The Impact of Process Management on Customer Satisfaction in Manufacturing Industries – A systematic Literature Review

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Abstract

The study aims at systematically reviewing the literature which investigated the association between process management practices and customer satisfaction in manufacturing organizations. Peer-reviewed publications, indexed in Scopus database, were identified, screened and synthesized using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework and published between 1982 and 2026. To explore the trends of publication, thematic evolution, keyword networks and conceptual relationships, the selected 65 eligible studies were analysed using systematic review and bibliometric approach. The results reveal the use of process management techniques is always to enhance the operational efficiency, product quality, process reliability and delivery performance and thus, customer satisfaction, invariably. Indeed, the review reveals that Industry 4.0 technologies provide the ability to improve these relationships through digital technologies, digital integration, automation and real-time decision making. The study highlights key methodological and theoretical gaps, such as the lack of standardized measurement models and the lack of evidence from longitudinal studies and suggests future research directions. It also has implications for manufacturing companies who are looking for sustainable operational excellence and value creation for their customers.

Keywords: *Operational Excellence, Business Process Management, Lean Manufacturing, Industry 4.0, Digital Transformation, Bibliometric Analysis*

1. Introduction

Process management has become one of the critical factors for the performance of modern industries, especially in the aspect of customer satisfaction. Process Management is basically the way in which organizational processes are systematically designed, put into practice, monitored, and improved over time to increase the efficiency, consistency, and quality of the products/services offered to the market (Kohlbacher & Reijers, 2013).

In the present era of fast development of technology, and high expectations from customers, in which the competitive global manufacturing has emerged, the process management is an effective mean of coordinating the manufacturing processes with the market demand (Roh et al., 2014). Process management systems like Lean Manufacturing, Six Sigma and Total Quality Management (TQM) allow companies to enhance product quality, reduce defect rates, optimize processes, and deliver products on time.

The enhancements are significant in improving the customer satisfaction, which is widely identified as one of the most important factors leading to customer loyalty, brand reputation and long-term profitability of the organizations (Sreedharan et al., 2018).

In the modern manufacturing landscape, process management has become a key area of research in management because of the increasing focus on customer manufacturing, operational excellence and digitalization. With the rapid global competition and the ever-changing customer expectations, manufacturing companies are continually implementing integrated process management strategies like Lean Manufacturing, Six Sigma, Total Quality Management (TQM) and Business Process Management (BPM) to ensure the enhancement of operational efficiency and maintain the customer satisfaction levels.

These methods enable continuous improvement in processes, eliminating waste, decreasing process variability and improving overall organization performance.

Additionally, the advent of Industry 4.0 technologies has introduced new opportunities for process optimization: Artificial Intelligence (AI), Predictive Analytics, Internet of Things (IoT) technologies and real-time process monitoring have helped companies be more agile, responsive and customer-centric in their operations.

As a result, manufacturing companies are moving beyond the traditional business models of production and focusing on value creation and customer satisfaction, characterized by constant improvement, flexibility and innovation, as the path to a sustainable competitive advantage.

This makes the link between process management and customer satisfaction a significant interdisciplinary research field of Operations Management, Quality Management, Digital Transformation and Strategic Management.

The goal of process management is to improve the consistency of product quality, one of the key ways it improves customer satisfaction. Customers are increasingly demanding products that meet specified requirements, which will also perform as expected over the product's life cycle. Process variability, manufacturing defects and rework are often a consequence of inadequate manufacturing processes, which adversely affect customers' perception of quality and organization's reliability (Topalović, 2015).

On the other hand, a well-functioning process management system will set up routine processes, standardized operating procedures, and a strong quality control system to minimize operational mistakes and ensure uniformity in the production results.

For instance, Six Sigma is used to reduce the process variation and attain near-perfect quality through using the statistical tools to reduce the defects prior to the products reach the customers (Ly et al., 2012). These enhancements help build customer trust and satisfaction, minimize product returns, warranty returns, and quality related operating expenses. This hypothesis was supported by Fraggetta et al. (2021) who found a positive correlation between process capability indices and customer satisfaction, indicating that SPC is crucial for enhancing manufacturing performance.

Process management also plays a key role in ensuring operational efficiency and delivery performance, which are essential for customer satisfaction. Along with high product quality, customers are increasingly considering timely delivery, order fulfilment reliability, and responsiveness to market demands. Process management improves the performance of operations by making the process more efficient, eliminating non-value-added activities (NVA), reducing the use of resources and eliminating bottlenecks (Alzaydi et al., 2016).

Value stream mapping and eliminating waste are two key Lean Manufacturing principles that help organizations streamline processes and focus on value added activities for the customer. These enhancements reduce production lead times, boost manufacturing flexibility and help manufacturers meet customer-specific demands. Process Management practices have also resulted in a shift in manufacturing enterprises to being customer centric as well as helping to make them more efficient.

In comparison with the traditional production system, modern process management not only focuses on the efficiency of internal processes but also takes into consideration customer inputs in the process planning, performance measurement and process improvement activities. By doing this, an organization can achieve customer satisfaction and build a long-term competitive advantage by meeting the changing demands of customers and market demands (Roh et al., 2014).

Moreover, process management instils a mindset of continuous improvement, crucial in dynamic manufacturing settings to ensure continued customer satisfaction. The continuous improvement practices that organizations employ help them adjust to technological change, regulatory requirements, and customer expectations, all of which are changing quickly.

Kaizen focuses on small, incremental changes, involving workers in the process of improvement, solving problems together and making decisions based on data (Lepistö et al., 2024). Recurring process inefficiency identification and elimination before it have an impact on production/service quality means that organizations will not experience operational interruptions and will make their overall customer experience better. This kind of proactive improvement culture benefits the organization's resilience, long-term competitiveness, and building customer trust (Cannon & Edmondson, 2005).

The importance of innovative and continuously enhanced processes in pursuing better customer results is highlighted by systematic reviews available on process management and customer satisfaction in the

manufacturing industries (Goshime, Y., et al., 2019).

Moreover Altinkemer, K., et al. (2011) the pioneers in describing business process reengineering when they introduced their model explaining how the concept of business process reengineering could be applied to dramatically improve operational performance, such as customer satisfaction. Likewise, process variation reduction pioneered by quality gurus like Byaro, M., & Rwezaula, A. (2024) resulted in consistent quality of the products produced which in turn increased percentile trust in products produced. Moreover, empirical studies by (Mohsin, M., et al., 2011) proved the argument that total quality management practices that have a profound grounding in process control and continuous improvement go a long way in boosting customer satisfaction.

Also, research by Dabees, A. et al., (2024) showed that process-based quality initiatives bolster organizational performance and consumer perception. Therefore, it is always emphasized in the literature that efficient management of processes is one of the pillars in the attainment of high customer satisfaction levels in manufacturing industries.

Additionally, modern literature broadens this point of view by combining the introduction of process control with new approaches and technological findings. Indicatively, Lean Manufacturing practices by (Wang, C. N., et al., 2024) signified the practices are effective in optimizing work flow effective in optimizing work flow efficiency and waste reduction in the workflow at Lean Manufacturing, which translates into better delivery performance and customer satisfaction.

Simultaneously, (Silva, A. C., et al., 2024) emphasize that Six Sigma methodologies can be used to enhance the accuracy of the process and reduce the number of defects which will contribute to the development of a strong customer trust. Researchers like (Frank, A. G., et al.,2019) also believe that with the introduction of the industry 4.0, digital technologies will allow real time monitoring of the processes and provide a higher level of responsiveness to customer needs. As a result, the literature suggests that integrating the old process management system with the emerging innovations plays a significant role in driving customer satisfaction within the manufacturing industries.

The aim of the study is to systematically review and critically analyse existing literature on process management practices and their relationship to customer satisfaction in manufacturing industries with particular focus on identification of key methodologies (such as Lean, Six Sigma, TQM and BPM) analysis of their direct and indirect impacts on customer outcomes, and identification of key trends, challenges and research gaps.

