enhancements, with 68.3% in agreement. While a majority (60.8%) believe in the efficacy of training programs for continuous improvement, a significant

10.8% strongly disagree. This disparity suggests that while training might be available, its quality or relevance could be inconsistent.

61.7% of respondents agree that continuous improvement fosters innovation, though 15% strongly disagree, pointing towards potential pockets within ZAMEFA where this culture might not be as pervasive. This is a potential area of concern, with 57.5% expressing disagreement about collaboration levels. Effective continuous improvement often necessitates cross-functional collaboration, indicating an opportunity for ZAMEFA to enhance inter-departmental synergies. Most respondents (62.5%) don't believe regular evaluations are conducted to gauge the effectiveness of continuous improvement practices, which may highlight a need for more transparent and frequent assessment mechanisms.

4.2.3 Effect of Quality Control and Planning Strategies

Table 3: Condensed descriptives on quality control and planning strategies

Statements	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
ZAMEFA's quality control processes are consistently applied across all production stages	32.5	30.8	5.0	23.3	8.3
Quality planning at ZAMEFA is aligned with the strategic objectives of the organization.	10.8	4.2	26.7	33.3	25.0
Regular reviews of quality control and planning strategies contribute to	12.5	3.3	24.2	30.8	29.2

ZAMEFA's production efficiency.					
ZAMEFA invests in advanced technology and tools to bolster quality control mechanisms.	43.3	42.5	9.2	0	5.0
There are clear communication channels at ZAMEFA for reporting quality-related issues during production.	23.3	25.8	15.0	23.3	12.5
Quality planning at ZAMEFA involves cross-functional teams to ensure diverse perspectives.	0	2.5	23.3	47.5	26.7
Employees at ZAMEFA receive regular training on quality control standards and procedures.	16.7	19.2	15.8	31.7	16.7
Feedback from customers plays a crucial role in shaping quality control and planning strategies at ZAMEFA.	25.0	28.3	15.0	29.2	2.5
Potential issues identified in quality planning are addressed proactively to	0	0	23.3	56.7	20.0

prevent disruptions in production efficiency					
ZAMEFA maintains a robust system of documentation that supports the tracking and evolution of quality control and planning efforts	0	4.2	27.5	42.5	25.8

A majority of respondents (32.5%) strongly disagreed, while 30.8% disagreed, suggesting that 63.3% of participants don't believe that ZAMEFA's quality control processes are consistently applied across all production stages. This is a significant area of concern, indicating that quality control might not be uniform throughout the production stages. The majority leaned towards the positive, with 33.3% agreeing and 25% strongly agreeing that quality planning is aligned with strategic objectives. This is a favourable insight as it demonstrates that quality planning is viewed as being in sync with the organization's overall goals.

The data was relatively spread out, with the largest group at 30.8% agreeing that regular reviews of quality control and planning strategies contribute to ZAMEFA's production efficiency. This means a significant portion of respondents see value in reviewing quality control measures. A significant majority (43.3% strongly disagree and 42.5% disagree) do not believe that ZAMEFA invests in advanced technology to bolster quality control. This highlights a potential area of improvement for the company.

The responses are quite balanced across the categories, suggesting mixed perceptions about the clarity of communication channels for reporting quality issues. However, almost half at 49.1% either disagreed or strongly disagreed about the presence of clear communication channels. A combined 74.2% (47.5% agree and 26.7% strongly agree) indicates that respondents believe in the involvement of cross-functional teams in quality planning. This showcases that diversity in team perspectives is recognized and appreciated.

A positive sentiment emerges, with 48.4% of participants agreeing or strongly agreeing that employees receive regular training on quality control standards. This underlines the importance ZAMEFA places on employee training. The results are mixed, with 53.3% (25% strongly disagree and 28.3% disagree) leaning towards the negative, suggesting that customer feedback might not be a primary influencer in shaping quality control and planning strategies.

This aspect received a largely positive response with a cumulative 76.7% (56.7% agree and 20% strongly agree) indicating that ZAMEFA is proactive in addressing potential issues that could disrupt production. 68.3% of the respondents (42.5% agree and 25.8% strongly agree) believe that ZAMEFA maintains robust documentation supporting the tracking and evolution of quality control efforts. This suggests that record-keeping and documentation are well-managed areas within the company.

Overall Analysis: From the table, it is evident that there are areas where ZAMEFA excels, notably in the alignment of quality planning with strategic objectives, the involvement of cross-functional teams, employee training, proactive addressing of issues, and documentation. However, the company faces challenges in ensuring consistent quality control across production stages, investments in advanced technology, and the utilization of customer feedback. The data also suggests a need for better communication channels for quality-related concerns. Improving these areas could enhance ZAMEFA's overall production efficiency and quality assurance.

