Optimising the procurement process of an organisation in the manufacturing industry to improve its efficiency, cost-effectiveness, and overall management practices

by

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DECLARATION

I, Edmund Charles Esau, declare that the contents of this dissertation represent my own unaided work and that the dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed **Date**

11 November 2024

ABSTRACT

This comprehensive research explores the optimisation of procurement processes in the manufacturing industry, driven by the persistent challenges associated with traditional methods. Though beneficial in the past, the labour-intensive and manual nature of these methods is increasingly recognised as time-consuming, prone to disruptions, and lacking in strategic value. Consequently, the study advocates for a paradigm shift towards unified, digital platforms, emphasising the transition from manual to automated procurement processes to enhance efficiency, speed, and reduce errors.

The research underscores the critical role of procurement in organisational success, with a specific focus on the manufacturing industry. Despite technological advancements, the underutilisation of procurement's potential prompts an examination of automation, particularly within the context of the Fourth Industrial Revolution (4IR). The overarching goal is to optimise procurement in the manufacturing sector, aiming for improved efficiency, cost-effectiveness, and overall management.

The literature review accentuates the importance of optimised procurement processes in navigating the competitive global environment. Efficient procurement is fundamental for manufacturing organisations, contributing to minimised lead times, reduced operational bottlenecks, and enhanced overall operational efficiency. Cost-effectiveness emerges as a central theme, with well-optimised procurement processes enabling organisations to negotiate favourable terms, identify cost-saving opportunities, and strategically source materials and services. This optimisation extends beyond immediate financial considerations to align procurement activities with organisational goals, foster supplier relationships, and integrate sustainable and ethical practices.

This research aims to investigate and analyse effective methods, technologies, and strategies for optimising the procurement process within the manufacturing industry, with a specific focus on improving efficiency, cost-effectiveness, and overall management practices. Traditional procurement processes, outlined by Jenkins (2021), involve a nine-step process, providing a foundation for delving into challenges, particularly those arising from unclear specifications.

The literature also acknowledges the transformative force of the Fourth Industrial Revolution, introducing technological enhancements, automation, and data-driven decision-making in procurement processes. Blockchain technology enhances transparency and security, while Artificial Intelligence (AI) and machine learning reshape procurement practices.

The anticipation of continued advancements in AI and machine learning further emphasises the need for automation to enhance decision-making processes and strengthen relationships between manufacturers and suppliers. Sustainability and ethical sourcing are expected to be prioritised, aligning with the 4IR's emphasis on transparency and traceability.

The research process, guided by Singh (2021), outlines eight crucial steps for investigating procurement process optimisation. A quantitative research method was used in the study. This involved data collection through questionnaires from a non-probability sample of 11 individuals directly involved in procurement. Findings reveal perceived declines in efficiency and cost-effectiveness of traditional procurement methods, emphasising the need for human involvement in automated processes.

The data collected through questionnaires within a manufacturing organisation explores various aspects of procurement processes. Respondents' express views on traditional procurement methods, potential synergy between traditional and modern approaches, perceptions and usage of automated procurement systems, and the necessity of human intervention. Recommendations based on the findings include exploring reasons for uncertainty, investing in training programmes, and establishing feedback mechanisms for continuous improvement.

The research concludes by proposing a future procurement process involving technical systems and tools, aiming to integrate technological advancements with human expertise. This solution addresses identified challenges in traditional procurement and emphasises the significance of balancing human intervention and technological advancements for effective procurement in contemporary business environments. The study offers valuable insights for strategic decision-making and process enhancement in the manufacturing industry's procurement practices.

Keywords: procurement, optimisation, manufacturing, cost-effective, efficiency, traditional, fourth industrial revolution.

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DEDICATION

This thesis is dedicated to the Lord Almighty.

He has granted me all the strength and energy needed to fulfil my study journey from a National Diploma to a Master of Engineering degree. Nothing would have been possible without the Lord.

Thank you, Lord.

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Term	Definition
Procurement	The act of obtaining goods and services for business purposes (Young, 2020).
Cloud-native digital platforms streamline	A modern approach to building and running software applications that exploit the flexibility, scalability, and resilience of cloud computing (Carey, 2021).
Automatisation	Describes a wide range of technologies that reduce human interaction in processes (Groover, 2014).
Robotic Process Automation (RPA)	It is the application of technology that is governed by business logic and structured inputs, which are aimed at automating business processes (Boulton, 2018).
Natural Language Processing (NLP)	It is a branch of Artificial intelligence that allows computers to understand text and spoken words like humans (IBM Cloud Education, 2020).
Artificial Intelligence (AI)	An intelligent entity that is created by humans that is capable of thinking, acting rationally, and has the ability to perform tasks intelligently without being explicitly instructed (Advani, 2021).
Internet of Things (IoT)	Describes the physical objects embedded with sensors, software, processing abilities, and other technologies that connect and exchange data with other devices and systems over the internet or other communication networks (Alexander, 2021).
Technological Roadmap	A Technological Roadmap is a display in the form of a document or diagram that illustrates every step on the route towards an entirely digital enterprise (Ustunday and Cevikcan, 2018).

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction and Motivation

As a cornerstone of economic activity, the manufacturing industry is intricately linked with the procurement of raw materials and resources, which are vital components of the production process. In this context, traditional procurement methods have historically been the bedrock of supply chain management, facilitating the seamless flow of materials through a complex network of suppliers, manufacturers, and distributors. This introduction aims to delve into the significance of traditional procurement methods within the manufacturing sector, elucidating their role in production and exploring the contemporary discourse on the possible automation of these processes.

Traditional procurement methods persist as foundational components of the operational framework in the manufacturing industry. These conventional approaches have been instrumental in shaping the industry's supply chain dynamics and organisational practices. Notably, these methods are characterised by their historical significance and entrenched role in facilitating procurement processes within manufacturing enterprises (Smith, 2018). Despite the advent of technological advancements and evolving business practices, the manufacturing sector continues to rely on these traditional methods, which involve intricate coordination and collaboration among suppliers, manufacturers, and distributors (Jones *et al*., 2019). This adherence to traditional procurement practices reflects the industry's recognition of their enduring efficacy and relevance in ensuring the seamless flow of materials and resources within the manufacturing ecosystem.

Traditional procurement methods have been the linchpin of the manufacturing industry, providing a structured framework for acquiring materials necessary for production (Smith, 2018). These methods have evolved to address the unique challenges and complexities inherent in the manufacturing supply chain. From just-in-time inventory systems to vendor-managed inventory, organisations have honed these traditional approaches to align with their specific production needs (Jones *et al*., 2019). The historical significance of these methods lies in their ability to establish reliable and consistent channels for sourcing materials, contributing to the overall efficiency of manufacturing operations.

The transition from a manual procurement to an automated process has its benefits, such as improving the efficiency and speed of the procurement process. The transition from manual to automated processes creates a centralised system for all the data and documents. The transition also assists in reducing the manual errors. (Higgins, 2019) A cloud-native digital platform streamlines each functionality of the procurement process and helps it communicate with other functionalities'' (Procurement Software Blog, 2019).

This enhancement allows procurement professionals to do specific tasks that normally took weeks in a matter of days, if not hours.

The intricate coordination fostered by traditional procurement methods directly impacts the production capabilities of manufacturing organisations. Efficient procurement ensures a timely and steady supply of raw materials, reducing the risk of production delays and disruptions. This is particularly crucial in industries with high demand volatility and perishable inventory, where adherence to traditional procurement practices can enhance the adaptability and responsiveness of manufacturing processes (Smith, 2018). Moreover, traditional methods often involve long-term relationships with suppliers, fostering trust and collaboration that goes beyond mere transactional exchanges. Such relationships contribute to a stable supply chain, enabling manufacturers to optimise production schedules and streamline operations (Jones *et al*., 2019).

While traditional procurement methods have demonstrated their effectiveness, they are not without challenges. The labour-intensive nature of these processes, involving manual tasks such as order placement, invoice processing, and inventory management, can lead to increased operational costs and susceptibility to human errors (Brown & White, 2021). Organisations often grapple with the need to balance the benefits of established procurement methods with the imperative to enhance efficiency in an era of rapid technological advancement.

In recent years, the manufacturing industry has experienced a paradigm shift due to technological advancements, leading to discussions about the potential automation of procurement processes. A recent study analysed the procurement process of a company in Finland, focusing on improving inventory levels and purchasing efficiency through automation. The findings suggest that automating procurement can enhance operational efficiency and reduce costs (Juhala & Shamsuzzoha, 2024). The integration of artificial intelligence (AI) and machine learning (ML) in procurement systems has paved the way for more streamlined, accurate, and agile processes (Brown & White, 2021). Automation offers the promise of efficiency gains, cost savings, and improved decision-making through real-time data analytics. Organisations are exploring automated solutions for tasks such as demand forecasting, order processing, and inventory management to mitigate the challenges associated with manual procurement processes (Brown & White, 2021).

The prospect of automation in procurement poses transformative implications for the manufacturing sector. As organisations contemplate adopting automated procurement systems, they must weigh the potential benefits against the challenges of implementation, including the need for substantial initial investments, system integration

complexities, and the impact on existing workforce dynamics (Brown & White, 2021). Additionally, the shift towards automation raises questions about the future role of procurement professionals, emphasising the importance of upskilling and reskilling to meet the evolving demands of a technologically advanced procurement landscape.

In conclusion, this comprehensive introduction has provided an overview of the historical significance of traditional procurement methods in the manufacturing industry, elucidated their role in production, and introduced the contemporary discourse on the automation of these processes. As we delve further into this exploration, subsequent sections will analyse the specific traditional procurement practices, the impact of these methods on organisational production, and the challenges and opportunities presented by the potential automation of procurement processes within the dynamic landscape of the manufacturing sector.

1.2 Background

Procurement is a critical support function within organisations, significantly influencing business operations, budgeting, and overall success. Recent studies highlight that the procurement function constitutes a substantial part of the supply chain, utilising a significant portion of an organisation's resources (Sascha & Uwe, 2021). This underscores the necessity for organisations to execute the procurement process as efficiently as possible. Surprisingly, despite the availability of advanced technological tools, many companies have not fully leveraged the potential benefits of an optimised procurement process (Kumar, et al., 2020). The advent of Industry 4.0 has intensified competition among companies, making operational efficiency a crucial differentiator (Kamble, et al., 2020). One effective approach to enhancing procurement efficiency is through process optimisation via automation, which will be the focal point of this research.

Automating the procurement process has become a focal point across various business sectors, especially in the context of the Fourth Industrial Revolution. This era is characterized by the convergence of technologies such as artificial intelligence (AI) and the Internet of Things (IoT), leading to the emergence of the Artificial Intelligence of Things (AIoT), which is reshaping industries by offering enhanced efficiency, improved decision-making, and new business opportunities (Melita.io, 2023). In procurement, Industry 4.0 introduces intelligent automation, data-driven insights, and enhanced connectivity, all of which can significantly enhance procurement processes (Althabatah, et al., 2023). Consequently, businesses are compelled to adapt to this evolving landscape to remain competitive.

1.3 Research Title

The research title chosen for this research project reads as follows:

“Optimising an organisation's procurement process in the manufacturing industry to improve its efficiency, cost-effectiveness, and overall management practices.”

1.4 Problem Statement

The manual procurement process at a machine-building manufacturer in the Western Cape is labour-intensive and time-consuming, negatively impacting the organisation's efficiency, cost-effectiveness, and management.

1.5 Primary Research Question

Will optimising the procurement process improve efficiency, cost-effectiveness, and organisational management to initiate business improvement and gain a competitive advantage within the market?

1.6 Research Questions

The investigative questions in support of the primary research question are as follows:

1.6.1 Why are the traditional procurement methods not as efficient and cost-effective as they were ten years ago?

1.6.2 Could the traditional methods be used in synergy with modern procurement management methods?

1.6.3 What systems/programmes/software are available to assist in automating the procurement process within a manufacturing organisation?

1.6.4 Will the automation of the procurement process within a manufacturing organisation still require human interference to ensure maximum efficiency, cost-effectiveness, and correct management of the procurement function?

1.7 Research Objectives

The research objectives for this research have been identified as the following:

1.7.1 Determine the traditional methods of procurement currently being used and the processes involved in these methods.

1.7.2 To establish whether traditional methods could be used with modern methods for improved results and better management.

1.7.3 To suggest the most suited/suitable systems/programmes/software available for either full automation or assistance in the automation of the procurement process.

1.7.4 To investigate what level of skills, human interactions, or training is needed from the systems/software/programmes to ensure effective automatisation of the procurement processes and their management.

1.8 Research Ethics

The ethical clearance for this research was obtained from the university in accordance with its policies and procedures, ensuring adherence to the highest standards of academic integrity. Ethical conduct in research is fundamental to promoting responsible practices, respecting participants' rights, and contributing meaningfully to the body of knowledge. This section outlines how ethical considerations were addressed to comply with institutional guidelines and ensure the integrity of this study.

Key ethical considerations in this research included obtaining informed consent, safeguarding confidentiality, and maintaining data integrity. Informed consent was secured by clearly communicating the study's objectives, potential risks, and participants' rights, including the freedom to withdraw at any stage. Confidentiality was protected through measures such as de-identifying participants' data and implementing secure storage methods to prevent unauthorized access. Additionally, participants were assured that their information would only be used for the stated research purposes.

To ensure the reliability and validity of the data, strict adherence to ethical research practices was observed. Measures such as Turnitin checks for originality and adherence to the ethical codes of professional organisations, such as the Engineering Council of South Africa, were implemented. Data accuracy and impartiality were maintained through ongoing supervision and regular consultation with the research advisor. Written permission was also obtained from Technical Systems, the sole organisation involved in the study, to confirm their support and approval of the research activities.

The research was designed to avoid harm to participants, the community, or the environment. The study remained impartial, with no conflicts of interest or external funding influencing the findings. All sources were appropriately cited using the Harvard referencing style to prevent plagiarism, ensuring that the research adhered to academic and ethical standards. Authorship was clearly established, with the student serving as the primary author and the supervisor as the secondary author, reflecting their respective contributions to the research. By obtaining ethical clearance from the university and

adhering to these principles, this research upholds the integrity and credibility essential to academic inquiry.

1.9 Chapter Content Analysis

The chapter and content analysis applicable to this research study is as follows:

Chapter 1: **The Introduction and Background:** This chapter provides a brief introduction and background to the research problem, therefore outlining the crux of the study.

Chapter 2: **Literature review:** This chapter represents an extensive literature review on the importance of procurement, the fourth industrial revolution, the impact of 4IR on procurement, optimising, and the benefit of optimisation in the procurement process.

Chapter 3: Research design and methodology*:* In this chapter, the design and methodology to be used within the ambit of this dissertation will be elaborated upon in detail**.**

Chapter 4: Data Analysis and the Results: In this chapter, results gleaned from the data collection conducted will be analysed and interpreted.

Chapter 5: Discussion of the results: Here the results will be discussed in detail and will inform the conclusions.

Chapter 6: Conclusions and recommendations: In this chapter, the research will be concluded, and recommendations made to mitigate the research problem.

