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“Applicability of Artificial Intelligence in the Supply Chain. Case Study of a Fast-Moving Consumer Goods (FMCG) Company.”

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Patras, Greece, “May” “2026”

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"I would like to thank my son and my husband for their continuous support, motivation and patience throughout this journey. This achievement would not have been possible without you. I also extend my gratitude to Professor Dr. Ilias P. Vlachos for his support and guidance during this dissertation."

Abstract

In today's environment, Fast-Moving Consumer Goods (FMCG) companies function within a highly complex and integrated value chain, extending from raw material procurement to the final consumer. As a result, organizations face increasing pressure to enhance operational efficiency and embrace more agile strategic approaches. In this environment, companies need to adapt to new technologies such as Artificial Intelligence to remain competitive. Artificial Intelligence (AI) is consistently described as a significant competitive advantage for supply chain in FMCG companies which can improve the accuracy of Demand Forecasting, Optimization of inventory, operational costs, distribution efficiency and risk management. The empirical literature indicates that Fast-Moving Consumer Goods (FMCG) companies are increasingly adopting Artificial Intelligence (AI); however, many organizations continue to face challenges in achieving successful implementation. This dissertation investigates the applicability of Artificial Intelligence within FMCG companies, with particular emphasis on its impact on supply chain management. The study begins with a comprehensive review of the literature on Supply Chain and Artificial Intelligence, focusing on core AI technologies and their relevance to supply chain functions. Subsequently, a qualitative analysis was conducted among employees of an FMCG company. The research adopts a case study methodology, employing semi-structured interviews among employees of an FMCG company to explore potential applications of AI and mainly the Gen AI tools in FMCG supply chain functions, the solutions may offer, and the organization's readiness to adopt such technologies. The findings reveal that the company currently leverages Artificial Intelligence tools, including Machine Learning, primary for demand planning and Generative AI mainly for administrative tasks. While Generative AI has not yet been integrated into its core supply chain operations, company is working in this direction. Furthermore, AI was identified as a well-established and widely recognized tool across supply chain functions. Participants perceived GenAI as a transformative innovation with the potential to significantly reshape the FMCG industry, particularly due to the substantial efficiency gains and enhanced decision-making capabilities it can provide in supply chain transactions. Looking ahead, the future of supply chain management is projected to become increasingly efficient, with Artificial Intelligence regarded as an essential and integral component of this evolution.

Keywords

Artificial Intelligence, Generative AI, Fast Moving Consumer Goods, Supply Chain Management, Supply Chain

"Εφαρμογή της Τεχνητής Νοημοσύνης στην Εφοδιαστική Αλυσίδα. Μελέτη Περίπτωσης Εταιρείας Καταναλωτικών Προϊόντων ."

"Σοφία Μπέτσιου"

Περίληψη

Στο σημερινό περιβάλλον, οι εταιρείες Ταχέως Κινούμενων Καταναλωτικών Αγαθών (FMCG) λειτουργούν μέσα σε μια εξαιρετικά πολύπλοκη και ολοκληρωμένη αλυσίδα αξίας, που εκτείνεται από την προμήθεια πρώτων υλών έως τον τελικό καταναλωτή. Ως αποτέλεσμα, οι οργανισμοί αντιμετωπίζουν αυξανόμενη πίεση για να ενισχύσουν την επιχειρησιακή τους αποτελεσματικότητα και να υιοθετήσουν πιο ευέλικτες στρατηγικές προσεγγίσεις. Σε αυτό το περιβάλλον, οι εταιρείες πρέπει να προσαρμοστούν σε νέες τεχνολογίες όπως η Τεχνητή Νοημοσύνη για να παραμείνουν ανταγωνιστικές. Η Τεχνητή Νοημοσύνη περιγράφεται σταθερά ως ένα σημαντικό ανταγωνιστικό πλεονέκτημα για την αλυσίδα εφοδιασμού στις εταιρείες FMCG, το οποίο μπορεί να βελτιώσει την ακρίβεια της Πρόβλεψης Ζήτησης, τη Βελτιστοποίηση του αποθέματος, το λειτουργικό κόστος, την αποδοτικότητα της διανομής και τη διαχείριση κινδύνου. Η εμπειρική βιβλιογραφία δείχνει ότι οι εταιρείες Ταχέως Κινούμενων Καταναλωτικών Αγαθών (FMCG) υιοθετούν όλο και περισσότερο την Τεχνητή Νοημοσύνη. Ωστόσο, πολλοί οργανισμοί συνεχίζουν να αντιμετωπίζουν προκλήσεις στην επίτευξη επιτυχούς εφαρμογής. Αυτή η διατριβή διερευνά την εφαρμογή της Τεχνητής Νοημοσύνης στις εταιρείες FMCG, με ιδιαίτερη έμφαση στον αντίκτυπό της στη διαχείριση της αλυσίδας εφοδιασμού. Η μελέτη ξεκινά με μια ολοκληρωμένη ανασκόπηση της βιβλιογραφίας για την Εφοδιαστική Αλυσίδα και την Τεχνητή Νοημοσύνη, εστιάζοντας στις βασικές τεχνολογίες Τεχνητής Νοημοσύνης και τη σχέση τους με τις λειτουργίες της αλυσίδας εφοδιασμού. Στη συνέχεια, διεξήχθη ποιοτική ανάλυση μεταξύ των εργαζομένων μιας εταιρείας FMCG. Η έρευνα υιοθετεί μια μεθοδολογία μελέτης περίπτωσης, χρησιμοποιώντας ημι-δομημένες (semi-structures) συνεντεύξεις μεταξύ υπαλλήλων μιας εταιρείας FMCG για να διερευνήσει πιθανές εφαρμογές της Τεχνητής Νοημοσύνης και κυρίως των εργαλείων Γενικής Τεχνητής Νοημοσύνης στις λειτουργίες της εφοδιαστικής αλυσίδας της εταιρείας, τις λύσεις που μπορούν να προσφέρουν και την ετοιμότητα του οργανισμού να υιοθετήσει τέτοιες

τεχνολογίες. Τα ευρήματα αποκαλύπτουν ότι η εταιρεία αξιοποιεί επί του παρόντος εργαλεία Τεχνητής Νοημοσύνης, συμπεριλαμβανομένης της Μηχανικής Μάθησης, κυρίως για τον σχεδιασμό της ζήτησης, και της Γενετικής Τεχνητής Νοημοσύνης κυρίως για διοικητικές εργασίες. Ενώ η Γενετική Τεχνητή Νοημοσύνη δεν έχει ακόμη ενσωματωθεί στις βασικές λειτουργίες της εφοδιαστικής αλυσίδας, η εταιρεία εργάζεται προς αυτή την κατεύθυνση. Επιπλέον, η Τεχνητή Νοημοσύνη αναγνωρίστηκε ως ένα καθιερωμένο και ευρέως αναγνωρισμένο εργαλείο σε όλες τις λειτουργίες της εφοδιαστικής αλυσίδας. Οι συμμετέχοντες αντιλήφθηκαν την Γενετική Τεχνητή Νοημοσύνη ως μια μετασχηματιστική καινοτομία με τη δυνατότητα να αναδιαμορφώσει σημαντικά τον κλάδο των Καταναλωτικών Προϊόντων , ιδίως λόγω των σημαντικών κερδών αποδοτικότητας και των βελτιωμένων δυνατοτήτων λήψης αποφάσεων που μπορεί να παρέχει στις συναλλαγές της εφοδιαστικής αλυσίδας. Κοιτάζοντας μπροστά, το μέλλον της διαχείρισης της εφοδιαστικής αλυσίδας προβλέπεται να γίνει ολοένα και πιο αποτελεσματικό, με την Τεχνητή Νοημοσύνη να θεωρείται ως ένα ουσιαστικό και αναπόσπαστο στοιχείο αυτής της εξέλιξης.

Λέξεις – Κλειδιά

Τεχνητή Νοημοσύνη, Γεννητική Τεχνίτη Νοημοσύνη, Ταχέως Μεταβαλλόμενα Καταναλωτικά Αγαθά, Διαχείριση Εφοδιαστικής Αλυσίδας, Εφοδιαστική Αλυσίδα

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List of Abbreviations & Acronyms

AI	Artificial Intelligence
SCM	Supply Chain Management
SC	Supply Chain
FMCG	Fast Moving Consumer Goods
GEN AI	Generative Artificial Intelligence
WMS	Warehouse Management System
ML	Machine Learning
LLM	Large Language Model
ERP	Enterprise Resource Planning

1. Introduction

In the 21st century, a new technological revolution is taking place and is associated with the introduction of artificial intelligence (AI) in the everyday lives of individuals as well as in the function of businesses. The use of AI entails the ability of computational systems to act independently and be able to solve problems that arise in different cases with low cost and in a short amount of time (Dash, McMurtrey, Rebman, & Kar, 2019).Supply Chain Management (SCM) is of pivotal importance in the function of businesses and in customer satisfaction. In order for it to be effective, it is important to allow the managers to calculate and decrease risk associated with the challenges in the sector (Brintrup, et al., 2024). Such challenges are, among others, related to the need to move products fast, at the correct center at a low cost (Sallam, Mohamed, & Mohamed, 2023), implement law, achieve sustainability (Basu, 2023), as well as the need to tackle cyberthreats (Melnyk, et al., 2022). The adoption of AI in SCM can allow managers to decrease the time, cost and challenges associated with the seasonality of the sector. There are several AI tools that can be used in SCM and AI powered technologies as well as real time monitoring that can facilitate cost reduction and allow them to gain a competitive advantage in the market (Dash et al., 2019). Additionally, it could be important in the management of big data in order to maximize efficiency and efficacy (Zeng & Yi, 2023). In this thesis will focus on the use of AI in the SCM of companies in the field of Fast-Moving Consumer Goods (FMCG). FMCG are products like food, beverages, textiles and other products that are not durable. As a result, it is important for companies who produce them to transfer them fast and at proper conditions (Kuzmina, Prendeville, Walker, & Charnley, 2019). At a European level such companies typically focus on transferring large amounts of consumables in retail markets like supermarkets, wholesale markets and hypermarkets (Stanciu, Vîrlănuţă, Vochin, Ionescu, & Antohi, 2019). Based on AIM (2024) data, in Greece, the FMCG sector, represents a major pillar of the economy, accounting 36,1% of Greece GDP in 2023 and contributing €79.5 billion in economic value. The industry consists of 7.678 companies and 87.892 employees. In order to discuss this topic, a critical literature review as well as qualitative research with the use of semi-structured interviews will take place. The critical literature review will focus, mostly, on the careful selection of academic articles published after 2018, in order to investigate the applications of AI in the SCM of FMCG. The primary research aimed to

investigate potential applications, challenges that could be addressed in the existing function of the Supply Chain and the company's degree of readiness to apply Generative AI tools.

2. Aim of this dissertation

In today's fast moving business environment, it is crucial for FMCG companies to be able to transfer and store products on shelves on time due to high competitiveness. Their main goal is to avoid being out of stock so that consumers can be able to find the product available by the time they need it and of the best quality possible. However, global supply chains are facing many challenges and disruptions including demand volatility, supply disruptions, raw material shortages, labor shortages and increased customer expectations. FMCG Companies, as they operate in a landscape where resilience, speed and accuracy needed, must be able to tackle these challenges and maintain a functional SC. Artificial Intelligence has shown that it could address many challenges through predictive analytics and automation. Therefore, the aim of this dissertation is to examine the evolution of supply chain management by exploring how Artificial intelligence technologies have optimized the Supply Chain processes and how GenAI could optimize further the supply chain performance across key functions such as forecasting, inventory management, customer service and logistics. Main research questions that are going to be approached include the applications of Artificial Intelligence and Generative AI within the FMCG supply chain and their emerging role, their ability to optimize the existing operational processes, the current level of organization readiness for GenAI adoption, and the implications these technologies may introduce. The methodology will be primary research through questionnaires, interviews and collection of available data from known and available resources for this topic in order to analyze them and enhance the content which could offer actionable insights to companies and to academy. To enable a thorough understanding emphasis is placed on the careful selection of articles published in credible scientific magazines, academic books and reports. The material used is published mostly after 2016 and, preferably, after 2020, expect on articles focusing on definitions and the theoretical framework of the dissertation (i.e. methodological aspects). This is to ensure that the analysis is up to date with current research in the field.