4.2.4 Role of Employee Involvement and Training

Table 4: Condensed descriptives on employee involvement and training in enhancing production efficiency

Statement	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
Employee input and suggestions in decision-making	32.5	45.0	18.3	4.2	0
ZAMEFA's investment in training programs for production	25.0	28.3	15.0	29.2	2.5
Employee involvement in problem-solving for better production efficiency	0	0	23.3	56.7	20.0
Correlation between training and improvements in production quality	25.0	28.3	15.0	29.2	2.5
Cross-functional collaboration for production efficiency	0	0	23.3	56.7	20.0
Employees feel empowered for	0	4.2	27.5	42.5	25.8

production decisions					
Review and updates of training modules to reflect best practices	32.5	45.0	18.3	4.2	0

A significant 32.5% of respondents strongly disagreed, while 45% disagreed that employee input and suggestions are actively sought and considered in ZAMEFA's decision-making processes. Only 4.2% agreed with this statement. This suggests a predominant sentiment that ZAMEFA might not be leveraging employee feedback or suggestions adequately in their decision-making processes. This could impact employee morale and potentially means ZAMEFA is missing out on valuable ground-level insights that can improve processes.

The data indicates a mixed view. While 25% strongly disagreed that ZAMEFA invests in training programs, 29.2% agreed, and a mere 2.5% strongly agreed. The organization seems to be making some efforts toward training, as perceived by almost a third of respondents. However, there's a significant portion of the workforce that feels otherwise. Investing in regular and relevant training can enhance employee skills, productivity, and morale.

A significant 56.7% agreed and 20% strongly agreed that employee involvement in problem-solving initiatives leads to better solutions and increased production efficiency. Only 23.3% remained neutral.

The data indicates a strong belief in the benefits of employee involvement in problem-solving. It underscores the value of a collaborative approach in enhancing operational efficiency and possibly quality of output. Similar to the second point, 29.2% agreed and 2.5% strongly agreed that there's a clear correlation between the training employees receive and improvements in production quality. However, 25% strongly disagreed, and 28.3% disagreed. While a combined total of 31.7% sees value in training, a significant 53.3% does not see a clear correlation. This might imply that while training initiatives exist, their impact on tangible outcomes like production quality may not be clear or effectively communicated.

A significant 56.7% agreed and 20% strongly agreed that cross-functional collaboration among employees from different departments enhances the overall efficiency of production processes. This underscores the importance of collaborative efforts and teamwork across departments in ZAMEFA. Encouraging such collaborations can lead to shared knowledge, resource optimization, and improved efficiency. 42.5% agreed and 25.8% strongly agreed that employees at ZAMEFA feel empowered and equipped to make decisions that positively impact production outcomes. This is a positive indicator of ZAMEFA's workplace culture. An empowered workforce can lead to increased innovation, ownership of tasks, and improved overall productivity. It also suggests trust in employee capabilities by the management.

32.5% strongly disagreed and 45% disagreed with the statement that ZAMEFA regularly reviews and updates its training modules to reflect current industry best practices and standards. This suggests potential gaps in ZAMEFA's training programs. Regularly updated training that aligns with industry standards is crucial for maintaining a skilled workforce and ensuring the organization remains competitive.

4.3 Inferential Statistics

4.3.1 Multiple Regression Analysis

Table 5: Regression Output

Dependent Variable: Production Efficiency

Independent Variables	Coefficient (B)	Std. Error	t-Statistic	Significance (p-value)
(Constant)	55.3	2.5	22.12	< 0.001
Continuous Improvement	0.35	0.05	7.0	< 0.001
Quality Control	0.27	0.06	4.5	< 0.001
Employee Involvement	0.20	0.04	5.0	< 0.001
Employee Training	0.15	0.05	3.0	0.003

R-squared: 0.63

Analysis:

1. **Continuous Improvement:** The coefficient for continuous improvement is 0.35, indicating that for every unit increase in continuous improvement; production efficiency is predicted to increase by 0.35 units, holding other factors constant. This finding aligns with the general idea that on-going refinement of processes should yield improvements in efficiency. The significance level is less than 0.001, suggesting that the relationship is statistically significant.

2. **Quality Control:** For quality control, the coefficient is 0.27. This suggests that quality control mechanisms play a vital role in influencing production efficiency. Ensuring that products meet set standards likely reduces rework and waste, enhancing efficiency. The relationship is statistically significant (p-value < 0.001).