The importance of the study is that it was a highly synthesized compilation of data obtained after conducting 65 peer-reviewed articles, which proves that the management of processes has an enormous impact on customer satisfaction due to its improved quality, reduced defect rates, operational efficiency, and punctuality, and offers significant identifiable contribution to the body of knowledge in this field, through pinpointing gaps such as the lack of standardized models of measurement and the lack of longitudinal research, and suggests that, in future research and managerial practice, integrated, customer-centric models of processes should be developed, which then identifies the gaps to be filled through conducting future research and implementing corresponding frameworks.

2. Research Gaps

The systematic literature review exposes various critical research gaps that should be researched upon by academicians. Whereas past research is abundantly rich in studies that explore process management methodologies like Lean, Six Sigma and Total Quality Management, they area comprehensively extensive in nature in studies that delve into the concept of Customer-centric process management frameworks.

In addition to this, there is a significant lack in standardized and unified measurement models that effectively relate process management practices with customer satisfaction outcomes, thus limiting comparability and generalizability across studies. In terms of methods, the use of cross-sectional research designs is largely prevalent in the literature with little use of longitudinal and mixed-method research designs.

Adoption and influence of emerging technologies, such as those in Industry 4.0 are also poorly studied, across various manufacturing environments. These gaps indicate that future studies should develop a comprehensive, standardized, and context-sensitive models that better explicitly relate the practices of process management with the outcome of customer satisfaction.

Contributions of the study

This systematic literature review has many important theoretical, methodological and practical contributions to the body of knowledge on process management and customer satisfaction of manufacturing industries. First,

it provides a synthesis of the fragmented literature on process management that has accumulated over more than 40 years, thereby providing an overall perspective on how process management has developed and how it affects performance measured in customer-oriented terms.

Second, it establishes a comprehensive conceptual framework that integrates process management methodologies, operational excellence, Industry 4.0 technologies, organization and customer satisfaction, and provides a single explanatory model.

Third, using the technique of bibliometric analysis, the study reveals dominant themes, new research trends, knowledge structures, and changing knowledge clusters in the discipline over time.

Fourth, the review points to key methodological gaps such as the absence of a unified measurement model, scarce longitudinal studies and inadequate studies that combine digital transformation with conventional quality management systems. Finally, the study builds on the previous theories on digital technologies by showing how they can be combined with Lean, Six Sigma, TQM, and BPM practices to create sustainable customer value.

Last but not least, the results can serve as a reference for future academic studies and the decision-making process of manufacturing managers in order to enhance the operational performance without compromising customer satisfaction, making this research valuable to further industrial research and development.

Process Management Approaches

Process management is a method for systematically planning, monitoring, controlling and optimizing the processes of an organization in order to improve the efficiency of the processes, the quality of the products and services, the consistency of operations and the satisfaction of the customer. Process management is a critical factor in manufacturing industries to minimize the waste, reduce defects, improve delivery performance and enhance productivity. Multiple process management tools and methods have evolved over the years to assist in operational excellence.

Lean Manufacturing is a philosophy and methodology that aims to eliminate non-value-adding activities and enhance the efficiency of the production flow, including the use of value stream mapping and Kaizen.
Six Sigma focuses on reducing defects in a process and controlling process variations by using statistical tools and the DMAIC (Define–Measure–Analyze–Improve–Control).

Total Quality Management (TQM) encourages continuous improvement through a customer focus, employee involvement, leadership commitment and quality-oriented culture.
Business Process Management (BPM) gives a structured procedure for designing, automating, tracking and improving business processes.

In recent years, Industry 4.0 technologies such as artificial intelligence, automation, IoT and real-time monitoring have become digital enablers to optimize processes and apply customer-centric manufacturing practices.

Customer Satisfaction Models

Customer satisfaction models are theoretical approaches designed to explain the relationship between customer perception, expectations, and satisfaction with the product/service, as well as their impact on customer behavior, including loyalty and retention.

The Expectation-Confirmation Theory (ECT) is one of the most popular models, as it describes that customer satisfaction depends upon the level of agreement with his/her expectations as to the performance of the product or service (Oliver, 1980).

The SERVQUAL model developed by Parasuraman, Zeithaml, and Berry (1988) uses five dimensions to assess the customer satisfaction: reliability, responsiveness, assurance, empathy, and tangibility.
In a similar way, the American Customer Satisfaction Index (ACSI) measures customer satisfaction based on perceived quality, perceived value, and customer expectations (Fornell, et al., 1996).

In manufacturing companies, customer satisfaction can also be measured based on factors like consistency of product quality, defect rates, delivery reliability, complaint management efficiency, and after-sales service.
Modern customer satisfaction systems are embedding process management more and more with digital responsiveness, sustainability and customer feedback mechanisms, establishing a strong connection between process management and the creation of customer value and how well they are managed.

Methodology Used for the Systematic Literature Review

This study uses Systematic Literature Review (SLR) method, which is a method that enables getting a complete, clear and evidence-based synthesis of existing research on the relationship between process management and customer satisfaction in manufacturing industries.

The review is conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, which considers a rigorous and reproducible process for conducting a study selection.

The peer-reviewed publications were retrieved from the Scopus database with predefined search strings dealing with process management, customer satisfaction, Lean Manufacturing, Six Sigma, Total Quality Management (TQM), Business Process Management (BPM), and Industry 4.0. Studies eligible for inclusion were screened through clear inclusion and exclusion criteria, followed by qualitative synthesis and bibliometric analyses of the literature to look for trends, developments, conceptual connections, and new avenues of research in the field.

Results Found from the Systematic Literature Review

The systematic review proves that good process management practices can actually have a significant impact on customer satisfaction, as they can improve the quality of the product, reduce process variability, increase operational efficiency, and ensure reliable delivery performance. The results also show that integrated methods like Lean Manufacturing, Six Sigma, TQM, BPM have significant roles in the operational excellence and the long-term competitiveness of the organization.

Additionally, the adoption of Industry 4.0 tools such as Artificial Intelligence, predictive analytics and real-time process monitoring has enhanced the process optimization capabilities and customer-centric decision-making. In addition, key research gaps are identified, which include the lack of a standardized measurement framework, a lack of longitudinal evidence and a lack of research on the digital transformation of process management, and promising avenues for future research.

Structure of the Remaining Paper

This paper is organized as follows: The research objectives and the theoretical background of process management approaches and models of customer satisfaction are presented in Section 2. The method of the study, which encompassed a review protocol based on the PRISMA approach, study selection process, bibliometric analysis, and conceptual framework is described in Section 3.

The results of the systematic literature review and a summary of the most important themes found in the articles included in the review are presented in Section 4. In section 5, a critical analysis of the literature reviewed is presented, focusing on the key research design patterns and measurement approaches. The results are discussed theoretically, managerially and practically in Section 6.

Finally, the paper summarizes key findings, managerial implications, theoretical implications and social implications, provides limitations of the study, and proposes future research directions in Section 7.

Research Purpose and Objectives

The primary purpose of this review is to summarize and critically analyze studies about process management practices and customer satisfaction in manufacturing (Olayinka et al., 2024). The review has a number of objectives. It will first examine the direct impact of process management on customer satisfaction and how process improvement can positively impact customers (Abbas, 2019; Bhat et al., 2020).

Second, it provides a comparison between Lean, Six Sigma, and Business Process Management (BPM) approaches, outlining their advantages and synergy opportunities (Chiarini and Kumar, 2020; Drohomeretski et al., 2013).

Third, it examines the way digital technologies enhance processes and customer feedback usage, and how digital transformation has changed the manufacturing (Kamble et al., 2019; Sony et al., 2020).

Fourth, it emphasizes the issues that businesses experience in adopting such systems, including the lack of resources, change resistance, and measurement problems (Albliwi et al., 2014; Antony et al., 2017). Lastly, it outlines the gaps in the existing literature and recommends further research to enhance theory and practice on the relationship between process management and customer satisfaction (Aquilani et al., 2017).

This systematic literature review aims at critically reviewing and synthesizing the existing body of literature

between process management practices and customer satisfaction in manufacturing industries. The goal of the review is to determine ways in which key process management practices like Lean Manufacturing, Six Sigma, Total Quality Management (TQM), and Business Process Management (BPM) enhance operational performance and customer results.