3. Literature Review

The present chapter aims at reviewing the existing literature with regard to, first, the management of SCM "traditionally" and with the use of AI and, second, to investigate the potential limitations in the adoption of AI in the SC.

3.1 Supply Chain- The Traditional Model

The term "Supply Chain Management" is complex and can be defined differently according to the focus of a paper or the approach used. Its history can be traced back to the 1950s when its use was related to the interaction between the supplier and the buyer and, then, it was further defined and evolved as a term in the 1980s (Blanchard, 2021; Frazzon et al., 2019).Hugos (2024) understands SCM as managing processes to influence the performance of the supply chain (p. 3-4). As part of this definition, the author further elaborates what it entails and describes it as either a systemic, strategic process that is focused on "*the coordination of the traditional business functions and the tactics across these business functions*" in a company or "*the coordination of production, inventory, location, and transportation*" in the SC with a focus on achieving "*the best mix of responsiveness and efficacy*" (Hugos, 2024, p. 4). Altekar (2023, p. 4) adds that SCM is about strategic management of the procurement, transportation and storage of materials with a focus on finished products. The company needs to organize its processes to achieve the above in a cost-effective manner that is current and in line with the demand of customers. This means that the SCM is also associated with the creation of value for the company. Then, Frazzon et al. (2019) underlines that the rise in the use of new technologies worldwide has led to the creation of the term "Industry 4.0". Industry 4.0 refers to the use of digital and automized technologies to ensure a transparent and real-time process of information sharing and production. As the incorporation of such technologies continues, the term SCM 4.0 has also been created. SCM 4.0. refers to the use of smart technologies in managing the supply chain.

3.1.1 Purpose and Evolution of Supply Chain Management

According to Hugos (2024), the focus of SCM is effectiveness and fulfilling the customers' needs while, at the same time, always improving customer service and organization of procedures. To achieve that, SCM and decision-making with regard to it place emphasis on production, inventory, location, transportation and information. This means that the companies have to consider what products they transfer, where they store them and how and if they can be transported accurately, efficiently and on time.

Blanchard (2021), then argues that, although SCM has changed over the years, its aims have not changed significantly. Indeed, both traditional and modern supply chain management are aimed at understanding what the SC of a company is and what it entails, its limitations, the optimal processes that will ensure the timely and safe transportation of goods and empowering the human resources who work in this department.

Frazzon et al. (2019) attempted to discuss the process of change from the traditional SCM to SCM 4.0. Based on their research, in the past, SCM was based on a clear system that was focused on the processes and interorganizational operations, collaboration and administration, as well as strategy and governance. Additionally, it was important to promote the company's product, form relations with third parties as well as to measure quality and effectiveness.

Nowadays, SCM integrates elements from different fields and aims at using information technologies to achieve automation of processes in logistics. Some of the techniques incorporated are, among others, the use of barcodes and Enterprise Resource Planning Systems (ERPs). Barcodes can help with the tracing of products in real time and receiving information accurately regarding inventory. ERPs are used in estimating the quantity of goods produced by each department, their average transportation time, the integration of various manufacturing processes and, also, for receiving information on the supplier and the transportation systems. Moreover, Warehouse Management Systems (WMS) are used to monitor the processes that take place in the warehouses, estimate the available space in real time and share this information with partners. Transportation Management Systems (TMS) are also used to apply solutions when problems occur and to properly intervene when necessary (Frazzon et al, 2019).

As a result, in the 21st c. the SC encompasses the following (Altekar, 2023, p. 4):

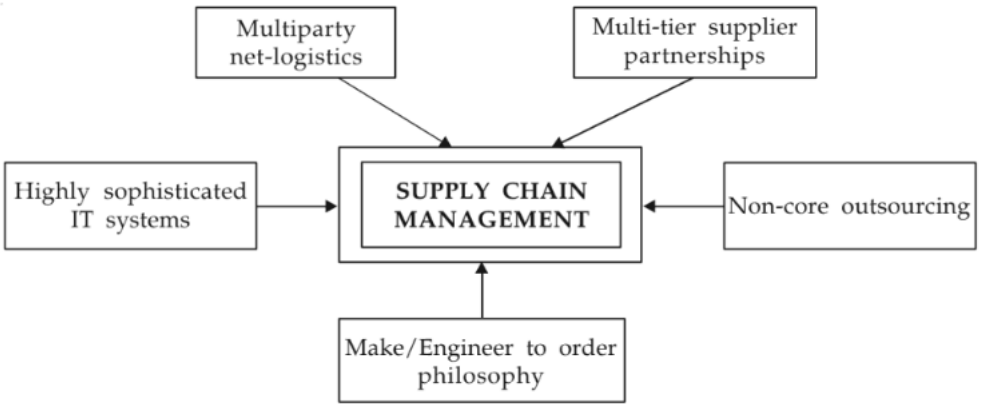

FIGURE 1.1 Conceptual model of SCM.

Figure 1, modern SCM, based on Altekar (2023, p. 4).

Using a make-to-order philosophy is an interesting shift in the logic of SCM. As the demand rises, companies aim to increase profitability and performance by decreasing the storage area needed and the time of production. By producing on demand, companies reduce losses, improve their overall performance and can accommodate the needs of different suppliers and customers (Kusrini & Miranda, 2021).

3.1.2 Traditional SCM and challenges in their application

As it has been stated above, traditional SCM as a term first appeared in the aftermath of World War II. With the increase in international trade and the expansion of the market, companies started organizing their production and systems more. This led to the need for business to improve their processes and find ways to remain competitive, especially due to the entrance of new competitors in the market. SCM was used to increase profit, productivity, quality and delivery (Altekar, 2023).

Traditional SCM is, similarly to modern SCM, aimed at more than simply ensuring that the customer will receive their goods and services on time. On the contrary, traditional SCM is associated with inbound logistics, thus the way products are stored and handled, operations,

outbound logistics, sales and services. This means that the companies have to invest in technologies that will allow a careful selection of machines, tools and processes to physically store and transport a product to the customer. Additionally, they must consider how to advertise and promote their services and, through SCM, to improve their image (Blanchard, 2021).

Further focusing on traditional SCM, Lambert & Enz (2017) aim to identify its applications and challenges. Based on the authors, in the early 2000s, SCM was understood more as a process that entailed the transportation of goods to a certain number of suppliers that was, more or less, standardized. Companies produce goods based on estimations on demand and manage their relationships with their key partners with the use of strategic design to earn a competitive advantage in their market.

Traditional SCM, therefore, was based on a system similar to the one illustrated below:

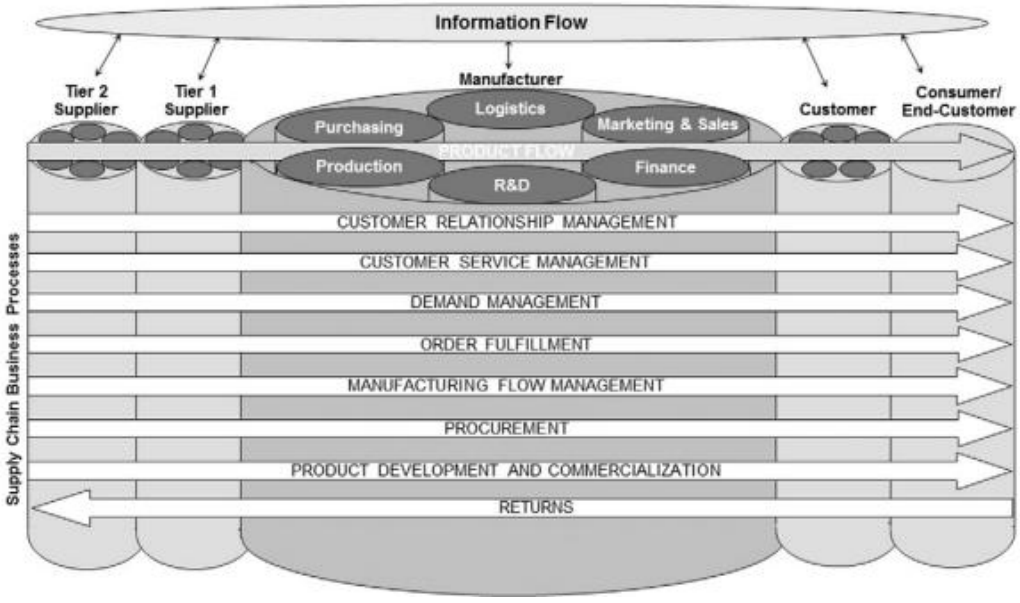

Figure 2, traditional SCM, Lambert & Enz (2017, p. 2)

This figure demonstrates that each company had its key suppliers, manufacturers and customers and used its logistics, marketing, R&D, finance, sales, production and purchasing departments to build relationships, manage their resources, fulfill demand and orders, order and use goods in their production and develop and market their products. The process was largely formed based on expectations on demand and the information that the company had in hand from their own departments and relationships with their suppliers and customers (Lambert & Enz, 2017).

Altekar (2023) in their analysis have shown the changes in the expectations of customers as the companies transition from traditional SCM to more market-led SCM model. In detail, nowadays the customers are no longer looking for companies that can produce goods but that their production is of high quality and volume. Additionally, they are looking for suppliers that have lower prices and better quality to price ration. The value of the company's SCM lies in their ability to deliver timely and comfortably.

The use of AI technologies, especially in the case of companies that sell FMCGs can allow the companies to tackle the problems that occur in the traditional SCM. In detail, through the use of AI, they can increase the resilience of the supply chain as well as decrease disruptions that occur. The "traditional" approach, being focused on the processing of data with conventional means, does not offer such an opportunity to the same extent (Singh et al., 2025).

These companies use AI and the internet in general to improve their decision-making process, review data as well as to acquire information on the market (Nozari, Szmelter-Jarosz & Ghahremani-Nahr, 2022). According to Singh et al. (2025), AI is used in these companies to optimize routing, increase the efficiency of their processes, monitor and predict demand. In the case of companies that produce FMCGs this is important as the companies need to produce the optimal amount of goods and transfer the products fast and safely, therefore, AI technologies and the internet are used to facilitate this process and ensure cost-reduction. This transforms the SCM as it becomes less reactive and more proactive (Najafi, Nozari & Edalatpanah, 2022).

4. Artificial Intelligence

Artificial Intelligence as a concept introduced in 1950 from Alan Turing in his paper, "Computing Machinery and Intelligence'', where investigated the possibility of machines to think like humans and introduced the imitation game as a method for evaluating machine Intelligence (Turing, 1950). This was the start of the theoretical framework that established the basis for Artificial Intelligence (AI) while during the decades, many innovations by scientists and engineers shaped it to the AI we know today. (aws. Amazon.om/what is artificial intelligence ,Russell and Norvig, 2016). Artificial Intelligence is a transformative

technology which redesigns the industries and the way we interact with the world (Mishra, 2024). AI has demonstrated significant potential since late 1970s to enhance human decision making and increase productivity across business core activities (Min, 2010). AI is an umbrella, which consists of different subsets where any subset uses a variety of techniques for making machines more human-like (aws. Amazon.om/what is artificial intelligence). In this dissertation, the most well-known AI tools are mentioned such as Predictive AI, Machine Learning (ML), Deep Learning (DL) , Generative AI (GenAI) and Agentic AI.

4.1 Artificial intelligence Tools

Identified that there are various AI tools that can or are used in the SCM. In this section of the paper, the aim is to discuss if, how and to what extent different "types" of AI and automation processes are currently used, their potential and limitations as well as how they are used in the SCM of companies that produce FMCGs.