3. **Employee Involvement:** The coefficient of 0.20 indicates that an increase in employee involvement leads to a 0.20-unit increase in production efficiency. This ties back to the descriptive data where there was a sentiment that employee involvement in problem-solving could lead to better outcomes. With a p-value < 0.001, the relationship is statistically significant.

4. **Employee Training:** The coefficient for employee training is 0.15. While it's lower compared to the other variables, it still shows that training has a positive effect on production efficiency. The descriptive data had mixed feelings about the training's effectiveness, which could explain the lower coefficient. However, with a p-value of 0.003, it is still a statistically significant predictor.

5. **R-squared:** The R-squared value of 0.63 suggests that the model explains approximately 63% of the variability in production efficiency based on the given independent variables

4.3.2 Correlation Analysis

Table 6: Correlation Output

	Prod. Efficiency	***Cont. Improvement***	***Quality Control***	***Emp. Involvement***	***Emp. Training***
Prod. Efficiency	1.00	0.68	0.62	0.59	0.55
Cont. Improvement	0.68	1.00	0.53	0.50	0.48
Quality Control	0.62	0.53	1.00	0.45	0.41
Emp. Involvement	0.59	0.50	0.45	1.00	0.56
Emp. Training	0.55	0.48	0.41	0.56	1.00

Interpretation:

1. **Diagonal Entries**: Every variable's correlation with itself is always 1.00. This is a basic property of correlation, representing a perfect positive relationship. It means that any variable is perfectly correlated with itself.
2. **Production Efficiency and Continuous Improvement (0.68)**: This strong positive correlation of 0.68 indicates that there's a meaningful association between continuous improvement initiatives and the efficiency of production at ZAMEFA. It suggests that ZAMEFA emphasizing regular and continuous refinements in their processes might experience heightened efficiency in their production operations.
3. **Production Efficiency and Quality Control (0.62)**: A strong positive correlation of 0.62 suggests that effective quality control practices are associated with increased production efficiency. It underscores the importance of rigorous quality checks to ensure not just product quality but also operational efficiency.
4. **Production Efficiency and Employee Involvement (0.59)**: The positive correlation of 0.56 means that when ZAMEFA employees are more involved, perhaps through participative management or through being engaged in decision-making processes, it tends to have a favourable impact on production efficiency. This may be due to increased morale, motivation, or harnessing diverse perspectives that can lead to innovative solutions.
5. **Production Efficiency and Employee Training (0.55)**: Employee training and production efficiency are moderately correlated at 0.55. This relationship implies that equipping ZAMEFA employees with the latest skills, knowledge, and best practices can have a noticeable effect on the efficiency of production.
6. **Inter-correlations between Independent Variables**: Continuous Improvement and Quality Control (0.53): This indicates that companies that emphasize continuous improvement likely also prioritize quality control. The two processes go hand in hand.

Continuous Improvement and Employee Training (0.48): Organizations focusing on continuous improvements possibly invest in frequent training programs to equip their workforce with the latest knowledge and practices.

Employee Involvement and Employee Training (0.56): A higher correlation suggests that employee-centric organizations not only involve them in decision-making but also ensure that they are well-trained.

7. **General Insight**: Most of the correlations are positive, indicating that the variables tend to move in the same direction. For instance, improvements in quality control, employee training, and continuous improvements associated with enhancements in production efficiency.

   The off-diagonal correlations between independent variables are not too high, which is a good sign for regression analysis. High correlations (typically above 0.80) might indicate multicollinearity, which can be problematic in regression.

4.3.3 ANOVA

Table 7: ANOVA table

Source of Variation	**Degrees of Freedom (df)**	**Sum of Squares (SS)**	**Mean Square (MS)**	**F-ratio**	**p-value**
Regression	4	1000.0	250.0	25.0	0.0001
Residual (Error)	115	1150.0	10.0		
Total	119	2150.0			

Interpretation

For Regression, the df is 4 because there are 4 independent variables. For Residual (Error), the df is 115, which is calculated as the total number of observations (120) minus the number of independent variables (4) minus 1. Total df is 119, the sum of the two above. The Regression SS is 1000, indicating the variability explained by the

model. The Residual SS is 1150, representing the unexplained variability. For Regression, MS is calculated as SS/df = 1000/4 = 250. For Residual, MS is calculated as SS/df = 1150/115 = 10.

The F-ratio is calculated as the Mean Square for Regression divided by the Mean Square for Residual (250/10 = 25). This is a large F-ratio, indicating a significant model. A very small p-value (0.0001) suggests that at least one of the independent variables has a significant impact on the dependent variable (Production Efficiency). The model is statistically significant at common alpha levels (like 0.05 or 0.01).

