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Article

Driving innovation and operational efficiency: the role of AI in strategic sourcing and product development

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Abstract

This paper investigates the current markets that are becoming more volatile and globalized, and which have put organizations in a continuous struggle to come up with new services and products quickly, but at the same time ensuring high quality and cost effectiveness in their operations. The study examines how Artificial Intelligence (AI) could be strategically utilized in strategic sourcing and new product development (NPD) as it has a transformative role in the innovation capacity, competitiveness, and operational performance. Supply chain interruptions, volatile costs and untrustworthy suppliers have threatened the innovation speed and competitiveness of organizations. These have been caused by the fact that market dynamics are becoming increasingly unpredictable and complex and therefore require more resilient and intelligent methods of sourcing and product development. In this study the mixed method was used, which included interviews with experts, and secondary data analysis to investigate how the use of AI positively affects sourcing efficiency, supplier reliability, and innovation performance. Early reports point to the fact that the technologies based on AI have considerable positive effects on the information-driven decision-making process, cost control, and material quality during the procurement process. The developments do not only make the procurement more efficient but also allow quicker and more successful NPD cycles. Furthermore, AI also enables organizations to have real-time view and dynamic responses, which can help eliminate supply chain disruptions and maintain business continuity. The study can add value to the domains of supply chain management, innovation, and strategic sourcing because it shows that AI integration helps to develop theory and practice. The approach and findings are useful to manufacturing, FMCG, and high-tech corporations that want to take advantage of AI as a source of innovation, operational excellence, and market competitiveness in a more uncertain business climate.

Keywords: Artificial Intelligence, Strategic Sourcing, New Product Development, Innovation Capacity, Operational Performance

1 INTRODUCTION

The world today is fast-paced and competitive under the global market and in this kind of environment, businesses are finding it easier to run their operations through Artificial Intelligence (AI) to make their operations lean, lower costs and create innovations. Fast-Moving Consumer Goods (FMCG) is the industry that is characterized by a vast amount of production and short circles of distribution, and it is associated with such issues as product quality upkeep, addressing a demand change, and streamlining the supply chain. The supply chains are becoming more complicated all over the world and

FMCG companies are forced to evolve quickly in order not to lose competitiveness. Artificial Intelligence is one of the most disruptive technologies that make this transition possible.

AI has a great potential to transform much in the process of supply chain management, especially product development, and strategic sourcing. FMCG is an industry that performs an important product development, which involves prompt product innovation, focusing on consumer preference, and utilizing resources efficiently. In the same way, strategic sourcing is a significant part of realizing that companies are in a position to source of materials at optimal prices without affecting high quality of standards and supplier relationships. Technologies that use AI including predictive analytics, machine learning, and process automatization can use real-time insights, augment decision-making, and eliminate operational waste areas.

This paper targets to discuss the influence of AI on product development and strategic sourcing in the FMCG industry with regard to how the technologies of AI can be applied in supply chain activities and what their implications are in terms of key performance indicators (supporting product innovation, sourcing flexibility, cost efficiency). With further introduction of AI in the FMCG industry, it is important to look into the precise art that AI has on supply chain management, including the ideation and launching of a product to selection of suppliers and supplying materials.

The key research question in this work entails the desire to comprehend why and how the adoption of AI in product development and strategic sourcing enhances the performance results and competitive value in the FMCG industry. This paper will address both of these mentioned areas of the supply chain and discuss the AI adoption in each in order to bridge the current gap between empirical studies and the effect AI has had particularly in the FMCG sector. Due to this investigation, the study will also provide practical findings on how FMCG companies can optimize AI potential to facilitate and simplify their supply chain process in order to cut some costs and even boost their capability in product development in terms of speed and efficiency.

Recent trends that support the application of AI in different industries prompted activity in the research that focuses on determining the potential uses of AI in these areas. Specifically, the use of AI technologies is becoming one of the most popular trends in the area of supply chain management, and its effects have already appeared in such sectors as FMCG, where the changes in demand, price sensitivity, and the importance of velocity demand constant enhancements in the processes. It is a crucial factor that AI is used in product development and strategic sourcing in the FMCG industry since the two aspects greatly influence the capability of organizations to compete in the market.

In the FMCG industry, ideal product development has been a process that entails a number of processes, namely, the generation of ideas, design, testing, production and commercialization. Conventionally, this has been a long process that has been expensive. Nonetheless, the product development area has advanced with AI development. AI has enabled an opportunity to minimize time taken in product design and prototyping. AI enables firms to understand consumer taste, market dynamics and opponent conduct in a dimension never undertaken before using predictive analytics and information-driven discernments. This assists the companies in making sound decisions regarding the kind of products to come up with, the way that the products can be positioned in the market and which category of consumers to consider.

AI can also be used to automate tasks in the product development cycle that can be repetitive, e.g. creating new ideas, or prototyping different design options. The adoption of the AI-driven tools that simulate consumer responses on the design and prototypes of products has gained momentum in recent years, because it potentially allows predicting the reception of the product by potential customers based on past purchasing patterns, feedback, and market insights. Further, other AI applications such as machine learning can be used to build on and analyze huge,

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collected sets of data over social media, review, and survey to detect newly emerging trends that are not always easy to identify due to traditional market research strategies.

As an example, AI in the product can speed up the discovery of market gaps, increase individualization, and shorten time-to-market. This especially helps in the FMCG industry where the taste of the customer is ever changing and there is a little life to the product. The agility of responding to changes in demand granted to companies through AI means that new products are launched at higher rates with higher appeal in the market. The use of AI-based platforms to generate ideas, create prototypes, and test products has already been implemented by a handful of FMCG corporations in recent years and dramatically decreased the time and cost of product development (Choi & Ng, 2020).

Another discipline in which strategic sourcing can benefit the FMCG business through AI is its inability to address homesickness as another problem of supply chain operations. The necessity of linking relations with suppliers, cost reduction, and quality improvement is the key to preserving the efficiency of operations in sourcing. In the traditional form, procurement has been manual and also reactive. Nevertheless, the use of AI-fueled solutions has transformed strategic sourcing by entailing automation of activities, including choosing suppliers, predicting demands, managing inventories, and optimizing costs.

Machine learning, data analytics and other AI technologies enable businesses to make sourcing habits more efficient, forecast supplier behavior, analyze risk and locate cost-cutting solutions. As an illustration, AI based systems can assess suppliers on various performance rates, e.g. delivery reliability, pricing advantage and quality levels. Using the past records, the AI systems can foresee which supplier would best fit the needs of the company and thus organizations able to make more informed decisions concerning sourcing of materials and even contract establishment.

Moreover, AI-enabled technologies are mature enough to be used to improve companies in the process of demand forecasting and management, and, therefore, enhance their efforts in optimizing their inventory levels and reducing stockouts or inventory overloads. By comparing trends in consumer behavior, sales estimates, and such external factors (market fluctuations, weather events, and geopolitical issues) AI can make much more adequate assumptions about demand trends. Such predictive ability is vital to companies in FMCG industry where volatility and uncertainty in demand of products is high.

AI has also led to the magnification of its role in supplier management. Suppliers can be monitored by AI endlessly to ensure their quality, adherence to the contract, and even follow the sustainability activities of the suppliers. Automation of these processes will help to save time and resources of FMCG companies and provide quality with more consistent performance of the supply chain (Bhardwaj & Farris, 2019). Also, AI is also helping to make sourcing process more transparent as it allows having insights into a complete supply chain in real-time and helps to reduce risks associated with fraud, supplier reliability and geopolitical shocks.