4.1.1 Predictive AI

Predictive AI is a tool that is used by companies in their operations and is supported by artificial intelligence models and machine learning (Kagalwala et al., 2025). Based on the paper by Kagalwala et al. (2025) the use of predictive AI in the SCM has been revolutionary in the field as, along with machine learning, it can help increase performance and reduce cost. This is because the companies can predict their demand and, therefore, produce on time, the correct amount of products, become more efficient and responsive to the changes in the market. Additionally, the use of predictive AI can allow companies to recognize patterns in their demand which, in its turn, helps them optimize their internal processes. In the case of companies that produce FMCGs, the predictive use of AI is of outmost importance, and this type of AI is one of the most adopted and used (Uddin, 2026).

The use of predictive AI makes it possible for companies to have an estimation on the storage that they will need to use as well as when and how many products they will produce. As a result, many departments in companies, such as procurement, logistics, production and marketing, have increased readiness and are able to make better decisions. This leads to lower risk and higher flexibility (Kagalwala et al., 2025).

Muthukalyani (2023) points out that predictive AI is valuable in SCM as forecasting is used, apart from its ability to identify patterns, to further improve customer satisfaction. This is due to the fact that the companies that use it perform better and are more likely to be able to respond to the customers' needs, which makes them more credible and competitive. Similarly, when it comes to FMCGs, Nweje & Taiwo (2025) point out that alongside machine learning, predictive analytics plays a pivotal role in helping FMCG companies to accurately forecast demands, reduce out of stocks and optimize inventory levels. Sharma (2025) also notes that, in the case of FMCGs, this type of AI is used in prediction of sales, in developing new techniques to forecast the trends in the sector as well as towards an overall optimization of the SCM. AI tools can allow the prediction of trends and demand and, therefore, can stock their warehouses in time with the correct amount of products. This helps reduce waste and mitigate risk. This can lead to a further increase of resilience which is necessary in the case of FMCGs (Tazvivinga & Samuels, 2024).

The fact that predictive AI uses technologies that allow for a fast and accurate use of large amounts of data is its competitive advantage compared to "traditional" SCM strategies and tools. Since predictive AI and machine learning can combine various databases, companies are able not only to use current data but, also, the existing databases of the company in the decision-making process (Muthukalyani, 2023).

According to Ejjami & Boussalham (2024), the use of predictive AI can enhance the performance of companies by increasing their resilience. Companies that use predictive AI can better interpret data without bias and with more accuracy. However, the researchers identify potential concerns in the use of predictive AI. Among the most important ones are data privacy and transparency. Since the data used is often classified and "sensitive" it is important for companies to ensure that they are ready and capable to ensure that they are cryptographed and that the algorithm they use are optimal and do not allow for sharing or theft of information, i.e. from competitors.

Moreover, Ejjami & Boussalham (2024) argue that the use of predictive AI raises questions on fairness and integrity in the operation of companies. Logistics, procurement and SC management must adhere to strict standards and take into consideration various factors before making a decision and, in the case of predictive AI, they must ensure that no decisions are made before carefully considering the results of an analysis. AI must be used as a tool and not as the "decision-maker" and managers should make sure that they know how to interpret the data and predictions.

Apart its application in FMCGs SCM, predictive AI analytics also can have an impact on other markets. For instance, Khan et al. (2024) in their study show that the use of predictive AI technologies can allow a reduction of cost and uncertainty in the healthcare SCM. In this specific market the adoption of predictive AI also helps decrease uncertainty, increase performance and reduce costs as well as allowing for a better decision-making process.

Then, when it comes to the problems and limitations of applying predictive AI technologies in the SCM , Ahmed, Abdullahi, Gital & Dutse (2024) argue that this technology is important in improving performance, but that positive impact can be limited by factors such as:

- Decreased data quality
- Problems with the interpretation of data and the reports generated by the AI model
- The lack of knowledge on behalf of human resources.

4.1.2 Generative AI

Generative AI is one of the available types of artificial intelligence systems that is used to analyze data, find information, use real-world databases and create content among other things. It can, to some extent, mimic human intelligence, in the sense that it follows certain patterns of speech and "behaviour" that is "human-like" and that it can learn and be taught. Additionally, Generative AI can combine data to create images, text and sound and even do stimulations (Shekhar et al., 2023).

In detail, Generative AI models are a type of Large Language Model (LLM) and can be open-types of AI. Such an example is ChatGPT. This type of Generative AI is programmed to learn while interacting with the user and, as a result, while in its early stages the accuracy of data and information were rather limited, they are improving over time (Khlie, Benmamoun, Jebbor & Serrou, 2024). Large Language Models (LLMs) are used in the SCM to enable automizing and optimizing the management of logistics as well as in the decision-making process and are applied regardless of them. LLMs are types of AI that are focused on language.

Moreover, Generative AI relies on neural networks (Li et al., 2024) and machine learning algorithms not to classify, predict or optimize data and resources like other AI types, but to create an original content. The algorithms used in Generative AI can be used in SCM to help it adapt, become more resilient and transform. This need derives from the fact that the

international market is changing as well as that businesses can be largely benefited by its incorporation in their services (Boone et al., 2025; Fosso Wamba, Guthrie, Quieroz & Minner, 2024; Shekhar et al., 2023).

The use of Generative AI constitutes a new development and innovative practice in the SCM worldwide. Its inclusion to the management of resources and logistics as well as the SC is expected to completely transform the capabilities of businesses. However, not all of them apply it to the same extent with some having already fully incorporated it and other using it in very specific strategic decisions and/or practices such as to reduce prices or in customer support (Fosso Wamba, Guthrie, Queiroz & Minner, 2024).

While, in general, Generative AI is more associated with the creative industries, in reality it can have various benefits in the SCM. For instance, it can allow the incorporation of real-world databases in order to optimize the workflow, improve the decision-making processes that are applied in a company, allow further automation of tasks and the prediction of future trends. Therefore, it will lead to an increase in productivity, efficiency and effectiveness (Khlie, Benmamoun, Jebbor & Serrou, 2024).

Additionally, Generative AI can lead to an improvement in the companies' management and overall strategic planning by reimagining how their processes can be done and what managerial decisions could be taken. Contrary to other type of AIs whose input is mostly dependent on the data entry, Generative AI can propose solutions, "think" and interact with the user and combine data to create proposals (Boone et al., 2025). Moreover, it can allow a better communication between companies leading to an improvement in coordination and SCM (Li et al., 2024).

4.1.3 Machine Learning

When it comes to machine learning (ML) in the SCM, along with other types of AI such as predictive AI and Generative AI, it can help the companies use data to forecast their future demand and, therefore, to identify patterns and trends (Kagalwala et al., 2025). Vlachos & Reddy (2025) in their analysis emphasize that machine learning plays an important role in improving demand forecasting, procurement performance and overall supply chain efficiency. Similarly, Aichner & Santa, (2023) in their study highlights that the use of ML in the SCM of companies that produce FMCGs is important in predicting demand and, therefore, can allow for a better performance by the procurement department and the SCM.

Companies that use such technologies are able to optimize their SCM and decrease risks while also enhancing performance. As is the case with Generative AI (Li et al., 2024) ML types and models are applied differently depending on whether they are used for customers or suppliers (Rolf et al., 2023).

Machine learning is considered to be a "sub-type" of AI (Tirkolaee et al., 2021) but it has applications in the design of other types of AI models such as Generative AI (Boone et al., 2025). In detail, machine learning is used in the detection of patterns as well as their identification in datasets and to give new insights into how they can be better used and translated. Its main application in the SCM has to do with managing operations and predicting patterns and outcomes. However, it can be used in other functions and processes in businesses such as in manufacturing, in problem-solving and analysis of information (Tirkolaee et al., 2021).

According to Tirkolaee et al. (2021), there can be various applications of machine learning techniques and practices in businesses such as in the design of the applied SCM framework, its automation, predicting outcomes and risks. Further, it can be used in understanding processes, in calculating financial risk associated with different decisions in the SCM as well as choosing between different suppliers. ML is considered to be an area of AI that is related to programming. It uses algorithms to react to data that is large in size, new and even unknown and can assist in its classification into different categories and in making predictions. Furthermore, it uses "computer-aided modelling and realization of learning phenomena" to improve a process' performance and/or make predictions (Wenzel, Smit & Sardesai, 2019, p. 420). Prior to its implementation, it is crucial that the companies adapt their current systems such as their ERPs (Aichner & Santa, 2023).

Wenzel, Smit & Sardesi (2019) argue that ML can enhance decision making and performance in the SCM when processing and management with conventional tools is impractical, inefficient or simply impossible. According to the researchers, the use of ML can lead to a more sophisticated SCM, which is, though, dependent on the types of models used as well as the type of datasets that are selected and the hardware that is utilized. ML can be categorized in the following types:

Supervised learning, which is associated with the use of a computer programs that has a known output and uses known example databases. The process is supervised in the sense

that rules learned are applied when new databases are used and that the computer programs can be trained. It is the most used type of ML and is chosen in order to classify data and do regression.

Unsupervised learning, then, is used typically in clustering and is based on the model of learning, on behalf of the computer, without a "teacher". This method can be used in various tasks such as non-linear dimension reduction and association rules and is associated with finding similarities between the data (inputs) in order to categorize them by identifying common "patterns".

Reinforcement learning, additionally, is a solution applied during the training phase. As a result, it is a process that involves learning, helping the system find solutions and adjust.

Nwangwu (2025) examined the applications of AI in the decision-making process of the SC in lubricant firms in Nigeria and showed that ML and predictive AI is used to increase competitiveness through the use of predictive models combining complex data and incorporating their existing knowledge in their predictive models. The majority of the companies rely on neural networks that have, indeed, a positive effect on the SCM while there is a reported lack of knowledge and expertise on behalf of the employees on the use of AI and ML in general. However, know-how is essential in the successful application of ML and predictive AI in the SCM.

In further detail, regarding MC and its impact in the decision making process, Nwangwu (2025) argued that it is used to analyze different databases and identify patterns as well as provide information on different topics, from the weather to the demographic characteristics of the customers to suggest changes in the supply chain management. Neural networks which, according to the author as a type of MC algorithm, are used in the exploration of big data that are characterized by their complexity and, along with human creativity, can lead to a significant increase in performance as well as a cost reduction.

4.1.4 Deep Learning

In the case of SCM deep learning also plays an important role in forecasting demand and improving effectiveness, efficiency and profitability. Deep learning is a type of ML

algorithms (Hosseinnia Shavaki & Ebrahimi Ghahnavieh, 2023) commonly used alongside ML and other types of AI and can reduce the time and effort taken to perform analytics and process complex data (Douaioui, Oucheikh, Benmoussa & Mabrouki, 2024; Terrada, El Khailj & Ouajij, 2022).

According to Terrada, El Khaili & Ouajji (2022) deep learning has several specific applications in the SCM which are most related to production, energy efficiency, e-commerce and predictions. The use of deep learning can allow forecasting of trends and patterns in SCM and can be beneficial both in the short and in the long term.

4.1.5 Agentic AI

Agentic AI is a dynamic type of artificial intelligence that is used to automize the SC as well as increase sustainability and efficiency, particularly with regard to cost. It is a type of AI that, when properly applied in the SCM, can reduce the probability of error by acting largely independently. Contrary to other types of AI, agentic AI makes decisions and applies them and, as a result, it is considered to be one of the most "intelligent" types of AI (Aylak, 2025). This type of AI is considered to have large potential in using algorithms to take action. It is very affordable and effective, while it is also autonomous, something that largely reduces the need for human intervention and interaction.

In further detail, agentic AI can be used in real-time and real-world situations and does not limit its capabilities in predicting patterns or identifying them. On the contrary, while acting independently, it uses the data that it possesses to resolve issues and, simultaneously, adapts and learns (Aylak, 2025). This ability is what largely distinguishes it from other types of AI (Tathavadekar, 2025).

Therefore, the use of Agentic AI is expected to fully revolutionize the SCM. Being very adaptable, its use is not limited to a specific problem or department but can be expanded to areas such as financial management and environmental protection. Amongst others, companies use it in warehouse management and manufacturing and it is shown that it can increase agility (Kalisetty, 2024).