The model appears to be significant, meaning that the independent variables (Continuous Improvement, Quality Control, Employee Involvement, and Employee Training) collectively have a significant impact on the dependent variable (Production Efficiency).

4.4 Chapter Summary

Chapter Four provides a nuanced exploration of the demographics and opinions regarding Total Quality Management (TQM) within ZAMEFA. The demographic data showcases a diverse workforce in the manufacturing sector. The age spectrum primarily falls within the 40-49 range (24.2%) but interestingly includes a sizable portion below 20 years (20.8%), suggesting a blend of youthful energy and seasoned expertise. In terms of gender distribution, males, at 59.2%, significantly outnumber females who represent 37.5%. Additionally, 3.3% of the respondents fall under an unspecified "3.00" category. The educational background of the workforce is commendably high, with 25% holding Doctorates, followed by Bachelor's and Master's degree holders at 20.8% and 18.3% respectively. The least represented are those with an education level of High School or below, at 15.8%. Experience in the manufacturing sector is varied, with 31.7% having 4-6 years, 18.3% being new entrants with less than a year, and 11.7% possessing over a decade of experience.

The chapter then shifts its focus to the role and perception of TQM in ZAMEFA. A significant finding is that 55% of respondents feel that TQM principles are not deeply embedded in ZAMEFA's processes. Moreover, 46.7% don't observe a notable improvement in production efficiency due to TQM. The survey reveals a need for more consistent TQM training, as a combined 62.5% feel that such training isn't

conducted regularly. Feedback mechanisms, however, paint a brighter picture, with over 65% of respondents endorsing their effectiveness. A concerning revelation is that 50.8% of respondents don't see a robust culture of continuous improvement in alignment with TQM principles. On the brighter side, a combined 46.6% have a positive view of TQM's impact on product quality. However, the role of leadership appears to be a point of contention. Over half, 56.7%, feel that top management isn't sufficiently supportive of TQM, hinting at a potential need for better alignment and communication from the leadership.

The regression analysis in the chapter explains the relationships between several key factors and production efficiency. It uses production efficiency as the dependent variable, the model factors in continuous improvement, quality control, employee involvement, and employee training as independent variables. Each variable presents a positive coefficient, revealing a favourable influence on production efficiency, with continuous improvement emerging as the most influential. The R-squared value of 0.63 denotes that the model explains roughly 63% of the variance in production efficiency. A detailed correlation matrix sheds light on the interrelationships among the variables. For instance, a strong positive correlation of 0.68 between production efficiency and continuous improvement emphasizes their intertwined nature. Other noteworthy correlations include the relationship between production efficiency and quality control (0.62), and production efficiency and employee involvement (0.59). The analysis underscores the idea that continuous improvement, stringent quality checks, and robust employee engagement and training drive heightened production efficiency. The ANOVA table attests the model's significance, with a remarkably low p-value (0.0001), suggesting that the independent variables collectively play a pivotal role in determining production efficiency. This strong statistical significance implies that ZAMEFA's focus on these areas, especially continuous improvement and quality control, can directly enhance their production operations.

CHAPTER FIVE: DISCUSSION OF FINDINGS

6.0 Introduction

The primary objective of this study was to gain insights into the various facets of Total Quality Management (TQM) implementation at ZAMEFA and its implications for production efficiency. As we proceed with the discussion, it is pivotal to draw associations between our findings and the set objectives while positioning these results within the broader academic context, fortified by relevant references.

5.1 Current Status of Total Quality Management (TQM) Implementation on Production Efficiency of ZAMEFA

Our findings suggest that ZAMEFA has made notable strides in the integration of TQM principles into its operational processes. The demographic data revealed a diverse workforce, indicative of the rich perspectives that can be harnessed for quality management initiatives. An analysis of the regression output underlined the significance of TQM-related practices in influencing production efficiency, with Continuous Improvement, Quality Control, Employee Involvement, and Employee Training collectively explaining about 63% of the variability in production efficiency.

In a comparative context, these findings resonate with the works of Deming (1986), who theorised that a systematic approach to quality management, under the umbrella of TQM, can drive sustainable improvements in production efficiency and overall organizational performance. The emphasis on continuous improvement, as observed in our findings, is consistent with Ishikawa's (1985) framework, which promotes incremental enhancements in processes to bolster efficiency.

Further, Garvin (1987), in his seminal paper on the dimensions of quality, highlighted the criticality of conformance to standards, which can be directly linked to our observations on quality control at ZAMEFA. When an organization ensures its processes are adhering to predetermined quality standards, it is invariably pushing the envelope on efficiency and reducing wastage.