The other key objective is to understand how process management impacts on customer satisfaction, both directly and indirectly, for example, through improving the quality of the product, reducing defect, improving process efficiency, making processes more reliable, being able to innovate, and being able to respond to customer needs.

The review is also aimed at identifying similarities and differences among the different process management techniques, and the effectiveness of the techniques in different manufacturing scenarios.

Furthermore, the role of Industry 4.0 technologies, Artificial Intelligence, automation and digital monitoring systems in the process management capabilities and customer-oriented performance will be analyzed. In addition, the review attempts to identify those organizational or management issues which influence the effectiveness of process management systems such as organizational culture, leadership commitment, employee involvement and availability of resources.

Finally, the study aims to uncover the main gaps in the existing theory, method, and empirical studies, including the absence of a common measurement model, lack of longitudinal studies, and absence of integrated frameworks from customer's viewpoints for future academic studies and managerial practice.

3. Methodology

Systematic Literature Review (SLR) is used as a methodology in this study to obtain the analysis between process management and customer satisfaction in manufacturing industry, which is structured, transparent and complete. The review is carried out according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines in order to respect a good methodological procedure and to have a systematic selection of relevant studies.

Literature on the review was mainly taken from the Scopus database by selecting the keywords related to process management, customer satisfaction, Lean Manufacturing, Six Sigma, TQM, BPM, and Industry 4.0. The publications searched were from 1982 to 2026. Only literature published in English in peer-reviewed journals concerning manufacturing industries was included, and any duplicate, conference abstract with no paper, inaccessible records and non-manufacturing studies were excluded.

A total of 65 articles were chosen, following a systematic screening and eligibility assessment process, for detailed qualitative synthesis and bibliometric analysis. Additionally, bibliometric methods like keyword co-occurrence analysis, word cloud analysis, co-word networks, trend topic analysis, and thematic mapping were used to uncover the predominant themes in the literature, conceptual relationships, and emerging trends.

This research is based on systematic literature review to offer clear and comprehensive overview. The searches were made in the Scopus database and created during the period 1982-2026. Out of 182 articles found, 65 were chosen for analysis. This research were analyzed to identify frameworks, research designs, key findings and gaps to process management and customer satisfaction in manufacturing.

The aim of this study is well achieved using a Systematic Literature Review methodology as it allows to synthesize a large amount of literature on process management and customer satisfaction in a comprehensive and unbiased way. The topic involves several theoretical perspectives, working practices and technological advances, so an SLR offers a structured approach for synthesizing results from various studies and uncovering themes and patterns and ensuring that research gaps are identified.

Adopting the PRISMA framework increases transparency, replicability and methodological reliability of the selection and evaluation of studies. Moreover, bibliometric analysis can be used to supplement systematic review as it gives quantitative information regarding publication trends, dominant keywords, evolution of the themes and intellectual structure of the research field. The mixed methodology is especially useful to analyze the changes in process management practices, to evaluate their effect on customer satisfaction and to discover research opportunities in manufacturing industries.

To develop the list of the existing processes of customer satisfaction management in manufacturing, the study has used a wide-ranging search strategy (Buer et al., 2018). It used the search in the Scopus database (deep and

regular search functions) (Calvo-Mora et al., 2013). The results were refined using the help of Boolean operators. The key search terms were process management + customer satisfaction (Chakraborty and Tan, 2007).

In order to be as methodologically rigorous as possible, inclusion criteria were limited to peer-reviewed articles published since 1982 and since 2026, in English, and dealing with empirical studies in manufacturing industries (Cherrafi et al., 2016).

The exclusion criteria had removed simply theoretical contributions, non-manufacturing studies (except comparable), abstracts of conferences without full articles and duplicates across databases.
Following this screening process in which inclusion and exclusion criteria were used, 65 studies were chosen to undergo in-depth analysis (Dahlgaard-Park, 2011). Every study was considered regarding its method, results and practical implications.

Scopus was the chosen database as it is one of the world's largest and most comprehensive multidisciplinary citation databases covering high-quality peer-reviewed journals, conference proceedings, books, and review article literature from engineering, operations management, manufacturing, business and management areas. The outstanding features of Scopus are the reliable citation indexing, standardized bibliographic information, and compatibility with bibliometric software like Biblioshiny and VOSviewer, making it ideal for systematic literature searches and bibliometric analyses.

The chosen time period of 1982-2026 includes all the history of process management research, beginning from the early 1980's, when the concept of the modern quality management philosophies of Business Process Management and Total quality Management emerged. The review period will be prolonged up to 2026, to allow for the incorporation of the latest developments in Lean Manufacturing, Six Sigma, Industry 4.0, Artificial Intelligence, digital transformation and customer centric manufacturing. The extensive time span allows for analysis of publication trends over the entire period, changes in theme and evolution of concepts in the more distant past, and the identification of emerging research trends in more than 40 years of growth in the field.

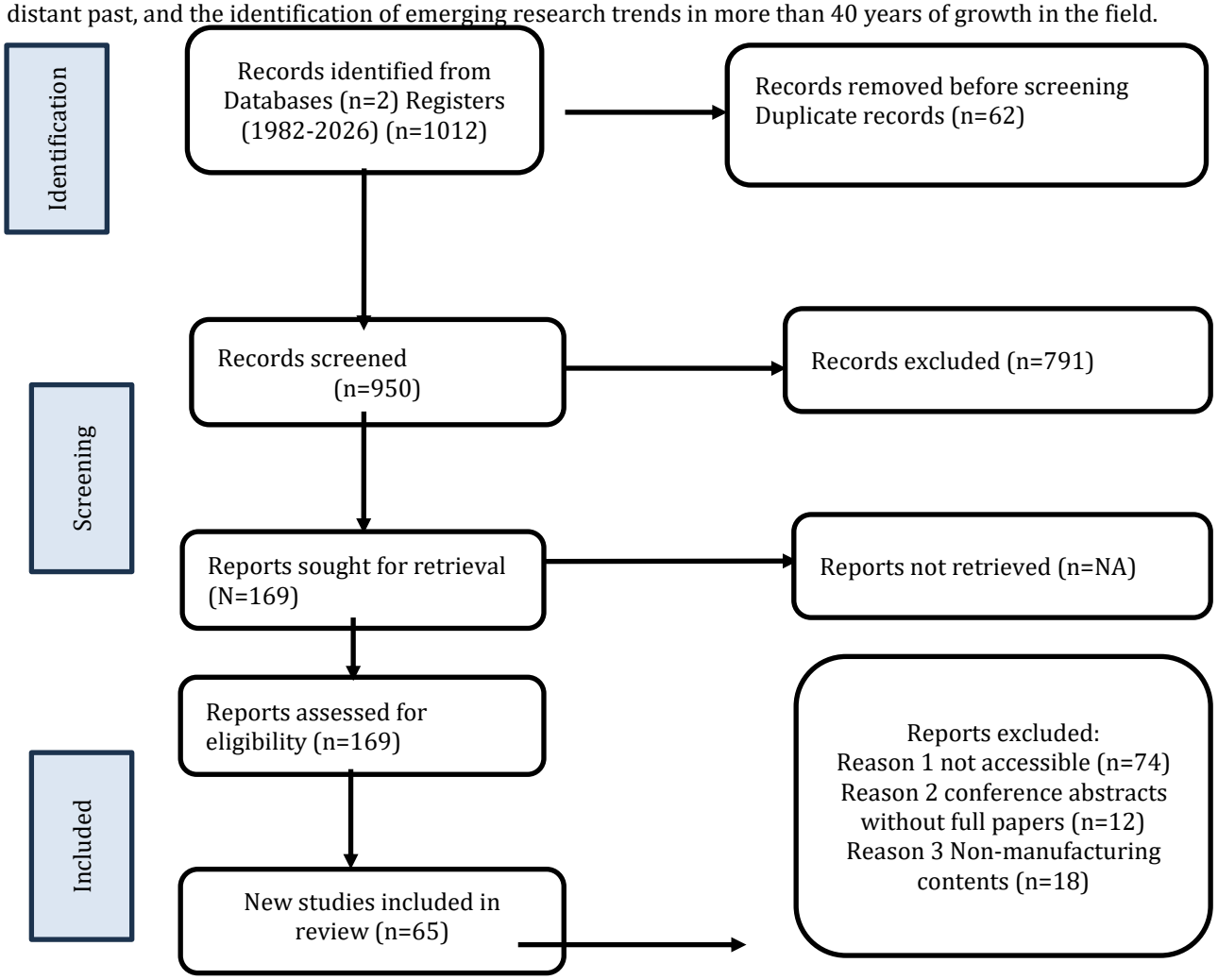


Figure 1: PRISMA Framework

Source: Authors own compilation

The selection of the studies will be discussed with this PRISMA framework to form a systematic review. Firstly, in databases and registers, the number of records (1012) is identified and 62 duplicates are excluded, leaving 950 records to screen.