Although prior research is already developing a substantial amount of information on the use of AI in programming and sourcing of products, there is a substantial gap in the knowledge on how AI is being incorporated among the functions especially within the FMCG industry. Other literature has already been conducted regarding AI in product development yet usually in a vacuum (Choi and Ng 2020). In a similar way, despite the study by Bhardwaj and Farris (2019) who have discussed how AI can be used in sourcing, there is still a lack of an empirical study linking these two vital activities of the supply chain. This paper intends to fill that gap by looking at how the application of AI in the process of both product development and sourcing can create operational efficiency, innovation, and competitiveness in one go by the FMCG industry.

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2 REVIEW OF LITERATURE

The potentials and the interdisciplinary uses of generative artificial intelligence (GAI) were thoroughly discussed by (Ooi et al., 2025). The aim of the study was to analyze in what ways GAI transformed different areas that are other than its technological basis and combine insights of such spheres as healthcare, education sector, marketing, and supply chain management. The paper used an all-inclusive literature search as its process and was able to classify the existing status of GAI applications, outline their limitations and give hints at the future study. The results were that GAI had great potential in the growth in creativity, automation, and data-supported decision-making in all industries. The authors concluded that although GAI was transformable, its actualization required considering ethical mandates, inter disciplinary studies and regulation to dictate its proper use.

The (Varriale et al., 2025) study critically assessed the characteristics of matching artificial intelligence with some of the emerging technologies; the Internet of things (IoT), blockchain, and cyber-physical systems in production systems today. This convergence provided the study with the aim to determine its effects to the manufacturing performance and competitive advantages. Through the use of a systematic literature review and critical synthesis approach, the authors reported on enabling and inhibiting factors toward a successful adoption of AI in a manufacturing setting. The challenge of the study was that the presence of AI meant that when it was combined with these technologies, incentives became more flexible, it was possible to conduct predictive maintenance, and the quality of products also increased. The authors have concluded that digital strategy, organisational readiness and technological infrastructure need to be aligned to realise successful implementation.

According to (Gama & Magistretti, 2025), there is an extensive literature analysis on the application of artificial intelligence that can improve the management of innovation. The paper sought to achieve a taxonomy of AI uses in terms of their contribution to such varied innovation capabilities as ideation, experimentation as well as launching into the markets. To widen the scope of ELMs, the authors conducted a systematic review of previous literature to map the AI functions on different stages of innovation and divided them into main themes. The results indicated that AI could largely boost the capability and effectiveness of the innovation processes, particularly regarding market trends analysis and idea generation. The study ended by stating that organisations, which strategically implement AI as a part in their innovation models, would attain greater novelty, lower risk and efficiencies in time-to-market.

Witkowski and Wodecki (2025) examined the role of artificial intelligence in the new product development (NPD) and product management process. The goal of the paper was to determine certain phases where AI has most returned the value. The authors used the case-based analysis and secondary data and noticed that high-impact disciplines like idea generation, requirement modelling, and customer feedback analysis leveraged AI especially in the initial stages of work. In the study, it was determined that AI assisted in optimising decision-making and enabled changing to the market demands faster. The authors decided that AI did not only serve as a support tool but a strategic force of NPD and product continuous enhancement.

Gupta and Sharma (2025) explore the pivotal role of digital transformation in advancing green banking practices through the lens of Environmental, Social, and Governance (ESG) factors, arguing that technology-driven innovation is a critical enabler of sustainable banking in the modern financial landscape. The study demonstrates that digital tools and platforms significantly strengthen the integration of ESG considerations into banking operations, thereby enhancing transparency, regulatory compliance, and environmental accountability (Gupta & Sharma, 2025). The paper makes a significant contribution to the emerging discourse on fintech-driven sustainability, offering actionable insights for banks and policymakers aiming to align digital

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strategies with ESG-oriented green banking frameworks (Gupta & Sharma, 2025).

The article (Cooper & McCausland, 2024) aimed at establishing AI in Stage-Gate process of new product development. It was aimed at examining the role of AI tools in improving the decision-making quality and minimizing innovation risks. The research described the application of AI in identifying opportunities, screening of ideas, and forecasting the market, based on conceptual analysis and industry examples. The results demonstrated that furnished systems with AI increased the accuracy of data processing and improved in favor of go/no-go decisions. The authors concluded that its firms that use AI in their NPD processes who had a more streamlined process and who were better suited to handle innovation in an uncertain situation.

Elsewhere (Ameen et al., 2024), Ameen and colleagues explored the relationship between the measure of artificial intelligence capability and the concept of strategic agility on product and service creativity. The aim of the study was to establish whether strategic agility mediated the relationship between AI and the outcome of creativity. By use of a quantitative methodology with structural equation modelling, the authors used data provided by a number of firms in different industries. The results revealed that AI expertise was not enough on its own but in combination with strategic responsiveness it had a strong effect on the outcome of creativity. The authors came to the conclusion that organisations ought to invest in both AI technologies and in frameworks of dynamic strategies that enable organisations to adapt to market changes flexibly and creatively.

A prospective study of the role of generative artificial intelligence in innovation management was provided (Mariani & Dwivedi, 2024). The purpose of the study was explained as the description of emerging issues and the research agenda in the future according to the current literature and development of technology. The authors conducted bibliometric and qualitative review by searching the themes of ethics, trust, co-creation, and process redesign. The results indicated that GAI was taking innovation to the new stage of hybridization in which human-centred processes were rapidly replaced by the content creation and fast prototyping processes. The authors reasoned that scholars and practitioners have to come up with governance models that safeguard and promote trust, transparency, and human control in anchor innovation systems through GAI.

Barthwal et al. (2024) have focused on new AI-based food processing system applications. It was aimed to identify the emerging trends in the field of AI, which would enhance innovation, safety, and sustainability of the food industry. Through extensive literature review, the authors studied the manner in which, through AI techniques like image recognition, robots, and predictive analytics, industries automated the chain of inspection, optimised supply chains and reduced food loss. The results revealed that AI enhanced quality checking and regulatory compliance as well as augmented efficiency of operation. The authors summed up that AI turned out to be one of the vital drivers of intelligent food systems and recommended collaboration between food technologists and AI experts across different fields of activity.

In a managerial and strategic context, (Cooper, 2023) explored the ways in which artificial intelligence was transforming the new product development environment. The objective of the paper was to highlight AI's transformative potential in risk reduction, customer alignment, and innovation forecasting. Based on the case study and conceptualisation, the author demonstrated the use of AI tools in market research, voice-of-customer analysis and rapid simulation. All the results showed that AI enhanced the decision-making process at the early stages of development and made the management of the portfolio easier. The author reached a conclusion that companies that integrated AI into their innovation pipelines got more speed, accuracy, and agility.

The role played by artificial intelligence in contemporary product development practice was examined (Ahmed & Ahmed, 2023). The study aimed

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to evaluate AI's role in improving prototyping, consumer alignment, and lifecycle efficiency. Based on the consideration of existing practices and industry evidence, the authors spoke about generative design, ML-based testing, and automated analytics. According to the results, the AI-enabled systems enabled companies to respond fast to consumer demands and reduce the mistake in development stages. The authors have concluded that AI was not an additional technology anymore but the center of performance within product innovation cycles.

