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Supply Chain Management (SCM)

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Review of the supplier selection process and supply chain strategy
in a complex manufacturing company

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Patras, Greece, June 2024

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Thank you.”

Abstract

The current study is about the selection of suppliers and supply chain management practices at a complex manufacturing organization based in Athens, Greece. This study will investigate the strategies and criteria for evaluating suppliers, challenges faced in supply chain management, and the use of advanced technologies by applying qualitative methods, including semi-structured interviews with leading procurement professionals. These reveal that effective communication, reliable performance metrics, and strategic supplier relationships are key. Moreover, the research places particular stress on sustainability and innovation in today's supply chain practices. Thus, even though the methodology contains some limitations in the face of a small sample and the context specificity of the findings, it is rather informative for improving operational efficiency and the quality of the product in complex manufacturing environments. The amount of academic contribution will be huge, as well as the practical one through actionable recommendations that can provide decision support for the selection of suppliers and management of the supply chain.

Keywords

Supplier Selection, Supply Chain Management, Complex Manufacturing, Qualitative Research, Sustainability Practices.

Περίληψη

Η παρούσα μελέτη αφορά την επιλογή προμηθευτών και τις πρακτικές διαχείρισης της εφοδιαστικής αλυσίδας σε έναν πολύπλοκο κατασκευαστικό οργανισμό που εδρεύει στην Αθήνα, Ελλάδα. Αυτή η μελέτη θα διερευνήσει τις στρατηγικές και τα κριτήρια για την αξιολόγηση των προμηθευτών, τις προκλήσεις που αντιμετωπίζονται στη διαχείριση της εφοδιαστικής αλυσίδας, καθώς και τη χρήση προηγμένων τεχνολογιών εφαρμόζοντας ποιοτικές μεθόδους, συμπεριλαμβανομένων ημι-δομημένων συνεντεύξεων με κορυφαίους επαγγελματίες προμηθειών. Αυτές αποκαλύπτουν ότι η αποτελεσματική επικοινωνία, οι αξιόπιστοι δείκτες απόδοσης και οι στρατηγικές σχέσεις με προμηθευτές είναι κλειδιά. Επιπλέον, η έρευνα δίνει ιδιαίτερη έμφαση στη βιωσιμότητα και την καινοτομία στις σημερινές πρακτικές εφοδιαστικής αλυσίδας. Έτσι, παρόλο που η μεθοδολογία περιέχει ορισμένους περιορισμούς λόγω του μικρού δείγματος και της συγκεκριμένης συγκυρίας των ευρημάτων, είναι αρκετά ενημερωτική για τη βελτίωση της λειτουργικής αποδοτικότητας και της ποιότητας του προϊόντος σε πολύπλοκα κατασκευαστικά περιβάλλοντα. Η ακαδημαϊκή συμβολή θα είναι τεράστια, καθώς και η πρακτική μέσω εφαρμόσιμων συστάσεων που μπορούν να προσφέρουν υποστήριξη στις αποφάσεις για την επιλογή προμηθευτών και τη διαχείριση της εφοδιαστικής αλυσίδας.

Λέξεις – Κλειδιά

Επιλογή προμηθευτών, Διαχείριση Εφοδιαστικής Αλυσίδας, Πολύπλοκη Βιομηχανική Παραγωγή, Ποιοτική Έρευνα, Πρακτικές Βιωσιμότητας.

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1. Introduction

Supply chain management has become a critical success factor for organizations in the rapidly changing global manufacturing environment. This represents an extremely high degree of importance in industries such as aerospace, automotive, and electronic engineering, which give rise to complex issues or problems through product design, global supply chains, and the nature of production processes. Effective selection and supplier management is, therefore, a critical process that ensures operational competence, product or sound quality, and the firm's overall competitiveness in the market. The research investigates explicitly the strategies and practices involved in selecting suppliers and managing supply chain processes in complex manufacturing at one leading firm in Athens, Greece.

1.1 Industry Context

Aerospace, automotive, and electronics manufacturing are high-complexity and high-precision industries. In such sectors, the buying of various components and materials from different suppliers worldwide needs to be integrated to a great extent. For instance, one of the biggest challenges in the aerospace sector is supply chain reliability because of the rigorous safety standards and regulations that it has to conform to. In the automotive industry, just-in-time manufacturing and rapid innovation cycles pose significant problems. In contrast, the timely availability of specialized components forms a significant part of electronics manufacturing, many of which usually present supply chain vulnerabilities. The complexities in these industries demand robust supply chain strategies that can help mitigate risks and ensure operational efficiency.

1.2 Importance of supplier selection

However, supplier selection forms the fulcrum of modern supply chain management. It is an evaluative process with critical criteria for choosing suppliers so that an organization can identify and engage suppliers to meet its needs about quality, cost, reliability, and service. The selection of suppliers should be made very carefully because of the complexity of the manufacturing operations, so that the selected suppliers may adjust the production flow without any hassle and work along with the overall strategic company objectives. For instance, in the case of the automotive industry, massive recalls caused by their suppliers have been faced by companies like Toyota. To this end, the selection process would involve

the identification of needs and requirements, market research, pre-qualification and screening, issuance of proposal requests, evaluation and selection, development and negotiation of contracts, and finally, supplier relationship management (Ho, Xu, & Dey, 2010).

Supply chain strategic management has an aspect beyond only selecting suppliers at the very onset. It is a process characterized by continuing monitoring and adaptation to bring out resiliency, efficiency, and support for strategic targets. It not only negates the complications that might emerge from such an extended chain, but it also caters to the uncertainties and variabilities of operational environments, especially in complex manufacturing conditions. Technological integration into the domain of supply chain management.

Effective strategies along a supply chain would, therefore, lean towards emphasizing this bundle of many factors about supplier relationship management, logistics optimization, technology integration, and sustainability practices for responsiveness and agility. The globalization of markets, apart from increasing the pace of supply chain complexity, has elicited over time the stimulus to adopt more advanced technologies and innovative practices in the supply chain management process.