Through the screening stage, relevant records are filtered out, and 169 records are desired to be accessed; all 169 are evaluated and then there are 12 conferences abstract without full papers and 18 non-manufacturing-related contents. Finally, the 65 articles that meet all the inclusion criteria are available for the final review, illustrating the systematic screening and eligibility process that led to a science base that narrowed down.

Table 1: Inclusion and exclusion criteria

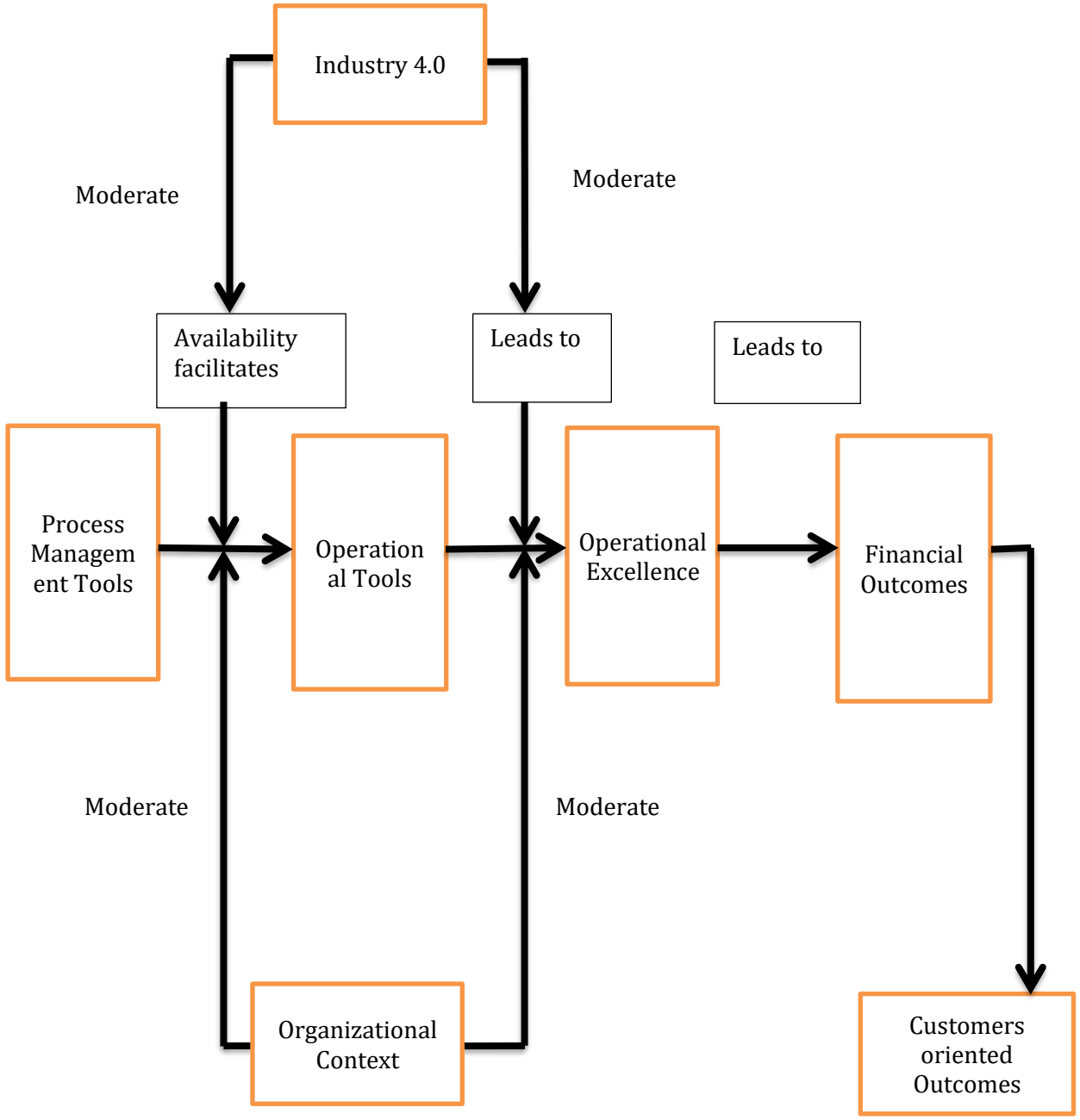
Criteria Type	Inclusion Criteria	Exclusion Criteria
Database	Records identified from databases/registers (n = 1012)	Duplicate records removed before screening (n = 62)
Screening (Title/Abstract)	Records screened (n = 950)	Records excluded during screening (n = 791)
Retrieval	Reports sought for retrieval (n = 169)	Reports not retrieved (n = NA)
Eligibility Assessment	Reports assessed for eligibility (n = 169)	Reports excluded (n = 104): • Not accessible (n = 74) • Conference abstracts without full papers (n = 12) • Non-manufacturing contents (n = 18)
Final Selection	New studies included in review (n = 65)	Records not meeting eligibility criteria after full-text review

Source: PRISMA

The process of the selection of studies has been carried out with a rigorous and systematic approach; it has been done in line with PRISMA guidelines. A total of 1,012 records were obtained from a number of databases and registers at first. Of the 950 studies after removing duplicate records, 950 were screened for title and abstract. At these stage 791 records were discarded due to not being relevant to the criteria set, and 169 reports were included for full text retrieval and eligibility assessment.

All 169 reports were carefully evaluated and 104 were rejected, for a variety of reasons, such as the report being inaccessible (74 studies), conference abstracts with no full papers (12 studies), and reports not relevant to the manufacturing sector (18 studies). A total of 65 studies were selected after a thorough screening and eligibility process for the systematic review. The structured selection process meant that only high-quality studies, accessible and contextually relevant studies were included which improved the reliability, validity and robustness of the findings of the review.

Conceptual Framework



In this study, the conceptual framework comprehensively explained that the impact of process management practice on customer satisfaction in manufacturing organizations in terms of operational excellence, technological advancement and organizational capabilities was integrated into one framework. Process management tools like Lean Manufacturing, Six Sigma, Total Quality Management (TQM), Business Process Management (BPM) and continuous improvement methods are the key strategic resources in the improvement of manufacturing processes, according to the framework.

These practices contribute to the implementation of operational tools like process standardization, quality assurance systems, workflow optimization, waste elimination and statistical quality control and performance monitoring.

These tools of the trade successfully used then contributes to the operational excellence which translates to better productivity, processes less variation, less defects, product delivery on time, resource utilization, and less processes variability.

Operational excellence is then manifested in the organizational outcomes of product quality, cost effectiveness, flexibility, potential for innovation, and or competitive advantage that result in the customer outcomes which are customer satisfaction, customer trust, customer loyalty, customer perceived value, repeat purchase intent, and long-term customer relationship development.

Moreover, the framework features Industry 4.0 technologies like Artificial Intelligence, Internet of Things (IoT), big data analytics, predictive maintenance, cloud computing, digital twins and real-time monitoring, which will further improve process management efficiency, enabling intelligent automation, data-driven decision making, predictive quality control and rapid response to customer requirements. Similarly, organizational context (e.g. leadership commitment, employee involvement, organizational culture, technological readiness, resources availability, capability in change management) will moderate the success of process improvement efforts.