Another research (Marrone, 2023) strived to address the development of optimal solutions to innovation and product development processes with the use of artificial intelligence through a doctoral dissertation. It was aimed at creating a realistic application process when using AI in industrial product development. The study used a mixed-methods research design that involves interviews, case studies, and a literature synthesis to reveal the effects of AI on ideation, market validation, and feedback loops. The results indicated that AI use considerably shortened the product development cycles and increased compliance with customer expectations. The dissertation observed that realising any such success would depend on a change not only to a set of tools, but also to the organisational culture and development of talent.

Gerschutz et al., (2023) proposed a conceptual framework, the AI4PD, whose purpose is to standardise the use of AI techniques in systematic product development. The goal was to facilitate the smooth incorporation of AI in various stages of the development process, both in the planning stages and validation stages. By use of theoretical modelling that is exemplified by use-case demonstrations, the authors have explained how modular artificial intelligence tools can be amalgamated with the conventional engineering processes. The results indicated the optimisation of design, efficiency of the process, and data consistency. The authors arrived at a conclusion that scalable, repeatable innovation in multifaceted product systems necessitated standardised integration of AI.

Piller et al. (2023) studied how hybrid intelligence (human judgement and AI tools) was used in new product development teams). It aimed at measuring the effect of this combination on ideation, collaboration, and execution. The study relied on the use of case examples and theoretical integration on the manner in which AI enhanced the capabilities of human beings in brainstorming, design iteration, and market responsiveness. The results implied that hybrid teams were quicker at prototyping and had superior performance based on creativity. The authors drew a conclusion that AI should never challenge human talent but could be utilized to increase the ability of a team and their decisions in the innovation environment.

Manavis et al. (2023) explored how product development has embraced artificial intelligence with regards to the architectural and built environment fields of study. The purpose was to study how AI supported design steps, prototyping, and decision calculations on projects of built environments. With a qualitative research design that adopts interdisciplinary literature, the authors assessed the AI applications in generative design and performance simulation, and iterative modelling. The results indicated AI facilitated designing processes, spatial efficiency in design, and data-informed design creativeness in architectural design. The authors distinguished that AI became a potent co-creator in the domain-specific constraint and sustainability-constrained design-led innovation.

Along with the need to shift towards big need elicitation by small-scale generative design considerations, (Marion et al., 2023) introduced artificial intelligence as the tool in user-centred new product development. The purpose of the study was to find out the role of AI in the process of finding latent user needs and turning them into design inputs. By focusing on case-based thinking and the combination with design thinking models, the authors discussed how NLP and data mining, together with machine learning helped in supporting the early stages of development and the idea generation. The results indicated that AI opened the doors to more scalable and varied capture of user insight, and

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corresponding product solutions became more comprehensive and responsive. The authors decided that AI played a pivotal part in enhancing human-centred innovation by scaling up the operationalisation of empathy.

The authors (Lei et al., 2022) performed the case study concerning its impact on product development and process design relying on AI. The aim of the research was to define the role of AI tools in the design of complex systems and streamlining of production parameters. The authors applied simulation models and AI algorithms in analysing product development stages and process flow dependencies. The findings indicated that AI provided considerable enhancements in precision during process planning, lowered operation costs, and increased flexibility within manufacturing setting. The authors drew a conclusion that AI integration was essential in the development of responsive and flexible design systems that are allied with the Industry 4.0 practices.

A systematic review of the role of artificial intelligence in the practice of product management was provided by (Namatherdhala et al., 2022). The objective of the study was to determine the essential AI technologies and how they affect the life cycle of the products in terms of planning, forecasting, and execution. The authors used the analysis of recent publications in various sectors; in this way, they divide AI use into planning, market analysis, and customer engagement. The research results implied that utilizing AI-enabled systems optimizes the time-to-market, customer retention, and predictive planning. The paper has come up with the conclusion that AI can be used as a vehicle of change in product management as it enables managers to make decisions based on data and better respond to the needs of the market.

Based on the use of AI, the migration of the virtual product development of the medical devices industry has been addressed in (Schweitzer et al., 2021). It was meant to determine the impacts of the AI technologies on the high risk industries like engineering, testing and regulatory design. In this paper, the role of the AI technology in the CAD process, simulation and virtual verification was considered with references to such case studies as the medical product companies. The given results were more precise, decref testimony ten and the possibility to comply with the safety requirements. As the authors have stated, the AI-supported virtual development models were decisive in innovation in the controlled industries and decreased the time and cost of dealing with traditional engineering processes. The aim was to examine the way that the AI applications transformed sourcing decisions, i.e., by implementing intelligent spend analysis, supplier segmentation, and automating risk assessment. The research contributed to explaining how the use of AI simplified discovering suppliers and improving data-driven negotiations by applying qualitative case analysis and secondary data. According to the findings, AI shifted the sourcing activity which was a transactional process to a strategic endeavor. The author concluded that the implementation of AI did not only push the efficiency of sourcing but also stimulated innovation and the cooperation of suppliers.

The assessment of the strategic dilemma by developing or purchasing artificial intelligence capabilities of firms was conducted by the research by (Hoffreumon et al., 2024). In this study the aim consisted in analysing complementarities between internal development of AI and acquiring it by third party in technology sourcing strategies. Using empirical evidence that was obtained based on firm surveys, the authors concluded that firms that had high absorptive capacity performed better based on internal AI development whereas other firms performed better using partnerships. The findings brought to the fore that sourcing was determined by firm firm based resources and complexity of the AI technology to be used. The strategic alignment and organisational capabilities decided on the preferred sourcing path according to the authors.

The implementation of good sourcing strategy and identification and sourcing of reliable suppliers in the competitive procurement environment were

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discussed (Jean, 2024). The purpose of the study was to provide best practices in the process of supplier evaluation, negotiation planning and performance monitoring. Having considered the procurement frameworks and the four stages of sourcing lifecycle, the paper highlighted the significance of the criteria quality, cost, reliability, and innovation. The findings highlighted the fact that strategic sourcing had to be done in such a way that there was constant supplier performance evaluation and alignment to organisational objectives. The author reasoned that a methodical and facts-driven sourcing strategy assisted companies in constructing vigorous and joint supply chains.

The article (Singh & Das, 2024) aimed at discussing the transformation of digitisation in the management of the supply chain based on artificial intelligence and machine learning. The aim was to investigate the ways in which smart technologies reformed the essential SCM processes like forecasting, logistics and supplier management. The authors performed conceptual analysis and provided examples of global supply chains to provide key AI areas of application in this study, anomaly detection, route optimisation, and demand planning. The conclusion was that AI enhanced a faster response rate, decreased the risk of operations and made better inventory choices. The authors decided that digitisation with the help of AI and ML was not optional anymore when becoming resilient and competitive in supply chains.

Bag et al., (2023) offered editorially edited evidence to the outcomes of COVID-19 related to strategic sourcing decision making and how they affect business performance. This was aimed at summarising the way in which the pandemic has led to reconsidering the sourcing strategy of firms based on the frameworks of technology and resilience. The authors were able to identify more use in AI to predict demand, calculate the risk ranking of its suppliers, and model scenarios through a synthesis of industry responses. The results were that AI-driven agile sourcing helped companies to adjust rapidly to shocks. The conclusion of the authors was that in post-COVID supply chains, strategic flexibility, transparency of data and the application of AI to supply chain decisions was necessary to operate in the face of future shocks.