4.2 Alternative Approaches in Supply Chain

Based on the literature review that has taken place, SCM is bound to change as new technologies are being developed and incorporated in its practice and processes (Kalisetty, 2024). Apart from the incorporation of AI technologies, there are current trends that are worth further investigating and discussing.

For instance, the available literature review illustrates the need for increasing visibility and accountability in the SCM. This is due to the fact that the suppliers and customers alike demand from the companies to share their information more effectively and timely (Roy, 2021).

Moreover, in various sectors, there is an increasing trend of digital transformation of the SC. This process is largely influenced by the use of alternative technologies in the SCM and caused by the introduction of internet, the digital technologies and other types of automation technologies in the SCM (Preindl, Nikolopoulos & Litsiou, 2020).

Additionally, whilst the 4th industrial revolution leads to the need to transform, many companies do not completely abandon the "traditional" SCM but use the new technologies to increase performance more "conservatively" and at smaller scales.

Another "trend" in SCM that is identified through the literature review is the aim for sustainability. Nowadays, both the consumers and the society in general demand that the companies reduce their environmental impact by introducing smart ways and technologies towards a "green" SCM (Tseng et al., 2019).

Digital transformation is associated with this development (Lerman et al., 2022), however this approach is more focused on applying the existing knowledge and experience in improving sustainability. Based on the existing literature, though, to enhance performance and achieve the reduction of environmental impact through a sustainable SCM, it is important for companies to also use mathematical models to conceptualize and transform their practices and processes (Tseng et al., 2019).

Moreover, the fact that, at a global level, temperatures rise and biodiversity is reduced, leads to governments requiring companies to improve their practices in order to avoid being fined (Ventura, 2021). That is especially true in the European Union where companies are legally bound to reduce carbon emissions, increase recycling and decrease waste by repurposing

goods (Partzsch & Breunig, 2025).

4.3 Comparison Of Different Types Of AI

	Predictive AI	**Deep Learning**	**Generative AI**	**Machine Learning (ML)**	**Agentic AI**	**Similarities**	**Gaps**
Purpose	Forecasting, pattern detection, risk reduction, performance improvement, optimizing internal processes	Forecasting, process complex data, recognition using neural networks	Producing human-like text, content, and reasoning, analyze data, find information, use real world databases. It can lead to an improvement in automation and decision making	Data analysis, pattern detection, give insights	Autonomous decision-making and action	All depend on data inputs and computational modeling to function effectively	Predictive AI and ML focus on accuracy, Generative AI focuses on language, Agentic AI focuses on autonomy
Level of Autonomy	Low–moderate. Depends on user input and data quality. It is not a decision maker	Low–moderate. Learns patterns but cannot act on its own	Moderate. Generates content but requires oversight	Low–moderate. Depends on training and algorithms	High. Acts independently using learned knowledge	All require training data	Agentic AI is the only fully autonomous type
Main SCM Applications	Demand forecasting, risk reduction, process optimization, increase performance and reduce costs	Demand prediction, warehouse optimization, production, partner management	Limited SCM use. Is mainly used for communication, documentation, decision support	Demand forecasting, procurement optimization, managing operations	Autonomous supply chain decisions, dynamic response	Predictive AI, ML, and Deep Learning support forecasting	Generative AI is not yet used for SC optimization ,Agentic AI moves from prediction to autonomous decision-making and execution
Strengths	Fast and accurate use of large amounts of data, reliable, accurate predictions	High accuracy in complex pattern recognition	Demonstrates human-like reasoning and communication, with continuous improvement over time	Data analysis, predicting patterns and outcomes, associated with all types of AI	Highest independence. Can act without human intervention	All improve decision-making	Generative AI: Perform less accurately in predictive tasks, Predictive AI: Constrained by the quality of available data, Agentic AI: Still in the early stages of development and maturity.

Weaknesses	Depending on data quality and user input. Data Privacy and Transparency	Requires large datasets	Perform less accurately in predictive tasks. It is constantly taught and it is evolving	Requires continuous training.	Ethical and control concerns. Complex implementation	All require data and training	Generative AI has yet limitations in handling critical SCM optimization tasks, whereas Predictive AI can forecast outcomes but cannot act independently
Relationship to ML	Built on ML models	Subset of ML (neural networks)	Uses ML for training LLMs	Sub-type of AI	Uses ML to learn and act	ML is the foundation for all AI types	ML is a base technology, whereas Predictive AI, Generative AI, and Agentic AI are applications
Human-Like Behavior	Low	Low–moderate	High. Mimic human intelligence	Low	High (autonomous agents)	Generative and Agentic AI mimic human behavior	Predictive AI and ML do not mimic human behavior

Comparing the different types of AI and automated technologies used in the SCM is important in this research process. However, it is noted that it is not always possible to completely differentiate with one another as several technologies have similar means or applications.

When it comes to predictive AI, first of all, it is supported by AI models and ML and is focused on increasing performance and cost-effectiveness (Kagalwala et al., 2025). This technology is additionally implemented by companies in order to find patterns in their data and optimize their processes with regard (and not only to) SCM. Though its use companies can reduce risk and increase performance (Kagalwala et al., 2025) as well as customer satisfaction (Muthukalyani, 2023).

Predictive AI is less autonomous and "smart" compared to other AI types such as agentic AI in the sense that the success of its application is largely reliant on the user and the data that has been given to it. On the other hand, though, it is important as it can be a fast, reliable and accurate way to predict what decisions which have specific outcomes (Nweje & Taiwo, 2025). Similarly to predictive AI, deep learning can predict demand and, therefore, is used

in different processes, from warehouse management to managing relationships with partners (Douaioui, Oucheikh, Benmoussa & Mabrouki, 2024; Hosseinnia Shavaki & Ebrahimi Ghahnavieh, 2023Terrada, El Khailj & Ouajij, 2022).

When used simultaneously to traditional SCM and ML, predictive AI can allow the improvement of the decision-making process (Muthukalyani, 2023) and the increase of the company's resilience (Ejjami & Boussalham, 2024). Its impact also lies on the fact that it overcomes problems related to human error particularly in processing and interpreting data (Ejjami & Boussalham, 2024).

Generative AI, next, is a more "human like" agent (Shekhar et al.,2023), similarly to agentic AI. This is due to the fact that this type of AI mimics, in a way, how humans think and talk (Shekhar et al., 2023). Since it is a type of LLM it follows its logic. However, it is more prone to mistakes compared to predictive AI (Ejjami & Boussalham, 2024) because it is being constantly taught and it is evolving. This improvement may take time but it is shown that it can lead to an improvement in automation and decision making over time with this type of AI learning from its mistakes and constantly improving with every new retraining and scaling (Khlie, Benmamoun, Jebbor & Serrou, 2024). However, it is mostly focused on language (Srivastava et al., 2024) and is not used in the classification, prediction or optimization of SCM in the way that other types of AI are (Boone et al., 2025; Fosso Wamba, Guthrie, Quieroz & Minner, 2024; Shekhar et al., 2023).

ML is associated with all types of AI as it is used in their creation and function and its main purpose is data analysis and predictions (Kagalwala et al., 2025; Vlachos & Reddy, 2025). It is used in their analysis to point out that machine learning is important in predicting demand and, therefore, can allow for a better performance by the procurement department and the SCM. Companies that use such technologies are able to optimize their SCM and decrease risks while also enhancing performance. As it the case with generative AI (Li et al., 2024) ML types and models are applied differently depending on whether they are used for clients or suppliers (Rolf et al., 2023).

Machine learning is considered to be a "sub-type" of AI (Tirkolaee et al., 2021) but it has applications in the design of other types of AI models such as generative AI (Boone et al., 2025). In detail, machine learning is used in the detection of patterns as well as their identification in datasets and to give new insights in how they can be better used and translated. Its main application in the SCM has to do with managing operations and

predicting patterns and outcomes. However, it can be used in other functions and processes in businesses such as in manufacturing, in problem-solving and analysis of the available information for both suppliers and buyers and the company itself (Tirkolaee et al., 2021). Agentic AI is the most independent type of AI used in SCM as it can apply the knowledge it possesses to act autonomously (Aylak, 2025).

4.4 Governance and Ethics

Coming to governance, it is not just about understanding the legal dimensions of using GenAI in the SCM but also about data management. As it has been said above, the employees should, in any case, be able to process data, maintain data privacy and integrity. This will increase the company's accuracy, credibility and efficacy. Clients, suppliers and the consumers alike want to be sure that their data, including their financial data and sensitive information are secure. Otherwise, the company can face loss of income, legal trouble and/or loss of reputation (Aldboush & Ferdous, 2023).

GenAI governance will entail, based on the above, the decision making process regarding adopting AI in the SCM, controlling, reporting, predicting and analyzing, managing problems relating to mistakes and errors made by the AI that can affect the SCM as well as being up-to-date with the existing legislation. All of the above are, apart from associated with management, also important in ethics. Compliance with the international, EU and national law can allow the company to be more accountable and protected in the case of a "malfunction" of the software or hardware used (Mesarčík, Podroužek & Gavorník, 2023). Audit can play an important role in the process. Internal audit, which is done by members of the organization, can allow building trust, resilience and increasing cybersecurity. On the other hand, external audit is generally considered to be more reliable as it is done by independent auditors who do not have interest in stating that a process is safe if it is not.

What is important to underline is that compliance to law and considering ethics in their everday function should not be theoretical and sole statements of the company. The more secure the processes the better their outcomes, the less the risk and the higher the trust not only on behalf of the customers, suppliers and consumers but also the employees (Han et al., 2025).

4.5 Limitations

Limitations of "traditional" SCM and the use of AI, LLMs and ML in the SCM

Traditional SCM can have challenges and limitations in its application. As companies progress and implement changes to incorporate new technologies, their customers and suppliers demand that they are increasingly more flexible and adaptable. This means that traditional SCM can reach its limits and not be able to allow for close collaboration that is possible with the use of internet and cloud technologies. Moreover, rejection of IT technologies can lead to reduced awareness of the needs of the market and/or lack of proper information on the state of their production, the time and place when an order arrives or their current storage capacity (Kopanaki, Karvela & Georgopoulos, 2018).

The ability to trace goods and orders immediately with the use of internet is, indeed, crucial in today's market. Companies, regardless of their size, must be able to perform and deliver what they promise. At the same token, the managers need to be able to learn about new technologies and implement change when necessary (Queiroz, Telles & Bonilla, 2020).

This is particularly the case for companies that produce and/or transport consumables such as food. Food needs to be transferred properly, at the right temperature and overall conditions and delivered in a timely manner (Mesic, Molnár & Cerjak, 2018; Sitek, Wikarek & Nielsen, 2017). The lack of incorporation of new technologies and automation processes can reduce the transparency, reliability and safety of the SCM and increase waste. Therefore, the companies that do not implement them will be at loss, both in terms of capital and also in terms of status in the market (Gurrala & Hariga, 2022).

On the other hand, however, AI also has limitations. Like any type of AI model, for instance, in the case of predictive and generative AI cybersecurity becomes crucial, but, especially in the case of generative AI, one concern raised by researchers is related to misinformation and mismanagement. The information given by such AI models is dependent on the model's "learning" process and not all of it is reliable or accurate (Boone et al., 2025). This means that it should be mostly used as a tool and not as a panacea in all of the company's problems and challenges with regard to SCM (Boone et al., 2025; Li et al., 2024).

Then, in the case of ML, there are limitations and concerns identified by the existing literature. Vlachos & Reddy (2025), for instance, highlighted the importance of data protection as well as overall system security and the adherence to relevant legislation. Moreover, they raise concerns over the potential social and ethical implications of the use of machine learning in the SCM. Tirkolaee et al. (2021) mentioned that the lack of attention in understanding how it can be applied to the SCM can lead to problems in its application. Also, Ni, Xiao & Lim (2020) point out that the use of the different models of ML is not even across the board in SCM and, therefore, the companies do not take full advantage of the potential of its use.