The dynamics of these technological, managerial and organisational elements show that sustainable satisfaction with the customer is not only the consequence of individual quality activities, but also of the integration of process management elements facilitated by implementation of digital transformation and organisational readiness, and the whole roadmap for operation excellence and manufacturing competitiveness over time.

Bibliometric Analysis:
This report is a summary of a bibliometric research based on Scopus dataset on process management and customer satisfaction. It consists of written descriptions and visual network diagrams (Tree Map, Most Frequent Words, Word Cloud, Co-word and Keyword Co-occurrence).

Bibliometric Overview
The bibliometric dataset is the year 1982-[Year of data collection, e.g., 2022] and includes 182 publications published in 75 sources. The rate of growth in the literature is 1.59 per annum and it implies that there is a steady interest in the scholarship in the domain. The publications included 472 authors, and the percentage of single-authored papers is very low (26), contributing to a high research collaboration tendency.

It is further supported by the rate of international co-authorship of 22.53 percent and 2.95 on average co-authors per document.

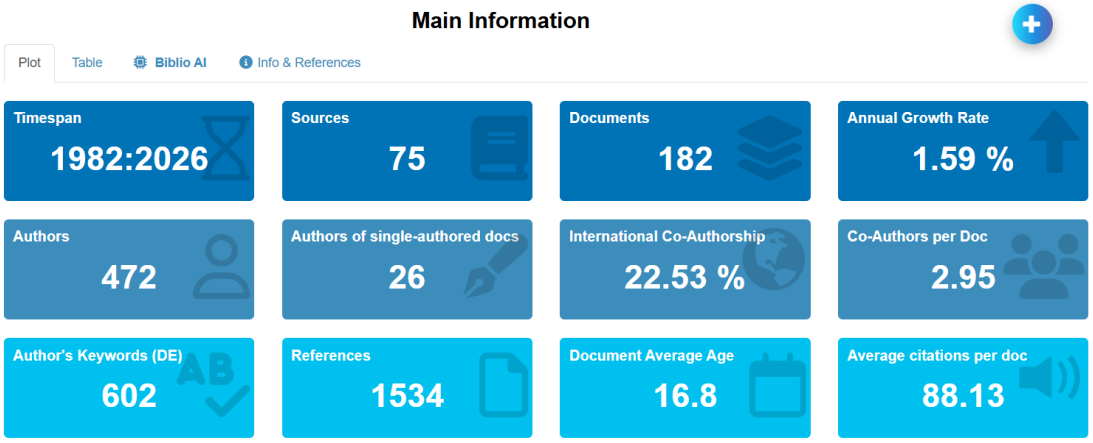


Figure 2: Main Information of the Timespan

Source: Biblioshiny
To continue on this subject, Figure 3 Main Information of the Timespan, clarifies all the details on the topic, Source: Biblioshiny.

Regarding knowledge structure, there are 602 author keys, and the dataset is backed up with 1,534 references, which suggests a notable thematical level and is highly rooted in the previous research. The mean of the document age (16.8 years) indicates quite a young and developing literature, and the mean citation (88.13 citations/document) reflects the high impact of the research.

Tree Map
Customer satisfaction is represented as the most powerful keyword (7%), which reflects a good customer-centric research background. Then there are process improvements (6%), process engineering and management (4%), indicating growing attention paid to environmentally friendly and innovative practices.

Keywords related to manufacturing, quality control, competition, quality management and total quality management (≈3% each) highlight the incorporation of management and operations.

The appearance of new themes like Industry 4.0, digital transformation, big data, and e-commerce is to be taken as the evidence of the increase in the digitalization of the literature. On balance, the distribution implies a multidisciplinary research environment focused on the results of the customers, process engineering, and process management.

Figure 3: Tree Map

Source: Biblioshiny

Most Frequent Words

The presented analysis of the most appropriate keywords suggests that the most dominant is the term customer satisfaction as it illustrates the central position in libraries. Environmentally friendly practices and innovation follow this, and emphasis on sound research focus to such sustainable and innovative practices is high.

Such keywords like supply chain management, artificial intelligence, service quality, and performance are moderately relevant; that is, the operational, technological, and service-related aspects have the equal number of attentions. All in all, the keyword distribution validates the emphasis of multidisciplinary research, with customer-centric outcomes as its core of the research.

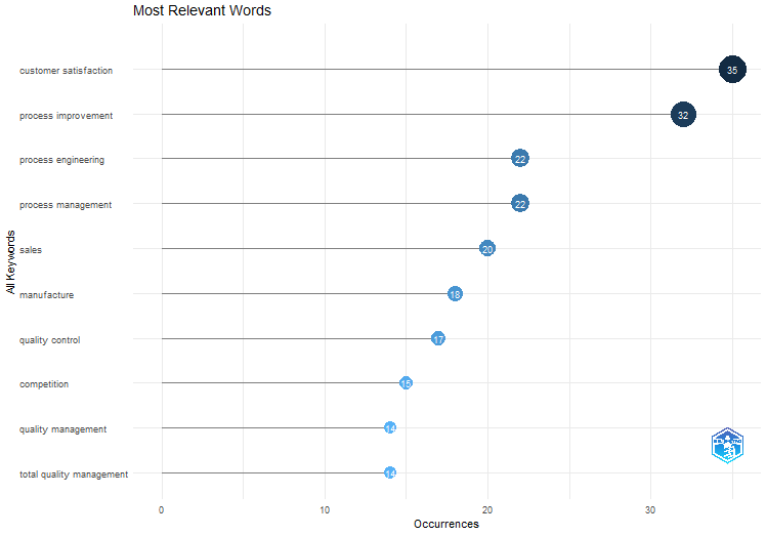


Figure 4: Most Relevant Words

Source: Biblioshiny

Word Cloud

Figure 5: Word Cloud

Source: Biblioshiny

As can be seen with this word cloud, customer satisfaction is the major goal of manufacturing and business activities. Improvement of processes, engineering and management are significant towards attainment of better performance. Quality control, manufacturing, and supply chain management are also highlighted in the image to help ensure that the products and services delivered are reliable. Generally, it indicates that business can only be effective with continuous improvement and good management.

Trend Topics

This chart illustrates the way that various manufacturing and management topics have gained popularity as time went on by. The circles indicate the time when a topic became significant, and larger circles indicate that the topic was more frequently discussed. Previously years were more concerned with quality assurance, industrial management and operations research.

Over time, emphasis was put on the improvement of processes, customer satisfaction, project management and supply chain management. Machine learning, data processing and advanced manufacturing planning are other issues that have received increased attention in the recent past. In general, the sphere of business and manufacturing investigations has turned into the sphere of some primitive quality regulation to the development of new technologies and the high-level decision-making.