1.4 Technologies associated with Industry 4.0

IoT, blockchain, and advanced analytics—are among the many enablers of better supply chain visibility, transparency, and decision-making power. For example, Walmart has put blockchain to work in enhancing food traceability, dramatically reducing the time taken to trace produce from farm to store. These technologies can track goods in real-time, predict equipment maintenance, and efficiently manage stock—the latter aimed at reducing costs while improving service levels.

1.5 Sustainability in Supply Chain Management

Sustainability has also been one of the striking themes in recent supply chain management. Organizations are keen to know how issues of the environment and social responsibility impact their reputation and competitive benefits when incorporated into their supply chain practices (Seuring & Müller, 2008). This reaches out to the reduction of carbon emissions, wastages, and ethical labor, which makes a broader element of corporate social responsibility.

Corporations like Unilever are already dedicated to creating sustainable supplies, setting a destination point of 100% sustainably sourced agricultural raw materials by 2020. This

offering not only helps the brand image, but also contributes to the long-term supply stability.

1.6 Company Overview

This study investigates how a genuinely large and technologically advanced company in complex manufacturing, specializing in commercial refrigeration units and glass packaging products for the world's food, beverage, and pharmaceutical industries, selects suppliers and deploys supply chain management practices. This firm operates across numerous countries, relying on a highly integrated supply chain to support its manufacturing activities. The varied products the company produces and sells globally, coupled with the many challenges of supplier selection and supply chain management, make this the ideal subject for such a study.

1.7 Methodology of Research

This will be a qualitative research study, which, for the most part, will involve in-depth interviews with key company supply chain professionals. Qualitative methods will be adopted because, in this study, there is a need to unravel in detail how specific experiences, perceptions, and strategies of those directly involved in supply chain management come about. These methods allow both flexibility in the exploration of specific themes and an avenue for respondents to express detailed and nuanced responses. More rigid quantitative methods might overlook the complexities and dynamics of supply chain management in the real world, which this approach particularly excels at capturing (Creswell & Poth, 2018).

Thematic analysis will be used to analyze the data collected from the interviews. At operation, it involves the identification of underlying patterns or themes within the data, its analysis, and reporting in a manner that gives complete coverage of the different practices of supplier selection and supply chain management dimensions at the company.

Thematic analysis is most appropriate for this research because it allows the study of both manifest and latent meanings in the data, revealing insights into the factors that drive supply chain decisions and practices (Yin, 2018).

This research would be very important for the beginner in adding to their academic knowledge and, at the same time, creating a practical application of supply chain management. Elucidating the complexities of supplier selection and supply chain strategies in a lean, complex manufacturing context, this thesis aims to bring out best practices and actionable insights that other companies can use in similar contexts. These findings will

make critical contributions to the existing literature on supply chain management and bring realizations to the forefront, particularly about supplier assessment, technology integration in the supply chain, and sustainability. This is critical since it fills the literary gap where few qualitative insights are available about the lived experiences of supply chain professionals on a similar subject (Nowell et al., 2017).

The qualitative approach is very suitable for eliciting the intricacies and nuances associated with supply chain management in a real-world setting. It offers rich, elaborate insights that quantitative methods might miss out on. For instance, even though the quantitative surveys are themselves effective measures of the extent to which specific practices are followed, they do not explain the reasons behind these practices or the problems associated with them that supply chain professionals encounter. As opposed to this, in-depth interviews in the form of semi-structured interviews may reveal those deeper insights and hence give a holistic understanding of supply chain management (Merriam & Tisdell, 2015).

The research will select participants based on their roles and experiences in supply chain management within the company. This is a form of purposeful sampling to ensure that the data that will be collected will be relevant and detailed. Interviews will be conducted in a semi-structured format. This set of predefined questions will guide the discussion but provide room to elaborate on areas that participants feel are relevant. In other words, while specific topics will have to be covered, there will be space to enable participants to introduce their ideas and insights (Christopher, 2016).

Data transcription and thematic analysis will come next. This step necessitates coding the data based on significant themes and patterns. The themes will be analyzed with respect to the research questions, providing insight into supplier selection and supply chain management practices in the company. Thematic analysis systematically examines the data to ensure the findings are robust and reliable (Braun & Clarke, 2006).

The ethical dimensions of carrying out qualitative research are considered in this study. Indeed, informed consent will be sought from each participating individual by ensuring that all those who turn out understand the study's objective and the rights of participant involvement. Confidence in the research will be ensured through data anonymization to ensure it does not refer to any identity (Creswell & Poth, 2018).

This would translate into an exploratory approach for the study, utilizing a qualitative methodology to demonstrate the intricacies of supplier selection and supply chain management within a complex manufacturing environment. Semi-structured interviews will

provide appropriate richness, depth, and insights into practices and challenges faced by supply chain professionals in the field. Simultaneously, we will conduct a thematic analysis to gather information about effective supply relationships. The findings will not only be of academic use in offering more knowledge and showcasing best practices that provide actionable insights for other firms operating in the same environments, but they will also find practical utility from those companies. The approach closes a literature gap while offering an exhaustive supply chain management education based on the direct experiences of people involved in the process.

2. Literature Review

Supply Selection Process

In firms dealing with complex manufacturing set-ups, the supplier selection issue is very sensitive to the operations with respect to supply chain management. It involves screening potential suppliers as to whether they will be able to meet the specific firm needs in terms of quality, cost, reliability, and service amongst others. However, supplier selection is careful because the manufacturing processes are highly complex, yet the respective suppliers are strategically positioned in the production flow.

Supplier selection starts with the initiation of supply identification, which encompasses the detailed specification of what kind of materials, components, or services are needed from suppliers. This step is important so that this information can form the basis through which potential suppliers should be measured against (Chai, Liu, & Ngai, 2013). After identifying needs, companies develop a framework for their supplier selection criteria. These will most often include price, quality, delivery reliability, service capabilities, and the financial stability of the supplier. Additional issues that are taking on more importance tend to focus on sustainability practices and technological competencies (Govindan et al., 2013).

The second step involves searching for prospects once the purchasing requirements have been identified. This includes the use of preliminary screening procedures intended to come up with a shortlist of suppliers who are considered to meet the minimum sourcing requirements. There are different sources where one can get information about potential suppliers, including various industry databases and trade fairs to word of mouth publicity by industrial partners (Ho, Xu, & Dey, 2010).