Hypothetically, (Moskowitz et al., 2023) analysed how artificial intelligence, along with Mind Genomics, may help to identify the concept of sustainable sourcing in terms of the retail supply chain. It was assigned to find how AI could be applied to vet and rank sustainability-centred initiatives proposed by stakeholders. Through experimenting and cognitive segmentation, the authors proved that AI algorithms were helpful in identifying actionable sustainability preferences and relating them to some supply chain practices. The findings indicated that the synergy between AI boosted transparency, alignment with the consumer and value sourcing. The researchers reached a conclusion that AI would offer a scalable method to incorporate sustainability in retail procurement.

Artificial intelligence policy and strategy state were analysed with reference to moral aspects, diversity and inclusion in implementation of AI (Roche et al., 2023). This sought to find out how bias and transparency are taken into consideration when making sourcing and operational decisions through AI governance structures. By taking the position of policy analysis and case-based scrutiny, the loopholes of the governance of AI have been identified by the authors particularly in supplier assessment and labour practices. It was discovered that most AI strategies lacked specific DEI policies, although they had had an impact in both the workforce and vendors ecosystems. All these findings convinced the authors that the issues of ethical sourcing guided by AI required policy intervention and the incorporation of tech in the design efforts.

Cruz (2023) surveyed the issue of the ways to ensure the AI-based hiring and talent acquisition process is diverse, equitable and inclusive (DEI). The aim was to discuss the ways organisations can enhance the DEI results through the help of algorithmic tools without bias. On the basis of the organisational change theory and models of communication, the research was conducted on AI-driven recruitment activities and their compatibility with the DEI

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agendas. The results demonstrated how AI could facilitate DEI by being designed to use opaque standards, auditing systems, and by involving stakeholders. The author decided that the effective use of AI in talent sourcing is an issue demanding cross-functional cooperation and constant assessment of algorithmic fairness and results.

Rainy and Chowdhury (2022) https://rainyandchowdhury.wordpress.com/ reviewed the application of artificial intelligence in assessing vendor performance in retail supply chains that are digital. The task was to determine strategic decision-making models that would utilize AI in assessing and improving the suppliers. The study by the authors is a literature-based work on the application of AI tools in carrying out mechanical tracking of delivery, compliance, responsiveness, and innovation. Results indicated that AI-driven systems delivered performance in real-time and assisted in comparing vendors on a variety of KPIs. This study found that AI-enabled assessment models made evaluations more accountable and allowed supply chain stakeholders to actively develop suppliers within the digital supply ecosystems.

Jhurani (2022) evaluated the role of artificial intelligence introduction into the enterprise resource planning (ERP) systems and the way in which it can influence the use of the corporate strategies. It was hoped to find out how AI helped in demonstrating the effectiveness of ERP and the consequent optimization of strategic decision-making. The author employed the case studies and the process-level analysis to speak about the work of AI in demand forecasting, workflow automation, and anomaly detection. The findings indicated that AIs enabled better ERPs to anticipate, reduce downtimes and develop improved coordination of departments. The research findings were that; the AI plays key role in transforming the ERP to vibrant strategic platform that it composed a still pool of information to an enterprise performance.

Yorks et al. (2022) developed a study of the ways digitalisation, artificial intelligence, and strategic human resource development (HRD) are converging. The goal was to see how the rate of talent development and performance that fits with the aid of AI-based solutions performed in a digital working environment. The review of concepts and industry examples allowed the authors to demonstrate how AI may assist in analysing skills gaps, mapping individual learning trajectories and building leadership competencies. The findings stipulated that AI-based strategic HR development initiatives would result in better employee retention, flexibility and optimisation of talent. In the view of the authors, the AI was the foundation of the future-proof HRD strategies and necessitated the continuous re-shaping of organisational learning cultures.

The second review was conducted by (Noriega & Pourrahimian, 2022). Artificial intelligence and data-driven methods used in strategic open-pit mine planning were undertaken through this systematic review. This was aimed at assessing the effort of AI in the automation of the operating efficiency and long-term decision making mine strategy. Considering a broad range of peer-reviewed literature, the authors showed that there is a use of such machine learning, simulation models and optimalisation algorithm in ore-body modelling, pit limit design, and cost forecasting. The outcomes showed that the use of AI enormously influenced the increase in accuracy of the outcome concerning predicting the future, resource allocation, and environmental scrutiny. The authors theorized that the development of AI was rendering mine planning intelligent and sustainable and introduced data-centered decision-making systems in the resource sector.

The article written by (Borjesson & Dvorsak, 2021) is devoted to the exploratory qualitative research regarding the implementation of artificial intelligence regarding the sustainable sourcing practice. It was meant to determine the contribution of the AI technologies to environmental, social, and governance (ESG) targets within the sourcing operations. Through interviews and observing the cases in manufacturing and logistics firms, the study demonstrated that AI fostered greater transparency of suppliers, risk assessment, and ensuring compliance. The findings showed that the use of AI facilitated

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companies to detect malpractices, optimise resource distributions, and use procurements to support sustainability objectives. The authors concluded that, despite remaining in the early adoption stage, AI had a substantial potential in strengthening sustainable sourcing models and accountability.

(Chaturvedi et al., 2021) This study aims to determine the effect of the lean strategy of supply chain management on supply chain performance and supply chain performance impact on organizational productivity. The primary data collection instrument used was a questionnaire administered to a total sample of 200 managers from the Indian manufacturing industry from various segments, including purchasing, manufacturing/production, distribution/logistic, SCM, transportation, material, and operation. The convenience sampling method was used to pick the samples. Mean, logistic regression and correlation between independent and dependent variables were used to examine the data. Statistical techniques such as reliability and validity were used in the studies. According to the findings, the lean supply chain management strategy has a statistically significant connection with supply chain performance and, therefore, corporate productivity. Lean management strategy, on the other hand, is a strong predictor of organizational productivity.

The study of (Perrin et al., 2021) presented the model of a sources ecosystem that will enable the realisation of strategic innovation with the assistance of big data. It was the intention to implement data analytics in sourcing systems that led to increased agility and innovation. According to conceptual modelling and multi-case approach, the authors developed an ecosystem in which the co-evolution of firms and their suppliers was made possible with assistance of real time analytics, common data and measures of innovations. The findings reflected that the high turnover of innovation, supplier cooperation and aggressive risk management were related to such ecosystems. These conclusions of the researchers were that big data-powered ecosystems have been a radical change in transactional sourcing and the imperative on strategic partnerships based on innovation.

The impact of artificial intelligence on human resource management strategy and operations was observed by (Achchab & Temsamani, 2021). The goal was to examine the twofold effect of AI on strategic decision-making and expanding HR functionality. The study based its findings on the use of survey reports and literature-informed evaluation and noted the role of AI in profiling candidates, predicting their performance, and planning the workforce. The results indicated that AI enhanced the responsiveness of HRs, eliminated unconscious bias during the process of decision-making, and improved operational effectiveness. The authors decided that AI in HRM progressed strategic fit and required different abilities to achieve AI-literate HR experts.

Chaturvedi et al. (2021) examine the impact of lean supply chain management (LSCM) strategy on supply chain performance and organisational productivity, providing a structured analysis of how waste-reduction principles translate into measurable operational gains. The study highlights that organisations adopting lean strategies experience significant improvements in supply chain efficiency, cost optimisation, and overall productivity by eliminating non-value-adding activities across the supply chain (Chaturvedi et al., 2021). The findings offer practical implications for supply chain managers and organisational leaders seeking to align lean principles with long-term competitive and productivity goals (Chaturvedi et al., 2021).