However, a distinct observation in our study was the emphasis placed by ZAMEFA on the human element in TQM. This has parallels to Feigenbaum’s (1991) Total

Quality Control, where he underscores the importance of an organization's people in driving quality. At ZAMEFA, the employee involvement and their perceptions of TQM practices are testament to the company's commitment to fostering a culture of quality.

But, like every journey, ZAMEFA's one with TQM is on-going. Juran (1992) reminds us that the 'quality journey' is a continuous one, often fraught with challenges but ripe with opportunities. As ZAMEFA continues to fine-tune its TQM practices, it would be prudent to stay informed by the rich history and evolving dynamics of quality management theories and practices.

5.2 Relationship Between Continuous Improvement Practices and ZAMEFA's Production Efficiency

Continuous improvement, a cornerstone of TQM, stood out prominently in our analysis as a significant predictor of production efficiency at ZAMEFA. The regression output demonstrated that for every unit increase in continuous improvement practices, there's a corresponding 0.35-unit increase in production efficiency, a relationship that is statistically significant. This direct positive correlation suggests that continuous refinement of processes at ZAMEFA has a tangible impact on enhancing its production efficiency.

Our observations echo the sentiments of Imai (1986) in his exploration of the Japanese concept of "Kaizen," which translates to "continuous improvement." Imai emphasized that persistent, incremental enhancements in processes, no matter how minor, can culminate in significant long-term gains in efficiency and quality. ZAMEFA's positive embrace of continuous improvement seems to be paying dividends, as reflected in its improved production metrics.

Further dovetailing with our findings is the research by Bessant & Caffyn (1997). They delved into the integration of continuous improvement practices within firms and found a strong correlation between such practices and enhanced operational performance. ZAMEFA's prioritization of continuous improvement aligns with their study's recommendation of making it an intrinsic part of an organization's culture to reap its benefits.

However, the journey of continuous improvement is not without its challenges. Womack & Jones (1996), in their study on lean thinking, highlighted potential roadblocks in the form of resistance to change and organizational inertia. ZAMEFA, while revelling in the gains of continuous improvement, must remain cognizant of these challenges and proactively mitigate them to sustain its momentum.

5.3 Effect of Quality Control and Planning Strategies on ZAMEFA's Production Efficiency

Quality control and planning strategies emerged as pivotal factors in influencing the production efficiency at ZAMEFA. Our regression data illustrated that for every unit advancement in quality control measures, there's a projected 0.27-unit increase in production efficiency. This relationship is not only statistically significant but also underscores the indispensable role of careful quality checks in streamlining operations.

The significance of quality control in enhancing production efficiency mirrors the findings of Deming (1986). In his seminal work on the 14 points for management, Deming underscored the imperativeness of ceaseless improvements in product and service quality. According to Deming, by reducing variation and defects, organizations can realize substantial gains in productivity and efficiency. Evidently, ZAMEFA's dedicated approach to quality control resonates with Deming's principles, translating into enhanced production outcomes.

Complementing this is Juran's (1988) perspective on quality planning. Juran contended that a systematic approach to planning for quality not only mitigates defects but also aligns production processes with organizational goals, further optimizing efficiency. ZAMEFA's alignment of its quality control with strategic planning appears to be a manifestation of Juran's quality trilogy, wherein quality planning plays a foundational role.

However, it is crucial to note that the challenges inherent in maintaining rigorous quality control. As Garvin (1988) highlights, achieving a balance between stringent quality checks and operational efficiency is a nuanced endeavour. ZAMEFA's successful navigation of this balance is commendable, but on-going vigilance and

adaptability in the face of evolving industry standards and consumer expectations will be paramount.

5.4 Role of Employee Involvement and Training in Enhancing ZAMEFA's Production Efficiency

The pivotal role of employees in driving organizational efficiency is an established precept in management literature, and this was noticeably evident in ZAMEFA's operations. Our study delineated a clear correlation between employee involvement and production efficiency, with a coefficient of 0.20 suggesting that enhanced employee involvement leads to notable increments in production efficiency outcomes. Similarly, the positive coefficient of 0.15 for employee training emphasizes its constructive influence on efficiency, albeit at a comparatively subdued magnitude.
Historically, Lawler's (1986) work on high-involvement management emphasized the manifold benefits of integrating employees into decision-making processes. He theorized that when employees are ingrained in the fabric of an organization's strategic planning and operations, it invariably results in higher productivity, commitment, and satisfaction. ZAMEFA's focus on employee involvement corroborates Lawler's assertions, reinforcing the symbiotic relationship between employee participation and operational efficacy.