1.10 Chapter Summary

In this chapter, an introduction and motivation were provided to substantiate the need for the research to be conducted. This chapter served as the basis for the proposed research and provided the necessary background to the following chapter (chapter two), which will provide the reader with a comprehensive literature review on the importance of procurement, the fourth industrial revolution, the impact of 4IR on procurement, optimising and the benefit of optimisation in the procurement process.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The optimisation of procurement processes within the manufacturing industry is a critical imperative, integral to organisations striving for enhanced efficiency, cost-effectiveness, and elevated overall management practices. Strategic sourcing, acquisition, and resource utilisation management become paramount for sustained success in the dynamic, competitive global environment. This thesis delves into unravelling the multifaceted landscape of optimising procurement processes in the manufacturing sector, specifically focusing on the profound impact such optimisation can have on efficiency, cost-effectiveness, and broader management practices.

Efficiency stands as a cornerstone in the smooth functioning of manufacturing organisations. The evolving manufacturing landscape, propelled by technological advancements and global interconnectivity, underscores the necessity for streamlined and agile procurement processes (Christopher, 2016). An optimised procurement system not only expedites the acquisition of raw materials and components but also contributes to minimising lead times, reducing operational bottlenecks, and enhancing overall operational efficiency.

Cost-effectiveness emerges as a central theme in the discourse surrounding procurement optimisation, particularly in the competitive market environment where organisations must diligently manage resources to remain financially resilient. A well-optimised procurement process enables organisations to negotiate favourable terms, identify cost-saving opportunities, and strategically source materials and services (Olaleye, et al., 2024). The resultant cost-effectiveness positively impacts the organisation's bottom line and positions it competitively in the market.

Furthermore, optimising procurement processes extends beyond immediate financial considerations to encompass broader management practices. The strategic management of the procurement function involves aligning procurement activities with organisational goals, fostering supplier relationships, and integrating sustainable and ethical practices into the procurement framework (Handfield *et al.*, 2019). A comprehensive understanding of how procurement optimisation influences broader management practices is essential for organisations aspiring to achieve holistic operational excellence.

Transitioning to a literature review, an exploration of existing research, theories, and best practices related to optimising procurement processes within the manufacturing industry is undertaken. By critically examining the scholarly landscape, this review seeks to uncover key insights into the methods, technologies, and strategies that have proven

effective in enhancing efficiency, achieving cost-effectiveness, and refining overall management practices in the procurement domain. The synthesis of this literature aims to provide a foundational understanding for the subsequent empirical investigation and analysis, contributing to the development of a comprehensive framework for optimising procurement processes within the manufacturing sector.

As defined by Young (2020), procurement is the act of obtaining goods and services primarily for business purposes. It is most commonly associated with businesses due to the need for relevant services and the purchase of goods on a large scale, depending on the size of the business. Understanding traditional procurement processes is essential to automating and optimising procurement processes within manufacturing industries. According to Jenkins (2021), procurement is a vital and transactional part of conducting business across various industries, covering sections such as gathering business requirements, sourcing suppliers, tracking item receipts, and updating payment terms.

Jenkins (2021) emphasises that not all companies define the procurement process in the same way. Some consider procurement to involve various sections, while others focus solely on generating purchase orders to suppliers and ensuring correct and timely payments. Procurement plays a crucial role in understanding supply chains, helping companies find reliable suppliers that provide competitively priced goods and services matching the company's needs (Jenkins, 2021).

Additionally, Jenkins (2021) outlines nine steps in the procurement process: identifying needed goods and services, submitting purchase requests, assessing and selecting vendors, negotiating price and terms, creating a purchase order, receiving and inspecting delivered goods, conducting three-way matching, approving the invoice, and arranging payment and record-keeping. These steps can be summarised into three stages: sourcing, purchasing, and payment. The efficiency of the procurement process is influenced by various factors, including unclear specifications and requirements—a significant issue within manufacturing companies. Providing incorrect specifications leads to suppliers quoting on the wrong item, resulting in financial losses, return processes, and project planning delays (Ahmed, 2019).

2.2 The Importance of Procurement in Manufacturing

Over the past decade, traditional procurement methods in the manufacturing industry have encountered challenges related to efficiency and cost-effectiveness. Factors influencing this shift include the need for improvements in the conventional accounting system to align with Lean production models (Medeiros, 2016), considerations of client,

project characteristics, and external environment in the selection of procurement methods (Safeena, 2020), and the intricacies of production and stock control in companies with multiple sites (Frontoni, 2020). Consequently, there has been a noticeable transition towards modern costing techniques, including the Just in Time principle, Activity-Based Costing, Target Costing, Life Cycle Costing, Kaizen Costing, and Throughput Accounting (Ogungbade, 2018).

In the realm of manufacturing, procurement assumes paramount significance, as it ensures the acquisition of the correct materials, products, or services from the appropriate vendors at the right price. ForceIntellect (2020) emphasises the importance of the procurement process in meeting specifications and requirements while ensuring the delivery of the correct quantity to the designated recipient. Furthermore, Kamak (2019) underscores that effective procurement functions can contribute to maximising profits within an organisation.

The significance of effective procurement extends beyond immediate benefits, influencing a company's competitive advantage. A well-structured procurement system is a crucial component of the supply chain, involving the acquisition of necessary components from both internal and external sources (Tiwari, Chan, Ahmad, & Zaman, 2019). Negotiation, highlighted by Rogers, H. and Fells, R. (2018), becomes a pivotal element in procurement strategy, fostering closer relationships between purchasers/organisations and suppliers. Effective negotiation practices can significantly enhance buyer-supplier relationships by promoting mutual understanding a collaboration. As Farah (2016) discussed, strong relationships contribute to a mutually beneficial situation, creating value through better pricing and shorter deliveries than competitors, ultimately aiding in waste reduction and eliminating hidden costs.

In the dynamic landscape of the manufacturing industry, procurement functions as a linchpin, playing a pivotal role in ensuring operational efficiency, cost-effectiveness, and overall competitiveness. This multifaceted importance encompasses supply chain management, cost control, quality assurance, and the cultivation of strategic partnerships.

One of the core functions of procurement in manufacturing is to secure a reliable and diverse supply chain. The ability to source materials, components, and services from various suppliers enhances supply chain resilience and aids in risk management against disruptions like geopolitical events, natural disasters, or market fluctuations (Christopher, 2016).

Cost control is a critical aspect of procurement, as it contributes to favourable negotiation terms, optimal purchasing volumes, and reduced transaction costs, resulting in overall

cost savings for manufacturing firms (Sepehri, et al., 2020). Through strategic sourcing and value engineering, procurement professionals can identify opportunities for cost reduction without compromising product quality, ultimately improving the organisation's financial performance.

In the manufacturing sector, where quality is paramount, effective procurement processes are crucial in ensuring that materials and components meet required standards. By implementing stringent supplier evaluation criteria and quality control measures, manufacturers can uphold the quality of their end products, preventing defects and recalls and safeguarding the reputation of the manufacturing brand (Handfield *et al*., 2019).

Strategic partnerships formed through procurement activities play a vital role in the long-term success of manufacturing enterprises. Collaborating with key suppliers facilitates innovation, promotes knowledge exchange, and aligns mutual goals. By employing effective supplier relationship management, procurement professionals can build partnerships that extend beyond mere transactions, ensuring a reliable supply of high-quality materials while creating opportunities for joint product development, continuous improvement, and mutual growth (Handfield, et al., 2020).

The importance of procurement in the manufacturing industry is a fundamental aspect that cannot be overstated. Acting as the linchpin that connects supply chain operations, cost considerations, quality assurance, and strategic partnerships, a well-optimised and strategically aligned procurement function is a cost-efficient mechanism and a driver of innovation and resilience. This positions manufacturing organisations to thrive in an ever-evolving global market.

2.3 The Fourth Industrial Revolution

"Fourth Industrial Revolution" (4IR) characterises the progressive evolution of global processes and technological enhancements. This revolution signifies a paradigm shift in technology, eradicating the delineations between biological, physical, and digital domains that are presently dissipating. The Fourth Industrial Revolution can be conceptualised as an amalgamation of advancements in Artificial Intelligence, robotics, the Internet of Things, and various other technological elements. This confluence engenders transformative changes in societal structures, influencing the fabric of our lives and necessitating adaptations across diverse business sectors. Its trajectory builds upon the preceding three industrial revolutions that have shaped our world, with the first leveraging water and steam, the second optimising mass production through electricity, and the third automating manufacturing and production processes. The roots of the

Fourth Industrial Revolution can be traced back to the foundation laid by the Third Revolution, specifically in the automation processes within the manufacturing industry. Subsequently, the Fourth Industrial Revolution advances and delves deeper into the capacities of the technological systems currently in the process of creation and utilisation (Ustundag & Cevikcan, 2018).

The transformative potential of the Fourth Industrial Revolution extends beyond technological evolution, promising to reshape fundamental aspects of human existence. It holds the capacity to influence the way we live, communicate, and work. This ongoing revolution is concurrently restructuring educational systems, commerce, supply chains, and governmental structures. While disruptive in nature, it also positively impacts billions of lives by serving as a powerful tool to stimulate and enhance lives. The advent of newer technological systems facilitates improved access to information and education through robust computing devices, networks, mobile devices, and various digital services, which is particularly beneficial for individuals in less developed countries (Ustundag & Cevikcan, 2018).

As the Fourth Industrial Revolution unfolds, it introduces significant changes in how we conduct our activities and, perhaps more fundamentally, our identities as human beings. These changes permeate various aspects of our lives, impacting our sense of privacy, information consumption, skill development within careers, social interactions, and relationships with others. The prevalence of smartphones and devices, emblematic of advanced technological systems, raises concerns about potential erosions of human capacities for compassion and cooperation. The omnipresent connectivity facilitated by these devices poses the risk of depriving individuals of vital components of their lives, including meaningful conversations, reflective moments, understanding, emotional experiences, and the simple act of taking time to pause (Ustundag & Cevikcan, 2018).

Furthermore, the transformative impact of the Fourth Industrial Revolution on human identity is closely tied to the issue of privacy. The tracking and sharing of information emerge as pivotal components of the newfound connectivity. As such, the implications of this revolution extend beyond technological advancements, forcing us to confront profound questions regarding the preservation of individual privacy in this dynamically evolving technological era (Ustundag & Cevikcan, 2018). In conclusion, the Fourth Industrial Revolution signifies a technological evolution and poses profound implications for societal structures, human existence, and the preservation of fundamental human values.

2.4 The Impact of 4IR on the Procurement Process

The fourth industrial revolution brings about technological enhancements to improve systems, according to Richard (2021). The technology can now be designed to centralise and automate the interactions between organisations, customers, and other value chain partners to improve the speed and efficiency of the procurement processes (Richard, 2021). The most striking improvements are identified in the areas of competitiveness, innovativeness, flexibility, individuality, and working conditions (Glas & Kleemann, 2016).

With the technological enhancement of Industry 4.0, the procurement processes are shifting from traditional methods to more “electronic’’ methods. Glas and Kleemann (2016) further reiterate that from a technological perspective, electronic systems are used to facilitate tasks that have required heavy manual labour before. The automation of the procurement processes transforms the paperwork into electronic software systems, which then changes the labour-intensive task to a workflow and IT-supported process (Glas & Kleemann, 2016).

The Fourth Industrial Revolution (4IR) has ushered in a paradigm shift in the manufacturing industry, significantly transforming procurement processes. Integrating digital technologies, automation, and data-driven decision-making has redefined how organisations source, manage suppliers and optimise their supply chains (Schwab, 2017). The impact of 4IR on procurement in the manufacturing sector has been profound, influencing efficiency, transparency, and strategic decision-making.

One of the primary impacts of the Fourth Industrial Revolution on procurement processes is the widespread adoption of advanced technologies. Automation, artificial intelligence (AI), and the Internet of Things (IoT) have streamlined routine tasks, such as order processing, inventory management, and supplier communication (Wang *et al*., 2016). These technologies have enabled manufacturing firms to enhance procurement efficiency by reducing manual intervention, minimising errors, and accelerating the entire procurement cycle. Smart factories, equipped with interconnected devices, contribute to real-time visibility, enabling proactive decision-making and responsiveness to dynamic market conditions.

Additionally, the Fourth Industrial Revolution has revolutionised data analytics in procurement. The abundance of data generated by interconnected systems provides manufacturers with unprecedented insights into supplier performance, market trends, and risk factors (Handfield *et al*., 2019). Advanced analytics tools enable organisations to make informed decisions, optimise procurement strategies, and identify cost-saving opportunities. Predictive analytics, in particular, empowers manufacturers to forecast

demand, anticipate disruptions, and proactively adjust procurement plans, contributing to enhanced supply chain resilience.

The integration of blockchain technology has brought about increased transparency and security in procurement processes. Blockchain ensures an immutable and transparent record of transactions, enhancing trust and traceability throughout the supply chain (Iansiti & Lakhani, 2017). This is particularly valuable in procurement, where verifying the authenticity of products, ensuring compliance with regulations, and managing the complexities of a global supply chain are paramount. Blockchain technology strengthens procurement processes by reducing the risk of fraud, errors, and unauthorised alterations in transaction records.

The expectations for the future of procurement in the manufacturing industry within the context of the Fourth Industrial Revolution are ambitious. Continued advancements in AI and machine learning are anticipated to automate decision-making processes further, enabling more sophisticated supplier evaluations and risk assessments (Christopher, 2016). Integrating 4IR technologies is expected to lead to a more interconnected and collaborative supply chain ecosystem, fostering closer relationships between manufacturers and suppliers (Ivanov, 2018). Real-time data exchange and collaboration platforms will facilitate quicker response times, increased agility, and improved overall supply chain performance.

Moreover, the future of procurement in the manufacturing sector will likely witness an increased focus on sustainability and ethical sourcing. The Fourth Industrial Revolution, emphasising transparency and traceability, allows manufacturers to align their procurement processes with environmentally conscious and socially responsible practices (Sustainable Procurement Pledge, 2021). As consumer awareness and regulatory pressures continue to drive sustainability considerations, procurement strategies will evolve to prioritise responsible sourcing, waste reduction, and circular economy principles.

The impact of the Fourth Industrial Revolution on procurement processes in the manufacturing industry has been transformative, ushering in a new era of efficiency, transparency, and innovation. As we look to the future, integrating advanced technologies is expected to further refine procurement practices, with a heightened emphasis on sustainability and ethical sourcing. The manufacturing sector, propelled by the forces of 4IR, is poised for a future where procurement becomes a strategic enabler of resilient, sustainable, and socially responsible supply chains.

2.5 Optimising the Procurement Process in the Manufacturing Industry

Efficient procurement processes play a pivotal role in the success and sustainability of manufacturing operations. In the ever-evolving landscape of the industry, where global competition is fierce, optimising procurement becomes not just a matter of cost efficiency but a strategic imperative. With the 4IR, many companies are forced to implement technological enhancements to remain competitive. McAvoy (2016) mentioned that suppliers invest in more advanced technologies, whereas organisations invest in implementing advanced methods/solutions to procure goods and services. Companies that do not engage in the steps to invest in technological enhancement will be at a disadvantage (McAvoy, 2016).