The next phase is that of evaluation, during which the selected suppliers are assessed in depth through predefined criteria. It may use tools such as the Analytic Hierarchy Process

(AHP) or the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which is quantitative and helps in comparing the performance of different suppliers against the selection criterion objectively (Ho, Xu, & Dey, 2010). This may also be achieved through a series of visits and audits on-site to verify the information submitted by such suppliers for their operational capabilities.

The next one is negotiation and final selection. Following the supplier evaluation process, the considered suppliers with high scores are negotiated with in areas such as the price, delivery schedules, and after-sales service agreements. The aim of negotiation is to have a mutually benefiting relation with supplier(s) that focuses not only on current company requirements but also on long-range business outlooks (Chai, Liu, & Ngai, 2013).

On the contrary, if the company believes that the process of supplier selection is completed by supplier selection, it is wrong. By supplier performance monitoring and review, it is tracked whether the supplier performs according to agreed metrics or not so that the requirements of the company are still fulfilled. Constant performance monitoring is important for further improvement and the fact that supplier selection process will correspond with strategic goals of a company (Govindan et al., 2013).

In summary, supplier selection in complex manufacturing is a multidimensional and strategic exercise. The literature reviewed within the paper has tried to explain a few important steps: from the simple identification of supply needs, evaluation criteria, depth evaluation of suppliers, and negotiations. Supplier selection is not just a means to enhance supply chain efficiency but is also related to sustainability issues and the performance and success of the manufacturing operation. The companies that do this excel are best suited to respond to, and manage market changes, and can keep their positions secure when it comes to competitive advantage within the respective industries.

Supply Chain Strategy

A strong supply chain strategy would be the development strategy through which an organization should base its actions that would enable it to enhance operational efficiency and customer satisfaction, as well as gain competitive advantage. Harmonization of the organizational goals, therefore, becomes forthright with a good supply chain strategy. This, therefore, means that the performance of the business will be positively added to by the supply chain. These include the management of relations with suppliers and customers, optimization of logistics and operations, and an increased use of technologies that can aid in improving visibility and responsiveness related to supply chain requirements.

The premise under which the best supply chain strategy is built is based on understanding the business model around which an organization is built and what the market demands from the supply chain. Christopher (2016) asserts that capability alignment between the supply chain and the business is vital in achieving marketing success. This alignment ensures that the supply chain will be more sensitive to the market and aware of customers' needs and may thus enhance business agility and resilience in times of disturbances.

Particularly significant for the supply chain strategy is the objective to foster good relations with suppliers. Supplier relationship management is considered one of the critical factors to securing reliability, quality, and efficiency within the supply chain (Pagell & Wu, 2008). Apart from this, when there is an effective supplier collaboration within the company, it will lead towards product and process innovations by cutting across the benefits that are related to cost efficiency and sustainability (Cousins, Lamming, Lawson and Squire, 2008). These relationships are especially critical in demanding manufacturing plants where the dependencies among the levels of operations are crucial. Another element is in optimizing the logistics and operation. This envisions that there should be strategic plans towards the minimizing of costs for all physical movements required in transportation, warehousing, inventory management, and order fulfillment and at the same time, maximizing the service required. It enables the use of just-in-time (JIT) inventory management and lean manufacturing techniques to minimize waste and enhance efficiency (Womack & Jones, 2003). Furthermore, the practice of advanced planning and scheduling (APS) systems regulates the supply chain activities in such a manner that it is possible to take better decisions and utilizes resources efficiently.

The nature of technology is very well embedded in the modern-day supply chain strategies. Global supply chains are morphing with technologies like the Internet of Things, blockchain, and advanced analytics that they aid in making the process not only more transparent, agile, and end-customer-focused but also cost-effective (Kshetri, 2018; Sanders, 2016). To be specific, IoT devices make it possible to track goods at the point of delivery in real time, and blockchain goes even further by recording each transaction across the entirety of its chain in a safe and completely transparent way. This would, thus, give firms technological abilities to respond faster to change in demand and supply conditions and therefore improve the overall performance of the supply chain.

Sustainability, in fact, is starting to become part of the supply chain strategy. Nowadays, firms are starting to realize that they must consider social and environmental responsibilities

as well when managing their supply chain activities. He basically goes on to affirm that all the sustainable practices strengthened by the supply chain, which mainly focus on reduced carbon emission, lesser generation of waste, and fair labor practices, enhance social and environmental welfare. In such a manner, these practices promise an improved reputation and competitive advantage of the firm (Seuring & Muller, 2008).

In general, a supply chain strategy requires the alignment of supply chain operations in accordance with business goals, management of partner relationships, optimization of logistics and operations, integration of technology, and sustainability. By working on these important areas of performance, organizations will be in a position to structure resilient, efficient, and responsible supply chains that support strategic objectives and subsequently become a source of competitive advantage. The changing contours of the global business environment would therefore demand that supply chain strategy has to remain innovative and adapt with every passing phase. This underscores how increasingly important it is to keep on innovating and adapting supply chain management practices.

Complex Manufacturing Companies

Some examples of complex manufacturing companies include those that operate in an intricate environment where sophisticated design of products, the operational network of global supply chains, and production processes prevail. They are mostly found in the sectors like aerospace, automotive, and electronics, which have unique issues that they encounter while ensuring that their operations remain efficient and effective while handling quality measures in a manner that takes care of the dynamic demands of the market.

Product and component diversity, dependence on high-end technologies, and required coordination through reaching supply chains cause complexity in manufacturing. Based on the definition given by Hobbs (2004), such complex manufacturing systems are replete with many intertwined processes and technologies, which make this system highly variable and often plagued by uncertainty. This dictates the requirements to have a strategic approach to supply chain management, product development, and production planning that can enable operational excellence and market competitiveness.

Among other challenges, this is one of the critical issues complex manufacturing companies are grappling with due to peculiar intricacies experienced in the supply chain. Because of its span across different geographical locations and regulatory environments, globalization has brought elements of running operations at higher complexities. These global supply chain concerns in connection to the disruption risks have been ever-increasing, prompting

complex manufacturing companies to come up with robust strategies to possibly avoid these. These include coming up with advanced planning and risk management tools and entering strategic partnerships with key suppliers to cushion the supply chain.