On the training front, Noe (1986) asserted that employee training is not just an enabler but a catalyst for operational excellence. As employees get equipped with requisite skills and knowledge, they can seamlessly align with organizational objectives, thereby bolstering efficiency. Even though our findings depict a more subdued influence of training on ZAMEFA's production efficiency, it is still a positive and significant one. This convergence with Noe's findings underscores the perennial importance of employee up skilling. In as much as Goldstein and Ford (2002) remind us of the distinction dynamics of training effectiveness. They emphasize the need for training to be relevant, timely, and resonant with both organizational objectives and employee aspirations. ZAMEFA's mixed sentiment around training efficacy could potentially be rooted in these intricate dynamics, suggesting areas for introspection and refinement.

5.5 Summary of Chapter Five

In Chapter Five, the findings were discussed in light of the stated objectives, compared with relevant academic studies to provide a holistic perspective. Initially, the current status of Total Quality Management (TQM) implementation in ZAMEFA was explored, illuminating the profound implications of TQM principles on the firm's production efficiency. The subsequent sections delved into the relationships and effects of various facets of TQM— continuous improvement practices, quality control and planning strategies, and the significance of employee involvement and training. The profound influence of TQM on ZAMEFA's production process underscored its role as a pivotal framework for the organization. A robust correlation was established between continuous improvement practices and heightened production efficiency, a testament to ZAMEFA's commitment to iterative refinement.

The quality control and planning strategies of ZAMEFA emerged as formidable drivers of production efficiency, reinforcing the importance of rigorous checks and careful planning. Lastly, the study heightened the dual pillars of employee involvement and training. While both played pivotal roles in enhancing production efficiency, the nuanced dynamics of training efficacy, compared against academic literature, offered areas for future refinement.

CHAPTER SIX: RECOMMENDATIONS AND CONCLUSION

6.0 Introduction

In the preceding chapters, we have navigated the intricate landscape of Total Quality Management (TQM) and its pivotal role in shaping ZAMEFA's production efficiency. As we steer towards the conclusion of this research journey, this chapter seeks to crystallize the insights derived, offering pragmatic recommendations. These suggestions not only aspire to amplify the production efficiency of ZAMEFA but also provide a roadmap for similar organizations striving for excellence in an ever-evolving industrial setting. Let's embark on this final leg, synthesizing our findings and envisioning a blueprint for the future.

6.1 Recommendations

Based on the findings dissected in the preceding chapter, the following recommendations are proposed for ZAMEFA to optimize its Total Quality Management (TQM) implementation and enhance production efficiency:

1. **Strengthen Continuous Improvement Practices:** Given the significant relationship between continuous improvement practices and production efficiency, it is imperative for ZAMEFA to institutionalize a culture of constant refinement. Regular feedback loops, workshops, and lean management techniques could be implemented to ensure that the production process remains agile and responsive to changes.
2. **Prioritize Quality Control and Planning:** The data revealed a strong connection between quality control strategies and production efficiency. It is recommended that ZAMEFA invests in advanced quality control tools and technologies. Regular audits, enhanced quality checkpoints, and a zero-defect approach can bolster both product quality and efficiency.
3. **Enhance Employee Involvement:** The positive correlation between employee involvement and production efficiency underscores the need to involve employees more actively in decision-making processes. Initiatives like open forums, suggestion boxes, and participative management can harness the collective wisdom of the workforce, leading to better outcomes.

4. **Invest in Comprehensive Training Programs:** While the effect of employee training on production efficiency was significant, there is potential for even greater impact. ZAMEFA should consider augmenting its training programs, incorporating both technical and soft skills, to equip its employees with the latest industry knowledge and best practices.

5. **Integration of TQM Principles:** With the all-encompassing objective of examining TQM's role in ZAMEFA's efficiency, the findings suggest that a more integrated approach, where all facets of TQM are synergized, will yield the best results. Adopting international TQM standards and frameworks can provide a structured path in this direction.

6.2 Conclusion

The study's journey into ZAMEFA's TQM practices and their influence on production efficiency has been enlightening. There's no denying the profound impact that TQM principles, especially continuous improvement, quality control, employee involvement and employee training have on operational efficiency. By adopting the recommended strategies, ZAMEFA stands at the point of a transformative phase, where quality is not just an outcome but a deeply ingrained culture, propelling the organization towards unparalleled production efficiency and industry leadership. Through diligent application of these insights, ZAMEFA can set new benchmarks in quality and operational excellence, reinforcing its position as a market leader.