In summary, the integration of AI and Machine Learning into Supply Chain requires that the companies maintain a balance between "traditional" SCM methods and the adoption of new advanced technologies. In order to fully take advantage of the possibilities provided by the Artificial Intelligence , the companies must be able to have technical expertise and the know-how , comply with the existing regulations, adjust their strategies and address challenges that arise. Otherwise, the implementation of such technologies can lead to significant business disruption in the management of the SC (Singh, 2023).

Moreover, companies have to operate under conditions of uncertainty and be able to constantly change their practices and targets. This can be difficult, especially if the management does not have enough expertise or if the data used is large in quantity and highly complex. Such a need for constant adaptability can lead to problems regarding the efficiency of the SC as well as the ability to fulfil the needs of the customers (Terrada, El Khaili & Ouajji, 2022).

5. Research Methodology

The purpose of this chapter is to explain the research methodology, i.e. the process followed to design the interviews, collect primary data and analyze them.

5.1 Case Study of a FMCG company- A Qualitative Analysis

5.1.1 Qualitative Analysis

The main methodology followed in this dissertation is that of primary qualitative research using semi-structured interviews. The use of a qualitative methodology is selected in order to achieve an in-depth understanding of the topic, given its complexity and the fact that the introduction of AI technologies in the market are rather recent developments.

Qualitative interviews have been shown to be a practical, effective method of collecting data that can be used to collect information on the opinions, ideas, motivations and concerns of individuals. This methodology has practical implications and, when used appropriately, can allow for a generalization of findings. It has strong academic value in the sense that, especially in highly contested subjects, it can allow the participants to elaborate on topics that interest them and give their insights (Alamri, 2019; Maxwell, 2021).

On the contrary, in the process of conducting quantitative research, i.e. with the use of a questionnaire, the questions asked are more strictly structured and the answers are pre-given. The participants select between options that are closer to their actual opinion or answer regarding the degree to which they agree with a statement (Meadows, 2003).

Although quantitative research tools allow for the collection of a large number of data that can be, later on, analyzed with the use of statistical tools (Jasemi et al., 2013) they have many limitations that can be overcome with the use of interviews. These include the fact that there is no guarantee that the participants do, in fact, read the questions at hand, or understand the terms used (Oppenheim, 2000).

The interviewing process, however, can also be complex and have its limitations. As McDowell (2010) argues, interviews are not neutral exchanges; rather, they are socially situated interactions shaped by emotions, power relations, and the identities of both the researcher and the participant. This could have a significant impact on the research subjects who, based on current research on the subject, are likely to give answers that they think will make them more likable to the researcher or are in line with others' expectations although not true. Consequently, the production and interpretation of interview data are inevitably affected by the researcher's positionality. Recognizing these dynamics, the interview process in this study contacted via e-mail, a process that allowed participants to respond without time pressure and to formulate more thoughtful and detailed responses. Also, where necessary, telephone or face-to-face communications were made for clarifications.

However, the researcher can be affected by their personal opinions in the interpretation of data. This means that, while analyzing and incorporating the findings of the qualitative interview, there are likely to misunderstand certain statements, give more focus on specific information rather that other that can, in fact, be more relevant to the study and/or not "read between the lines" to understand the true meaning of what has been said by the participants in the study (Alshenqeeti, 2014).

These obstacles and limitations have to be properly addressed, and the research design has to be such so that they do not affect the research. To ensure that, the first step that has been taken was to carefully study the existing literature on the subject and identify potential trends, patterns, themes and research gaps that exist. Second, during the analysis and interviews, particular attention has been given to carefully selecting the topics and themes that were discussed and combining/analyzing the data based on a clear methodological approach. Then, third, the interview guide has designed and studied the interviews and carefully coded them. Analysis was done using a cross-case analysis. Based on this research methodology, the findings of the study are classified and categorized by theme with an emphasis on combining and comparing the answers of the research participants (Ryan, 2012). In detail, to perform a cross-case analysis, the researcher follows a path that is illustrated below:

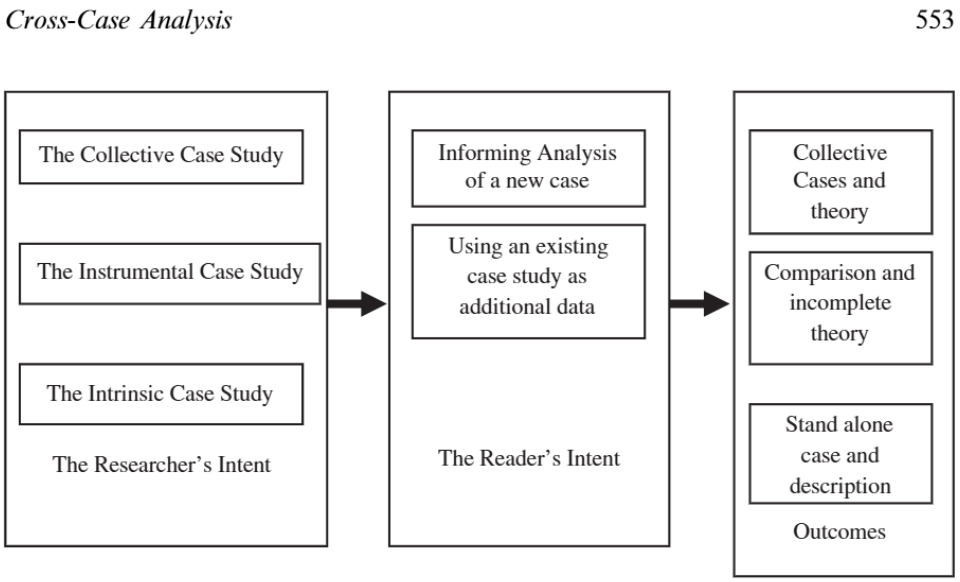

Figure 3, process of creating a case study, Ryan, 2012, p. 553

Figure 3 describes how a case study is created. Based on this "path", the researcher first has to understand their motive. In this case, the motive is the generalization of findings based on an understanding of the "patterns" identified between the interviews and the synthesis of the data. The reader may have different motivations, either to understand the subject in more depth or to use the data included in the thesis in their own research. Based on these assumptions, the outcomes of the study are expected to be: the presentation of the collective findings of the research, their comparison and the description of the data.

This is typically done using "tables" where the data is presented in brief. In order to better present and analyze the data, the columns of the tables with include the variables and the rows the "code name" of the research subject. Since the sample size is six (6) interviews, the "codes" are S1-S6 (research subject 1, 2, 3…). This is done to ensure their anonymity.

In this study, a qualitative analysis was conducted at an FMCG company, using the method of case study research. This study examines the applicability of Artificial Intelligence tools in the FMCG supply chain, the perceived benefits of implementing Generative AI within core supply chain processes, and the organization's readiness to adopt these technologies. The research questions are presented in chapter 5.2. The collection of data was conducted by interviewing a sample of six employees of the FMCG company that are related to Supply

Chain of the company. The type of interview was semi-structured, and the redefined questions are given in chapter 5.3. After the interviewing, the collected data were classified and analyzed.

5.2 Research Questions

The review of the literature about the applications of Artificial Intelligence in Supply chain functions generates significant research questions that this paper aims to answer by conducting a qualitative analysis. The Research Questions of the study, thus, are as follows:

- Which are the possible applications of Artificial Intelligent and GenAI in the FMCG Supply chain?
- How can GenAI technology help companies optimize their current processes in Supply Chain?
- Are the FMCG industries well prepared for the application of Gen AI technology in their Supply Chain?
- What are the implications of GenAI capabilities in the Supply Chain of FMCG companies?

5.3 Interview Questions

For the purposes of this research, the e-mail interview method was used. The choice of this asynchronous interview format facilitated the participation of individuals with limited availability and allowed for the provision of detailed, documented written responses.
Since this research uses semi-structured interviews, the research tool is a semi-structured interview guide. This guide includes fourteen (14) questions, out of which the first one concerns their age group and the second, their function and title within their company. The rest of the twelve (12) pre-defined questions are grouped based on their type and theme as follows:

AI implementation in the organization:

What artificial intelligence tools are currently implemented within your organization (eg Machine Learning), which departments utilize them and for what activity?

What opportunities have you seen from AI implementation?

What challenges have you faced from AI implementation?

Familiarity with different types of AI within their organization:

How familiar are you with Generative AI (LLM) tools such as ChatGPT or other AI based language models, and what is your current level of knowledge about them?

AI and SCM:

Do your company use any of Generative AI in Supply Chain Operations and in which department?

What opportunities do you see for implementing Gen AI in supply chain functions?

What challenges do you see for the implementation of Gen AI in Supply Chain Functions?

In your opinion, how Generative AI implementation could optimize the Supply Chain Procedures?

How would you describe the company's readiness to adopt Generative AI tools in Supply Chain?

Criteria for successful AI adoption:

In your opinion, what key elements are necessary for an organization to be prepared for the successful adoption of Generative AI?

In your opinion, which supply chain areas are likely to adopt Generative AI first, and why?

Importance of AI integration in the SCM:

How important is Gen AI implementation in supply chain for competitiveness in the market and why?

The interview guide follows the recommendations of a number of studies on qualitative research. In detail, first, the research participants were given a brief introduction and received information on the research process. This is important in ensuring that the research follows the academic standards and that the researcher has carefully planned the process (Ambele, 2025).

Additionally, the design of the interview guide takes into consideration the participants' profile and experience, meaning that the questions contain enough details to be able to be answered but, also, are neither overly simple or overly elaborate (Panyasai & Ambele, 2025). Focus was placed in framing questions that will be understood both by experts in the field and by the average reader who may read the final dissertation (Magnusson & Marecek, 2015). Also, the research tool is brief and takes into consideration the time-constraint factor and the fact that most research participants prefer the interview to be over quickly.

Moreover, the language is clear and the questions are short and refer to a different topic each time in order to avoid confusion (Taherdoost, 2022).

6. Findings

This chapter presents a cross-case analysis of interviews conducted with six employees from the Supply Chain function of an FMCG company, with the aim of drawing conclusions relevant to the objectives of this dissertation.

6.1 Participants Profile

As stated above, the total sample size was six. The Participants' Profile has as such:

Table 1, Sample Characteristics

Participants Code	**Function area**	**Age group**	**Years of experience in the SC**
S1	Customer service	25-34	1-3
S2	Logistics	35-44	13+
S3	Demand planning	35-44	13+
S4	Analytics	35-44	8-12
S5	Logistics	25-34	8-12
S6	Project Management	35-44	8-12

Based on Table 1 it is understood that the participants are between 25 and 44 years old and have varying levels of experience in the SCM.

Across all interviews, several common themes emerged regarding AI familiarity, opportunities, challenges, and organizational readiness. In detail each "theme" will be analyzed by combining the findings of the primary research. A comparison of their findings also follows when possible.

6.2 AI Tools Implemented Across Supply Chain Organization

When it comes to the AI tools that organization currently implement, the most commonly referred technology that mentioned from three out of six participants (S1,S2,S6) was GenAI, that is used primarily for administrative support such as drafting communication, summarizing documents, capturing meeting minutes and assisting with training materials. Other participants (S2,S3,S4) highlighted the use of predictive analytics and machine learning models within Demand Planning, Supply Planning and Purchasing, where they support forecasting accuracy, demand shifts, supplier-risk management and network design. More advance applications were also mentioned by participant S4 , the NPL automation in some extent in procurement and customer service. S5 mentions that the company applies AI tools in analytics ,demand forecasting and process automation, to support planning, reporting and decision making. Overall, while AI is present across multiple functions, mainly in demand planning, analytics, procurement, its integration into core supply chain operations varies, with Gen AI still used mainly for supportive activities rather than strategic ones.