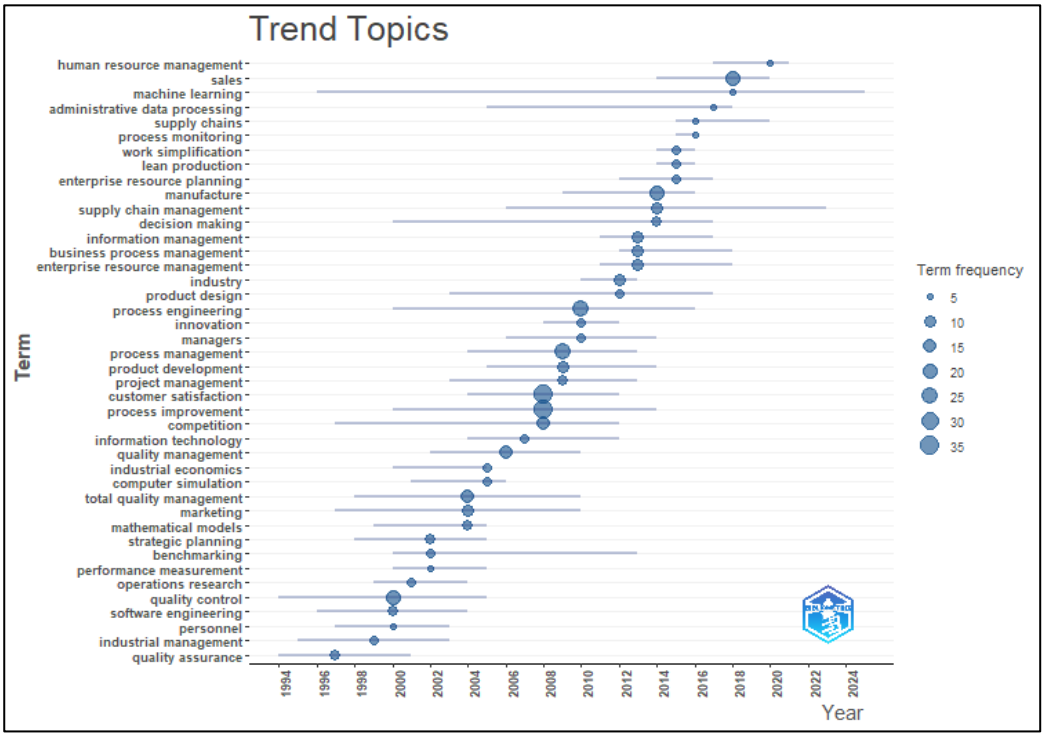


Figure 6: Trend Topics

Source: Biblioshiny

Co-word Net

The image depicts the interconnection of various business and manufacturing issues. The more general, central, terms such as customer satisfaction, process improvement and quality control are the primary areas of focus and suggest that numerous other issues rely upon them.

The coloured clusters spares depict various groups of associated activities. As an illustration, there are groups devoted to process engineering and sales, quality management and total quality management, and even competition, strategy, manufacturing, and information management.

As a whole, the diagram indicates that customer satisfaction is in the centre and there are numerous areas that collaborate to generate it, including: quality management, process improvement, and manufacturing.

Figure 7: Co-word Net

Source: Biblioshiny

Keyword Co-Occurrences

The term co-occurrence network indicates the way in which various keywords employed in research are interrelated. Every set of linked words reflects an area of topic to which researchers concentrate on. The diagram indicates the subject of process improvement and customer satisfaction have been the central ones and there are numerous other subjects connected to these two subjects.

Some other crucial disciplines are process engineering, supply chain management, manufacturing, total quality management, and information management. The clusters of colours show that these subjects constitute separate sets of similar studies but are linked to each other.

In entirety, the image implies that making sure that processes, quality and supply chains management are effective are some of the roles of ensuring that organisations can perform better and have more customer satisfaction.

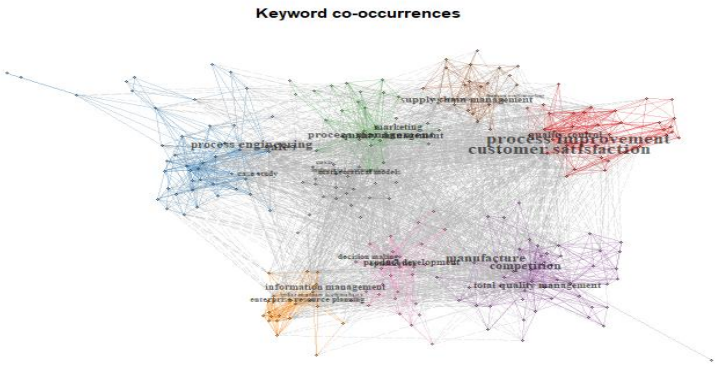


Figure 8: Keyword co-occurrence

Source: Biblioshiny

4. Results

Various powerful conceptual models serve as the foundation of the literature on process management and customer fulfilment in the manufacturing industry and are supported by numerous empirical pieces of evidence (Bajjou, M. S., & Chafi, A. 2025). Business Process Orientation (BPO) framework is a framework that makes organisations function more as networks of cross-linked processes rather than functional silos, through cross-functional process perspectives, process ownership, systematic monitoring and customer-oriented alignment (Berradi, A. et al.,2023).

Research indicates continuously that the further BPO maturity, the greater the customer-oriented performance results. In much the same way, the Total Quality Management (TQM) theory identifies soft components like leadership commitment, employee involvement, Customer focus and supplier relationships as opposed to hard components which include statistical process control, quality appraisal systems, problem-solving tools and process standardisation (Cavallone, M., & Palumbo, R. 2022).

Both dimensions align to satisfaction of customers, but the soft elements can tend to be much predictive (Ghazali, E. M., et al.,2025). It is based on these, that the so-called Lean Six Sigma integration model has been developed to incorporate the Lean approach of waste reduction, flow optimization, and value stream mapping with variant reduction, defect elimination, and statistic discipline of the Six Sigma approach (Gomaa, A. H. 2026). This combination brings complementary advantages of speed (Lean) and quality (Six Sigma), leading to customer value enhancement, especially in manufacturing situations where performance and reliability are especially valued (Sim, C. L., et al.,2024).

Integrating the results of studies, process management practices demonstrate consistent direct impacts on customer satisfaction in terms of quality improvement, quicker and more reliable delivery services, effective processing of complaints and high quality of services (Handoyo, S., & Anas, S. 2024).

Mediating mechanisms further explain these impacts including enhanced product and service quality, process efficiency, employee satisfaction, and innovation capability, which all form a platform of long-run customer value-generation. These relationships are supported by empirical data: The implementation of TQM has been determined to increase the customer satisfaction indices (e.g., 76 to 106 in Indian tractor manufacturing), revenue, and market share (Ali AlShehail, O., et al.,2022; Tetteh, F. K., et al.,2025).

In plastics manufacturing the use of six sigma projects has led to reduced rejection rates, higher levels of sigma, and reduced customer complaints by approximately one-fifth (Abd Elnaby, Z., et al.,2024); (Tsarouhas, P., & Sidiropoulou, N. 2024), and Lean programs have delivered realized gains in process cycle efficiency, waste reduction, cost savings and responsiveness (Kumar, N., et al.,2022) specific results also point out sector-specific being customer satisfaction being heavily reliant on product reliability, warranty performance, supplier quality management, and in automotive manufacturing, Lean systems lead to significant process improvements (Ghadiri Khorzoughi, N., et al.,2026), in electronics and technology manufacturing, rapid product development, customization, and process agility are pivotal to customer expectations and in process industries

Methodologically, the literature is based on cross-sectional surveys due to their large sample sizes and statistical generalizability through their approaches like factor analysis and structural equation modelling, but they cannot be used to get causal inferences because they are a snapshot survey (Rane, S. B., et al.,2025). The case study research presents a rich context and detail of implementation, which can take the form of before-and-after comparisons or tracking of the implementation process, but generalizability is limited (Branch-Elliman, W., et al.,2022).

Although comparatively uncommon, longitudinal studies are gaining popularity due to their capability to capture temporal variations as well as make stronger causation inferences even though they present difficulties of resource-intensity and dropout amongst the participants (Jamaluddin, J., et al.,2026). When considering measurement methods, process management can be evaluated in variety of tools: BPO scales, TQM maturity models, Lean/Six Sigma implementation measures, and ISO certification scales but all of this is different in terms of development and standardisation (Sá, J. C., et al.,2022). In comparison, customer satisfaction measurement is older with the use of indices, surveys, Net Promoter Scores (NPS), complaint and retention rates, and dimensions of quality of service namely SERVQUA.

The conscience of high customer satisfaction measures with disaggregated process management measurements demonstrates the necessity of a more rigorous methodological correspondence in order to facilitate stricter inter-study comparisons and meta-analytic integration.

Almost all the studies showed significant correlation between process management and customer satisfaction, primarily in the form of better product quality, less defects and quicker responsiveness to customer requirements (Elhoushy, S., et al.,2026; Permatasari, W., et al.,2025).

5. Critical Analysis

Research Design Patterns

In process management and customer happiness literature reporting in manufacturing industries, three prevailing patterns of research design seem to exist (Prajogo & Sohal, 2004). The most common one is cross-sectional surveys which have the benefit of using large sample sizes and have a statistically generalizable result (Rungtusanatham et al., 1998).