In addition to challenges in the supply chain, complex manufacturing companies need to be pouring money into product innovation all the time if they are to keep their heads above water at all. Speed is the essence, and heavy research and development (R&D) investment have thus become necessary preconditions for continuous innovative improvisation of products and facilities on the part of these companies. On the other hand, businesses becoming more complex manufacturers gain new technologies and implementation of pioneering mechanisms, such as digital fabrication and additive manufacturing, which have a chance of making them increasingly flexible and productive. On the downside, however, setting up most of these technologies takes a great deal of knowledge and resources. The manufacturing process is inherently one that is multistage and multi-collaborative; thus, quality management is an essential area to be observed by any company involved in complex manufacturing. These companies need to understand that there is a need for adoption of Total Quality Management (TQM) practices and quality standards like ISO 9001 so that the level of quality can be maintained and meets the requirements of clients (Sousa & Voss, 2008). The second is the lean manufacturing principles that help in identifying wastage and eliminating them in line with improving the efficiency of operations and product quality.

Environmental sustainability has been a challenge to most complex manufacturing companies as it is an aspect that is now considered. New challenges include, among others, environmental aspects in relation to manufacturing processes, resource consumption, and waste generation-all of which have led to a rise in the regulatory pressures and demands from customers with respect to sustainability. In this practice, companies help themselves comply with regulations like scaling down on energy use, reducing waste generated, and resorting to the use of green materials with the aim of positioning the company as favorably as possible in the eyes of environmentally conscious consumers (Deif, 2011).

Nowadays, companies are more likely to seek the support of digital technologies in being able to navigate the complex manufacturing environment, and they are ultimately able to reduce costs and at the same time raise revenues. Industry 4.0 technologies based on the Internet of Things (IoT), robotics, and advanced analytics change entire manufacturing operations. They provide real-time control and monitoring in production processes,

predictive equipment maintenance, and even improve decision-making in conducting necessary analysis on available data in order to raise efficiency and reduce downtime when producing quality products.

In conclusion, complex manufacturing companies have to tackle a variety of challenges based on the complexity of their production processes, the globalization of supply chains, continuous innovation, quality management, managing environmentally friendly sustainability, and the adoption of new technologies. These require a strategic approach, which includes strong supply chain management, investment in R&D, adherence to high-quality standards, sustainability commitment, and the integration of digital technologies. And hence, proper management of these elements is very essential for the complex manufacturing companies in order to improve their operational efficiencies and further maintain high-quality standards and consequently be able to attain competitive advantage within the market.

Evaluation Criteria in Supplier Selection

Supplier evaluation is one of the critical steps that need to be carried out in the process of supplier selection. It enables organizations to achieve operation success and remain competitive, especially where an organization's supply chain is lengthy and involves sophisticated manufacturing processes. Last but not least is the means for those suppliers chosen, which will affect the quality, reliability, and general performance of the supply chain supposed to be in place. These criteria are not only to ensure that suppliers are in the position of fulfilling the present needs of the organization, but also have the capability to react in line with coming challenges and future market dynamics.

A comprehensive approach must therefore be employed, and a broad criterion used in the selection of suppliers based on this all-encompassing supplier evaluation. The most common criteria included in a comprehensive supplier evaluation are cost, quality, delivery reliability, flexibility, and service (Aissaoui, Haouari, and Hassini, 2007). Each has a role that he or she plays based on the assessment process, and this influences decision making.

In many cases, cost is often taken as one of the primary criteria for evaluation. The definition comprises the initial purchase price and total cost of ownership; in addition, all costs connected with acquisition, delivery, use, maintenance, and ultimate disposal of supplier-offered goods or services are considered to come from that supplier (Ellram, 1995). The Total Cost of Ownership is the tool that a company may use to enable the company to make

purchasing decisions that are more enlightened than mere first-price comparisons, which may leave the company at a point where it actually incurs unintended total cost.

Quality is a critical factor that will determine if the supplier can offer the organization products and services that are of its standards or even higher. The factors under quality may include the consistency of the products, conformity to the standards in line of the industry, as well as the processes of quality control and quality assurance on the part of the supplier (Foster, 2008). High-quality inputs become fundamental to maintain the quality of the final product because this directly influences customer satisfaction and reputation of the organization.

The next criterion is that of delivery reliability, which ensures the timely and accurate quantity supply capability and reliability as a second object of service or product supplier. Not only is the factor important in relation to maintaining high efficiency within the organizational functioning but also to avoid the cases related to disturbances or interruptions in the production process. It considers the elements related to lead time, on-time delivery rate, and its flexibility to attend to urgent requirement (Handfield & Nichols, 2002).

Flexibility relates to the extent the supplier is able to handle changes in demand or even specifications without materially affecting costs, quality, and delivery. With increased dynamics in markets that may experience a radical shift in demand, there is an increasing need for flexibility. This could relate to whether the supplier is willing to modify its products or service offers to satisfy an organization's particular needs (Christopher, 2016).

Service includes the extra help offered by the supplier to the buyer, including post-service, technical support, and communication capacity. Good service will thus form the basis of a good relationship between the buyer and the supplier through the convenience provided by service operation and problem resolution, which may arise in the years of partnership.

On the other hand, apart from the above main parameters, sustainability and innovation are also making their way towards entry in supplier evaluation processes of different organizations. Sustainability refers to the environmental and social effects that the operations of a supplier bring through their resource use, wastes generated, and labor practices (Seuring & Müller, 2008). The other parameter is innovation. This forms the supplier's ability to bring new ideas and technology that will ensure the organization has an edge in matters related to competition and improved performance (Wagner, 2012).

Usually, the supplier evaluation uses tools and techniques of multi-criteria decision-making (MCDM), for example the Analytic Hierarchy Process (AHP), Technique for Order of

Preference by Similarity to Ideal Solution (TOPSIS), and Data Envelopment Analysis (DEA). These tools help an organization make systematic comparisons of one supplier with others considering the criteria on the basis of the relative weight of each criterion with respect to strategic objectives of an organization (Ho et al., 2010).