Table 2, summary of findings regarding AI tools Implemented Across Organization

Topic	S1	S2	S3	S4	S5	S6
AI tools within Company in SC	Implementation of Gen AI mainly in: Assisting with administrative tasks Summarizing documents Drafting communications.	Logistics: the company mainly uses GenAI tools on daily activities such as: Capturing meeting minutes Recording training sessions Partial use of AI in image creation and training	The company already uses some AI tools, mainly predictive models, and ML AI is used mostly in Demand Planning to improve forecasts and by Purchasing to assess supplier risk.	The company uses ML in demand planning to: Improve forecast accuracy Predictive inventory tools in supply planning and logistics, anomaly detection in the control tower to flag unusual lead times or demand shifts Some NLP automation in procurement and customer service. Optimization engines support production scheduling and logistics routing	AI is mainly used to support planning and reporting decision-making in: Analytics Demand forecasting Process automation	Use of GenAI across various functions to keep minutes during the meetings and send the summary after the meeting

6.3 Opportunities Identified Through AI Implementation

Coming, then, to understanding where AI supports the functions of the company with an emphasis on SCM, the consensus is that it can improve efficiency, allowing functions to process data faster, decision making and operational performance. Four out of six (S1,S2,S3,S4) participants highlighted the automation of repetitive and administrative tasks, which gives employees time to focus on high-value activities. Participants S3,S4,S5 noted improvement in forecast accuracy, leading in out-of-stock reduction, more stable planning and earlier risk detection. AI was also mentioned that enhances operational efficiency, supports cost optimization and enables quicker reactions to demand changes (S3,S4,S5). Additionally, participants S2 and S6, mentioned benefits such as better content creation, improved presentation quality and time-efficient task execution. Overall, AI was viewed as a catalyst for improved productivity, more robust decision making and greater consistency across supply chain and operational processes.

Table 3, summary of findings on areas of Opportunities Identified Through AI Implementation

Topic	S1	S2	S3	S4	S5	S6
Opportunities Identified Through AI Implementation	Automation of repetitive tasks Advanced data analysis that helps with identifying patterns and decision making Brainstorming	Reducing the time and effort needed for administrative tasks and standardizing ways of working and methodologies Providing reliable predictive figures for Operations and supply Chain Allowing people to focus on more added value activities Decision-making processes Reduce manual workload for preparation of meeting minutes. Quick access to insights and methodologies Preparing presentations/ output to other stakeholders.	Making decisions faster and with better insights Improvement of forecasts has improved Reduction of stockouts Faster reaction to opportunities	AI has helped: Stabilize forecasts Reduce excess stock Identify risks earlier. Reduce manual work Has improved speed and consistency in day-to-day decision-making.	AI improves forecast accuracy, operational efficiency, cost optimization , and enables faster, data-driven decisions.	AI tools can help to perform tasks in a more time efficient manner

6.4 Challenges Identified Through AI Implementation

Related to the challenges encountered during AI implementation, participants consistently identified that the most significant challenge is the data-related issues that are produced. Most of participants (S1,S2,S3,S4,S5) mentioned that data quality, completeness and alignment across departments remain a significant challenge which often leads to non-reliable outputs or misinterpretations while S1 and S2 participants highlighted the difficulty of validating the results. Participants S2,S3,S4,S5, explained that specialized skills, critical thinking and training is very important in order to correctly read and use the outputs generated from AI tools. Cultural resistance also emerged , with some employees showing low trust in automated suggestions (S3,S4) Technical challenges were also mentioned by participants S1,S4,S5. Security and privacy concerns were mentioned as well from participant S1, particularly regarding the handling of sensitive company data. Overall, the challenges mainly mentioned are data quality produced, skills gaps, cultural adoption, system integration, governance and the need to human critical overview of AI outcomes.

Table 4, summary of findings on areas of Challenges Identified Through AI Implementation

Topic	S1	S2	S3	S4	S5	S6
Challenges Identified Through AI Implementation	Data Accuracy Security concerns High Costs	Data Quality Needed Trained people Needed critical thinking by employees in order not to lead to wrong conclusions	Data Quality Cultural Change Needed Training	Inconsistent Data Quality Time of adoption Integration of AI models with older systems Technical skills and training	Data quality issues System integration Limited AI skills	Refinement of practices Data accuracy and reliability Bot training Only complimentary to human thought

6.5 Familiarity with GenAI Tools

When it comes to familiarity with the use of GenAI in their day-to-day work, four out of six of the participants, namely S1, S3 and S5 mention that they are intermediate level users, meaning that they use it in their work but mainly as a supporting tool without having in-depth usage experience. S4 participant demonstrated high familiarity, actively following GenAI developments investigating future potential usage in Supply Chain. S2 participant, mentioned limited usage in professional context, explaining that content is generic for specialized tasks, while S6 participant mentioned privacy-related concerns , using GenAI only for simple queries, avoiding complex or sensitive topics. Overall, the responses indicate a generally positive level of awareness and engagement with GenAI, while confidence and depth of use differ depending on role and expertise.

Table 5, summary of findings regarding participants' familiarity with GenAI Tools

Topic	S1	S2	S3	S4	S5	S6
Familiarity with Gen AI	Familiar with GenAI tools through regular use (intermediate level). Confrontable with practical application	Quite familiar with GenAI. Uses GenAI mainly in personal life since finds outputs too generic for professional tasks	Quite familiar with GenAI to write drafts, get ideas (intermediate level)	Very familiar with GenAI and uses in various functions – follow GenAI developments	Good working knowledge of GenAI can understand their practical uses	Use of GenAI at a limited level in day-to-day work and cautiously. Avoid complex data or sensitive queries due to data privacy

6.6 Organizational Deployment of GenAI in Supply Chain

When it comes to organizational deployment of GenAI in Supply Chain of the company, participants consistently reported that Generative AI is not yet actively implemented within core Supply Chain operations. The use of LLM-based tools specifically for core supply chain operations tasks as mentioned by participants S1, S3, S4, S6 remains minimal or absent. Participants S2, S5 mentioned that GenAI is used through analytics team, IT functions or process improvement groups to support activities such as handling of large datasets, conducting network assessments or performing quick analysis. Overall, the findings indicate that deployment of Generative AI in Supply Chain Operations has not yet been deployed from the company.

The participants' answers can be summarized as such:

Table 6, summary of findings regarding Organizational Deployment of GenAI in Supply Chain

Topic	S1	S2	S3	S4	S5	S6
Organizational Deployment of GenAI in Supply Chain	Generative AI for Supply Chain operations not yet implemented	GenAI is used for managing big set of data for Supply Chain analytics and network assessment. In Operations, the usage is limited.	GenAI usage is limited for quick analysis but not yet implemented in Core operational processes	Not implemented yet. Early stage	GenAI usage is limited and in pilot phase mainly within IT, Analytics or process improvement	No specific GenAI tool for Supply Chain Operations

6.7 Opportunities for Implementing Gen AI in Supply Chain Functions

When it comes to recognizing the opportunities for Gen AI implementation in the Supply Chain functions, participants identified a wide range of potential opportunities across different operational areas. Three out of six participants (S1, S3 and S5) mention that it can allow the automation of processes, particularly in routine administrative tasks, reporting and communication. Then, S2 adds that it can allow a comprehensive market and benchmark analysis. S1 identifies different opportunities for different departments. Namely, for Inventory Management they claim that Gen AI can help to "*analyze datasets to identify patterns and improve forecasting accuracy*", in Logistics "*it can summarize complex reports and shipping documents to speed up decision-making*" and in Customer Service "*it can automate routine emails and communications*". Overall, to S2, GenAI improves efficiency. S3 adds that it can allow for better communication between teams, in managing supplies and for an early detection of problems and, S4, that it allows teams to analyze the root cause of problems faster. Additionally, to S4, GenAI makes data more accessible and has potential uses in procurement. At the same token, S5 refers to the opportunities in using GenAI to improve supplier and customer performance, in scenario analysis and in automated reporting, while S6 says that it can be used in data screening and forecasting. Overall, participants viewed GenAI as a transformative tool capable of improving accuracy, efficiency, and decision making across supply chain.

Table 7, summary of findings regarding Opportunities for Implementing Gen AI in Supply Chain Functions

Topic	S1	S2	S3	S4	S5	S6
Opportunities for GenAI implementation	Inventory Management: Gen AI can analyze datasets to identify patterns and improve forecasting accuracy. Logistics: it can summarize complex reports and shipping documents to speed up decision-making. Customer Service: it can automate routine emails and communications. Increase of efficiency	Reducing time and effort for administrative tasks. Provide reliable predictive figures for operations. Provide proposals for costs and potential financial opportunities. AI can also support Supply Chain by providing comprehensive market data on supplier cost benchmark analysis	Opportunities in automating analysis, generating demand scenarios, improving communication between teams, and speeding up report creation. It could also help with supplier management and early detection of issues.	Supporting planners with automated insights Helping teams with faster root-cause analysis Simplifying reporting, Making data more accessible through natural-language interfaces. Potential in procurement and customer service for drafting and summarizing large amounts of information.	Opportunities include scenario analysis, automated reporting, supplier and customer performance	Data screening & forecasting

6.8 Challenges for Implementing Generative AI in Supply Chain Functions

Regarding challenges for implementing GenAI in Supply Chain Functions, four out of six participants, namely S1, S2, S3 and S4 noted that employee training and capabilities are essential for successful usage of GenAI. Participants mentioned that employees need to develop strong analytical skills, critical thinking and understanding of AI limitations to interpret GenAI insight responsibly. Without proper training, there is a risk of misusing AI outputs. Data-related challenges, highlighted by all participants as the most significant barrier to implement GenAI in supply chain functions. Ensuring data integrity, accuracy and confidentiality was repeatedly emphasized, as GenAI outputs are only as reliable as the data provided. Technical challenges mentioned by participants S1, S4, S5, particularly the integration of GenAI with existing systems. Overall, challenges mentioned by participants

revolve around data quality system integration, governance, employee readiness, and human critical thinking.

The challenges identified have, in brief, as such:

Table 8, summary of findings regarding Challenges for Implementing Generative AI in Supply Chain Functions

Topic	S1	S2	S3	S4	S5	S6
Challenges identified	Data Integrity Employee Adaptation Integration (connection) of AI with current systems and ERPs can be technically difficult.	Data quality Training personnel When it comes to predictive analytics people need to be very well trained in order to be able and fully interpret and apply critical thinking on the proposed solutions AI can be used for providing insights and proposals and replace specific current expectations in the field Without proper training of people and staffing that can lead to wrong decision making.	Confidentiality Compliance with internal policies Training and use of high-quality data	Data privacy and accuracy Integration with core systems Employee training	Data security Reliability of outputs Governance Integration with existing systems	Data accuracy and reliability Bot training Only complimentary to human thought

6.9 Ways Gen AI can lead to the optimization of SC

Regarding the ways in which GenAI can lead to the optimization of the management of the SC and its processes, there are different themes identified. S1, S2 and S6 mention that it can help in forecasting, while S1, S3 and S5 in automation. Then, S1, S2, S3 and S5 state that GenAI can allow the companies to find solutions faster and more accurately and S4 and S6 mention that it can allow companies to process data.

Additionally, the participants in the interviews mention different ways in which companies

can benefit. In detail, S1 states that it can allow a better planning, customer service and transportation of goods, S2 that it can help in managing orders, S4 that it leads to a potential reduction of time needed in various processes and for an improved constituency of the analyses performed and S6 that it makes "*factoring in multiple external factors*" and "*providing complex matrix calculations*" possible. Overall, participants viewed Generative AI as a powerful enabler of efficiency, accuracy and responsiveness across supply chain functions, with strong potential to support both operational execution and strategic decision making.