To test hypothesised relationships these studies generally utilise methods like the factor analysis and structural equation modelling (Anderson and Gerbing, 1988). But their snap shot nature precludes a causal inference since they only record associations at one time without considering the dynamics of time (Rindfleisch et al., 2008).

The second is case study research which gives a contextual knowledge in detail of how the practices, process management, are applied (Eisenhardt, 1989). Before-and-after comparisons or follow DMAIC (Define-Measure-Analyse-Improve-Control) projects are actively used in case studies as a method to demonstrate practical results. Although these research projects are excellent at revealing the details of the organisational processes and barriers, their conclusions are limited by a low level of generalisability and the possibility of researcher or company bias (Stuart et al., 2002).

A more limited yet increasingly developing literature employs longitudinal methods which are particularly valuable in making out cause-and-effect conclusions and in analysing temporal trends (Pettigrew, 1990). Longitudinal research studies enable a more insightful approach to the long-term viability and the long-lasting impacts than tracking the maturity change in process management and customer happiness over time (Ven and Huber, 1990). However, they are expensive and challenging, associated with loss of participants. The fact that they are relatively scarce is indicative of a big opportunity to enable future research to reinforce causal arguments and to meet the changing expectations of their customers (Langley, 1999).

The review affirms that the process management and invariably enhance customer satisfaction by minimizing variability and concentrating on quality (Dean and Bowen, 1994). The extent of improvement, however, lies on the effectiveness of the organisations in handling people, technology and culture (Hackman and Wageman, 1995; Sitkin et al., 1994).

6. Measurement Approaches

In measurement, the literature applies a broad range of measurement tools in measuring the process management practices as well as the customer satisfaction outcomes (Ahire et al., 1996). The assessment of the process management is usually operationalised using the Business Process Orientation scales, Total Quality Management (TQM) maturity and Lean and Six Sigma implementation measures, ISO certification and audit scores (Dow et al., 1999); (Curkovic et al., 2000)). These scales differ in terms of development and standardisation which reflects the disjointedness of process management appraisal between the research (Douglas and Judge, 2001).

Conversely, customer satisfaction measurement is more developed and normalised. Some of these methods consist of customer satisfaction indexes and questionnaires, Net Promoter Score (NPS) measurements, customer complain rates and retention, and the service quality scales, including SERVQUAL (Anderson et al., 1994; Cronin and Taylor, 1992). These tools identify both the perception-based and behavioural measures of satisfaction, which allow the researchers to employ both the customer perceptions and the actual performance results (Fornell et al., 1996).

Nevertheless, the incompatibility of the process management and customer satisfaction measurement models still hampers direct comparisons and meta-analytic synthesis, indicating a necessity to have more integrated and standardised methods of assessment.

7. Discussion

Customer satisfaction is directly enhanced by effective process management. Industry 4.0 and digitalisation technologies add value to these outcomes but are hard on SMEs with limited resources and skills (Muller et al., 2018). One of the success factors is leadership and employee engagement (Waldman, 1994).

Conceptual Consequences

The resultant interpretation of results supports the conceptual assumption that process management techniques like Lean, Six Sigma, and their combination (Lean Six Sigma) significantly help patients become more satisfied with their products due to quality improvement, wastage reduction, and efficiency-enhancing processes. This confirms the current continuous improvement theories and quality management models (Gomaa, 2023), pitting the functions of digital work tools and customer feedback systems on the processes management effectiveness, being theoretically justified, and emphasizes the role of data-driven decision-making and real-time monitoring of performance in achieving high customer outcomes (Djordjevic et al., 2022).

The process ownership/continuous process improvement as two dimensions of business process orientation are theoretically proven to have a joint contribution to the performance of organisations and customer satisfaction, thus expanding the knowledge on the strategic contribution of process management. The data also dispel the idea that lean and Six Sigma concepts are only applicable to big businesses or advanced economies due to its productive adaptation and excellent performance among small businesses and in developing markets and extend the theoretical applicability of the proposed methodologies (Inuwa, 2023).

The Total Quality Management (TQM) as a theory of foundation is strengthened, and in this connection, creativity and continuous improvement are essential drivers, and purchaser satisfaction is an essential outcome (Anil and Satish, 2017; Nehme et al., 2024). The literatures synthesis enhances the conceptual comprehension regarding process management, by highlighting the mutually supportive character of the different approaches (e.g., Lean, Six Sigma, Kaizen).

Results underline the importance of customer satisfaction as a factor influencing the organisational performance and value of the customer-oriented approaches based on the Total Quality Management (TQM) and the Lean Six Sigma practices (Anil and Satish, 2019; Antony et al., 2017).

The prevalence of sustainability, innovation, and supply chain management as overarching themes indicates that managers ought to endeavour to integrate sustainability-driven and innovative practices in the operations and strategic management in an attempt to enhance long-term competitive advantage and capacity (Abbas, 2020; Cherrafi et al., 2016). Moreover, there is a growing role of artificial intelligence, digital transformation, and Industry 4.0, which points to the fact that digital technologies are crucial in enhancing the performance of organisations. In terms of social aspects, due to the high emphasis on customer satisfaction and the quality of services, the expectation levels toward transparency, reliability, and value in products and services are increasing (Cronin and Taylor, 1992; Fornell et al., 1996).

Companies implementing sound quality management initiatives make significant investments in customer confidence and enhanced social well-being (Anderson et al., 1994; Hackman and Wageman, 1995). The growing interest in sustainability, the green economy, and environment performance highlight the social responsibility of organisations to safeguard the environment and save resources (Garza-Reyes, 2015; Cherrafi et al., 2016). A management of operational and supply chain practices that incorporates sustainability can lead to waste minimization, emissions reduction, and equitable sourcing, which will benefit the whole society (Abbas, 2020).
Lastly, the global convergence in quality and environmental protection, as evidenced in the literature, is through international collaboration.

This kind of cooperation helps to spread knowledge across borders so that emerging economic centres could obtain effective administrative models and could lead to a just and sustainable evolution of industry (Buer et al., 2018; Frank et al., 2019).

Juxtaposition of the Conceptual Framework with the Systematic Literature Review Findings

The conceptual framework presented in this review has been created taking into account the synthesis of the evidence gathered from the selected studies and is therefore the most prevalent relations found in the literature. The framework is a comprehensive explanatory model that combines process management practices, operational tools, operational excellence, organizational outcomes, customer-oriented outcomes, Industry 4.0 technologies, and organizational context.

The systematic review in this study shows that most of the empirical studies have consistently confirmed that process management practices have a positive impact on operational excellence, which in turn improves customer satisfaction. This indicates that process management is the main strategic capability that ensures manufacturing organisations enhance their operational performance and deliver superior value to their customers.
In addition, the review finds that there are some direct dependencies that have been intensively studied in the literature. The correlations between process management practices such as Lean Manufacturing, Six Sigma,

Total Quality Management (TQM), and Business Process Management (BPM) and operational excellence are the strongest and most consistent.

A great deal of research has been performed that has shown enhancements in product quality, process standardization, defect reduction, elimination of waste, production flexibility, and delivery reliability after implementing these process management techniques. Similarly, operational excellence has been recognised to be having a direct antecedence of customer satisfaction due to product quality, delivery time, minimisation of customer complaints and service reliability. Detailed relationships between process management and customer satisfaction were also consistently and repeatedly found in all manufacturing industries, showing that companies with structured quality management have consistently higher customer satisfaction.

In addition to these direct linkages, there is another extensive body of literature on the role of mediating factors in process management on customer satisfaction. Operational excellence was the most common mediator between process management practices and customer-oriented outcomes. These operational improvements – related to operational efficiency, product quality, process reliability, delivery, innovation capability, and resource utilization – all contribute to the ultimate measure of customer satisfaction: process management.

Some studies have also shown that the intermediate mechanisms through which Lean Manufacturing and Six Sigma increases customer trust, customer loyalty, and long-term organisation competitiveness are improved product quality and reduced process variability. The results indicate that the satisfaction of customers is not only the result of the process management, but also the result of the gradual improvement on the operational performance.

The review also identifies a number of moderation variables that affect the strength of these relationships. Leadership commitment, employee involvement, organizational culture, technological readiness, resource availability, and change management capability are among the many organizational factors that have been reported as important factors in the successful implementation of process management initiatives.