One of the foundational aspects of an optimised procurement process is establishing and managing strategic supplier relationships. Laffitte, 2024, argues that successful procurement is not merely about transactions but about fostering collaborative partnerships. Effective SRM involves mutual trust, clear communication, and shared goals between manufacturers and suppliers. As Smith (2016) emphasises in the Harvard Business Review, building and maintaining robust supplier relationships enhances reliability, flexibility, and innovation in the supply chain.

The advent of digital technologies has revolutionized procurement in the manufacturing sector (Sepehri, et al., 2020) . Integrating advanced technologies, such as procurement software and analytics tools, is crucial to streamline processes and enhance overall efficiency. These tools provide real-time insights into the supply chain, enabling manufacturers to make data-driven decisions.

Goyal (2018) mentioned that converting from manual procurement processes to automated ones has the ability to provide clear visibility to the organisation. This refers to the wide spend and tight control over all the procurement activities, which can be seen as reducing manual errors, controlling spend analysis, maintaining supplier relationships, and streamlining sourcing. Goyal (2018) provides five main reasons why automation in the procurement process is the answer to adding value, increasing efficiency, and reducing costs. Optimising the procurement process necessitates a robust risk management strategy. The complexities of the global supply chain expose manufacturers to various risks, ranging from geopolitical uncertainties to supply chain disruptions. Effective risk management is integral to avoiding supply chain breakdowns, as emphasized by Christopher and Peck (2018). They argue that proactive risk identification and mitigation strategies are crucial for ensuring the resilience and continuity of supply chains in today's volatile and unpredictable business environment.

According to Goyal (2018), automation in the procurement process expedites approval processes. This eliminates purchase requests getting stuck in the approval process. It cuts down the ordering cycle time, removes redundant processes, and enables procurement staff to achieve more in a shorter time. Goyal (2018) states that procurement automation also provides insight into the company's historical spending. The organisation will be able to have a consolidated view of actual expenses, which will be beneficial for making long-term decisions or making new purchases on its behalf. It helps reduce costs and also identifies gaps in the process (Goyal, 2018).

Examining successful case studies provides valuable insights into optimising the procurement process. Toyota's renowned "just-in-time" (JIT) system serves as a prime example of procurement excellence (Womack & Jones, 2019). Womack and Jones (2019) emphasise how JIT minimises waste, reduces inventory holding costs, and improves overall production efficiency by aligning production with actual customer demand. This case study demonstrates the practical benefits of a streamlined procurement process, showcasing how a focus on efficiency and waste reduction can enhance operational performance in a real-world manufacturing setting.

Despite the potential advantages, optimising the procurement process in manufacturing comes with its set of challenges. Wynstra *et al*. (2015), shed light on the difficulties manufacturers face, including the delicate balance between cost-effectiveness and quality, managing intricate global supply chains, and ensuring compliance with regulatory standards.

Optimising the procurement process is not a mere operational enhancement; it is a strategic journey that manufacturing enterprises must embark upon to stay competitive in the global marketplace. The integration of strategic supplier relationship management, technological advancements, and robust risk management strategies are pivotal elements in this journey. Drawing on contemporary sources within the Harvard method ensures that the insights presented are not only relevant but also rooted in the latest developments in the field.

2.6 The Benefits of Optimising the Procurement Process

According to Keelvar (2021), automation solutions are powered by four main factors that are emerging to help improve the performance of an organisation. These include the following: Robotic Process Automation (RPA), natural language processing (NLP), artificial intelligence (AI), and machine learning (ML).

One of the primary motivations for organisations to optimise their procurement processes is realising cost savings. The most obvious benefit of procurement optimisation is

financial, states Lim (2017). Research by Monczka *et al*. (2015) highlights that efficient procurement practices contribute significantly to cost reduction, as streamlined processes lead to better negotiation outcomes, lower transaction costs, and improved contract management. Organisations can automate routine tasks by leveraging technology, such as e-procurement systems, reducing manual errors and ensuring compliance with negotiated contracts (Croom & Miles, 2019). In addition, Lim (2017) states that optimising procurement processes allows the company to realize immediate upfront cost savings. This also allows for better visibility into the company's budgets and spending (Lim, 2017). According to McAvoy (2016), automation/optimisation positively impacts the quality of the business and workforce productivity. Goyal (2018) confirms that procurement automation provides cost-saving.

Optimising the procurement process facilitates improved supplier relationship management (SRM). Firms that invest in building strong partnerships with suppliers experience enhanced collaboration, innovation, and responsiveness (Giunipero *et al*., 2019). A well-optimised procurement system enables organisations to track supplier performance, foster communication, and establish mutually beneficial relationships. The establishment of long-term partnerships with key suppliers often results in preferential pricing, better terms, and a more reliable supply chain (Ellram, et al., 2020). The automation of the procurement process eliminates transaction disputes (Vanner, 2020). According to research done by Vanner (2020), the automated process provides a central location to reference the goods and services provided and the delivery and payment settlements. The process is mapped out to provide end-to-end visibility so that every point can be reviewed with ease, as Vanner (2020) mentions. Keelvar (2021) confirms that information automatically becomes transparent and accessible when key terms are decided.

Automation in the procuring process also creates an opportunity to have workers/employees upskilled. Keelvar (2021) mentions that some work within the process requires empathy, creativity, and strategic thinking, which only human interaction can provide. Due to the procurement process normally being very labour-intensive, employees are deprived of the time to engage in strategic activities (Keelvar, 2021). The automation of the procurement process gives the employees the time to think freely and creatively, according to Keelvar (2021).

Operational efficiency is a key benefit derived from optimising the procurement process. Organisations can streamline workflows, reduce lead times, and improve efficiency by adopting best practices and utilising technology-driven solutions (Handfield *et al*., 2019). The literature highlights the multifaceted benefits that organisations can accrue by optimising their procurement processes. Cost savings, risk management, supplier

relationship management, and operational efficiency are key areas where organisations can realise tangible advantages. As the business landscape continues to evolve, organisations that prioritise and invest in optimising their procurement processes are better positioned to navigate challenges, drive competitiveness, and achieve sustained success. Future research should explore emerging technologies and evolving best practices in procurement optimisation to further enhance our understanding of its impact on organisational performance.

2.10 Chapter summary

In conclusion, Chapter Two highlighted the critical role of procurement in the manufacturing sector, emphasising its significance in enhancing operational efficiency and overall productivity. The chapter explored the influence of the Fourth Industrial Revolution (4IR) on procurement processes, showcasing how advanced technologies are reshaping procurement practices. Furthermore, it delved into the optimisation of the procurement process, presenting various strategies aimed at streamlining operations and improving cost-effectiveness. The chapter also underscored the tangible benefits of optimising procurement, including improved resource management, reduced lead times, and increased competitiveness.

Moving forward, the next chapter will focus on the research methodology, detailing the approaches and techniques employed to investigate the procurement process in the context of the machine-building manufacturer in the Western Cape. The chapter will outline the research design, data collection methods, and analytical framework used to evaluate the current manual procurement practices and propose actionable solutions for optimisation.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter outlines the systematic approach adopted to investigate inefficiencies in the manual procurement process at a manufacturing company in the Western Cape. Guided by Singh's (2021) research process framework, the study identified the research problem, reviewed relevant literature, and employed a single-method approach: quantitative.

Data collection involved anonymous questionnaires targeting procurement staff to evaluate current practices, explore automation possibilities, and assess the integration of modern technologies. The findings were analysed using statistical and descriptive methods which provided actionable insights for improving efficiency, cost-effectiveness, and management practices.

Ethical principles, including voluntary participation, confidentiality, and informed consent, underpinned the research process, ensuring integrity and reliability. This chapter sets the foundation for addressing the research objectives and achieving meaningful outcomes.

3.2 Research Paradigm

According to Singh (2021), the research process was a structured approach that involved a series of actions or steps essential for conducting research effectively. Research further adopted a planned and systematic approach to thinking. It supported scientific views, where individuals tackle challenges with impartiality, curiosity, and a logical process of inquiry. The research steps were organised coherently to guarantee that the research is detailed, methodical, and produce reliable results. The research process as described by Singh (2021) was followed below:

3.2.1. Step 1: Identify and define the research problem

A research problem is a statement about an area of concern within the organisation, a condition to be improved, or a difficulty within the organisation's process to be improved (Singh, 2021). The problem to be addressed should be closely related to the research title. The problem that will be undertaken should be clearly defined and supported by enough research to ensure that the problem has sufficient information to contribute to providing suggestions of potential methods, practices, and procedures that will aid in solving the problem.

The research problem for this dissertation focused on the current manual procurement process at a manufacturing organisation in the Western Cape, which was highly labour-

intensive and time-consuming. This inefficient approach had a negative impact on the company's overall productivity, cost management, and organisational practices. The study sought to determine whether optimising this procurement process could lead to improvements in efficiency, cost-effectiveness, and management, thereby driving business improvement and enhancing the company’s competitive position in the market.

3.2.2. Step 2: Review the literature

Singh (2021) mentioned that once the research problem was identified and defined, the following step was to review the existing research relating to the problem. These studies would educate the researcher about what studies have been conducted in the past, how these studies were conducted, and what conclusions were obtained from the information.

The literature should be based on the past and current manual procurement methods used within the manufacturing industry. This information would provide clarity on the procedures that were in place within the organisation. The research should also provide information on the common areas that impeded organisations from reaching their full potential with the relevant capacity. The literature provided information on potential systems/programmes/software available to organisations and will aid in automating the processes more effectively.

The literature review offered a comprehensive examination of the critical role that procurement played within the manufacturing industry, highlighting its influence on operational efficiency and overall business performance. It also explored the Fourth Industrial Revolution (4IR), emphasising its relevance to the ongoing technological advancements reshaping industries globally. By analysing the intersection of 4IR and procurement, the review investigated how emerging technologies were transforming procurement processes, driving automation, and increasing efficiency. Additionally, the review delved into the strategies for optimising procurement in the manufacturing sector and outlined the associated benefits, such as improved cost management, enhanced supply chain performance, and strengthened competitive advantage.

3.2.3. Step 3: Define the Research Problem

The research problem had to be clearly defined, serving as the foundation for developing investigative questions and research objectives that aligned with it. The research problem statement, investigative questions, and research objectives can be found in Chapter 1, specifically under sections 1.4, 1.5, 1.6, and 1.7.

3.2.4. Step 4: The Research Design

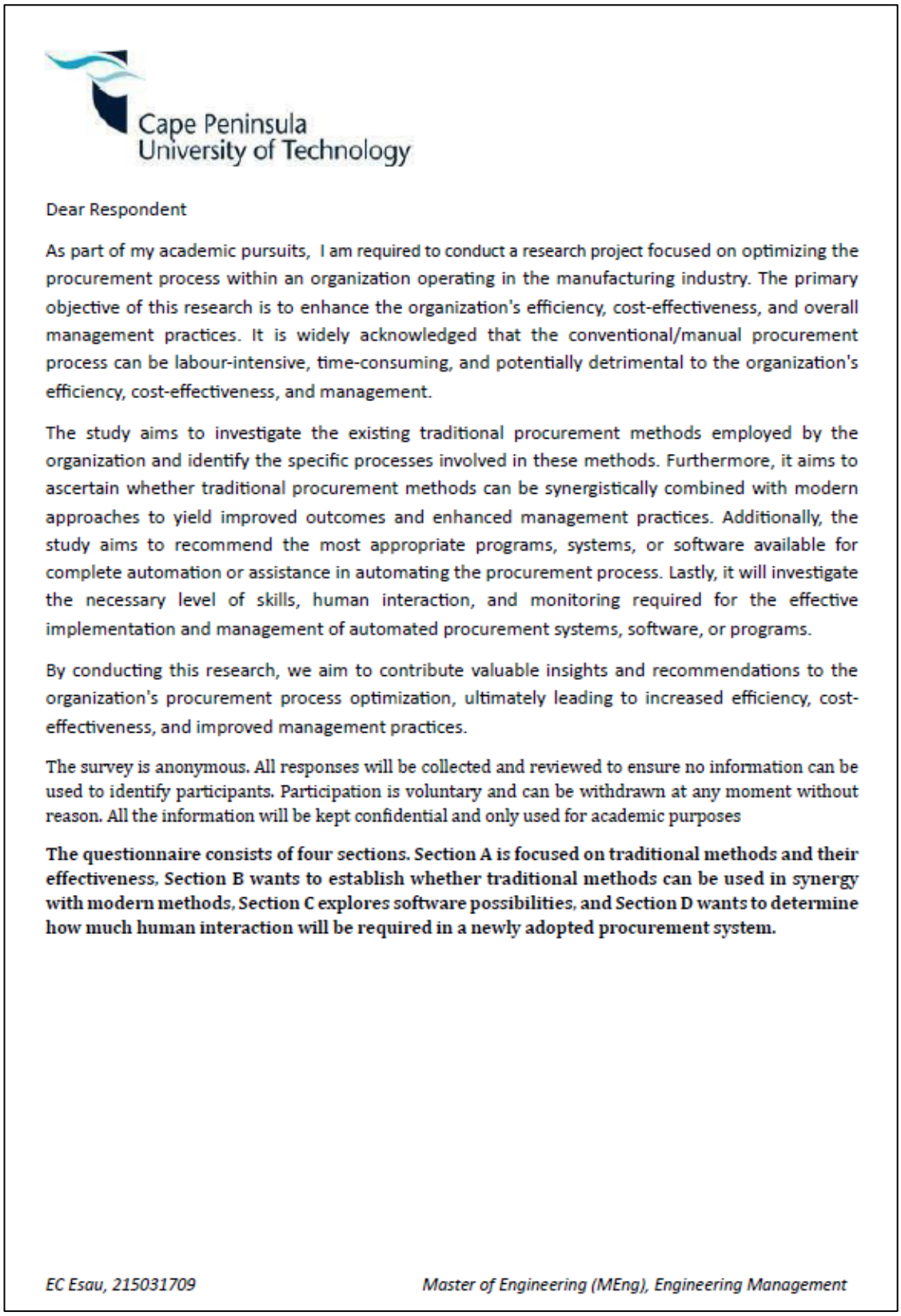
The research design related to the data to be collected to satisfy the research question. The type of research that was to be used needed to be clearly stipulated, accompanied by how the data would be collected to be substantial.

This research utilized a quantitative approach. Data were collected through a structured questionnaire administered to the employees of the company that were directly involved in the procurement process. The questionnaire primarily employed a 5-point Likert scale to measure respondents' feelings on a scale ranging from 'Strongly Disagree' to 'Strongly Agree

3.2.5. Step 5: The primary data collection method

The data were collected via anonymous questionnaires, which were printed and distributed to all employees associated with the procurement department across the entire company. The questionnaire is made up of four parts. Section A was focused on traditional methods and their effectiveness. Section B aimed to establish whether traditional methods can be used in synergy with modern methods, while Section C explored software possibilities. Section D finally intended to determine how much human interaction will be required in a newly adopted procurement system.