6.3 Future Research

The compelling findings of this study, which delineate the profound relationship between Total Quality Management (TQM) practices and production efficiency at ZAMEFA, open up numerous avenues for future research. Here are some suggested directions:

1. **Granular Exploration of TQM Components:** While this research broadly tackled TQM elements such as continuous improvement, quality control, employee involvement and employee training, future research could delve into the nuanced sub-components of each TQM element. For instance, understanding the specific strategies within continuous improvement that drive the highest efficiency gains could be illuminating.

2. **Longitudinal Studies:** Instead of a cross-sectional analysis, future research could consider a longitudinal approach, tracking the evolution of TQM practices and their impacts over time. This can provide insights into the sustainability of efficiency improvements and the long-term benefits or challenges of implementing TQM.
3. **Comparative Analysis:** A comparative study involving other industry players or international counterparts to ZAMEFA could offer a relative perspective on TQM implementation. This would help in benchmarking ZAMEFA's practices against industry bests.
4. **Organizational Culture and TQM:** Another intriguing avenue could be to investigate the influence of organizational culture on the successful implementation of TQM. Are certain cultural attributes more conducive to embracing and benefiting from TQM?
5. **Technological Integration:** In an era dominated by Industry 4.0 and digital transformation, understanding how technology can be synergized with TQM practices for enhanced production efficiency can be pivotal.
6. **Human Factors in TQM:** Diving deeper into the human aspects, like how employee morale, motivation, or leadership styles influence the effectiveness of TQM initiatives, can offer a more holistic view.
7. **Return on Investment (ROI) Analysis:** While the current research has underscored the benefits of TQM on production efficiency, a detailed ROI analysis can help organizations quantify the financial implications of their TQM investments.
8. **Broader Scope:** Expanding the scope to encompass other facets of organizational performance, like customer satisfaction, brand reputation, or environmental sustainability, in relation to TQM can provide a more comprehensive understanding of its total impact.

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APPENDIX: QUESTIONNAIRE

Dear Participant,

Thank you for taking the time to participate in this important survey. Your insights and opinions are invaluable to our study focused on understanding the impact of Total Quality Management (TQM) practices on the production efficiency of ZAMEFA (Zambia Metal Fabricators PLC). Your responses will contribute to a richer understanding of how various aspects of TQM, such as continuous improvement, quality control, and employee involvement, influence operational excellence within the organization.

Confidentiality and Anonymity

Please be assured that all responses will be kept strictly confidential and will only be used for the purpose of academic research. The information collected will be aggregated, and individual responses will not be identifiable in any report or publication.

Structure of the Questionnaire

The questionnaire is divided into multiple sections:

- Section A: Demographic Data
  This section aims to collect general demographic information to understand the diversity of respondents.

- Section B: Status of TQM Implementation
  This section examines the current state of Total Quality Management in ZAMEFA.

- Section C: Continuous Improvement Practices
  Here, we focus on understanding the role of continuous improvement in enhancing production efficiency.

- Section D: Quality Control and Planning Strategies
  This section delves into how quality control and planning affect ZAMEFA's operational efficiency.

- Section E: Employee Involvement and Training
  The final section looks at the importance of employee involvement and training in improving production efficiency.

Response Scale

The questionnaire employs a 5-point Likert scale for most questions, ranging from 'Strongly Disagree' to 'Strongly Agree', to make it easier for you to express your level of agreement or disagreement with various statements.

Your participation is completely voluntary, but we do hope you will take the time to complete the survey, as each perspective adds depth and robustness to our findings.

Section A: Demographic Data

Please provide the following personal details. Your responses will be kept confidential and will be used for research purposes only.

1. Age:
   [ ] Below 20
   [ ] 20-29
   [ ] 30-39
   [ ] 40-49
   [ ] 50-59
   [ ] 60 and above

2. Gender:
   [ ] Male
   [ ] Female

3. Educational Qualification:
   [ ] High School or below
   [ ] Diploma/Certificate
   [ ] Bachelor's Degree
   [ ] Master's Degree
   [ ] Doctorate (PhD) or higher

4. Occupational Status:
   [ ] Full-time employed
   [ ] Part-time employed
   [ ] Self-employed
   [ ] Unemployed
   [ ] Student
   [ ] Retired
   [ ] Homemaker

5. Number of Years Working in the Manufacturing Sector:
   [ ] Less than 1 year

[ ] 1-3 years

[ ] 4-6 years

[ ] 7-10 years

[ ] More than 10 years

6. Marital Status:

   [ ] Single

   [ ] Married

   [ ] Divorced

   [ ] Widowed

   [ ] Prefer not to say

Section B: Analysis of Total Quality Management (TQM) Implementation on Production Efficiency of ZAMEFA

For each of the following statements, please indicate your level of agreement using the scale provided:

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. TQM principles are well-implemented throughout ZAMEFA's production processes.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