The article of (Verhulsdonck et al., 2021) examined the synergetic effect of the design thinking, content strategy, and artificial intelligence in a technical communication and user experience design application “streams. The paper set out to gain an insight on how AI technologies related to human-centred design processes. In technical contents, the authors took a qualitative research approach of document review and practitioners interview in an attempt to establish how AI products have helped in the information architecture, user modelling and real-time feedback. The research discovered that AI generated a usability advantage, personalised delivery of content and reduced development processes. The authors concluded that the iterative

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feedback and sharing loops with and a combined skill set are required to empower successful collaboration of AI and content designers.

A formal approach to the implementation of a multi-sourcing strategy in an engineer-to-order (ETO) production system was advanced (Mwesiumo et al., 2021). It wanted to integrate AI and digital technologies to supplement sourcing decision-making in highly differentiated production apparatuses. A case study and process analysis were used to examine how the authors coordinated the suppliers and the variability of their lead times and quality assurance. The findings stated that AI-driven analytics improved supplier segmentation, order prediction, and delivery, order fulfilment using digital platforms. The researchers have drawn up an inference that AI-based multi-sourcing provided an agile model of production that introduced certainty rather than reduced uncertainty in the ETO supply chains.

In the research of (Barrad, 2020), the combination of AI, data analytics, and the procurement strategy was used to define how they can work together to cut the costs in the enterprise setting. The doctoral study aimed at determining the effect of technological enablers and their impact on the strategic procurement performance. Based on empirical observations obtained on Canadian companies and statistical models, the research revealed that AI-based analytics resulted in the optimisation of spending analytics, automated verification of compliance, and enhanced management of supplier contracts. The results have supported the belief that the adoption of AI was strongly associated with cost reductions in procurements and efficiency in the processes. By the end of the research, the author was ready to conclude that an organisation that implements the concept of AI as a component of procurement strategy records measurable improvements in its operational spending levels and proactive strategic management.

The influence of strategic sourcing on general supply chain approaches was examined by (Yildiz Çankaya, 2020). The aim was to evaluate the role of sourcing decisions in terms of their impact on agility, resilience and supplier-alignment in global operations. The survey and case-based analysis in the research showed that the means of strategic sourcing, namely, dual sourcing, long-term contracts, and risk-sharing, had a significant contribution to supply chain stability and responsiveness. It was found that strategic sourcing was a prerequisite to the proactive supply chain design. The author has come up with the conclusion that the well structured sourcing strategy was vital as an organization realized long run competitive edge in game markets when the environment was uncertain.

In their turn, Boehmke et al., (2020) relied on software available in the open-source to develop a framework based on data science in order to optimize the strategic sourcing analytics. It sought to demonstrate that advanced analytics would be able to supplement sourcing decisions, supplier performance management and procurement strategy. The authors relied on data sets and the practical data concerning purchases by using data toolkits written on Python to develop models of the supplier segmentation, cost benchmarking, and both short-run and long-run performance. The findings showed that procurement departments could also enable provision of custom and scalable solutions with open-source analytics system without huge reliance on commercially viable softwares. The authors reached a conclusion that the implementation of the data science into sourcing analytics would increase the degree of transparency, acceleration and strategic prospection in procurement activities. Based upon the literature study suggested following hypotheses –

Ho1 **-** *The use of Artificial Intelligence positively impacts product development in the FMCG sector.*

Ho 2 **-** *The use of Artificial Intelligence positively impacts strategic sourcing in the FMCG sector.*

3 RESEARCH METHODOLOGY

The aim of this research was to examine the impact of Artificial Intelligence (AI) on product development and strategic sourcing in Fast-Moving Consumer Goods (FMCG) industry, and

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professionals working in the supply chain areas in particular. To study the planned relationships and to meet the research objectives, a quantitative research design was incorporated, and analysis of the planned relationships was conducted in a structured and data-driven manner with the Structural Equation Modeling (SEM).

The research used a descriptive and a causal method of inquiry to investigate both existence of connection among variables and the direction of influence of AI to major operation functions. A cross sectional survey was used where information can be collected on a lot of individuals within a given period. This was deemed as the right approach to drawing the perceptions and experiences of the supply chain professionals about the integration of AI in their respective organizations.

The target group was FMCG company Indian employees occupying the role of supply chain, procurement, operations, or logistics staff members. The reason why these roles were taken into consideration is their direct relationship with the use of AI technologies in sourcing and product development processes. It followed the purposive sampling technique and the respondents of the domain knowledge were selected. The resulting sample was 385 valid responses that exceeded the recommended threshold of 300 responses of conducting SEM and provided statistical strength.

The actual data collection was performed during three months (between January 2025 and March 2025). A structured questionnaire was created and sent to the respondents via the options of professional network LinkedIn as well as through email. The survey instrument contained four parts, demographics, measures of the AI use, activities connected with the product development, and the strategic sourcing functions. A total of all the measurement items was founded on validated scales in a literature within the 5-point Likert scale with strong disagreement having the score of 1 and strongly agree had the score of 5. The questionnaire was piloted by several experts in the supply chain field in order to have a good comprehensiveness and contextual connotation.

4 RESULT

Maximum Likelihood (ML) was used to estimate the structural equation model (SEM) under analysis, being one of the most accepted methods in SEM being based on a multivariate normality of the data. In order to get the best parameter estimates, numerical optimization using the NLMINB algorithm was adopted. This algorithm can be of great use in non-trivial algorithms or where ordinary optimization technique may not encounter convergence issue. The number of observations was 385 that can be deemed adequate to conduct SEM, in particular, when dealing with a multi-latent construct and path variables.

Table-1: Structural Equation Models

Estimation Method	ML
Optimization Method	NLMINB
Number of observations	385
Model	AI= ~Predictive Analytics + Process Automation + Data Quality + Technological Infrastructure
	Product Development= ~Idea Generation + Concept Development +Design and Engineering + Commercialization
	Sourcing= ~Sourcing Flexibility + Cost Reduction + Supplier Quality + Supplier Lead Times
	Product Development ~Use of Artificial Intelligence
	Strategic Sourcing ~Use of Artificial Intelligence

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The model has measurement and structural components. Within the measurement model, such a latent construct as Artificial Intelligence (AI) is measured in terms of four observed indicators, including Predictive Analytics, Process Automation, Data Quality, and Technological Infrastructure. These pointers capture some of the vital aspects of AI application in organizational systems. The construct Product Development is also determined with four indicators Idea Generation, Concept Development, Design and Engineering, and Commercialization of the process of new product development and fulfillment of the new products. On the same note, Sourcing (or Strategic Sourcing) construct is quantified through Sourcing Flexibility, Cost Reduction, Supplier Quality and Supplier Lead Times, bringing out strategic qualities of procurement activities.

The structural component of the model reflects the stated directional relationships between the constructs hypothesized. In particular, according to the model, Use of Artificial Intelligence has a direct impact on Product Development and Strategic Sourcing. It means that the more an organization relies on the use of AI, the more innovation and agility in the creation of new products and increase in the efficiency and responsiveness of the sourcing operations will exist.

Table-2: Parameters Estimates

				95% Confidence Intervals				
Dep	**Pred**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
Product Development	Use of Artificial Intelligence	1.01	0.0183	0.976	1.05	1.001	55.2	<.001
Strategic Sourcing	Use of Artificial Intelligence	1.15	0.0162	1.115	1.18	0.99	70.6	<.001

Model parameter estimates of structural equation shows significant statistical correlation between the latent construct Use of Artificial Intelligence with two important outcome variables namely, Product Development and Strategic Sourcing. The findings give empirical confirmation to the hypothesized pathways in the structural part of the model.