The below figure displays the questionnaire that will be distributed to the employees:



Cape Peninsula
University of Technology

Dear Respondent

As part of my academic pursuits, I am required to conduct a research project focused on optimizing the procurement process within an organization operating in the manufacturing industry. The primary objective of this research is to enhance the organization's efficiency, cost-effectiveness, and overall management practices. It is widely acknowledged that the conventional/manual procurement process can be labour-intensive, time-consuming, and potentially detrimental to the organization's efficiency, cost-effectiveness, and management.

The study aims to investigate the existing traditional procurement methods employed by the organization and identify the specific processes involved in these methods. Furthermore, it aims to ascertain whether traditional procurement methods can be synergistically combined with modern approaches to yield improved outcomes and enhanced management practices. Additionally, the study aims to recommend the most appropriate programs, systems, or software available for complete automation or assistance in automating the procurement process. Lastly, it will investigate the necessary level of skills, human interaction, and monitoring required for the effective implementation and management of automated procurement systems, software, or programs.

By conducting this research, we aim to contribute valuable insights and recommendations to the organization's procurement process optimization, ultimately leading to increased efficiency, cost-effectiveness, and improved management practices.

The survey is anonymous. All responses will be collected and reviewed to ensure no information can be used to identify participants. Participation is voluntary and can be withdrawn at any moment without reason. All the information will be kept confidential and only used for academic purposes

The questionnaire consists of four sections. Section A is focused on traditional methods and their effectiveness, Section B wants to establish whether traditional methods can be used in synergy with modern methods, Section C explores software possibilities, and Section D wants to determine how much human interaction will be required in a newly adopted procurement system.

EC Esau, 215031709 *Master of Engineering (MEng), Engineering Management*

Figure 3.1: Blank Data Collection Questionnaire (Own Source: 2024)

Employee Survey Questions

The table to follow indicates the scale used to apply to each of the statements to follow in the next section.

1	2	3	4	5
Completely Disagree	Disagree	Undecided	Agree	Completely Agree

Using the table above, please indicate your level of agreement to the following statements by marking with a "X" in the column.

Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?		Scale				
		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.					
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.					
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.					
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.					
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.					

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.					
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.					
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.					
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	Currently, traditional procurement methods are being used in our organization.					
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.					
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.					
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.					
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.					
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.					

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.					
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.					
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.					
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.					
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.					
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.					
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.					
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.					

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.					
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.					
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.					
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.					
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.					

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.					

Thank you for your participation in this questionnaire. Your responses will greatly contribute to the successful completion of this thesis and potentially benefit the organization as a whole.

The research in question was focused on the procurement process, specifically improving the efficiency of the procurement process and improving how cost-effective this process was within an organisation. The data to be collected would reflect what procurement processes were used by an organisation within the manufacturing industry. The number of employees involved in this procurement process flow was also important information that needed to be obtained. In addition, it needed to determine what software programs were available to assist with the automation of the procurement process. The user-friendliness of this program needed to be assessed to determine whether the employees could operate and understand the processes easily.

The required data were collected from an organisation in the manufacturing industry. This information was to be obtained from the people working in the procurement department. The research would be done on systems that were available to automate the procurement process. The research would construct interviews with entities that specialised in assisting companies in improving their procurement process.

3.2.6. Step 6: Carry out the research process

A research process steps need to be followed to ensure consistency. The research steps according to Singh (2021), have been adopted for this research project.

3.2.7. Step 7: Preparing the research results

To analyse the collected questionnaire data, a comprehensive approach was employed. The responses were tabulated to ascertain the frequency of specific answers within each section and individual question. Subsequently, the percentage distribution for each section was calculated to facilitate comparative analysis and result substantiation. To enhance visual representation and comprehension, the data were presented in the form of bar graphs and data collection radars. These graphical displays will provide a clear overview of the data trends and facilitated the identification of key areas for process optimisation within the manufacturing organisation.

3.2.8. Step 8: Report on the research findings

The research findings were primarily a description of the significance of the study. Once all the data had been collected and analysed, it needed to be described. The conclusion of the study needed to be related to previous research findings. The report was then published as a journal article or book.

3.3 Research Design

The research study of optimising the procurement processes employed a single method of research, namely quantitative research method. Quantitative research focused on numbers and statistics to confirm theories and assumptions (Streefkerk, 2021). This method was expressed through numbers, graphs, and statistical models, providing a structured framework for evaluating processes and identifying areas for improvement (Streefkerk, 2021). The quantitative research was generated through questionnaires.

Constructive research needed to be done on what software/programmes/systems can be implemented in companies to aid and guide the procurement process to be fully integrated through automation. Interviews with the organisation's employees will be conducted, and the questions drafted were open-ended questions that aimed to get information on what procurement was causing delays and what processes should be improved to ensure efficiency. Also, the interviews sought to gauge the feeling about shifting from traditional methods to automation of processes.

Permission from the company needed to be obtained to access some historical data, mainly referring to what was procured, what process it followed, what was the time frame agreed upon, when it was completed, and if it was still within budget or over budget. This information would be used to implement an automated process to compare the results. As we move into a more technologically enhanced world, this will build a solid foundation for procurement methods and procedures.

3.4 Target Population

The target population for a study on procurement processes typically included all individuals involved in the procurement and supply chain functions of the organisation, such as employees in procurement departments, finance departments, and management. Suppliers were also integral, as their interactions with the organisation can significantly impact procurement performance (Mugenda & Mugenda, 2003). Including both internal staff and external suppliers provided a holistic view, capturing different perspectives on how procurement decisions and practices were influenced by and impacted each stakeholder in the process (Mamiro, 2010; Kenyanya, 2011).

Additionally, defining the target population carefully allowed researchers to address specific variables affecting procurement outcomes, such as communication efficiency, supplier performance, and adherence to procurement regulations (O’Regan, 2009). Such targeted studies were essential in revealing potential areas for improvement, such as streamlining communication and decision-making processes among all involved parties, thereby supporting efficiency and transparency in the procurement process

(Callender & Mathews, 2005). This broad inclusion also aligned with recommendations in procurement research to achieve representativeness and accuracy in results, ultimately leading to more effective procurement strategies.

3.4 Data Analysis

The primary data collection method for this research involved the distribution of self-administered questionnaires to relevant employees directly involved in the procurement process. To ensure anonymity and confidentiality, participants were not required to provide personal information. Once collected, the questionnaires underwent a rigorous cleaning process to identify and rectify any inconsistencies, errors, or missing values. Subsequently, the data were entered into Microsoft Excel for analysis. Descriptive statistics, such as frequencies, percentages, and measures of central tendency, were calculated to provide an overview of the responses. Inferential statistics, such as chi-square tests and t-tests, were utilised to identify significant relationships between variables. To ensure the validity and reliability of the research, a pilot study was conducted to identify any ambiguities or inconsistencies in the questionnaire. Additionally, ethical considerations, such as informed consent and data confidentiality, were be strictly adhered to throughout the research process.

3.5 Sample Size and Sampling Method

The purposive sampling method was the most appropriate method for this research study. Purposive sampling was effective when the researcher needed to focus on a specific subject, whether quantitative or qualitative (Palinkas et al., 2015). In purposive sampling, the researcher decided what information needed to be known and then identified people who could and were willing to provide the necessary information, often through interviews or questionnaires (Etikan, Musa, & Alkassim, 2016). The sample size included all 11 employees directly involved in the procurement process within the organisation. This was be a form of non-probability sampling, as it did not involve a random selection of samples (Taherdoost, 2016).

3.6 Data validity and reliability

The data validity according to Dudovskiy (2018) referred to how well an instrument measured what it is intended to measure. Middleton (2019) reassured that reliability and validity were concepts that are used to evaluate the quality of research. Where reliability focused on the consistency of a method to measure something and validity focused on the accuracy of a measure (Middleton, 2019). The measurement was considered reliable when the same result was consistently achieved through the same methods under the

same circumstances, whereas data was considered valid if the results that were produced corresponded to real properties, characteristics, and variations in the physical and social world (Middleton, 2019)

Reliability could be split into three measurement methods namely; test-retest, interrater reliability, and internal consistency (Sajjad Bahariniya, 2021).

Test-retest reliability referred to measuring a set of data more than once at a consistent rate and determining whether or not the same results were obtained. (Middleton, 2019)

Interrater referred to measuring the relevant set of data using different raters/observers to determine whether the results were obtained when the measuring was done by someone else (Middleton, 2019).

Further according to Middleton (2019), internal consistency was the measurement of the data itself which would provide information on whether different sections of the data could be used to measure the same thing. The author continued to argue that validity was split up into three sections, namely: Construct, content, and criterion.

- The construct of a concept referred to the adherence to all the existing theories and knowledge
- Content was the concept being measured which referred to the extent to which all measurement aspects were covered

Criterion was the result of a measurement to which the extent of the results corresponds to other valid measures of the same concept

3.7 Ethics

Bhandari (2021) mentioned that ethical considerations in the research that was conducted referred to the principles that assisted in guiding the research designs and practices. Ethics in research mattered for scientific integrity, human rights, and dignity, and collaboration between science and society according to Bhandari (2021).

Bhandari (2021) further mentioned that six ethical issues should always be taken into consideration when conducting research. These issues were:

- Voluntary participation
- Informed consent
- Anonymity
- Confidentiality

- Potential for harm
- Results communication

Voluntary participation: This indicated the participants in the research study were free to opt-in or out of the study at any given point in time.

Informed Consent: The participants that were to be involved in the research study had to be informed about what they would be asked, how and where the data would be used, and also inform them about any consequences involved (if any).

Anonymity: This referred to the information/identity of the participants that remained unknown to the researcher.

Confidentiality: The researcher knew the identity of the individual, but the information/data that was obtained was de-identified and the identity of the individual was kept confidential (Bhandari, 2021).

Potential for harm: The researcher needed to ensure that all forms of harm (social, physiological, physical) were kept to a minimum. There should be no harm caused in the research study that was conducted (Bhandari, 2021).

Results communication: The researcher was to ensure that the research that would be submitted was free from any plagiarism. That all the relevant information was referenced and acknowledged accordingly and correctly. No research misconduct was to be performed (Bhandari, 2021).

The information that was gathered in the research study should maintain its confidentiality, especially considering if these were significant processes within organisations that assisted in the organisation keeping its competitive edge. The participants of the research would remain anonymous and the questions that were asked were open-ended questions that allowed the participant to answer freely in their own words. There was a lot of emphasis that was put on the ethics pertaining to research, this had been maintained.

3.8 Chapter Summary

The research process, as outlined by Singh (2021), was a systematic sequence of steps designed to conduct effective research. It began with clearly identifying a research problem, which in this study focused on improving the manual, labour-intensive procurement process at a Western Cape machine-building company. Following this, a literature review examined prior studies and modern developments, such as the Fourth Industrial Revolution (4IR), which transformed procurement through automation.

A quantitative method approach guided data collection via anonymous questionnaires among procurement staff. Collected data were systematically analysed to assess procurement efficiency, with findings reported to align with prior research insights. This process aimed to identify how automation could enhance efficiency, cost-effectiveness, and competitiveness within the organisation.

CHAPTER 4: DATA COLLECTION AND RESULTS

4.1 Introduction

The forthcoming information delineates data collected via questionnaires distributed within the manufacturing organisation. This dataset reflects the number of employees categorised based on their responses, which encompass options ranging from 'completely disagree' and 'disagree' to 'undecided,' 'agree,' and 'completely agree,' as per the provided scale. The data was provided in the original format of questionnaires which was captured on Microsoft Excel and then imported into bar graphs and radar graphs. Thereafter the results were interpreted and analysed.

4.2 Results

The following sections present the results of the data collected via physical questionnaires distributed to relevant participants. Responses were manually entered into Microsoft Excel, where calculations were performed to determine totals and percentages for each table. Excel was also used to generate bar graphs and data radars based on the entered values, providing a visual analysis of the collected data. It is important to note that the data graphs that are presented in the section to follow were created by the researcher based on the data collected. The graphs and data are not from an external source. The limitation of the data collection was that it was only able to use the employees who were directly involved in the procurement within the organisation, with no challenges presented.

The interpretation of the tables provided indicates that the figures displayed under each response category (Completely Disagree, Disagree, Undecided, Agree, and Completely Agree) represent the total number of participants who selected each specific option out of the 11 participants surveyed. It should be noted that certain participants did not complete specific sections, which may affect the totals. The values at the bottom of the tables represent the overall total and are converted into percentage values for easy interpretation.

In the bar graphs, the x-axis corresponds to the response categories, while the y-axis represents the number of responses for each question. The radar graph aggregates the total responses for each category and presents the data in a way that centres the distribution.

4.1.1 Section A: Establishing the efficiency of traditional procurement methods

Table 4.1 shows the results obtained for the first part of the questionnaire. Section A focused on establishing whether the traditional procurement methods are as efficient and cost-effective as they used to be ten or more years ago.