In conclusion, supplier evaluation processes call for a multidimensional assessment with appropriate attention to a variety of parameters. Proper supplier assessment, determined by cost, quality, delivery reliability, flexibility, service, sustainability, and innovation, enables an organization to make fact-based decisions that will improve supply chain performance and put it at a strategic advantage. As markets continue to change, it is clear that the criteria and methods used in evaluating suppliers must also change with the times in order for organizations to remain on top in this dynamically changing global business world.

Supply Chain Management and Complexity

The Supply Chain Management (SCM) is coordinating of all the parties required in the process of manufacture and distribution. The supply chain may be simple or complex but over time, it has been getting more complex because of globalization, modern technology, and increasing customer requirements. These span areas like product and service diversity, supply chain network complexity, and global markets volatility. Effective management of such complexity is consequently vital for any organization to ensure their efficiency, competitiveness, and resilience to disruptions. It can, therefore, be dissected in this dimension. According to Ivanov, Dolgui, and Sokolov (2019), supply chain complexity results from three main categories that include structural, dynamic, and uncertainty complexities. Structural complexity arises due to the actual physical setup of the supply chain itself, including the number of links or tiers that comprise the actual chain, as well as locational decentralization or dispersion of these chain entities. In sharp contrast, dynamic complexity concentrates on the variability and the change rate of the supply chain, including demand uncertainties and product life cycles. The first two complexities explicitly incorporate both known risks and unknown uncertainties which may intervene in supply chain performance, for example, economic adversity, political chaos, and natural disasters. Organizations have increasingly resorted to strategic approaches in order to handle the ever-growing level of difficulties due to supply chain complexities with the help of technology. In such kind of regard, Zeng and Xia (2006) also refer that effective strategies include the employment of agile supply chain practices. This serviceability helps organizations reply to market changes and customer demands in an agile way through amplifying flexibility and speed in their

supply chain operations. It includes the use of lean manufacturing principles such as just-in-time inventory management and modular product design in decreasing lead times and improving responsiveness.

Besides, the current period also concentrates on using modern-day technology for purposes of integration concerning managing the complexity of the supply chain. The advanced technologies and operational tools from the fourth industrial revolution, Industry 4.0, that have included the likes of the Internet of Things (IoT), artificial intelligence (AI), blockchain, and big data analytics, catalytically influenced SCM visibility, raising decision capability of SCM and operational efficiency (Zhong et al., 2017). For example, IoT devices can track products in real-time across the supply chain and generate valuable information related to optimal inventory levels and predictive maintenance requirements. In a similar line of thought, AI can make an analysis of tons of data to draw patterns and forecast demand as well as optimizing operations regarding logistics. Beyond and above technology, the notion of supply chain resilience has become prominent as far as handling complexity is concerned. Resilience is the capacity of a supply chain to anticipate, prepare for, respond to, and recover from such disruptions while maintaining continuity of operations (Ponomarov & Holcomb, 2009). For building resilience, there has to be full understanding of a network of a supply chain, for example, naming all key nodes and possible vulnerabilities, and putting in place strategies for risk management; hence, diversification of suppliers, contingency planning, and strategic stock of items.

Collaboration and supply chain integration also surface as important elements in managing complexity. Easy and flowing communication of information to all including suppliers, manufacturers, distributors, and customers sets the ground for easy set operations that are aligned with one common factor: 'to achieve goals'. Vendor managed inventory, and CPFR (Collaborative planning, forecasting, and replenishment) are some of the collaborative methods. These tools can improve coordination and result in elimination of redundancies in supply chain operations.

The added layer of complexity to contemporary supply chain management practices is the influential sourcing considerations related to sustainability. Supply chains in any organization are expected to consider environmental, social, and economic sustainability in dealing with sources; some of these practices include resource usage and reduction in emissions and waste, ethical labor practices, and managing community welfare (Seuring & Müller, 2008). Achieving sustainability in SCM requires an integrative view wherein

economic imperatives cannot be assumed to be separate from environmental stewardship or social responsibility.

In summary, dealing with complexity in supply chain management is a multi-faceted challenge which requires strategic and integrated ways of management. Some of the strategies of navigating through the complexities of modernity in supply chain management include leveraging advanced technology capabilities, enhancing supply chain agility and resilience, fostering collaboration, and incorporating sustainability. As the business environment the world over is going through rapid changes, SCM practice needs to be adapted to by organizations in such a way that they can manage growing complexity adequately and, at the same time, respond efficiently to emerging disruptions, meet customer demand, and compete effectively.

Best Practices in Supplier Selection and Management

Best practices for strategic supplier selection and management are very important for any company in order to survive; suppliers impact the effectiveness and robustness of the supply chain in a big way. Emergent world market conditions with higher complexities within the supply chains call for a more strategic approach to supplier selection and management. This way not only will high-quality materials and services be procured, but the buyers will also foster lasting, collaborative relationships with suppliers, which will contribute to improved competitiveness and sustainability of their companies.

In fact, the step represents a basic best practice in the selection of a supplier: the establishment of lucid and comprehensive selection criteria conforming to the strategic objectives and operating requirements of the organization. According to Aissaoui, Haouari, and Hassini (2007), ideally, in this respect, the selection criteria should incorporate not only cost and quality but also delivery performance, flexibility, technological capabilities, and sustainability. From such a perspective, the following multi-criteria model, in one way or another, may bring integrated evaluation of possible suppliers and assure that selected partners will be able to match a given organization on different areas of business interest.

This is what calls for a cross-functional team in the supplier selection process, one that will consider all perspectives and competencies in making the best decision (Monczka et al., 2015). Among others, this team should include representatives from purchase, quality assurance, operations, finance, as well as any other available departments whose addition to the team will persuade consideration of all vital aspects of performance of the vendor.

After suppliers are identified, it is crucial to build a transparent and trust-based relationship for ongoing effective management and long-term success. When the organization has open communication and shared information with its suppliers, problems are identified early, then jointly scoped and solved between the organizations. Some of the methods available for use include product development process integration of suppliers and joint value analysis leading to better product design, cost reduction, and better supply chain flexibility (Handfield & Nichols, 2002).