Firstly, the product development is the dependent variable where the path coefficient between use of artificial intelligence and product development is 1.01 having a standard error (SE) of 0.0183. The confidence interval of the estimate at 95% is between 0.976 and 1.05 which implies that there is a high level of precision of the estimate. The standardized regression coefficient of beta (B) = 1.001, which is very strong and positive as well as near perfect standardized effect. This relationship is highly significant or significant at conventional levels as implied by the corresponding z-value of 55.2 and a p-value lesser than 0.001. This indicates that the more organizations adopt AI; the more they record significant value-additions in product development, which will most probable be as a result of the efficiencies realized in the ideation, design, and commercialization phases.

Second, the role of Use of Artificial Intelligence in Strategic Sourcing is even greater. It has an unstandardized estimate of 1.15 and SE of 0.0162 and a confidence interval of 1.115 to 1.18. The standardized beta coefficient is 0.990 in this case too and realizing a very good positive impact. Z- value of 70.6 is very high and p-value of < .001 indicates that it is statistically significant. These findings show that the AI technology can also help enhance the strategic sourcing processes of cost-effectiveness, supplier excellence and purchasing agility.

Collectively, these results echo the revolutionary capability of AI in its fundamental areas of operation. The power and value of the coefficients indicate that the investments in AI would probably lead to the measurable increase in both innovation-related and supply chain activities. The confidence intervals are very small and the z-scores substantial, which

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indicates a strong and solid estimation process that puts more authority behind the conclusions of the model.

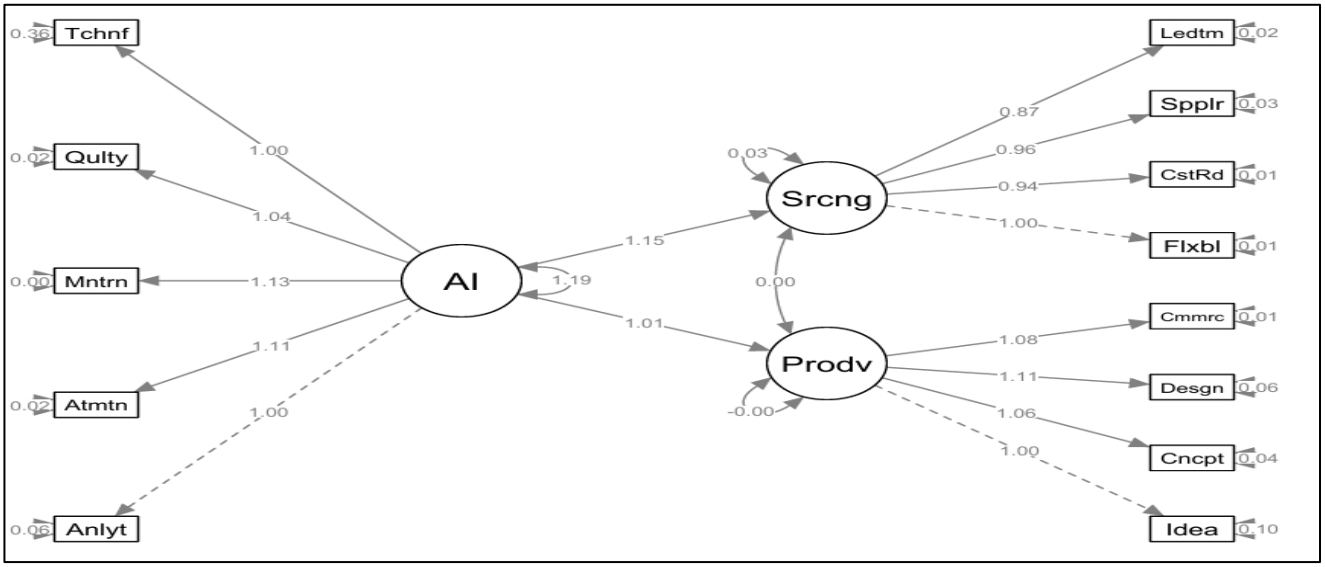

Figure-1 Path Diagram

Table-3: Measurement model

				95% Confidence Intervals				
Latent	**Observed**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
Use of Artificial Intelligence	Predictive Analytics	1	0	1	1	0.977		
	Process Automation	1.107	0.01396	1.08	1.135	0.994	79.3	<.001
	Process Automation	1.134	0.01287	1.108	1.159	1	88.1	<.001
	Data Quality	1.036	0.01352	1.01	1.063	0.992	76.6	<.001
	Technological Infrastructure	1.003	0.03045	0.943	1.062	0.875	32.9	<.001
Product Development	Idea Generation	1	0	1	1	0.963		
	Concept Development	1.059	0.01804	1.023	1.094	0.984	58.7	<.001
	Design and Engineering	1.114	0.01966	1.076	1.153	0.98	56.7	<.001
	Commercialization	1.079	0.01642	1.047	1.111	0.995	65.7	<.001
Strategic Sourcing	Sourcing Flexibility	1	0	1	1	0.996		
	Cost Reduction	0.936	0.00587	0.925	0.948	0.996	159.6	<.001
	Supplier Quality	0.956	0.00818	0.94	0.972	0.99	116.8	<.001
	Supplier Lead Times	0.866	0.00728	0.852	0.881	0.99	118.9	<.001

The measurement model provides insight into how well the observed variables (indicators) represent their corresponding latent constructs: Use of Artificial Intelligence, Product Development, and Strategic Sourcing. Each relationship is evaluated based on the factor loading estimates, their standard errors, confidence intervals, standardized loadings (β), and significance levels.

The latent construct Use of Artificial Intelligence was measured using four observed indicators: Predictive Analytics, Process Automation, Data Quality, and

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Technological Infrastructure. The reference indicator, Predictive Analytics, was fixed at 1.000 for scaling purposes, and its standardized loading (β) is high at 0.977, indicating strong representation of the latent construct.

Process Automation appeared twice, possibly due to a modeling or naming oversight, but both entries show very high loadings (1.107 and 1.134) with standardized coefficients of 0.994 and 1.000 respectively, and extremely high z-values (79.3 and 88.1). This confirms that Process Automation is a critical and highly reliable component of the AI construct.

Data Quality also shows a strong loading of 1.036 (β = 0.992), reinforcing its relevance in assessing AI integration. Technological Infrastructure, with a loading of 1.003 and standardized β = 0.875, contributes moderately to the construct, although its slightly lower standardized loading suggests that it may be a less dominant dimension compared to the others.

The construct Product Development is measured through four stages: Idea Generation, Concept Development, Design and Engineering, and Commercialization. Idea Generation is used as the reference indicator with a fixed loading of 1.000 and a strong standardized β = 0.963. The remaining indicators also display high unstandardized and standardized loadings: Concept Development (1.059; β = 0.984), Design and Engineering (1.114; β = 0.980), and Commercialization (1.079; β = 0.995). These values indicate that all four indicators robustly and significantly measure the construct of product development, capturing its full lifecycle from ideation to market launch.

Lastly, the construct Strategic Sourcing is assessed using Sourcing Flexibility, Cost Reduction, Supplier Quality, and Supplier Lead Times. Sourcing Flexibility is the reference item (β = 0.996), while Cost Reduction shows a strong and slightly lower loading of 0.936 (β = 0.996), with an exceptionally high z-value of 159.6, indicating high measurement precision. Supplier Quality and Supplier Lead Times follow with loadings of 0.956 (β = 0.990) and 0.866 (β = 0.990), respectively. These indicators also significantly contribute to the latent construct, suggesting that the sourcing construct is well-captured through these performance-focused dimensions.