Table 4.1: Section A results (Own Source: 2024)

	Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?	**1** ***Completely Disagree***	**2** ***Disagree***	**3** ***Undecided***	**4** ***Agree***	**5** ***Completely Agree***
1	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.	0	3	2	5	2
2	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.	0	1	3	5	3
3	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.	3	1	1	4	3
4	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.	0	2	5	3	2
5	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.	1	6	3	2	0
6	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.	0	2	2	7	0
7	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.	0	1	2	7	1
8	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.	0	1	3	4	3
9	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.	0	0	3	8	0
10	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.	0	2	3	4	1
	Total Number:	4	19	27	49	15
	Total Percentage:	3.51	16.67	23.68	42.98	13.16

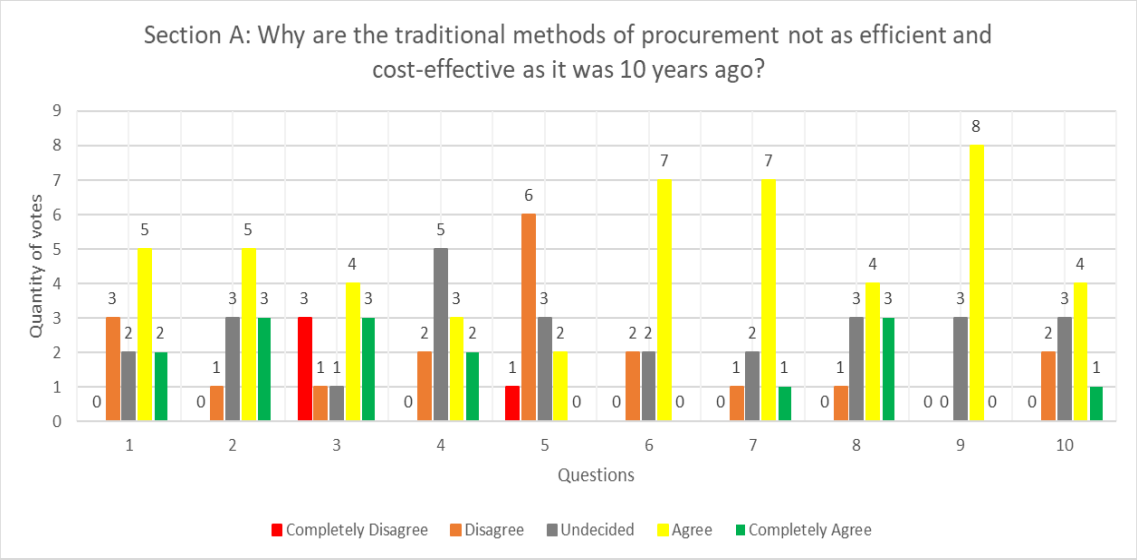


Figure 4.1: Section A Bar Graph Data Collection (Own Source: 2024)

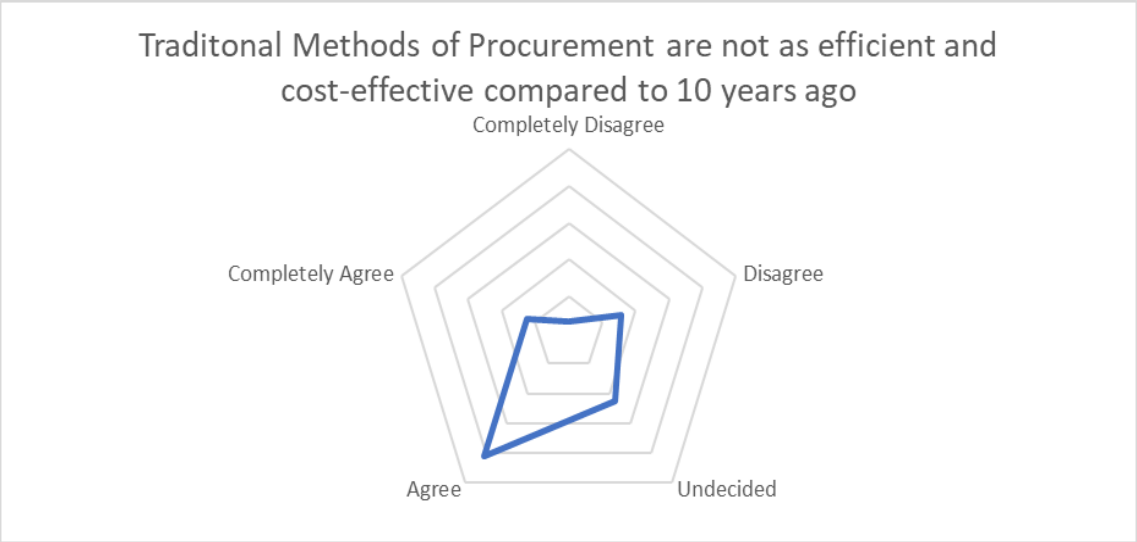


Figure 4.2: Section A Data Collection Radar (Own Source: 2024)

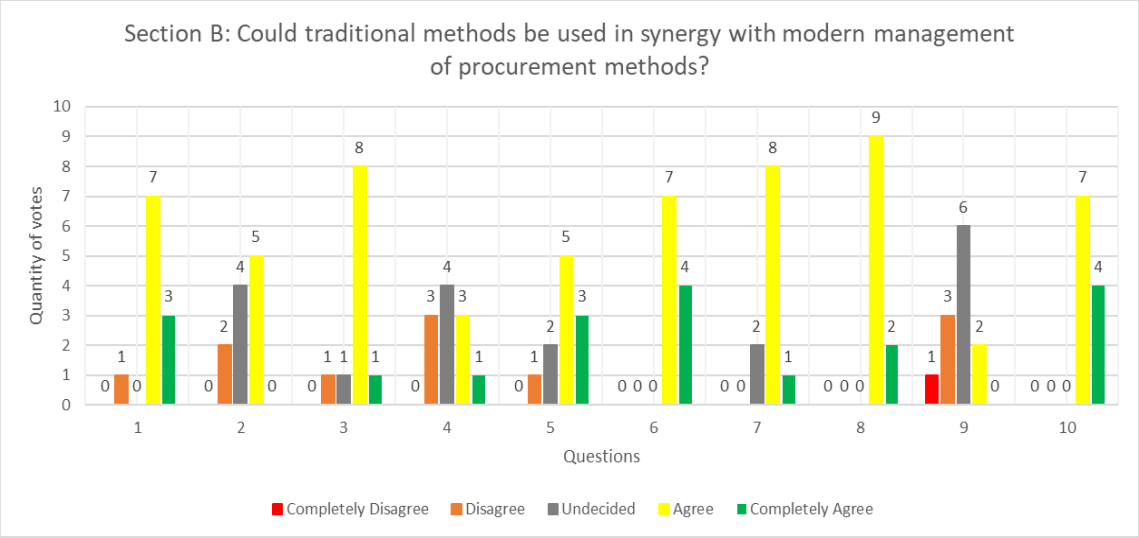
The responses to the section addressing the declining efficiency and cost-effectiveness of traditional procurement methods over the past decade indicate a strong consensus among participants. Specifically, 42.98% of respondents agreed that the manual procurement process impedes organisational efficiency. In contrast, 23.68% of participants remained undecided, while 16.67% disagreed and 3.51% completely disagreed with the statement. However, with a total of 56.14% of respondents either agreeing or completely agreeing, the majority of participants clearly view the manual procurement process as a significant barrier to efficiency. This finding is further supported by the data displayed in Figure 4.2, which shows a concentration of responses toward the "Agree" category, reinforcing the perception that manual processes are detrimental to operational effectiveness.

4.1.2. Section B: Determining if traditional procurement methods can be used in synergy with modern management of procurement methods.

The results presented in Table 4.2, Figures 4.3, and 4.4 assessed the potential for integrating traditional procurement methods with modern procurement management approaches.

Table 4.2: Section B results (Own Source: 2024)

	Section B: Could traditional methods be used in synergy with modern management of procurement methods?	**1** ***Completely Disagree***	**2** ***Disagree***	**3** ***Undecided***	**4** ***Agree***	**5** ***Completely Agree***
1	Currently, traditional procurement methods are being used in our organization.	0	1	0	7	3
2	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.	0	2	4	5	0
3	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.	0	1	1	8	1
4	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.	0	3	4	3	1
5	We are open to exploring ways to combine traditional procurement methods with modern management practices.	0	1	2	5	3
6	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.	0	0	0	7	4
7	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.	0	0	2	8	1
8	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.	0	0	0	9	2
9	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.	1	3	6	2	0
10	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.	0	0	0	7	4
	Total Number:	1	11	19	61	19
	Total Percentage:	0.90	9.91	17.12	54.95	17.12



Section B Bar Graph Data Collection (Own Source: 2024)

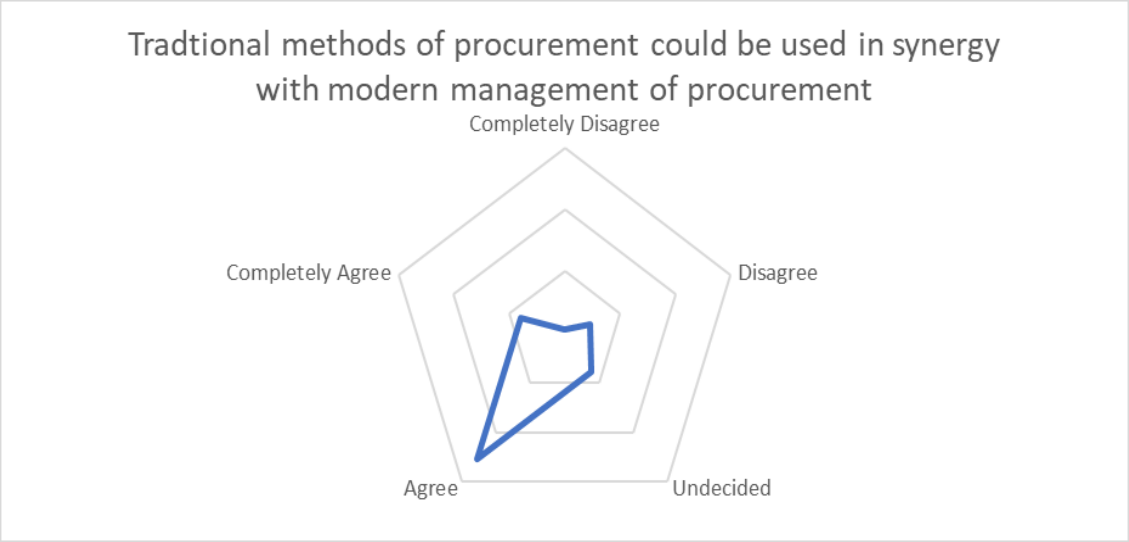


Figure 4.4: Section B Data Collection Radar (Own Source: 2024)

The responses to the section addressing whether traditional procurement methods could be effectively integrated with modern procurement management techniques reveal a clear consensus among participants. A total of 54.95% agreed with the statement, while 17.12% completely agreed, indicating broad support for the integration of traditional and modern approaches. However, 17.12% of respondents remained undecided, and a smaller portion, 0.90% and 9.91%, completely disagreed and disagreed, respectively. These findings suggest that while the majority favour the synergy between traditional and modern procurement methods, a minority of respondents either expressed uncertainty or disagreement.

4.1.3. Section C: Determining the most suitable automated programmes/software to complement the current manual methods.

The data in the following section highlights perceptions and usage of systems, programmes, and software designed to automate the procurement process within a manufacturing organisation. The responses are specified in Table 4.3, Figure 4.5, and Figure 4.6 respectively.

Table 4.3: Section C results (Own Source: 2024)

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		**1**	**2**	**3**	**4**	**5**
		Completely Disagree	***Disagree***	***Undecided***	***Agree***	***Completely Agree***
1	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization .	0	3	3	3	2
2	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.	0	1	2	7	1
3	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.	1	3	6	1	0
4	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.	0	3	1	7	0
5	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.	0	0	0	7	4
6	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.	0	0	0	9	2
7	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.	0	4	4	2	1
	Total Number:	1	14	16	36	10
	Total Percentage:	1.30	18.18	20.78	46.75	12.99

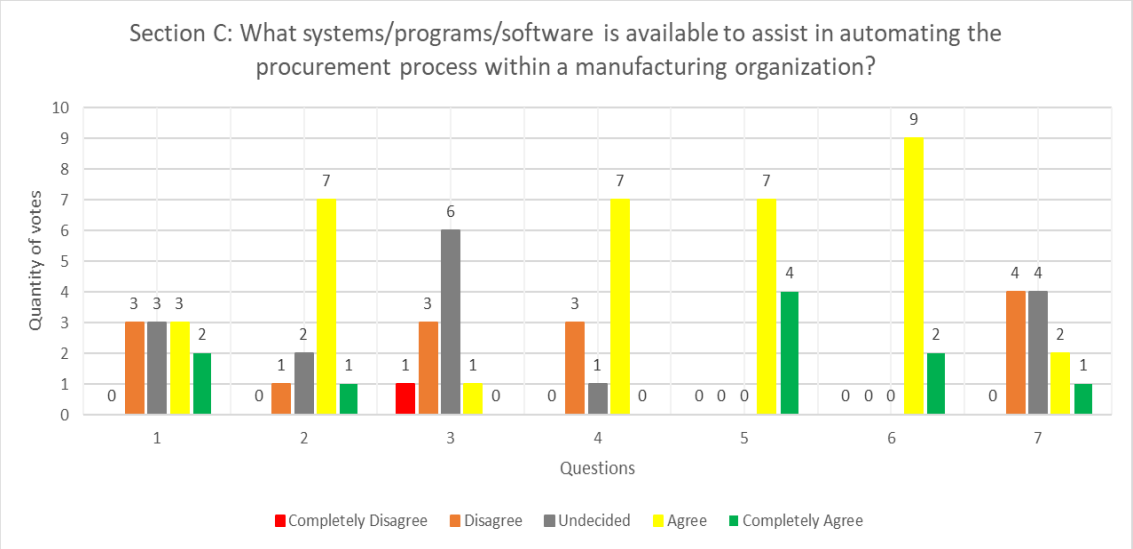


Figure 4.5: Section C Bar Graph Data Collection (Own Source: 2024)

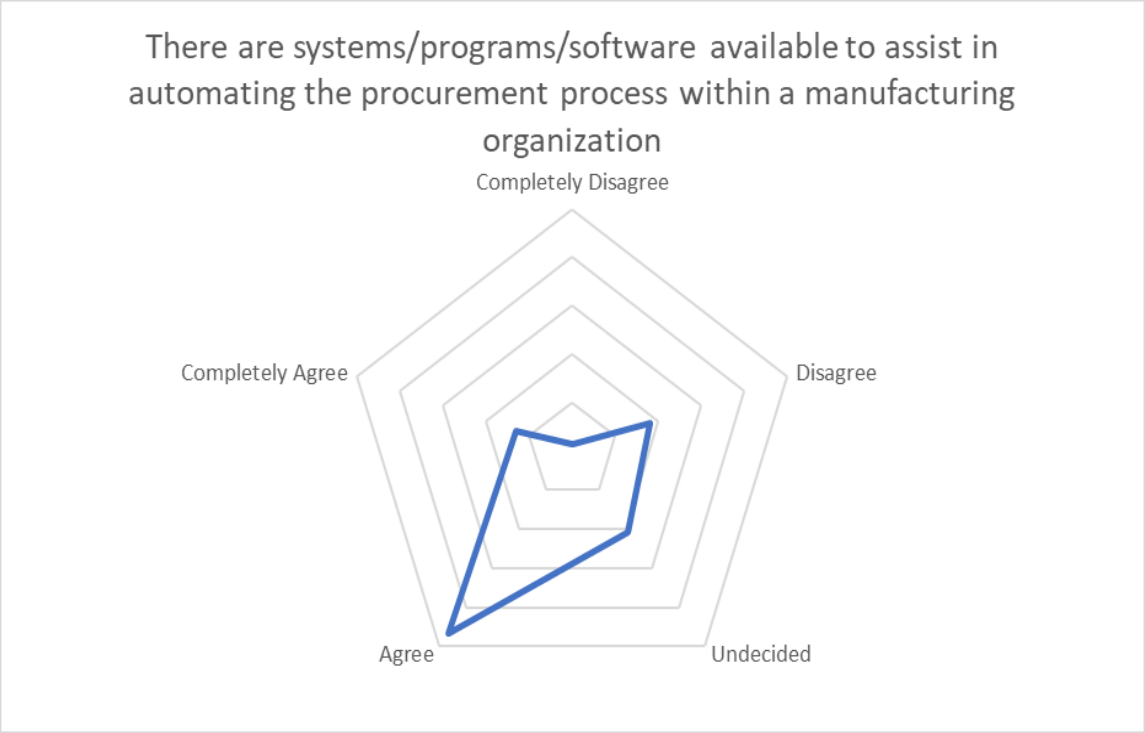


Figure 4.6: Section C Data Collection Radar (Own Source: 2024)

The results indicate a general consensus among respondents regarding the use of SYSPRO, the ERP system utilised by the manufacturing company, to streamline the procurement process through digital tools and workflows. Specifically, 46.75% of respondents agreed that SYSPRO can effectively facilitate procurement automation. Additionally, these respondents acknowledged the availability of alternative ERP systems that could serve similar purposes.