Table 9, summary of ways that AI can optimize SC procedures

Topic	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**
Ways GenAI can optimize SC procedures	Demand Planning's Forecasting can be more accurate In automating frequently used reports in Customer Service and in analyzing them Making assumptions and providing solutions and ideas for the problems spotted. Routing for transportation Robotics in warehouses is another way of implementing AI	Customer Order management & Pattern Forecasting accuracy & Cost analytics Solving quick problems on the floor of operations Improve forecast accuracy	It can speed up decision-making Automate repetitive tasks Improve visibility across the chain It can help identify patterns that are not obvious and suggest improvements faster.	Time reduction Increase response of teams Bring structure and consistency to analysis and documentation Support quicker decision cycles by summarizing complex data instantly.	Automating routine tasks Enhancing planning accuracy Supporting decision-making Improve responsiveness to disruptions.	Simplifying database creation and analytics Forecasting based on history Factoring in multiple external factors Providing benchmark prices Providing complex matric calculations

6.10 Company Readiness for Gen AI Adoption

Additionally, when it comes to the companies' readiness for GenAI adoption, all participants mention that the company is, to some degree, ready to adopt AI but further action needs to be taken to ensure that it is properly incorporated into their daily practices. S1, S2, S3 and S6 suggest that the company is more at an early state of GenAI adoption while S4 mentions that the company is moderately ready to adopt it. S5 states that the use of GenAI at the moment it rather limited. S1, S5 and S6 state that their company has some technical infrastructure and preparedness, while S2, S3 and S4 argue that GenAI is only used to a

limited degree in specific functions. Another recuring point is the need for a clear strategic roadmap. Participants S1,S2,S3 highlighted that companies require time, resources and structured planning to define where GenAI can add value in supply chain processes. Despite these gaps, several interviewees noted positive momentum, including the presence of dedicated AI team and growing organizational interest, suggesting that company is moving to the right direction. Overall, readiness is characterized by progressing with strong potential contingent on improved data foundations, employee upskills and clear strategic direction.

Table 10, summary of findings regarding the companies' readiness for AI adoption

Topic	S1	S2	S3	S4	S5	S6
Company readiness for GenAI adoption	Company: early stage of readiness. The digital infrastructure exists but full readiness will require more specialized training and a clear strategy	SCM: the use of AI is quite limited The company needs more time and resources and training people Limited readiness as most of the people are not properly trained and AI tools are evolving fast Many challenges in terms of appropriate quality of data	Company: early state of adoption Need clear processes, proper training, strong data foundations .	Company: moderately ready. There is leadership interest and a solid analytics base, but still need better data harmonization, clearer governance, and broader upskilling across functions	Moderate readiness, because of the data complexity	Company: not yet ready but moving in the right direction as there is a dedicated AI team working to provide a roadmap of AI adoption.

6.11 What Needed for Successful GenAI Adoption

Coming to the prerequisites for successful GenAI adoption, the participants of the study have different suggestions, although there is consensus on the importance of training the employees in the use of GenAI and all participants except on S6 state that the companies need to ensure the quality of the data used by GenAI in the SCM. In detail, S1 mentions the need to have proper digital infrastructure and clear planning, S2 the need for better staffing, S3 and S5 the importance of clear guidelines and of leadership support, S2 and S4 the application of change management, S4 the importance of using clear business led use cases and having stronger integration and S6 maintaining data privacy. Overall, participants

agreed that successful GenAI implementation requires a combination of robust data foundations, skilled and trained employees, clear strategic direction, strong governance and leadership commitment.

Table 11, summary of findings regarded prerequisites for a successful GenAI adoption in the SCM

Topic	S1	S2	S3	S4	S5	S6
What is needed for successful GenAI adoption	High Data Quality The right Digital Infrastructure to support new tools Providing Specialized Training Having a Clear Plan	Appropriate training & coaching Proper Staffing Proper training Appropriate change Management Strong set of qualitative data	Reliable and well-structured data Training Clear usage guidelines Leadership support	Reliable and well-governed data Clear business-led use cases Training for end-users Responsible AI guidelines Stronger integration capabilities Change management	High-quality data Clear use cases Strong governance Employee training Leadership support	Data privacy Employee education & training

6.12 Which Areas of SC will adapt Gen AI First

Across all interviews, participants consistently identified Demand Planning and Customer Service at the supply chain areas most likely to adopt GenAI first. These functions handle large volumes of data, involve repetitive and time-consuming tasks and require quick analysis , making them ideal for the early GenAI integration. Beyond these two areas, several participants mentioned planning, procurement, analytics and control tower as additional for early adopters. Overall, participants agreed that the first areas to adopt GenAI will be those with high data volumes, repetitive tasks and strong potential for efficient improvements.

Table 12, summary of predictions on which areas will adopt GenAI first

Topic	S1	S2	S3	S4	S5	S6
Which areas will adopt GenAI first	Customer Service Demand Planning	Demand Planning Operations	Demand Planning Customer Service	Planning Procurement Customer service Control tower	Planning Analytics Customer service	Demand planning Supply planning

6.13 Importance of Gen AI Implementation for Competitiveness

Last, the participants of the study discussed the importance of the incorporation of GenAI in the SCM in the competitiveness of the companies. All participants agreed that it increases competitiveness as it allows companies to act faster and four out of six, namely S1, S2, S4 and S6 because it improves responsiveness. S1 and S4 argue that it allows more precision, S1 and S3 it can lower the costs of operations, S2 that it ensures that quality of data, S3 that it increases reliability, and S5 that it leads to improved service quality and greater agility. Overall, participants viewed Generative AI as a strategic necessity for supply chain competitiveness, enabling faster decisions, improved accuracy, cost efficiency and agility which are the key capabilities to be competitive in dynamic markets.

Table 13, summary of findings regarding the importance of GenAI for the competitiveness of companies

Topic	S1	S2	S3	S4	S5	S6
Importance of GenAI for competitiveness	It is very important, as it allows companies to act faster and with greater precision, faster response times to customer needs and lower operational costs.	Appropriate adoption of AI can lead to significant reduction of the time needed and ensuring appropriate quality of data	Companies that adopt it can react faster, reduce costs, and offer a more reliable service.	It has the potential to improve speed, accuracy, and responsiveness	Gen AI is increasingly important as it enables faster decisions, better cost control, improved service levels, and greater agility.	It should be no1 priority to keep up to speed with market standards.

6.14 Discussion

Table 14, summary of findings

Topic	S1	S2	S5	S3	S4	S6
	Customer Service	**Logistics**	**Logistics**	**Demand Planning**	**Analytics**	**Project Management**
AI tools within Company in SC	Implementation of Gen AI mainly in: Assisting with administrative tasks Summarizing documents Drafting communications.	Logistics: the company mainly uses GenAI tools on daily activities such as: Capturing meeting minutes Recording training sessions Partial use of AI in image creation and training AI is mainly used to support planning and reporting decision-making in: Analytics Demand forecasting Process automation		The company already uses some AI tools, mainly predictive models, and ML AI is used mostly in Demand Planning to improve forecasts and by Purchasing to assess supplier risk.	The company uses ML in demand planning to: Improve forecast accuracy Predictive inventory tools in supply planning and logistics, anomaly detection in the control tower to flag unusual lead times or demand shifts Some NLP automation in procurement and customer service. Optimization engines support production scheduling and logistics routing	Use of GenAI across various functions to keep minutes during the meetings and send the summary after the meeting
Opportunities Identified Through AI Implementation	Automation of repetitive tasks Advanced data analysis that helps with identifying patterns and decision making Brainstorming	Reducing the time and effort needed for administrative tasks and standardizing ways of working and methodologies Providing reliable predictive figures for Operations and supply Chain Allowing people to focus on more added value activities Decision-making processes Reduce manual workload for preparation of meeting minutes. Quick access to insights and methodologies Preparing presentations/ output to other stakeholders. AI improves forecast accuracy, operational efficiency, cost optimization, and enables faster, data-driven decisions.		Making decisions faster and with better insights Improvement of forecasts has improved Reduction of stockouts Faster reaction to opportunities	AI has helped: Stabilize forecasts Reduce excess stock Identify risks earlier. Cuts down manual work Has improved speed and consistency in day-to-day decision-making.	AI tools can help to perform tasks in a more time efficient manner
Challenges Identified Through AI Implementation	Data Accuracy Security concerns High Costs	Data Quality Needed Trained people Needed critical thinking by employees in order not to lead to wrong conclusions Data quality issues System integration Limited AI skills		Data Quality Cultural Change Needed Training	Inconsistent Data Quality Time of adoption Integration of AI models with older systems Technical skills and training	Refinement of practices Data accuracy and reliability Bot training Only complimentary to human thought

Familiarity with Gen AI	Familiar with GenAI tools through regular use (intermediate level). Confrontable with practical application	Quite familiar with GenAI. Uses GenAI mainly in personal life since finds outputs too generic for professional tasks Good working knowledge of GenAI can understand their practical uses	Quite familiar with GenAI to write drafts, get ideas (intermediate level)	Very familiar with GenAI and uses in various functions – follow GenAI developments	Use of GenAI at a limited level in day-to-day work and cautiously. Avoid complex data or sensitive queries due to data privacy
Organizational Deployment of GenAI in Supply Chain	Generative AI for Supply Chain operations not yet implemented	GenAI is used for managing big set of data for Supply Chain analytics and network assessment. In Operations, the usage is limited. GenAI usage is limited and in pilot phase mainly within IT, Analytics or process improvement	GenAI usage is limited for quick analysis but not yet implemented in Core operational processes	Not implemented yet. Early stage	No specific GenAI tool for Supply Chain Operations
Opportunities for GenAI implementation	Inventory Management: Gen AI can analyze datasets to identify patterns and improve forecasting accuracy. Logistics: it can summarize complex reports and shipping documents to speed up decision-making. Customer Service: it can automate routine emails and communications. Increase of efficiency	Reducing time and effort for administrative tasks. Provide reliable predictive figures for operations. Provide proposals for costs and potential financial opportunities. AI can also support Supply Chain by providing comprehensive market data on supplier cost benchmark analysis Opportunities include scenario analysis, automated reporting, supplier and customer performance	Opportunities in automating analysis, generating demand scenarios, improving communication between teams, and speeding up report creation. It could also help with supplier management and early detection of issues.	Supporting planners with automated insights Helping teams with faster root-cause analysis Simplifying reporting, Making data more accessible through natural-language interfaces. Potential in procurement and customer service for drafting and summarizing large amounts of information.	Data screening & forecasting

Challenges identified	Data Integrity Employee Adaptation Integration (connection) of AI with current systems and ERPs can be technically difficult.	Data quality Training personnel When it comes to predictive analytics people need to be very well trained in order to be able and fully interpret and apply critical thinking on the proposed solutions AI can be used for providing insights and proposals and replace specific current expectations in the field Without proper training of people and staffing that can lead to wrong decision making. Data security Reliability of outputs Governance Integration with existing systems	Confidentiality Compliance with internal policies Training and use of high-quality data	Data privacy and accuracy Integration with core systems Employee training	Data accuracy and reliability Bot training Only complimentary to human thought

Ways GenAI can optimize SC procedures	Demand Planning's Forecasting can be more accurate In automating frequently used reports in Customer Service and in analyzing them Making assumptions and providing solutions and ideas for the problems spotted. Routing for transportation Robotics in warehouses is another way of implementing AI	Customer Order management & Pattern Forecasting accuracy & Cost analytics Solving quick problems on the floor of operations Improve forecast accuracy Automating routine tasks Enhancing planning accuracy Supporting decision-making Improve responsiveness to disruptions.	It can speed up decision-making Automate repetitive tasks Improve visibility across the chain It can help identify patterns that are not obvious and suggest improvements faster.	Time reduction Increase response of teams Bring structure and consistency to analysis and documentation Support quicker decision cycles by summarizing complex data instantly.	Simplifying database creation and analytics Forecasting based on history Factoring in multiple external factors Providing benchmark prices Providing complex matric calculations
Company readiness for GenAI adoption	Company: early stage of readiness. The digital infrastructure exists but full readiness will require more specialized training and a clear strategy	SCM: the use of AI is quite limited The company needs more time and resources and training people Limited readiness as most of the people are not properly trained and AI tools are evolving fast Many challenges in terms of appropriate quality of data Moderate readiness, because of the data complexity	Company: early state of adoption Need clear processes, proper training, strong data foundations.	Company: moderately ready. There are leadership interests and a solid analytics base, but still need better data harmonization, clearer governance, and broader upskilling across functions	Company: not yet ready but moving in the right direction as there is a dedicated AI team working to provide a roadmap of AI adoption.
What is needed for successful GenAI adoption	High Data Quality The right Digital Infrastructure to support new tools Providing Specialized Training Having a Clear Plan	Appropriate training & coaching Proper Staffing Proper training Appropriate change Management Strong set of qualitative data High-quality data Clear use cases Strong governance Employee training Leadership support	Reliable and well-structured data Training Clear usage guidelines Leadership support	Reliable and well-governed data Clear business-led use cases Training for end-users Responsible AI guidelines Stronger integration capabilities Change management	Data privacy Employee education & training
Which areas will adopt GenAI first	Customer Service Demand Planning	Demand Planning Operations Planning Analytics Customer service	Demand Planning Customer Service	Planning Procurement Customer service Control tower	Demand planning Supply planning
Importance of GenAI for competitiveness	It is very important, as it allows companies to act faster and with greater precision, faster response times to customer needs and lower operational costs.	Appropriate adoption of AI can lead to significant reduction of the time needed and ensuring appropriate quality of data Gen AI is increasingly important as it enables faster decisions, better cost control, improved service levels, and greater agility.	Companies that adopt it can react faster, reduce costs, and offer a more reliable service.	It has the potential to improve speed, accuracy, and responsiveness	It should be no1 priority to keep up to speed with market standards.