Another good practice in supplier management is the implementation of systems for performance measurement. Such systems should include key performance indicators (KPI) reflecting the strategy and expectations from suppliers. Such parameters of performance may include issues of quality, delivery accuracy, cost management, and innovation contribution (Cousins et al., 2008). Regular performance reviews based on these metrics can be useful in reflecting areas for improvement, to be further strengthened, for the development of the suppliers, and for more a consistent relationship between the buyer and supplier.

On the other hand, long-term partnerships with suppliers' impact, instead of being an impact, on short-term transactional relations. In this sense, both parties mutually advantage in terms of cost reduction, improved quality, and innovation. This is likely to make long-term partners invest in technologies as well as processes that are going to help the buying party the best, hence developing a better supply chain.

In modern business ecosystems, an ever-increasing preference for the basic criteria governing supplier selection and management includes the sustainability of an array of ethical practices. In other words, suppliers should uphold environmental standards and laws related to work, in consonance with overall corporate social responsibility at not only the organization level but also beyond that, in the supply chain. Moreover, if sustainability considerations are included while selecting suppliers and monitoring them for compliance through audits and certifications, it just happens to uplift brand reputation and ensure a global supply chain that is more sustainable.

Moreover, the practice of technology integrations in supplier management processes will be another best practice that would directly help in improving efficiency, as well as visibility across the supply chain. Advanced software and platforms offer shipment tracking capability in real-time, automated inventory management, and data-driven making of

decisions, thereby continuing in the same path for coordinating with improved richness and better collaboration with the suppliers involved (Sanders, 2016).

In total, best practices in supplier selection and management to structure the company on a competitive and sustainable supply chain. Supply chain management practices include the development of comprehensive selection criteria, the formation of cross-functional selection teams, establishing collaborative relationships with suppliers, implementing performance measurement systems, fostering long-term partnerships, emphasizing sustainability and ethics, and developing technology integrations in supplier management processes. Adhering to such best practices guarantees reliability, quality, and efficiency in the whole supply chain. In turn, this properly locates any organization for business success within these complex and dynamic global markets.

3. Research Methodology

3.1 Research Design

This study is primarily based on qualitative research because of the complexity involved in dealing with context-specific, highly interrelated phenomena regarding selection and supply chain management that require detailed investigation. Qualitative research allows a flexible design to bring out a deep exploration of the experiences, perceptions, and insights of the participants. This makes it most applicable to understanding complex organizational dynamics, especially in areas with several stakeholders and complicated decision-making processes. Regarding qualitative measures, the study seeks to gather detailed data to fully satisfy an attempt to understand the strategies and practices commonly used in supplier selection and supply chain management at complex manufacturing outfits.

The research objectives and phenomena under analysis in the current study seem to justify using a qualitative methodology. One of the strengths of qualitative research is that it responds appropriately to both "how" and "why" questions, highlighting the need to examine processes and influences related to supplier selection and supply chain management. Whereas quantitative research is, in a basic sense, tailor-made to measure variables and test hypotheses, qualitative study aims to fully understand the context and meanings that individuals map over these experiences (Merriam & Tisdell, 2015).

The qualitative design of the study allows for an in-depth exploration of the subjective experiences and insights of procurement professionals. Furthermore, it allows the researcher to appreciate the complexity of the supplier selection process and supply chain strategies,

which are typically fine-tuned decisions combined with complex concomitant contextual determinants. Further, in the domain of qualitative research strategies like semi-structured interviews, it would facilitate a flexible approach to inquiry to elicit interposed data richly to see the underlying mechanisms and dynamics at work.

Further, qualitative research is best applied when the study objective is an in-depth understanding of a phenomenon and not to generalize the findings to a larger population. This research aimed to provide some insights that could guide best practices and build up academic literature on supply chain management rather than provide generalizable results. The depth of data collection and its qualitative nature enable the derived findings to be grounded in the experiences of participants' lives, thereby providing a solid basis for understanding the complexity of supplier selection and supply chain management in a particular organizational context. In their own words, Marshall and Rossman (2016) state that it is an exploratory study giving ground to such an in-depth understanding of supplier selection and supply chain management.

The research paradigm followed is interpretivism, on the pretext that reality is socially construed, and to understand human behavior, interpretations of the meanings and contexts within which it happens are made. Interpretivism is appropriate for this study as it allows for the in-depth underpinning of the subjective experiences and perspectives of people regarding supply chain management. However, that is a paradigm that best synchronizes with the qualitative approach to exploring how people make sense of their experiences and how these interpretations shape their actions and decisions.

The interpretivist paradigm argues for the application of methods that facilitate probing deep within the experiences of the participants. It is at a place that acknowledges knowledge as constructed from social interactions, and understanding these interactions requires close attention to the context in which they occur. This research will utilize a semi-structured interview, which perfectly fits into the interpretive paradigm since it fully permits the participants to describe their experiences and perceptions in their own words—a way of presenting a rich context of the procedures and practices of supplier selection and supply chain management. A semi-structured interview technique determines an interpretive research paradigm, which enables the respondents to describe their experience and perception through their languages fully and outlines the practices and processes of selecting suppliers and supplies. There is consideration of the role that the researcher plays, either in the making or developing of knowledge. One of the central tenets of qualitative research is

that the researcher actively engages with participants in the process of conducting the study, and together they co-construct meanings and understandings. This view is essential in this study because it allows the researcher to work deeply with the participants, allowing fine-tuning of their probing in explaining the complex, context-bound nature of the phenomena at hand. By adopting an interpretive paradigm for the study, the researcher hoped to get deep and detailed insight into the practices relating to supplier selection and supply chain management based on the experiences and perspectives of those directly involved.

Table 1. Research Questions

Number	Research Question
RQ1	What strategies and practices does the company use in selecting and managing suppliers for its complex manufacturing processes?
RQ2	How does the integration of advanced technologies (e.g., IoT, blockchain, advanced analytics) impact the company's supply chain efficiency and decision-making?
RQ3	In what ways does the company incorporate sustainability practices into its supply chain management, and what are the benefits and challenges of these practices?
RQ4	How do the experiences and perceptions of supply chain professionals influence supplier selection and management practices, and what best practices emerge from these insights?