However, 1.30% of participants disagreed with the statement, suggesting scepticism about SYSPRO's capabilities or a preference for specialised supplier discovery platforms

designed to assist in identifying and onboarding new suppliers. Meanwhile, 20.78% of respondents remained undecided, indicating some uncertainty regarding the full range of programmes, software, and systems available to automate procurement processes. This highlights the need for further exploration or training to increase awareness and understanding of the available options for procurement automation within the organisation.

4.1.4. Section D: Determining whether human intervention is required for the automated procurement process.

Table 4.4 and Figures 4.7 and 4.8 display the results obtained for the final part of the data collection tool. Section D examines perceptions about the need for human intervention to achieve maximum efficiency, cost-effectiveness, and proper management within the automated procurement process in a manufacturing organisation.

Table 4.4: Section D results (Own Source: 2024)

		1	2	3	4	5
Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		***Completely Disagree***	***Disagree***	***Undecided***	***Agree***	***Completely Agree***
1	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.	0	0	0	7	4
2	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.	0	0	1	7	3
3	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.	0	0	1	7	3
4	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.	0	0	1	6	4
5	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.	0	0	1	8	2
6	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.	0	0	1	8	3
7	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.	0	0	3	5	3
8	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.	0	0	1	8	2
	Total Number:	0	0	9	56	24
	Total Percentage:	0.00	0.00	10.11	62.92	26.97

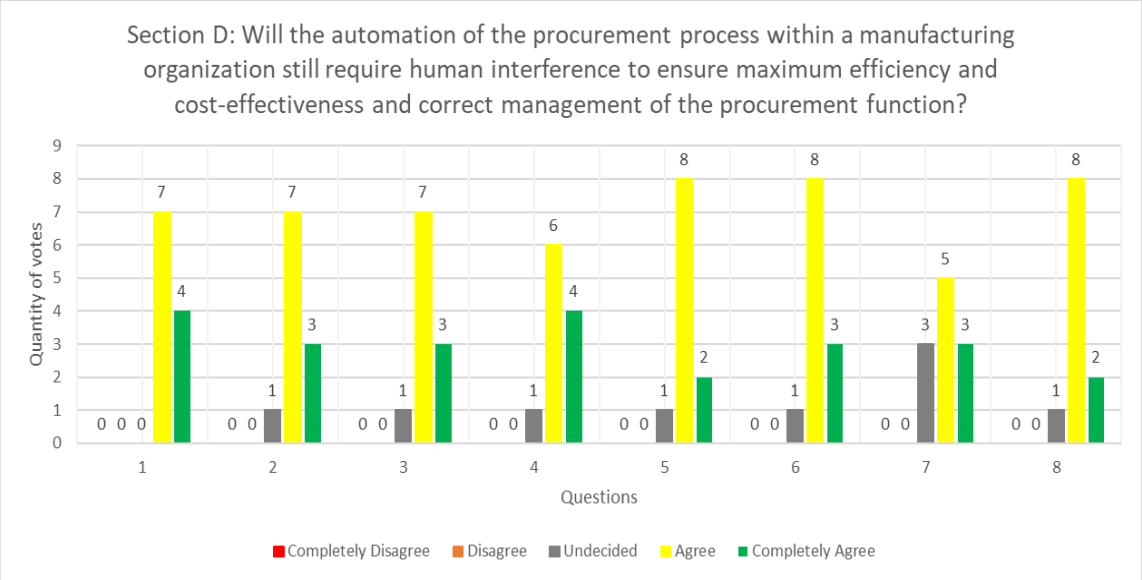


Figure 4.7: Section D Data Collection Bar Graph (Own Source: 2024)

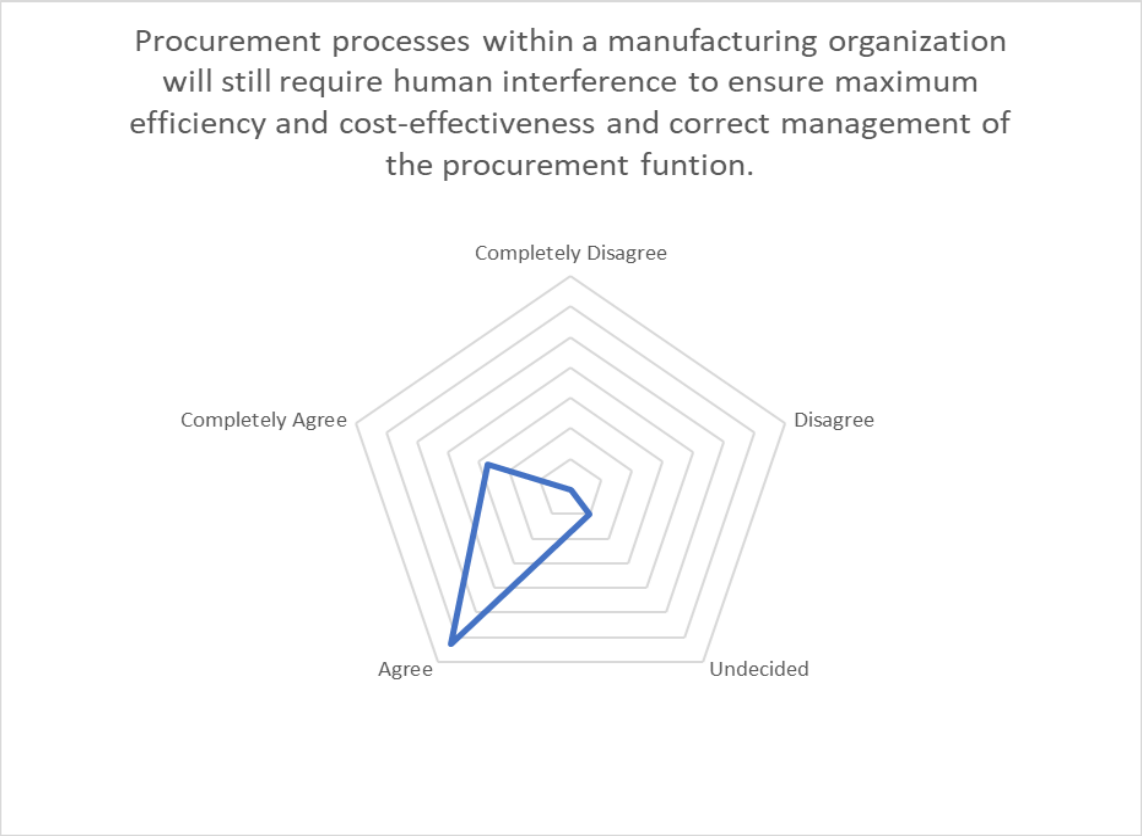


Figure 4.8: Section D Data Collection Radar (Own Source: 2024)

The responses to the section evaluating the necessity of human intervention in automated procurement systems to ensure optimal performance reveal a strong consensus among participants. A significant 62% of respondents agreed that human oversight is required to maintain the systems' maximum effectiveness, with an additional 26.97% completely agreeing with this viewpoint. This overwhelming agreement suggests that participants recognise the importance of human involvement in overseeing

automated processes, potentially to manage exceptions, make complex decisions, or address issues that automated systems alone may not handle adequately.

Interestingly, none of the respondents expressed disagreement with the statement, as 0% disagreed or completely disagreed. This absence of dissent highlights a broad belief in the value of human oversight in procurement automation. However, 10.11% of respondents were undecided, indicating that a small portion of participants may be uncertain about the extent to which human intervention is necessary, possibly due to the varying degrees of automation in different procurement contexts.

Referring to Figure 4.8, the data further supports this conclusion, showing a clear concentration of responses in the "Agree" and "Completely Agree" categories. This suggests a strong consensus that while automation has the potential to streamline procurement processes, human input remains a critical factor in ensuring that these systems operate at their highest level of efficiency. This insight may reflect broader concerns about the limitations of fully automated systems and the value of human expertise in complex decision-making within procurement operations.

4.2 Chapter summary

Chapter 4 presents the results of the quantitative data collection, focusing on four key areas. Firstly, the study found that traditional procurement methods have become less efficient and cost-effective due to factors such as technological advancements and economic fluctuations. Secondly, the integration of traditional and modern procurement methods is seen as a promising approach to improve efficiency and decision-making. Thirdly, automation tools like ERP systems and E-procurement platforms were identified as valuable tools for streamlining procurement processes, although training is crucial for their effective utilisation. Finally, the study emphasises the continued importance of human intervention in automated procurement, as respondents believe that human oversight is essential for ensuring maximum efficiency, cost-effectiveness, and correct management. Overall, the findings suggest that a balanced approach combining human expertise with technological solutions is necessary for optimal procurement outcomes.

CHAPTER 5: DISCUSSION OF THE RESEARCH FINDINGS

5.1. Introduction

This chapter provides an in-depth discussion of the research findings, integrating them with the study's objectives and the existing literature. The chapter begins by revisiting the primary aim of the research and contextualizing the results within the broader scope of procurement process optimization in the manufacturing industry. Key findings are critically analysed to highlight their implications for improving efficiency, cost-effectiveness, and management practices. Furthermore, the discussion addresses the alignment of these findings with current industry trends and theoretical frameworks. The chapter concludes by identifying any notable limitations and offering insights into their potential impact on the study's outcomes.

5.2. Aim of Research Conducted

The main aim of the research was to investigate whether optimising an organisation's procurement process in the manufacturing industry can improve the organisation's efficiency, cost-effectiveness and overall management practices. The problem statement of the research was defined as the manual procurement process at a machine-building manufacturer in the Western Cape, which is labour-intensive and time-consuming and negatively impacts the organisation's efficiency, cost-effectiveness, and management.

The research was conducted with four research objectives: firstly, to determine what the traditional procurement methods were currently being used and what processes are involved in these methods. The second was to establish whether the traditional methods could be used with modern methods for improved results and better management. Thirdly, it was to suggest the suited or suitable system, programme or software available for either full automation or assistance in the automation of the procurement process. Lastly, the research aimed to investigate the level of skills, human interactions, or monitoring needed by the systems/software/programmes to ensure effective automatisation of the procurement process and its management.

5.3. Key Findings

The research employed a single research method, namely quantitative. The quantitative research was conducted through a questionnaire focused on the numbers to confirm or deny assumptions and theories.

5.3.1. Section A

The comprehensive analysis of Section A indicates that a combination of market dynamics, economic pressures, and evolving customer expectations has contributed to the perceived decline in the efficiency and cost-effectiveness of traditional procurement methods. This analysis reveals that the impact of increased supplier competition further highlights the complex challenges traditional procurement faces in contemporary business environments.

Key findings supporting this conclusion include several factors. Technological advancements, viewed negatively by 42.98% of respondents, are seen as diminishing the efficiency and cost-effectiveness of traditional procurement. Economic factors, such as inflation and currency fluctuations, also significantly affect these methods. Additionally, changes in supplier behaviour and availability contribute to decreased efficiency, while the absence of real-time data and analytics limits the effectiveness of traditional procurement. Shifting market dynamics, including intensified supplier competition, further exacerbate these challenges. While a notable minority (16.67%) disagreed with the view that traditional procurement methods have declined in effectiveness, the overall data indicates a clear trend towards reduced efficiency and cost-effectiveness in traditional procurement practices.

5.3.2. Section B

Section B of the study examined the integration of traditional and modern procurement methods, revealing a consensus among employees on the potential synergy between these approaches. The findings suggest that although there is a conceptual acceptance of compatibility between traditional and modern methods, practical implementation will require strategic investment in training to ensure a seamless transition. Respondents expressed a broad understanding of the benefits of harmonising these methods but highlighted the need for training to bridge existing integration gaps. The study emphasises that equipping employees with essential skills is critical to enabling them to navigate effectively between the distinct yet complementary approaches of traditional and modern procurement.

Key findings supporting this analysis include several factors. A majority of respondents (72.07%) agreed that traditional procurement methods can complement modern management practices to improve efficiency and effectiveness, indicating strong support for integration. Additionally, 54.95% of respondents indicated that the organisation is open to exploring ways to combine these approaches. Further, 72.07% agreed that leveraging technology and data analytics could significantly enhance the effectiveness

of traditional procurement methods, pointing to substantial potential for improvement. However, challenges to integration remain, as only 17.12% of respondents felt that integration measures had been actively implemented, suggesting a need for more concrete actions. Moreover, some respondents (9.91%) expressed unfamiliarity or uncertainty regarding modern procurement practices, indicating a potential barrier to integration. Despite these challenges, the data shows a positive inclination within the organisation toward exploring integration possibilities, suggesting substantial potential for improvement through targeted exploration and implementation efforts.

5.3.3. Section C

In Section C, the study focuses on the feasibility of implementing systems, computer programmes, or software to enhance and automate procurement processes in the manufacturing industry. The research gains significance in light of global technological advancements and the paradigm shift observed across industries, emphasising not only the integration of advanced machinery but also the optimisation of industry-specific processes and methodologies. The manufacturing entity under investigation employs the SYSPRO Enterprise Resource Planning (ERP) system, with questionnaire responses highlighting a profound awareness of its advanced capabilities. Notably, SYSPRO seamlessly integrates with manual procurement methods, offering enhanced efficiency. However, challenges in time-intensive Purchase Order generation suggest potential improvements, such as integrating specialised software into the SYSPRO framework for increased procedural efficiency.

5.3.4. Section D

Section D of the data collection focuses on the role of human intervention in automating the procurement process within a manufacturing organisation to achieve maximum efficiency, cost-effectiveness, and effective management. The analysis reveals a strong consensus among participants regarding the indispensability of human involvement in ensuring the seamless and efficient functioning of procurement processes. Despite the optimisation opportunities that automation provides, respondents widely believe that a certain level of human interaction remains essential to maintain smooth operational functionality. This insight is valuable for organisations considering technological advancements in procurement, as it highlights the need for balanced integration of human oversight.

Key findings underscore this need for human involvement across multiple areas. Respondents overwhelmingly agreed that human intervention is crucial for achieving maximum efficiency within automated procurement processes. Additionally, most participants indicated that human judgment is vital for cost-effectiveness, emphasising the continued importance of human decision-making in cost optimisation. There was also a strong consensus that human oversight is required for the correct management of procurement functions, even in an automated setting. Finally, respondents recognised a synergistic relationship between human intervention and automation, affirming that automation alone cannot ensure optimal outcomes in procurement.

5.4. Results Interpretations

5.4.1. Section A

Section A of this study investigates the perceived decline in the efficiency and cost-effectiveness of traditional procurement methods over the past decade. Analysing the data reveals that most respondents agreed traditional procurement has seen a notable decrease in effectiveness, underscoring a trend of diminished efficiency and cost-effectiveness. The data were collected from employees directly involved in procurement processes within their organisations, ensuring that the insights gathered reflect firsthand experiences and provide valuable perspectives on the challenges within the procurement landscape.