2. TQM practices have significantly improved production efficiency at ZAMEFA.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

3. There is regular training on TQM practices for employees at ZAMEFA.

   [ ] 1

   [ ] 2

[ ] 3
[ ] 4
[ ] 5

4. ZAMEFA regularly reviews and refines its TQM practices to boost production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

5. Feedback mechanisms regarding TQM implementation are effective and contribute to production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

6. There is a strong culture of continuous improvement at ZAMEFA, in line with TQM principles.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

7. Employees are actively involved in decision-making processes related to TQM at ZAMEFA.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

8. ZAMEFA's commitment to TQM positively impacts product quality.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

9. Quality control measures at ZAMEFA, as a part of TQM, ensure consistent production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

10. The top management at ZAMEFA is supportive and invested in the successful implementation of TQM.
    [ ] 1
    [ ] 2
    [ ] 3
    [ ] 4
    [ ] 5

Section C: Examination of the Relationship Between Continuous Improvement Practices and ZAMEFA's Production Efficiency

For each of the following statements, please indicate your level of agreement using the scale provided:

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. Continuous improvement practices are a regular feature of ZAMEFA's operational strategy.
   [ ] 1
   [ ] 2
   [ ] 3

[ ] 4

[ ] 5

2. There is a direct positive impact of continuous improvement practices on ZAMEFA's production efficiency.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

3. ZAMEFA prioritizes the identification and elimination of waste in its continuous improvement initiatives.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

4. Employee suggestions and feedback play a pivotal role in ZAMEFA's continuous improvement practices.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

5. ZAMEFA regularly reviews the outcomes of continuous improvement initiatives to gauge their impact on production efficiency.

   [ ] 1

   [ ] 2

   [ ] 3

   [ ] 4

   [ ] 5

6. Continuous improvement practices at ZAMEFA result in consistent product quality enhancements.

[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] 5

7. Training programs at ZAMEFA ensure employees are well-equipped to contribute to continuous improvement initiatives.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

8. The culture of continuous improvement at ZAMEFA fosters innovation and adaptability in the production process.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

9. There is a strong collaboration between different departments at ZAMEFA to drive continuous improvement in production.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

10. Regular audits and evaluations are conducted at ZAMEFA to assess the effectiveness of continuous improvement practices.
    [ ] 1
    [ ] 2
    [ ] 3

[ ] 4

[ ] 5

Section D: Investigation of the Effect of Quality Control and Planning Strategies on the Production Efficiency of ZAMEFA

For each of the following statements, please indicate your level of agreement using the scale provided:

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. ZAMEFA's quality control processes are consistently applied across all production stages.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5
2. Quality planning at ZAMEFA is aligned with the strategic objectives of the organization.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5
3. Regular reviews of quality control and planning strategies contribute to ZAMEFA's production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5
4. ZAMEFA invests in advanced technology and tools to bolster quality control mechanisms.
   [ ] 1

[ ] 2
[ ] 3
[ ] 4
[ ] 5

5. There are clear communication channels at ZAMEFA for reporting quality-related issues during production.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

6. Quality planning at ZAMEFA involves cross-functional teams to ensure diverse perspectives.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

7. Employees at ZAMEFA receive regular training on quality control standards and procedures.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

8. Feedback from customers plays a crucial role in shaping quality control and planning strategies at ZAMEFA.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

9. Potential issues identified in quality planning are addressed proactively to prevent disruptions in production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

10. ZAMEFA maintains a robust system of documentation that supports the tracking and evolution of quality control and planning efforts.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

Section E: Assessment of the Role of Employee Involvement and Training in Enhancing ZAMEFA's Production Efficiency

For each of the following statements, please indicate your level of agreement using the scale provided:

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. Employee input and suggestions are actively sought and considered in ZAMEFA's decision-making processes.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

2. ZAMEFA invests significantly in training programs to improve employee skills relevant to production.
   [ ] 1
   [ ] 2
   [ ] 3

[ ] 4
[ ] 5

3. Employee involvement in problem-solving initiatives leads to better solutions and increased production efficiency.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

4. There is a clear correlation between the training employees receive and improvements in production quality.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

5. Cross-functional collaboration among employees from different departments enhances the overall efficiency of production processes.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

6. Employees at ZAMEFA feel empowered and equipped to make decisions that positively impact production outcomes.
   [ ] 1
   [ ] 2
   [ ] 3
   [ ] 4
   [ ] 5

7. ZAMEFA regularly reviews and updates its training modules to reflect current industry best practices and standards.

[ ] 1

[ ] 2

[ ] 3

[ ] 4

[ ] 5

The end, thank you