All factor loadings in the model are statistically significant ($p < .001$), with very narrow confidence intervals, and high z-values. Standardized loadings mostly range from 0.875 to 1.000, demonstrating strong internal consistency and convergent validity of the constructs. The results confirm that the measurement model is robust, with each latent variable reliably and validly measured by its respective indicators. Minor attention may be required to address the duplicated naming of Process Automation, which appears twice under the AI construct and may need to be verified or renamed for clarity and model integrity.

Table-4: Variances and Covariances

				95% Confidence Intervals				
Variable 1	**Variable 2**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
Predictive Analytics	Predictive Analytics	0.05771	0.00422	0.04944	0.06598	0.04643	13.68	<.001
Process Automation	Process Automation	0.0181	0.0014	0.01536	0.02084	0.0123	12.94	<.001
Process Automation	Process Automation	0.00136	4.42E-04	4.90E-04	0.00222	8.90E-04	3.07	0.002
Data Quality	Data Quality	0.02144	0.00162	0.01827	0.02462	0.01657	13.23	<.001

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Technological Infrastructure	Technological Infrastructure	0.3647	0.02634	0.31307	0.41633	0.23432	13.84	<.001
Idea Generation	Idea Generation	0.09602	0.00685	0.08259	0.10945	0.07346	14.01	<.001
Concept Development	Concept Development	0.04429	0.00319	0.03803	0.05055	0.03159	13.87	<.001
Design and Engineering	Design and Engineering	0.06132	0.00439	0.05271	0.06993	0.0392	13.96	<.001
Commercialization	Commercialization	0.01406	0.0012	0.0117	0.01641	0.00987	11.71	<.001
Sourcing Flexibility	Sourcing Flexibility	0.01144	0.00128	0.00893	0.01395	0.00713	8.93	<.001
Cost Reduction	Cost Reduction	0.01094	0.00117	0.00864	0.01324	0.00778	9.32	<.001
Supplier Quality	Supplier Quality	0.03045	0.00249	0.02557	0.03533	0.0205	12.23	<.001
Supplier Lead Times	Supplier Lead Times	0.02381	0.00196	0.01997	0.02765	0.01954	12.15	<.001
Use of Artificial Intelligence	Use of Artificial Intelligence	1.18532	0.0895	1.00991	1.36073	1	13.24	<.001
Product Development	Product Development	-0.002	6.71E-04	-0.00326	-6.33e−4	-0.00161	-2.9	0.004
Strategic Sourcing	Strategic Sourcing	0.03315	0.00283	0.0276	0.0387	0.02082	11.71	<.001
Product Development	Strategic Sourcing	0.00286	8.70E-04	0.00116	0.00457	0.35631	3.29	<.001

The variances and covariances reported in the structural equation model (SEM) output provide critical insights into the measurement reliability of the observed variables and the interrelationships between the latent constructs. Variance estimates indicate the degree of dispersion in each observed or latent variable, while covariances illustrate the extent to which two variables change together.

All observed variables show statistically significant variance estimates ($p < .001$), indicating that each variable contains sufficient variability to contribute meaningfully to the model. For the latent construct Use of Artificial Intelligence, its observed indicators—Predictive Analytics, Process Automation, Data Quality, and Technological Infrastructure—display variance estimates ranging from 0.00136 to 0.36470. Notably, Technological Infrastructure exhibits the highest variance (0.36470), suggesting greater heterogeneity in responses, while one of the Process Automation entries shows a very small variance (0.00136), which may suggest limited variation or potential redundancy if it's a duplicated item.

For the Product Development construct, indicators like Idea Generation (0.09602) and Design and Engineering (0.06132) have relatively higher variances, while Commercialization shows the least (0.01406), indicating more consistency among respondents on commercialization activities. The sourcing-related indicators show lower but significant variance, with Supplier Quality (0.03045) and Supplier Lead Times (0.02381) exhibiting the most spread within the Strategic Sourcing indicators.

Among the latent variables, Use of Artificial Intelligence has a significant and substantial variance estimate of 1.18532 ($p < .001$), indicating notable variation in AI use across the sample. Strategic Sourcing also demonstrates significant variance (0.03315), reflecting differences in strategic sourcing practices among respondents.

However, the variance estimate for Product Development is negative (-0.00195) and statistically

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significant (p = 0.004). This is problematic and theoretically invalid because variances cannot be negative. This condition, known as a Heywood case, often signals issues such as model misspecification, multicollinearity, or poor measurement of the latent construct. Immediate investigation and potential re-specification are recommended to address this anomaly.

The covariance between Product Development and Strategic Sourcing is estimated at 0.00286 and is statistically significant (p < .001). The standardized estimate (β = 0.35631) indicates a moderate positive association, suggesting that improvements in one domain (e.g., product development capabilities) are likely associated with enhancements in the other (e.g., sourcing strategies). This relationship aligns with theoretical expectations, as innovation and sourcing efficiency often reinforce each other in integrated supply chains and product lifecycles.

In summary, the variances of observed variables confirm adequate variability and measurement precision, while most latent constructs exhibit valid variance estimates. The significant and positive covariance between product development and strategic sourcing highlights their interdependence. However, the negative variance for product development necessitates model revision or closer inspection of indicator quality and construct validity. Resolving this issue is essential for the reliability and interpretability of the SEM results.

Table-5: Intercepts

			95% Confidence Intervals			
Variable	**Intercept**	**SE**	**Lower**	**Upper**	**z**	**p**
Predictive Analytics	3.7	0.057	3.589	3.812	65.121	<.001
Process Automation	3.907	0.062	3.786	4.028	63.2	<.001
Process Automation	3.901	0.063	3.778	4.025	62	<.001
Data Quality	3.763	0.058	3.649	3.877	64.912	<.001
Technological Infrastructure	3.728	0.064	3.603	3.852	58.629	<.001
Idea Generation	3.736	0.058	3.622	3.851	64.124	<.001
Concept Development	3.779	0.06	3.66	3.897	62.614	<.001
Design and Engineering	3.802	0.064	3.677	3.927	59.639	<.001
Commercialization	3.959	0.061	3.84	4.078	65.081	<.001
Sourcing Flexibility	3.915	0.065	3.788	4.041	60.66	<.001
Cost Reduction	3.781	0.06	3.663	3.9	62.549	<.001
Supplier Quality	3.862	0.062	3.74	3.984	62.175	<.001
Supplier Lead Times	3.735	0.056	3.625	3.845	66.391	<.001
Use Of Artificial Intelligence	0	0	0	0		
Product Development	0	0	0	0		
Strategic Sourcing	0	0	0	0		

Intercepts within a structural equation model (SEM) provide an important insight into the means of the observed variables when the effects of the related latent constructs are held at zero, i.e. when the latent variable is set at zero. Intercepts in this model of measurement assist one to know the minimum values or central horizons of every indicator that is observed regardless of the structural lines and latent communiques.

In the case of the latent construct Use of Artificial Intelligence, the observed indicators exhibit statistically significant intercepts with values of 3.700, 3.907, 3.901 (repeated, perhaps suggesting a data duplication or labelling mistake), 3.763, and 3.728 of Predictive Analytics, Process Automation, Data Quality and Technological Infrastructure, respectively. Such high values are indicative of an average positive report on the entity of implementing AI-related elements in the organization submitted by

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the respondents. The average score of the Process Automation is the highest, which means that the given object of AI is, perhaps, the most visible or actively adopted by the interviewed respondents.