Several critical factors were identified as contributing to this decline in traditional procurement effectiveness. Key among these are shifts in market dynamics within the manufacturing industry, economic factors such as inflation and currency fluctuations, and evolving customer expectations. These elements collectively contribute to the observed inefficiencies, and they present complex challenges for traditional procurement. Notably, most respondents did not identify increased supplier competition to reduce costs as a major factor affecting the efficiency or cost-effectiveness of traditional methods, adding complexity to the understanding of procurement dynamics.

In summary, the comprehensive analysis of Section A indicates that a confluence of market dynamics, economic pressures, and changing customer expectations has played a substantial role in the perceived decline of traditional procurement methods. The study also highlights the nuanced impact of supplier competition, illustrating the multifaceted challenges faced by traditional procurement in today’s business environment.

The data analysis further supports the research question, revealing specific factors that have influenced this decline. For example, 40.83% of respondents agreed that traditional procurement methods have become less efficient and cost-effective over the past decade. Additional insights include:

- **Technological Advancements**: A significant portion of respondents (40.83%) felt that technology has reduced procurement efficiency and cost-effectiveness, pointing to the need for strategic adoption of technology within these processes.
- **Market Dynamics**: The influence of market dynamics, especially supplier competition, remains contentious among respondents, suggesting that procurement strategies should closely consider evolving market trends and competitive pressures.

In conclusion, this section's data reflects diverse perspectives on the efficiency and cost-effectiveness of traditional procurement methods over the last ten years. While some respondents cite technological and economic factors as contributing to the decline, others view traditional methods more positively. Variations in individual responses indicate a degree of uncertainty or complexity in perceptions regarding the evolving effectiveness of traditional procurement.

5.4.2. Section B

Section B of the study examines the feasibility of integrating traditional procurement methods with modern management practices. The data analysis reveals a strong consensus among employees that traditional and modern procurement methods can work synergistically, highlighting the potential for a harmonious coexistence between these approaches. Many participants emphasised the interchangeable qualities of these methods, suggesting a conceptual acceptance of compatibility. However, they also identified the need for targeted training to bridge the gap between traditional and modern practices effectively.

While employees largely support the integration of these approaches, the study underscores that practical implementation will require strategic investment in training. Equipping employees with essential skills and knowledge is critical to ensuring they can navigate seamlessly between traditional and contemporary procurement dynamics. Training initiatives will enhance the workforce's ability to manage these distinct yet complementary approaches, optimising overall procurement effectiveness.

The data supports the hypothesis that integrating traditional and modern procurement methods can benefit the organisation. A notable portion of respondents (50.83%) affirmed that traditional methods, currently in use, could complement modern practices, pointing to a positive outlook on the potential synergy between these approaches.

In conclusion, the findings suggest that while challenges exist, the positive perspectives, observed success in other settings, and the potential for enhanced efficiency, cost-

effectiveness, and improved decision-making through technology and data analytics make integration a promising endeavour for the organisation.

5.4.3. Section C

Section C of the study assesses the feasibility of using systems, computer programmes, and software to streamline and automate procurement processes in the manufacturing industry. This investigation is driven by ongoing global technological advancements and the transformative shift across industries, which includes integrating innovative machinery and optimising operational processes.

The manufacturing entity analysed in this study relies on the SYSPRO Enterprise Resource Planning (ERP) system. Survey responses from personnel indicate a strong awareness of SYSPRO's advanced capabilities, particularly in its ability to integrate with existing manual procurement processes to improve efficiency. A primary function of SYSPRO in the organisation is generating Purchase Orders (POs), which involves manually loading individual items into the system for approval. However, respondents noted that this process is time-consuming, suggesting that integrating specialised PO generation software into SYSPRO could reduce manual labour and increase procedural efficiency.

Findings highlight the importance of training to equip employees with the necessary skills to operate these systems effectively. While SYSPRO has robust capabilities, fully leveraging them depends on the organisation's willingness to invest in developing complementary software packages and training resources to enhance operational efficiency.

The analysis reveals moderate agreement among respondents on the effectiveness of current automation systems in procurement. Many agreed on the utility of specific tools, such as ERP and e-procurement systems, but responses also reflect areas of uncertainty or disagreement. Key findings include:

- **Effectiveness of Specific Tools**: A significant majority (78.32%) affirmed that ERP, SYSPRO, and e-procurement systems effectively streamline procurement processes. Additionally, 59.74% of respondents valued Spend Analysis Tools for their insights into spending patterns, supplier performance, and cost-saving opportunities, while a similar percentage (59.74%) recognised the utility of purchase order automation software.
- **Areas of Uncertainty or Disagreement**: Only a minority of respondents (21.05%) acknowledged the use of supplier discovery platforms for identifying and onboarding new suppliers, indicating a potential gap in the existing tool landscape. Opinions also varied (33.77%) on exploring alternative systems or software solutions for procurement automation.

- **Training and Skill Development**: There was strong consensus (82.47%) on the importance of training programmes to equip workers with the skills needed to maximise the benefits of automation tools.

Overall, the data suggests a positive outlook on the benefits of automation in procurement but identifies areas for further exploration, such as supplier discovery tools. The emphasis on training underscores the importance of skill development to support the successful adoption and effective use of automation technologies in procurement.

5.4.4. Section D

The data collected in Section D unequivocally demonstrates the critical role of human intervention in the procurement function, even within highly automated manufacturing organisations. A significant majority of respondents (89.89%) affirmed that human involvement is essential for maximising efficiency. Similarly, 89.83% and 87.64% of respondents emphasised the necessity of human oversight for achieving cost-effectiveness and ensuring correct management, respectively.

These findings underscore the synergistic relationship between automation and human expertise. While automation can streamline processes and enhance productivity, it cannot fully replace the nuanced decision-making, problem-solving, and strategic thinking that human professionals bring to the table. A mere 20.25% of respondents believed that automation alone could guarantee maximum efficiency.

In conclusion, the data compellingly suggests that a balanced approach, combining the power of automation with the intelligence of human judgment, is the optimal strategy for achieving maximum efficiency, cost-effectiveness, and correct management in procurement.

5.5. Limitations

The research provides valuable insight into optimising the procurement process, certain limitations exist that should be considered when interpreting the results and recommendations. These limitations suggest what studies should be investigating in future:

- The study is confined to a single organisation limiting the generalizability of the findings to other industries or organisations with different structures.
- The research is region-specific, which may not reflect procurement challenges or strategies in other locations or global contexts.

- Data collection and analysis are conducted within a limited timeframe, which may not capture the long-term effects of procurement optimisation.
- The accuracy and completeness of the data provided by the organisation may affect the depth and reliability of the study's findings.
- The study does not explore the potential impact of advanced technologies, such as AI or blockchain, on procurement optimisation.
- The influence of resistance to change or human error in implementing new procurement processes may not be fully accounted for.
- Findings are based on current economic conditions, which may change and affect the relevance of the recommendations over time.
- The study primarily addresses cost-effectiveness and efficiency, potentially overlooking other important factors like sustainability or ethical sourcing.

5.6. Chapter Summary

This chapter presents a comprehensive analysis of the research findings, exploring the impact of traditional and modern procurement methods on organisational efficiency and cost-effectiveness in the manufacturing industry. A single method approach, consisted of quantitative data collection techniques, was employed to gather insights. Key findings include a decline in the efficiency and cost-effectiveness of traditional methods, the potential benefits of integrating traditional and modern approaches, and the need for careful consideration of automation and human intervention. While the study provides valuable insights, it is important to note the limitations, such as a limited sample size and the use of cross-sectional data. Overall, the research highlights the importance of a strategic approach to procurement, combining traditional and modern methods to optimise organisational performance.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

In recent years, procurement has emerged as a critical support function within organisations due to its substantial influence on business operations, budgeting, and overall success. As the entry point of the supply chain, procurement consumes over 60% of an organisation's resources, emphasising the need for efficient processes (Presutti, 2003). Despite the availability of powerful technological tools, many companies have yet to fully capitalise on the potential benefits of optimising procurement (Valk, 2008). With the advent of the Fourth Industrial Revolution, competition has intensified, and organisations are increasingly compelled to adapt to a rapidly evolving environment where artificial intelligence (AI), the Internet of Things (IoT), and digitalisation converge (Ustundag & Cevikcan, 2018). Automating procurement processes is becoming a crucial strategy for enhancing efficiency and profitability in this new landscape, making it a focal point for this research.

In the research thus far, the scope of the research was provided in chapter one, which provides a direction for the research as well as the aim of the research. Chapter 2 details the literature review that was conducted based on the following sections:

- A general overview of the procurement and the management thereof in the manufacturing industry.
- The importance of procurement in manufacturing.
- The Fourth Industrial Revolution
- The Impact of 4IR on the procurement process.
- Optimising the Procurement process in the manufacturing industry and lastly,
- The benefits of optimising the procurement process.

Chapter 3 details the research design and methodology used in the research process. Followed by Chapter 4 which discussed the results obtained through the questionnaires, and then analysed the relevant data.

Chapter 5 elaborates on the data collected, and relates the data to the main aim of the research.

6.2. The Research Problem Reviewed

The research problem that was investigated in this thesis was ‘’The manual procurement process at a machine-building manufacturer in the Western Cape is labour-intensive and time-consuming, negatively impacting the organisation’s efficiency, cost-effectiveness,

and management''. Based on the data that was collected, the problem statement does seem to be true within the manufacturing company. In the opinion of the researcher, the research problem can be improved if the recommendation is taken into consideration.

6.3. The Research Questions Reviewed

The research question on which the data collection was based is as follows: ''Will optimising the procurement process advance efficiency, cost-effectiveness, and organisational management to initiate business improvement and gain a competitive advantage within the market.'' If the recommendation is implemented within the organisation, the researcher believes that this is a viable solution can be provided to the research question.

6.4. The Investigative Questions Reviewed

The investigative questions in support of the primary research question are as follows:

- Why are the traditional procurement methods not as efficient and cost-effective as they were ten years ago?
- Could the traditional methods be used in synergy with modern procurement management methods?
- What systems/programmes/software are available to assist in automating the procurement process within a manufacturing organisation?
- Will the automation of the procurement process within a manufacturing organisation still require human interference to ensure maximum efficiency, cost-effectiveness and correct management of the procurement function?

The research reveals that traditional procurement methods, while once effective, are now less efficient and cost-effective due to factors such as technological advancements from the Fourth Industrial Revolution, rising costs, and increased global complexity. Automation, artificial intelligence, and data analytics now provide alternatives that can streamline processes, reduce errors, and improve decision-making, making traditional methods appear outdated (Arin, 2020). Additionally, challenges like globalisation, supply chain disruptions, and evolving regulations further diminish the effectiveness of traditional approaches. Manual data entry and paper-based processes associated with traditional methods are also increasingly time-consuming, error-prone, and costly.

However, traditional methods retain value when integrated with modern tools, creating a flexible hybrid approach that leverages both established practices and new technologies.

Modern communication and collaboration tools can strengthen traditional supplier relationships, enhancing trust, transparency, and performance tracking. Data-driven insights from analytics tools complement traditional experience, offering better decision-making capabilities and identifying cost-saving opportunities (Christopher et al., 2015; Goyal, 2018). Furthermore, modern risk management tools enable more precise analysis and forecasting, helping organisations to identify and mitigate risks earlier than traditional, intuition-based methods (Chopra & Sodhi, 2014).

In summary, a hybrid approach—combining traditional procurement methods with modern technologies—offers a robust strategy for improving efficiency, cost-effectiveness, and performance. This approach enables organisations to adapt to the challenges of a complex global business environment by leveraging the strengths of both traditional and modern procurement strategies.

6.5. The Key Objectives Reviewed

The research aimed to optimise the procurement process in a manufacturing company, focusing on four key objectives. First, it assessed traditional procurement methods, identifying the nine-step process outlined by Jenkins (2021), which includes steps from identifying required goods to finalising payment and record-keeping. This detailed understanding of traditional methods provided a foundation for examining potential improvements.

The second objective explored the potential benefits of integrating traditional procurement methods with modern technologies. This hybrid approach can enhance efficiency, strengthen supplier relationships, improve decision-making, and support risk management, drawing on both traditional and contemporary strategies (Christopher et al., 2015; Goyal, 2018). For example, traditional supplier relationships can be enhanced using modern tools that improve communication, collaboration, and performance tracking.

Next, the research aimed to identify the most suitable systems for automating the procurement process. The company’s existing SYSPRO ERP system was identified as a practical option for managing procurement stages without incurring the high costs of implementing a new system. By leveraging SYSPRO, the company could begin the automation process smoothly and efficiently.

Finally, the study investigated the skill levels and training required to manage an automated procurement system effectively. Feedback from employees involved in procurement revealed that, while the systems were relatively user-friendly, additional

training would be crucial for ensuring smooth and effective operations, equipping staff to handle various procurement scenarios confidently.

6.6. Recommendations

Based on the results obtained from the data collection, the following recommendations are proposed to address the challenges identified in the procurement process:

Provide Targeted Training for Staff on the SYSPRO System to enhance the efficiency and effectiveness of the procurement process, it is recommended that staff members receive more comprehensive and relevant training specifically focused on the SYSPRO system. The findings indicate that staff lack the necessary knowledge to fully utilise the system, leading to inefficiencies. By equipping staff with the required expertise, particularly in managing procurement functions within SYSPRO, the organisation can improve accuracy, reduce errors, and streamline procurement activities.

These recommendations aim to address the key inefficiencies identified during the study and provide actionable steps for improving procurement processes through better training and technological upgrades.

6.7. Final Conclusion

This thesis investigates the efficiency and effectiveness of traditional procurement methods within the manufacturing industry, focusing on a machine-building manufacturer in the Western Cape. The research found that while traditional methods are still in use, they have become less efficient and cost-effective due to technological advancements, globalisation, and the increasing complexity of the supply chain. To address these challenges, a hybrid approach that integrates traditional methods with modern technologies and strategies is recommended. This approach leverages the strengths of both worlds, leading to improved efficiency, cost-effectiveness, and overall performance. While automation offers significant benefits, human intervention remains crucial for ensuring maximum efficiency, cost-effectiveness, and optimal management of procurement processes. The research highlights the importance of staff training to maximise the potential of the SYSPRO ERP system and streamline procurement activities. By implementing these recommendations, organisations can optimise their procurement processes, gain a competitive advantage, and thrive in the evolving manufacturing landscape.