The research has shown that the organization is aware of the benefits of Generative AI but remains in the early stages of practical adoption within core supply chain operations. Employees are generally familiar with GenAI and use it mainly for personal productivity, while its application for professional tasks remains at an early stage. A consistent finding is that data quality produced, systems integration, and employee readiness as the main challenges that need to be tackled for successful implementation. Related to the data quality, participants emphasized that successful GenAI implementation depends on reliable, well structured, and secure data. Despite these challenges, participants identify significant opportunities for GenAI implementation across supply chain functions such as demand planning, forecasting, customer service, procurement, and analytics where GenAI can automate repetitive tasks, enhance forecasting, accelerate decision-making and improve communication across functions. Overall, the research shows that Generative AI is viewed as highly important for future competitiveness, offering speed, accuracy, cost efficiency and agility. However, companies need to strengthen their data foundations, upskill employees and have clear strategies to fully realize these benefits.

7. Conclusions

The present dissertation dealt with an extremely interesting and up-to-date subject- the use of AI in the SCM. In particular, the value of the research lies on the fact that it specialized in companies that produce FMCG that are likely to "spoil" faster. That way not only did the study critically discuss and investigate the existing and potential applications of the use of AI in SCM but, also, its results can be helpful in reducing waste, tackling out of stocks and increasing customer satisfaction.

In the current international environment where crises take place at a geopolitical level, the SC is likely to be severely affected. Successful management of the SC is expected to become even more focal for companies and a priority for businesses and governments alike.

The literature review showed that there are different types of AI available and that they have some common elements as well as differences. However, they are used mostly to achieve the same end-goals, which are to increase performance, achieve higher levels of customer satisfaction, decrease workload and increase the value of the SC. Moreover, AI is used in reducing time and cost, receiving and sharing real time information on where the goods are

and in what condition and, more commonly, to predict trends and demand.

Based on the literature it is found that the companies place particular emphasis on the "human" factor, both with regard to the employees and to the customers, clients and suppliers. In this sense, AI does not aim to replace the "humans" but to facilitate processes and reduce errors. However, one must note that there is little evidence as to how the adoption of such technologies since their development and use is a rather recent phenomenon.

In addition to the above, the present study compared the "traditional" SCM means, strategies and approaches to the SCM with the use of AI. It was found that AI completely revolutionized the management of the SC in the sense that data that needed a lot of time and effort to be processed and interpreted can, now, be quickly and at a low cost combined. The different types of AI, either predictive, agentic, generative etc. can be used in different departments to produce different results.

The overall consensus, both based on the critical literature review as well as the analysis of the primary findings of the study, is that the supply chain management can be benefited by the use of AI. The main benefits include the ability to predict future trends, and, as a result, manage resources, production, logistics and other functions. Moreover, the workload of the employees is reduced as well as the possibility of "wasting" FMCGs as the company can estimate how and when to produce the right amount of goods at the right amount of time.

Moreover, the companies can, and to some extents do apply, GenAI not only to produce content but also in their customer support. Content creation is not related to artistic works in this case but, more, to generating reports and assisting the employees in everyday functions. Customer services can be benefited by the use of GenAI in assisting with simple queries and/or resolving problems.

Apart from discussing the aforementioned topics, this thesis also attempted to suggest potential solutions to some key problems that arise. Among many, the main suggestion was to incorporate and fully adhere to the existing legislation on AI in order to ensure that the companies maintain their reputation, credibility and position in the market. This is also important in avoiding fining and other legal repercussions that may occur. Moreover, companies should train their employees to be able to use AI safely and in accordance with the existing law. It is important for employes to identify potential problems in the data, the reports and "answers" the AI is giving and to be "train it" in order for it to improve. Additionally, the companies must be able to protect their workforce and to assist them in accepting AI. Change management and, in particular, decreasing resistance to change could

play a pivotal role in achieving this goal.

The findings of the primary research also support these assumptions. Most participants believe that GenAI is important for data prediction and analysis, but express concerns about their level of knowledge and experience in using it, as well as about data accuracy produced and privacy.

Having analyzed and compared the responses of the participants in the different themes of the qualitative analysis, then, answering the research questions and discussing the findings is attempted.

With regard to **RQ1 on the potential applications of AI and GenAI in the SCM,** it is found that AI and GenAI can be used in various areas of supply chain such as demand planning and forecasting, customer service automation, suppliers' performance analysis, logistics optimization, automated reporting and procurement support.

These findings are also supported by the literature review. According to Kagalwala et al. (2025), Muthukalyani (2023), Nweje & Taiwo (2025), for instance, companies can be benefited in many ways by adopting AI in their everyday processes. With regard to predictive AI and ML, they can be able to increase the accuracy of their predictions and reporting and improve customer satisfaction. What is important is that they use AI in the proper way to respond to their customers' needs and demands to increase profitability, efficacy, efficiency and transparency (Khlie, Benmamoun, Jebbor & Serrou, 2024).

Especially considering GenAI, Shekhar et al. (2023) pinpoint that these systems can be used to create content and combine data to create original reports and material. This has been stated by S2 who mentioned that the use of AI in the SCM leads to "Quick access to insights and methodologies when working on projects or investigating solutions - Rich and robust content for preparing presentations/ output to other stakeholders.".

Moreover, as has also been stated by the majority of the respondents, Khlie et al. (2024) mention that GenAI can learn by the interaction with users and that it can help in automating and optimizing the SCM. It is assumed, therefore, that the use of GenAI will, in the future, also help in the decision-making process. Moreover, according to Boone et al. (2025), Fosso Wamba et al. (2024) and Shekhar et al. (2023), this type of AI can allow the companies to become more competitive in the market. This benefit has been mentioned by all participants in the present study.

The literature review performed also raises additional issues. For instance, Li et al. (2024) focus on how machine learning and GenAI is actually used in the SCM while Fosso Wamba

et al. (2024) on how the use of GenAI can specifically lead to the transformation of the capabilities of the businesses.

Apart from solely GenAI, the literature review illustrated the potential benefits of using AI, ML and deep learning in SCM. Based on Rolf et al. (2023) and Vlachos & Reddy (2025), ML can allow the increase of the performance of the procurement department as well as client and customer support. Moreover, to Tirkolaee et al. (2021), ML can help in the optimization of the analytical process as well as, consequently, in problem solving. At the same token, to Hosseinnia Shavaki & Ebrahimi Ghahnavieh (2023) deep learning and ML also lead to better forecasting, increased performance, efficiency and profitability and, to Douaioui, Oucheikh, Benmoussa & Mabrouki (2024) and Terrada, El Khailj & Ouaji (2022) it can lead to better time management.

Then, for **RQ2 on how GenAI can optimize the existing processes applied in the SC**, the research shows many areas where GenAI could optimize and transform supply chain processes by streamlining work, improving decision quality and strengthening overall performance. Participants mentioned that GenAI can automate repetitive tasks, enhance forecasting accuracy, accelerate decision- making, and instantly summarize complex data. These capabilities will help organizations to operate with greater speed, precision and resilience in an increasingly complex supply chain environment.

The existing literature, as it has been analyzed in the first part of this dissertation, shows that automation can be improved in companies by incorporating predictive AI models and ML to predict trends, combine data and perfect their processes. Moreover, they will improve automation through understanding the limits of the internal processes used (Kagalwala et al., 2025). Shekhar et al. (2023) also point out that GenAI follows patterns and learns while used by humans, therefore, automation can be achieved by working alongside GenAI to create data, combine it and perform stimulations. As is the case with the interviews, similarly the literature review does not place increased emphasis on how automation will be improved rather than the impact of this improvement on the performance of SCM.

Furthermore, regarding **RQ3 and the level of readiness of companies for the successful application of GenAI technology in the SC** the participants, first, identified some challenges associated with the effective adoption in the SCM. Based on their responses to the questions, they tend to believe that the main factor that impacts the effective adoption of GenAI in the SCM is the training of human resources, the experience and the expertise on the matter. Moreover, it is found that they think that the data produced is potentially of

lower quality or accuracy and it important to ensure their validity. Therefore, at the moment, they are not fully capable of incorporating GenAI in all core processes and functions.

With regard to the level of readiness of companies and the impact of lack of expertise and training, the available literature review raises some similar points for AI in general and, more specifically, GenAI too. According to Leong et al. (2025) HRMs should take into consideration that many employees are not accepting the incorporation of AI in the processes of their company. As a result, they react negatively to it and appear to be resistant to change. Moreover, Veluru (2024) points out that many employees do not fully understand how to use AI and, therefore, several mistakes take place. Additionally, Woo, Tay & Oswald (2024) mention that many employees are not properly trained in the use of AI in their everyday work and they should, therefore, be trained and assisted in this area.

Considering more limitations and concerns raised by articles and studies included in the analysis, Kopanaki, Karvela & Georgopoulos (2018) pinpoint the rejection of change by employees as well as some companies that apply traditional SCM means and tools. Moreover, Queiroz, Telles & Bonilla (2020) note that it is not only employees that have knowledge gaps considering the use and adoption of AI but managers as well. Therefore, this dimension should be taken into consideration as well.

Last, when it comes to **RQ4 and the potential implications of GenAI capabilities in the SCM** the responders answered that it allows faster and more efficient processing and using of data that, in its turn, can potentially allow recognizing patterns and improving decision-making processes. Additionally, the majority believe that companies will be able to react better to opportunities that arise in the market if they adopt GenAI in their SCM. At the same token, it is shown that the companies are more at an early stage of application of GenAI in their SC and logistics. While the companies have a certain degree of technological expertise and knowledge, they still need to improve their employees' capabilities and skillset to be able to take advantage of the potential uses and capabilities of GenAI. However, the finding is that the companies will be able to increase their competitiveness in the market since they will be able to respond faster and better to challenges the face.

What one needs to note is that it can be quite hard to distinguish between the applications and the implications of the use of GenAI in the SCM. However, in this subsection one can examine how the tool can be used in the future as well as how AI in general can transform the SCM.

Based on the literature review, predictive AI can be used in introducing change in the market

in general and allow a complete transformation of the SC for many companies (Kagalwala et al., 2025). Furthermore, as Muthukalyani (2023) found, companies can be benefited not only by improving their current data management and processing strategies and tools, but also by improving their future processes and decision making.

Increasing resilience can, also, improve performance as well as increase the companies' capabilities and cybersecurity processes. This will differentiate it from their competition (Ejjami & Boussalham, 2024).

In particular, when it comes to GenAI, Khlie et al. (2024) underlines that it can be trained and, thus, its limitations will be resolved. Therefore, its constant improvement will also lead to an increase in the company's performance. Boone et al. (2025), Fosso Wamba et al. (2024) and Shekhar et al. (2023) additionally state that the market is changing. Along with this change, the applications of GenAI as well as its capabilities will change. This means that the use of GenAI will have further implications on the performance of the companies. To Fosso Wamba et al. (2024) the adoption of GenAI will lead to an increase in the capabilities of the businesses, innovation and development of methods to better manage resources and logistics.

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