Table 2. Interview Questions and Their Objectives Relevant to eFTI Implementation Challenges

No.	Question	Objective
4	Can you describe the end-to-end process of selecting a supplier for a new project?	To understand the comprehensive process and steps involved in supplier selection.
5	What specific challenges do you face when dealing with mold manufacturing and supply?	To identify and explore the unique challenges encountered in mold manufacturing and supply.
6	How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?	To determine the methods and criteria used for evaluating supplier quality and reliability in situations with limited technical information.

No.	Question	Objective
7	In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?	To assess the impact of cost, lead time, and MOQ on supplier selection decisions.
8	How does your company manage the risks associated with single sourcing for mold production?	To understand risk management strategies for single sourcing scenarios in mold production.
9	Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?	To gain insights into real-world examples and strategies used to handle complexities in supplier selection.
10	How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?	To explore the alignment of procurement strategies with company-wide goals, particularly sustainability and innovation.
11	What role does supplier relationship management play in the procurement process at your company?	To investigate the importance and role of supplier relationship management in the procurement process.
12	How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?	To understand the evolution of procurement strategies in response to industry changes and disruptions.
13	Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?	To identify potential improvements and future changes needed in supplier selection and management processes.
14	What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?	To explore the technologies and tools used in the procurement department for enhancing supplier selection and management.
15	In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?	To gather suggestions and opinions on improving procurement processes to boost operational efficiency and product quality.

Table 3. Research Design

Component	Description
Research Design	Qualitative research
Rationale for Qualitative Research	Complexity involved in context-specific, highly interrelated phenomena regarding selection and supply chain management that require detailed investigation.
Focus of Qualitative Research	Deep exploration of the experiences, perceptions, and insights of participants.

Component	Description
Research Objectives	Understand strategies and practices in supplier selection and supply chain management at complex manufacturing outfits.
Strengths of Qualitative Research	Responds to "how" and "why" questions, examines processes and influences, fully understands context and meanings.
Methodology Justification	Qualitative study aims to understand the context and meanings that individuals map over their experiences (Merriam & Tisdell, 2015).
Data Collection Method	Semi-structured interviews with procurement professionals.
Purpose of Semi-Structured Interviews	Flexible approach to inquiry, elicit interposed data richly, understand underlying mechanisms and dynamics.
Scope of Research	In-depth understanding of phenomena, not generalization of findings. Provide insights for best practices and build academic literature on supply chain management.
Interpretivism Paradigm	Reality is socially constructed, understanding human behavior requires interpreting meanings and contexts. Appropriate for in-depth understanding of subjective experiences and perspectives.
Role of Researcher	Actively engages with participants, co-constructs meanings and understandings. Enables detailed insight into practices relating to supplier selection and supply chain management based on experiences and perspectives of those directly involved.

3.2 Grounded Theory

Grounded theory refers to a systematic methodology in the social sciences that involves constructing a theory through methodical data collection and analysis. Unlike other research methodologies wherein one starts with a hypothesis, in grounded theory, one begins by collecting data to identify patterns or themes to develop a theoretical framework. Research dealing with processes, actions, or interactions, where no pre-existing theory aids in understanding the phenomena under study, particularly benefits from this approach. Grounded theory provides a solid framework to study suppliers and supply chains in the context of procurement professionals' subtle and complex experiences, as this paper explains (Bryant & Charmaz, 2007).

The inductive nature of grounded theory allows for emergent theory that is very close to the actual data collected, hence grounding the theory in actual participants' experiences. Given

the dynamic and context-specific nature of supply chain management in complex manufacturing environments, this approach is very relevant (Charmaz, 2014). Data collection in grounded theory involves several methods, such as interviews, observations, and reviews of documents, which contribute rich, detailed data. Semi-structured interviews are one of the most appropriate data collection methods for this study and fit best with the tenets of a grounded theory approach. These interviews permit the researcher to delve deep into their quests, perceptions, and insights, thereby allowing them to spot important patterns or themes that come out while conversing (Corbin & Strauss, 2015).

After data collection, there is an elaborate scheme of coding and analysis within the grounded theory methodology. Initial coding breaks down the data into parts and then examines each segment for critical points of interest. Focused coding follows, selecting the primary and most frequent codes to synthesize and explain more significant data segments. Since this is an iterative process, the researcher goes back and forth between collecting data and analysis to refine codes and develop categories that form the basis for the emerging theory. Applying constant comparative analysis to data is crucial in grounded theory. Data is compared cyclically with the emerging categories to refine and elaborate on the theory further. This process would ensure that the theory remains very close to the data and can change or adjust when new insights and patterns come to the surface (Glaser & Strauss, 1967).

Constant comparative analysis in this study will, therefore, enable the understanding of how procurement professionals do supplier selection and supply chain management to identify the core categories that explain the process.

Memo-writing is another important aspect of taking grounded theory to its final stage. It keeps a record of the researcher's reflective process on data and codes leading to emerging categories. Memos are records of a researcher's thoughts, insights, and questions regarding the data and analysis; they are traceable and indicate how theory evolves through time. Memo writing in this study is purposed to be done concerning reflecting on the interviews and processes of coding; hence, rigors and depths are brought into the overall analysis. Grounded theory concludes with the development of a coherent theoretical framework, capable of elucidating the observed phenomena and facilitating the integration of categories. Such a theory should be in a position to provide an explanation and insight specific to the context of the study but also with a view toward its possible application elsewhere to other similar contexts.

This emergent theory from the supplier selection for supply chain management study reports back to give a full understanding of strategies, challenges, and best practices in the area of interest. One of the main strengths of grounded theory lies in the integration of flexibility with a developed theory that is firmly rooted in empirical data. Such a methodology is appropriate for exploring complex and context-dependent phenomena, like supply chain management practices in manufacturing. This study employs systematic steps such as data collection, coding, constant comparative analysis, and memo-writing to generate a grounded theory that provides a detailed explanation of supplier selection and supply chain management practices, based on the experiences of procurement professionals.

3.3 Participants

The participants of this study are selected through purposive sampling, a common technique for selecting samples for qualitative research. It means that individual participants are chosen with specific characteristics or experiences that pertain to the research questions of interest (Patton, 2015). The targeted study group includes procurement professionals from a major manufacturing company in Athens, Greece. The selection criteria were based on working in procurement or supply chain management for at least five years. The selection included procurement manager roles, procurement specialist roles, and supply chain analyst roles. These have been set to ascertain that participants will have significant knowledge and experience in supplier selection and supply chain management to offer deep insight into the issues.