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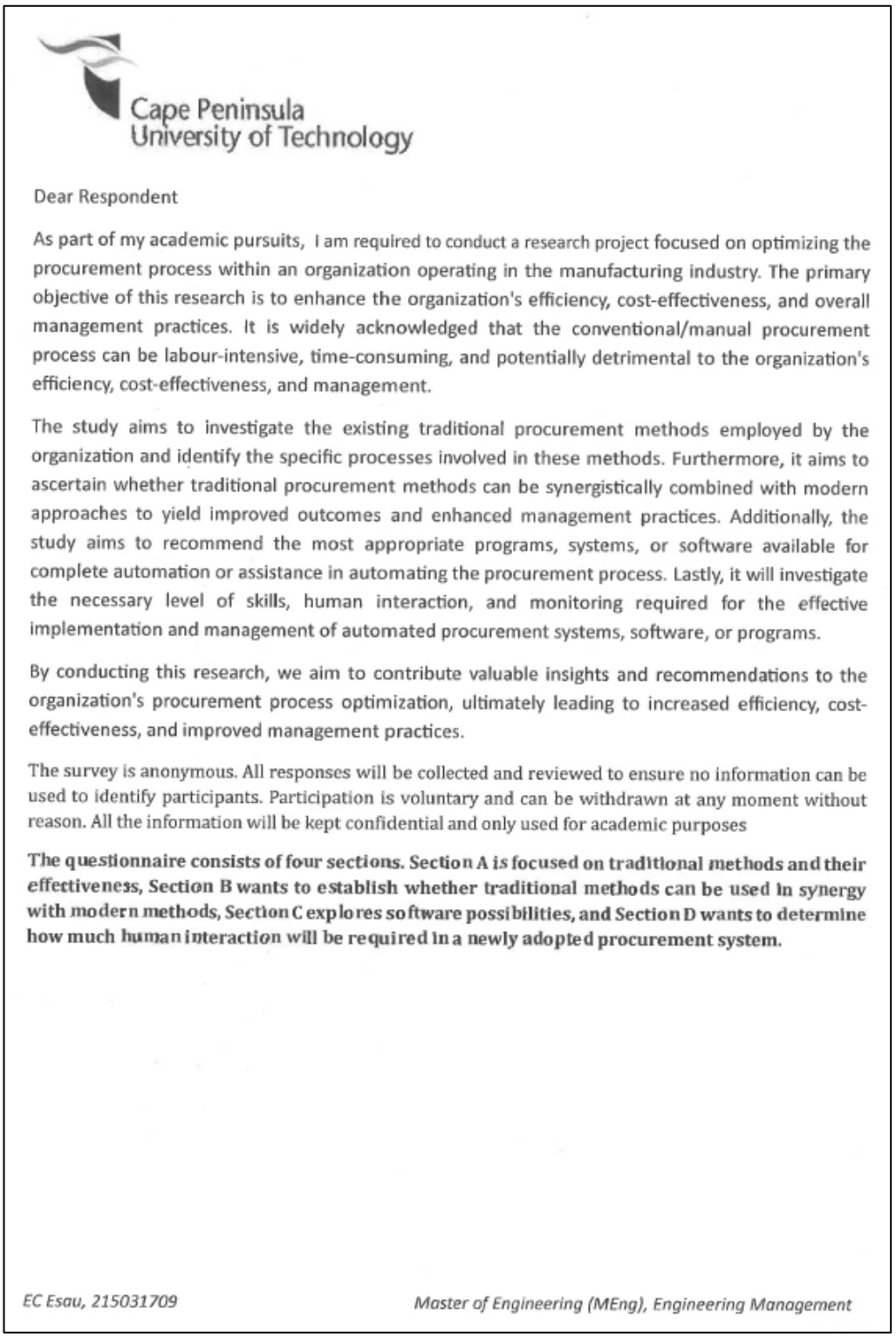
APPENDICES

Appendix A Employee Survey Questions – Scatter Plot



Cape Peninsula
University of Technology

Dear Respondent

As part of my academic pursuits, I am required to conduct a research project focused on optimizing the procurement process within an organization operating in the manufacturing industry. The primary objective of this research is to enhance the organization's efficiency, cost-effectiveness, and overall management practices. It is widely acknowledged that the conventional/manual procurement process can be labour-intensive, time-consuming, and potentially detrimental to the organization's efficiency, cost-effectiveness, and management.

The study aims to investigate the existing traditional procurement methods employed by the organization and identify the specific processes involved in these methods. Furthermore, it aims to ascertain whether traditional procurement methods can be synergistically combined with modern approaches to yield improved outcomes and enhanced management practices. Additionally, the study aims to recommend the most appropriate programs, systems, or software available for complete automation or assistance in automating the procurement process. Lastly, it will investigate the necessary level of skills, human interaction, and monitoring required for the effective implementation and management of automated procurement systems, software, or programs.

By conducting this research, we aim to contribute valuable insights and recommendations to the organization's procurement process optimization, ultimately leading to increased efficiency, cost-effectiveness, and improved management practices.

The survey is anonymous. All responses will be collected and reviewed to ensure no information can be used to identify participants. Participation is voluntary and can be withdrawn at any moment without reason. All the information will be kept confidential and only used for academic purposes

The questionnaire consists of four sections. Section A is focused on traditional methods and their effectiveness, Section B wants to establish whether traditional methods can be used in synergy with modern methods, Section C explores software possibilities, and Section D wants to determine how much human interaction will be required in a newly adopted procurement system.

EC Esau, 215031709 *Master of Engineering (MEng), Engineering Management*

Employee Survey Questions

The table to follow indicates the scale used to apply to each of the statements to follow in the next section.

1	2	3	4	5
Completely Disagree	Disagree	Undecided	Agree	Completely Agree

Using the table above, please indicate your level of agreement to the following statements by marking with a "X" in the column.

	Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?	**Scale**				
		1	**2**	**3**	**4**	**5**
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.					
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.					
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.					
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.					
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.					

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.					
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.					
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.					
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.					
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.					
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.					
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.					
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.					
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.					

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.					
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.					
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		Scale				
		1	2	3	4	5
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.					
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.					
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.					
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.					
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				✓	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.		✓			

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		Scale				
		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					✓
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.					✓
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.					✓
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					✓
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				✓	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				✓	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.					✓

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.					

Thank you for your participation in this questionnaire. Your responses will greatly contribute to the successful completion of this thesis and potentially benefit the organization as a whole.

Scatter plot

Cape Peninsula
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Captured

EC Esau, 215031709 *Master of Engineering (MEng), Engineering Management*

Employee Survey Questions

The table to follow indicates the scale used to apply to each of the statements to follow in the next section.

1	2	3	4	5
Completely Disagree	Disagree	Undecided	Agree	Completely Agree

Using the table above, please indicate your level of agreement to the following statements by marking with a "X" in the column.

Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?		Scale				
		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.				✓	
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.				✓	
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.	✓				
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			✓		
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.		✓			
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.		✓			

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.				✓	
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.			✓		
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.			✓		
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			✓		

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.				✓	
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.				✓	
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.			✓		
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.				✓	
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.				✓	
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.				✓	
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.			✓		

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				✓	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.			✓		
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4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.		✓			
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6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				✓	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.				✓	

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5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				✓	
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7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.				✓	

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				✓	

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EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.				X	
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.	X				
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					X
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.		X			
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.		X			

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.		X			
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.				X	
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10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.				X	
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.				X	
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.				X	
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.					X
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					X
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.					X

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				X	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.				X	
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.				X	

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.					X
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.				X	
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.		X			
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.		X			
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.				X	

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				X	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.		X			

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		Scale				
		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					X
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.					X
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.					X
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					X
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				X	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				X	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.					X

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				X	

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Cape Peninsula University of Technology

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Captured

EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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Completely Disagree	Disagree	Undecided	Agree	Completely Agree

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Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?		Scale				
		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.				X	
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.				X	
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.					X
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.		X			
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.		X			
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.				X	

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.				X	
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.				X	
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.				X	
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.		X			

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.					X
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.			X		
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.		X			
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.					X
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					X
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				X	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				X	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.		X			
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					X

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		Scale				
		1	2	3	4	5
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.				X	
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.				X	
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.		X			
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					X

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				X	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.		X			

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					X
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.				X	
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.				X	
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.				X	
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				X	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				X	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.				X	

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				X	

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EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?		Scale				
		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.			X		
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.		X			
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.	X				
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.		X			
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.	X				
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.				X	

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.				X	
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.		X			
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.			X		
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.				X	

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.				X	
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.			X		
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.		X			
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.				X	
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					X
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				X	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				X	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.		X			
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					X

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		1	2	3	4	5
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.		X			
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.				X	
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.			X		
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					X

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				X	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.			X		

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		Scale				
		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					X
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.					X
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.					X
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					X
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				X	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.					X
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.					X

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.					X

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EC Esau, 215031709

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1	2	3	4	5
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		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.			X		
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.			X		
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.				X	
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			X		
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.				X	
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7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.			4		
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.			4		
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.			4		
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			4		

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.				4	
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.			4		
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				4	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.			4		
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.			4		
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.				4	
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				4	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				X	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.			X		
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		1	2	3	4	5
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2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.				X	
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.			X		
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.			X		
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.				X	

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7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.			4		

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5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				4	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				4	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.			4		

B.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				4	

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3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.				X	
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.				X	
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3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.				X	
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.				X	

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				X	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.				X	

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		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.				X	
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.				X	
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.				X	
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.				X	
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				X	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				X	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.				X	

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				X	

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EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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Employee Survey Questions

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1	2	3	4	5
Completely Disagree	Disagree	Undecided	Agree	Completely Agree

Using the table above, please indicate your level of agreement to the following statements by marking with a "X" in the column.

Section A: Why are the traditional methods of procurement not as efficient and cost-effective as it was 10 years ago?		Scale				
		1	2	3	4	5
1.	A decline in efficiency and cost-effectiveness of traditional (10 years or older) procurement methods has been observed.		X			
2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.	X				X
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.				X	
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.				X	
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.		X			
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.				X	

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.				X	
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.					X
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.				X	
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					X

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.					X
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.				X	
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.		X			
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.		X			
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.					X
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				X	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.					X
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.			X		
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					X

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.				X	
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.			X		
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.			X		
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.		X			
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					X

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.					X
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.		X			

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		Scale				
		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.				X	
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.				X	
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.					X
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					X
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.					X
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.					X
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.					X

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.					X

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Cape Peninsula University of Technology

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EC Esau, 215031709

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2.	There has been a significant change in market dynamics that has affected the efficiency and cost-effectiveness of traditional procurement methods in the past 10 years.				X	
3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.				X	
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.					X
5.	An increase in competition among suppliers has led to higher prices and reduced cost-effectiveness of traditional procurement methods compared to a decade ago.		X			
6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.			X		

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.					X
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.			X		
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.				X	
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.		X			

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.				X	
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.				X	
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.					X
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.					X
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.					X
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.				X	
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				X	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.				X	
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.				X	
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.					X

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		Scale				
		1	2	3	4	5
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.					✓
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.					✓
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.	X				
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.				✓	

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.					X
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.					X

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		**Scale**				
		1	2	3	4	5
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.					X
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.					X
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.				X	
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.					X
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.					X
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.					X
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EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.		X			
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			X		
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4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.			X		
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3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.		X			
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.				X	

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EC Esau, 215031709

Master of Engineering (MEng), Engineering Management

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3.	Advancements in technology played a role in reducing the efficiency and cost-effectiveness of traditional procurement methods over the last decade.			X		
4.	The changes in supplier behaviour or availability have contributed to the decreased efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.				X	
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6.	Changing regulatory requirements or compliance standards have made traditional procurement methods less efficient and cost-effective compared to what they were 10 years ago.				X	

7.	Economic factors, including inflation and currency fluctuations, have impacted the efficiency and cost-effectiveness of traditional procurement methods over the past decade.			X		
8.	The lack of real-time data and analytics in traditional procurement methods has contributed to their decreased efficiency and cost-effectiveness over the last 10 years.					X
9.	A shift in customer expectations and demands that traditional procurement methods struggle to keep up with have been observed.				X	
10.	There are other factors not mentioned above that have contributed to the reduced efficiency and cost-effectiveness of traditional procurement methods over the past 10 years.			X		

Section B: Could traditional methods be used in synergy with modern management of procurement methods?		Scale				
		1	2	3	4	5
1.	Currently, traditional procurement methods are being used in our organization.					X
2.	I am familiar with modern management of procurement methods, such as automation, digital platforms, and data analytics.		X			
3.	Traditional procurement methods can complement modern management practices to enhance efficiency and effectiveness.				X	
4.	We have implemented measures to integrate traditional procurement methods with modern management practices in our organization.			X		
5.	We are open to exploring ways to combine traditional procurement methods with modern management practices.				X	
6.	Leveraging technology and digital tools can enhance the effectiveness of traditional procurement methods.				X	
7.	There are specific areas or processes within our procurement function where we believe traditional methods could work synergistically with modern management practices.				X	

8.	Incorporating data analytics and real-time insights into traditional procurement methods can improve decision-making and cost-effectiveness.					X
9.	I have observed the successful implementation and integration of traditional procurement methods with modern management practices.		X			
10.	Training and resources to facilitate the integration of traditional procurement methods with modern management practices will assist with the transition.				X	

Section C: What systems/programs/software is available to assist in automating the procurement process within a manufacturing organization?		Scale				
		1	2	3	4	5
1.	We are currently using systems, programs, and software to automate the procurement process within our manufacturing organization.			X		
2.	There are enterprise resource planning (ERP), Syspro systems that include procurement modules, and E-procurement systems that streamline the procurement process through digital tools and workflows.				X	
3.	There are supplier discovery platforms available that help the organization identify and onboard new suppliers which ensures a diverse and competitive supplier base.			X		
4.	Spend Analysis Tools software systems that are available to be integrated into the procurement process within an organization will assist the organization in providing insight into spending patterns at suppliers, supplier performance, and potential cost-saving opportunities.				X	
5.	With purchase orders being created on a daily basis for all departments, a purchase order automation software that automates the creation, approvals and tracking of purchase orders which reduces the manual intervention, will streamline the procurement process within the organization.					X

6.	There are many software/programs/systems available that could assist with automating the procurement within the organization, but with those programs requires a training program to ensure all workers operating it will be equipped with the necessary skills.				X	
7.	We have considered and utilized other systems, programs, or software solutions for automating the procurement process within our manufacturing organization.			X		

Section D: Will the automation of the procurement process within a manufacturing organization still require human interference to ensure maximum efficiency and cost-effectiveness and correct management of the procurement function?		**Scale**				
		1	**2**	**3**	**4**	**5**
1.	The automation of the procurement process within a manufacturing organization requires human interference to ensure maximum efficiency.				X	
2.	Human involvement is necessary to achieve cost-effectiveness in the automated procurement process of a manufacturing organization.				X	
3.	The correct management of the procurement function in an automated manufacturing organization still relies on human intervention.				X	
4.	The automation of the procurement process alone cannot ensure maximum efficiency without any human interference.				X	
5.	The automated procurement process within a manufacturing organization requires human oversight to achieve cost-effectiveness.				X	
6.	Human interaction is necessary to manage and optimize the procurement function in an automated manufacturing organization.				X	
7.	The automated procurement process cannot guarantee the correct management of the procurement function without any human involvement.				X	

8.	The automation of the procurement process in a manufacturing organization still relies on human involvement to achieve cost-effectiveness and correct management of the procurement function.				X	

Thank you for your participation in this questionnaire. Your responses will greatly contribute to the successful completion of this thesis and potentially benefit the organization as a whole.