Organizations with supportive leadership, quality culture, qualified employees, and technological infrastructure continuously show better relationships between the implementation of process management and customer satisfaction than organizations without such organizational abilities. Over the last few years, Industry 4.0 technologies, such as Artificial Intelligence, Internet of Things (IoT), predictive analytics, cloud computing, digital twins, real-time monitoring systems, have been looked upon in greater detail as technological moderators to enhance process optimization and customer-oriented decision-making.

While there are many studies that show direct link between process management and customer satisfaction, relatively few studies have investigated integrated models that combine both intervening and moderating processes. The majority of empirical studies are on individual relationships, not examining the combined effect of organizational context, operational excellence and Industry 4.0 technologies on customer-oriented outcomes. In addition, the review shows that there are few longitudinal studies that can confirm cause-and-effect relationships over time. There are also no standard frameworks for measuring, making it difficult to compare across studies and difficult to build up a body of knowledge in this area.

Overall, in the conceptual framework developed in this study, there were good consistency, high level of support from the literature, and the integration of the main relationships reported by previous researchers in a complete model. Meanwhile, the framework identifies some under-researched avenues for further research, such as the joint mediating influence of operational excellence and the moderating influence of the organizational context and Industry 4.0 technologies. Thus, the proposed framework will not only give an overview of the present knowledge but will also be a theoretical guideline for empirical studies in the field of process management and customer satisfaction in manufacturing industry.

Table 2: Juxtaposition of the Conceptual Framework with Existing Literature

Proposed Relationship in the Conceptual Framework	Evidence from Existing Literature	Status
Process Management → Operational Excellence	Extensively supported through Lean Manufacturing, Six Sigma, TQM and BPM studies	Strongly Supported
Operational Excellence → Customer Satisfaction	Strong evidence through improvements in quality, reliability, delivery performance and efficiency	Strongly Supported
Process Management → Customer Satisfaction	Direct positive relationship confirmed across manufacturing industries	Strongly Supported
Process Management →	Operational excellence consistently functions as a	Frequently

Operational Excellence → Customer Satisfaction	mediator between process management and customer satisfaction	Reported Mediation
Product Quality → Customer Satisfaction	Product quality identified as one of the strongest mediating mechanisms	Frequently Reported Mediation
Process Efficiency → Customer Satisfaction	Process efficiency improves delivery reliability and customer experience	Frequently Reported Mediation
Industry 4.0 → Process Management Effectiveness	AI, IoT, predictive analytics and digital technologies improve process optimization	Moderately Supported
Organizational Context moderates Process Management → Customer Satisfaction	Leadership, organizational culture, employee involvement and technological readiness influence implementation success	Moderately Supported
Financial Outcomes resulting from Operational Excellence	Cost reduction and profitability reported but comparatively fewer empirical studies directly link them with customer satisfaction	Limited Evidence
Integrated mediation and moderation models	Very limited evidence; identified as an important future research direction	Research Gap

Source: Authors' synthesis based on the systematic literature review

8. Conclusion

The study concludes that process management is a key driver of customer satisfaction within the manufacturing industry, but it is through the ability to control the quality of the product, its consistency, operational efficiency, and timely delivery. With the help of digital technologies and continuous improvement practices, such as Lean, Six Sigma and TQM (in particular BPM), the number of defects will keep decreasing, workflows will get streamlined, and customers' trust will grow over time. However, the organizational issues (e.g. leadership, resources, cultural preparedness) are very significant in the implementation of these strategies and the resistance to change and lack in uptake by the SMEs is still a challenge.

The significant study identifies include lack of integrated frameworks, standardized methods of measuring and these points need to develop more comprehensive and customer-focused approaches to process management, in subsequent study and practice.

Managerial Implications

This review offers some key management implications for manufacturing companies. Managers need to understand that process management can be about more than just operational efficiency; it can be a strategic initiative to improve customer satisfaction, organization competitiveness and sustainability. BPM, Six Sigma, TQM and Lean Manufacturing practices should be taken together in manufacturing companies to assist in improving the quality of the product, lowering the variability of the process, and reducing the waste in the process.

Digital transformation technologies like automation, predictive analytics, AI, and real-time monitoring systems are critical investments for organizations to make in order to enhance their responsiveness and decision-making capabilities.

Moreover, for successful implementation, one needs to have a strong commitment from leadership, participation of employees, continuous training, and the creation of an organizational culture that is quality oriented. Managers should also develop mechanisms for obtaining customer feedback and measuring customer performance in order to continually track customer expectations and results. The study also emphasises the importance of strategic and technological assistance to SMEs to help them successfully take process management initiatives.

Theoretical Implications

The study holds significant theoretical value, as it combines important concepts from quality management, operations management, process management, customer satisfaction and digital transformation in a coherent and unified framework, based on existing theories in these areas.

The review is a confirmation of the theoretical lines on which Total Quality Management (TQM), Lean Manufacturing, Six Sigma, Business Process Management and Business Process Orientation are founded, which means that they are not mutually exclusive in improving the value creation for customers. Moreover, the results validate the Resource Based View and Dynamic Capabilities Theory, showing that a combination of

organizational resources, technological skills, leadership involvement and continuous improvement can create Sustainable Competitive Advantage for the organization.

The embedding of Industry 4.0 technologies brings a modern theoretical perspective on how digital innovation empowers existing process management systems with intelligent automation, predictive analytic and real-time decision-making. In general, the research contributes to theory development by suggesting an integrated view which posits that customer satisfaction is the result of orchestrated actions between managerial practices, technological innovations, organizational context, and operational excellence.

Social Implications

The results of this review have significant social implications as it has been concluded that process management is not only about the efficiency of an organization, but it also has social benefits that include the quality of the products, protection of consumers, sustainability, and responsible manufacturing. Structured quality management systems are more likely to deliver reliable, safe and high-quality products, and build consumer confidence and public trust in the organization.

The introduction of Industry 4.0 technologies also helps to foster transparency, traceability and accountability across manufacturing processes, allowing them to better meet customer expectations and reduce production errors and environmental waste. Further, process optimisation is a key element of sustainable resource use, energy saving, emissions reduction and sustainable manufacturing that help achieve global sustainability goals. The focus on continuous improvement also promotes employee development, teamwork, and learning, which boosts employee engagement and job satisfaction.

As a result, the introduction of customer-oriented process management practices is not only a key component of economic growth but also of sustainable industrial development and improved social welfare.

9. Limitations

Although the study was comprehensive, there are some shortcomings that should be noted. The review is limited to peer-reviewed and published literature in English only, indexed in Scopus database and does not include literature that may not have been indexed in Scopus database or published in other languages. Using secondary data reduces the power to determine causality between process management practices and customer satisfaction.

Moreover, the literature reviewed is heterogeneous with respect to the industrial sectors, geographical regions and methodology, which restricts comparison between studies. The majority of the studies reviewed in this report use cross-sectional designs, limiting the capacity to see long-term changes in organizations and causal effects.Moreover, the measurement of the construct of process management and customer satisfaction is not homogenous, which makes comparisons of empirical results more difficult. The review also highlights under sampling of small and medium enterprises (SMEs) and developing economies where contextual factors could have a strong effect on the outcomes of implementation.

Future Scope

Further research is required in developing standardised measurement models for process management studies which provide a better comparability in process management studies and also would include operational and customer-oriented performance measures. To assess the long-term effects of process improvement efforts and to build better causal relationships, it is necessary to use longitudinal and mixed-method research design.

Further studies should also cover more literature of non-Scopus indexed journals and databases with multiple bibliographic databases like Web of science, dimensions, IEEE Xplore to get a wider coverage of literature. More focus should be given to SMEs, to the specific needs of developing economies and to specific contexts where resources and culture are major determinants of implementation success.

Further research is needed to explore the potential of new technologies such as Artificial Intelligence, Digital Twins, Blockchain, Internet of Things, machine learning, and predictive analytics in process management systems and their impact on customer satisfaction, organizational resilience, sustainability and competitive advantage.

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