Equally, the averages of the indicators of Product Development depict very good positive values. The intercepts are Idea Generation that stands at 3.736, Concept Development at 3.779, Design and Engineering at 3.802 and Commercialization with the highest mean perceptions at 3.959. The trend reveals that the overall attitude of response to products development processes is positive and the last stage of process namely commercialization is seen to be most effectively completed.

The indicators also gave high intercepts in the Strategic Sourcing context: Sourcing Flexibility of 3.915, Cost Reduction of 3.781, Supplier Quality of 3.862 and Supplier Lead Times of 3.735. The above values suggest that average benefiting strategic sourcing functions is measured in a positive way by the dimension of flexibility, efficiency, and supplier performance.

All variable intercepts are statistically significant (p-values less than .001), and the resulting z-values are high (sitting at ca. 66, to ca. 58). These estimates thus can be trusted up to a high degree of certainty. In addition, the narrow 95 percent confidence rates strengthen the soundness and integrity of the intercept values further.

On the other hand, the latent constructs namely Use of Artificial Intelligence, Product Development and Strategic Sourcing are intercepted at zero, which is normal practice in SEM in order to facilitate identification of the model. By adjusting these intercepts, one gets a starting point of reference, such that any other parameter in the model can be estimated, without overlapping.

Finally, the intercept estimates depict how all observed variables were positively rated not only by the sample of respondents, but also indicate the overall satisfaction or maturity in AI adoption, product development processes, strategic sourcing practice. Nonetheless, the redundancy of Process Automation should be reviewed to go ahead and make sure the clarity of the model and the conceptual accuracy.

5 DISCUSSION AND CONCLUSION

This paper sought to explore how Product Development and Strategic Sourcing in the FMCG industry were affected by Artificial Intelligence (AI) specifically among professionals in the supply chain. The hypothesis that led to the research was that AI has a significant impact on these major operational functions. Through structural equation modeling (SEM) the study evaluated the impact of AI adaption on product development processes and sourcing strategies. The findings offered important information about the positive correlations amid the use of AI and the enhancement of product development and sourcing efficiency.

This research has shown that the implementation of AI and especially predictive analytics, process automation, and technological infrastructure significantly influenced product development and strategic sourcing. These findings are consistent with the literature about the transformative nature of AI in business activities. The research on the topic has also echoed the dramatic impacts of AI on optimizing operations and decision-making procedures in supply chain management (Agarwal & Tanniru, 2018; Choi & Ng, 2020). As an example, Choi and Ng (2020) stressed that AI-enabled predictive analytics could facilitate the product development process by shortening the time-to-market and enhancing product customization. The same is reflected in our research, which suggests that AI plays a vital role in every phase of product development, including the generation of ideas and commercialization.

Moreover, the findings of the study support the position of AI in strategic sourcing. The results support the previous research by Bhardwaj and Farris (2019), who indicated that the AI use in sourcing activities, including cost reduction and supplier quality improvement, contributes to the more flexible sourcing and overall efficiency. The AI-based

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sourcing provides companies with the possibility to optimize supplier relationships, minimize the costs of procurement, and lead times, thereby increasing their competitiveness in the FMCG industry.

The paper is also a contribution to the positive AI-operational performance relationship that has been established in the FMCG industry. It offers empirical data that AI is not just a means of automation but a strategic instrument of product development and sourcing innovation and efficiency. Although the findings confirm the notion that AI is an improvement in these aspects, they also indicate that organizations should ensure that there is smooth adoption of the AI technologies in their current frameworks, and constant tracking to achieve the full potential of these technologies.

Among the key points of the study, there was the heavy focus on the automation of processes and predictive analytics as the major efficiency drivers. The results are in line with the works that promote the implementation of AI technologies that automate processes and make them more data-driven. As the AI technologies are still developing, more studies are required to investigate the ways in which these tools can be implemented into the multi-layered, more complex supply chains.

6 CONCLUSION

The results of this investigation highlight the significant role of Artificial Intelligence in changing product development and strategic sourcing in FMCG industry. The results showed that the use of AI has a positive influence on the operational efficiency of supply chain functions and the capacity to be innovative. The impact of AI was especially strong in the automation of processes and predictive analytics which are at the center of the enhancement of product development schedules and implementation of sourcing strategies.

AI permits the use of smarter decision-making and automation, which aids organizations to simplify operations, cut down on expenses, and improve the quality of products. These results are consistent with the ever-expanding literature pointing out the ability of AI to not only enhance tactical processes but strategic decision-making in intricate supply chains (Bhardwaj & Farris, 2019). Thus, businesses operating in the FMCG industry are advised to further invest in AI tools so that effective integration of these systems could be established and the employees could be equipped with the knowledge of using AI initiatives to gain competitive advantage.

To sum up, the research confirms that AI can be viewed as a pivotal instrument in terms of improving not only the efficiency of product development but also of sourcing. Nevertheless, to actually enjoy the fruits of AI usage, organizations should constantly reevaluate and redefine the strategies to implement AI so that they stay in step with technology progress and market changes. Future investigations may be aimed at researching the secondary outcomes of the long-term adoption of AI in different industries and determining the ways the new technologies in the field of AI may also streamline the processes within supply chain management.

7 STUDY IMPLICATIONS

The research has several practical, theoretical, and policy implications in the FMCG industry and beyond, which indicate that the importance of Artificial Intelligence (AI) in the supply chain management can transform the industry. The study indicates that AI can greatly improve the level of efficiency of the operations by automating some processes such as demand forecasting inventory management and supplier selection, as well as accelerate the innovation process in the development of products by accelerating the time-to-market and data driven personalization. In the case of strategic sourcing, AI can help in reducing the procurement lead times, supplier relationship optimisation, quality management. In theory, the research would add up to the knowledge of the beneficial role of AI in the implementation of the supply chain performance as the latter provides great insight into AI application in both product development and sourcing efficiency. These implications apply across most industries too meaning that the use of AI can bear the same kind of

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benefits in different sectors. Incentives and training of policy makers are also encouraged to adopt AI, especially among SMEs. Further studies should also focus on long term impacts of AI on industry of supply chains, and also study new technologies such as machine learning and block chain and hence continue to build the future possibilities of AI to improve business practices.

8 FUTURE SCOPE OF THE STUDY

Further research potential of the topic will include the study of several critical directions that can enhance our knowledge of the influence of AI on the supply chain management and can be applied in other industries. The long-term or future investigation may be a study of the positive results of AI adoption and its implications on organizational performance, such as the productivity of the organization employees, satisfactory level of customers, and financial performance. Secondly, there is a chance to extend the analysis to other industries besides the FMCG one, including automotive, electronic, and pharmaceutical, to learn whether the correlation between AI and supply chain efficiency can be applied to other settings. Cross-industry comparisons would promote interesting ideas as to the multiple uses of AI in supply chains. Moreover, the implications of integrating such AI technologies as machine learning, blockchain, and So connected home of Things (IoT) could be further investigated in terms of what product development, sourcing, and, overall, supply chain resilience those advances could have in combination. The organizational culture and readiness of an employee to implement AI effectively could be also researched how to identify the barrier in the adoption of AI and suggest the strategies to combat it. Lastly, a policy-driven research direction (policy related) may research how all this can be enabled within SMEs by government (regulatory frameworks, subsidies, and incentives to foster access to AI and make AI inexpensive) and explore the challenges in further adoption in SMEs.

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