Firstly, participants were selected with the assistance of the human resources department at the company. An initial list of qualified candidates was compiled, and these individuals were contacted through email to inform them of the purpose of the study, the nature of their participation, and the ethical considerations involved: confidentiality and the voluntary nature of participation. Those who were interested were then provided with ample information sheets and consent forms to be signed before engaging in interviews. In this way, it was ensured that the interviewees were well-informed and had validly volunteered for ethical research reasons (Orb, Eisenhauer, & Wynaden, 2001).

The study consisted of four participants in total. Qualitatively, this sample size was adequate for the standard followed in qualitative research because the focus is on depth rather than breadth of data (Guest et al., 2006). This category included one procurement manager, one

procurement specialist, one supply chain analyst, and one head of engineering, whose involvement with procurement might have been indirect but involved supplier relationship management within the scope of his engineering remit. This broad spectrum of responsibilities gave me an overall view of how the company chooses suppliers and practices supply chain management.

The range of experience among participants was from three to over ten years, with one participant describing the experience level as being between five and ten and another between two and five.

Such a diverse level of experience worked well for the mutual appreciation of the practices and challenges in supplier selection and supply chain management. The areas of primary focus from which the participants came included mold manufacturing and supply, plastic parts procurement, and supplier relations management, ensuring that the study captured a broad knowledge-based spectrum relevant to the research questions.

In this regard, participants highlighted their experiences and views on several supplier selection processes and supply chain management. Topics discussed included the criteria for supplier selection, challenges in managing relationships, and mitigation of risks arising from supplier non-conformities or misalignment with strategic goals. This approach gave the researcher an all-inclusive view of the processes and considerations taken in supplier selection in a complex manufacturing environment. The semi-structured interviews facilitated flexible and responsive interaction with the participants, enabling the exploration of emerging themes and insights into specific issues as they became apparent during a conversation. Fully informed, written consent was obtained from each participant before the study, and all interviews lasting between 60 and 90 minutes were recorded. Such recordings were transcribed verbatim to ensure detailed analysis.

Therefore, select participants in this study were based on expertise and experience in the procurement and supply chain management functions of a leading manufacturing company; it was that strategy that ensured rich and relevant data were collected and valuable information derived for the complicated processes associated with supplier selection and general supply chain conductance. Varying roles and experiences within the study participants gave all-encompassing insight that matched the study's objectives to explore and illuminate best practices within this crucial area of business operations.

Table 4. Research Sample

Component	Description
Sampling Technique	Purposive sampling
Selection Criteria	<ul style="list-style-type: none"> - At least five years in procurement or supply chain management - Roles: Manager, Specialist, Analyst
Recruitment Process	<ul style="list-style-type: none"> - List from HR - Email contact - Information sheets and consent forms
Total Participants	Four
Participant Roles	<ul style="list-style-type: none"> - 1 Procurement Manager - 1 Procurement Specialist - 1 Supply Chain Analyst - 1 Head of Engineering
Experience Range	3 to 10+ years
Focus Areas	<ul style="list-style-type: none"> - Mold manufacturing - Plastic parts procurement - Supplier relations
Interview Topics	<ul style="list-style-type: none"> - Supplier selection criteria - Relationship management - Risk mitigation
Interview Method	Semi-structured interviews (60-90 minutes)
Ethical Considerations	<ul style="list-style-type: none"> - Informed consent - Confidentiality - Voluntary participation
Data Collection	Recorded and transcribed interviews
Outcome	Insights into supplier selection and supply chain management

3.4 Data Collection Method

This research adopted a data collection method that is intended for the recording of detailed and nuanced insights on supplier selection and supply chain management practices within a leading manufacturing company. Appropriate for use in qualitative studies because of the allowance for the development of in-depth explorations of participants' experiences and perceptions, semi-structured interviews were the primary data collection method for the research (Creswell & Poth, 2017). Semi-structured interviews balance the flexibility of

open-ended interviews with the focus of a structured interview. These allow an inquirer to probe deeply into specific areas while ensuring coverage of all relevant topics.

Questions on the end-to-end process of supplier selection, criteria used to evaluate suppliers, challenges in managing suppliers, and strategies for aligning supplier practices with the company's strategic goals were developed using themes arising from the literature review. Idealistically, this guide comprised questions on the end-to-end process of supplier selection, the criteria for supplier appraisal and evaluation, challenges faced within its supplier management, and strategies to align supplier practices according to the strategic goals of the company. The questions were meant to be flexible, with the interviewer being free to follow interesting or unexpected responses and explore new themes that emerged during the interviews by respondents (Patton, 2015).

Prior to the main data collection exercise, a pilot study was done to refine the interview guide and assure that the questions asked were clear and effective in eliciting detailed responses. The pilot was carried out among two people who met the selection criteria for the study but were outside of the sample's final compilation. Suggestions obtained from the pilot exercise were used to edit the questions to enhance their clarity and relevance.

The primary data collection activity involved face-to-face interviews with five respondents, each lasting 60 to 90 minutes. The interviews were held in a quiet, private room located on the premises of the organization to allow for confidentiality and minimize interruptions. The reason for using the face-to-face approach is that it helps in rapport building and enables the gathering of non-verbal cues, which give a lot more meaning to their responses (Opdenakker, 2006). All interviews were audio-recorded for analysis purposes with the participants' consent and subsequently transcribed into verbatim responses to give a complete data set.

The interviewer used probing questions and prompts to get detailed responses that the participants may share, which might add depth and richness to the data. This would thus tap into the deeper insights of the participants' experiences and, in turn, facilitate the probing of complex issues relating to supplier selection and supply chain management. The interviewer also took field notes on the interviews to note down contextual information or initial impressions that could later be used to complement the transcriptions (Saldaña, 2016). Thus, the reliability as well as the validity of the data being collected were highly regarded. To increase the credibility of the results, techniques like member checking and triangulation were used (Lincoln & Guba, 1985). Triangulation, in this case, will ensure a comparison of

interview data with company documents or reports to enhance the validity of the results and establish a more comprehensive view of the research topic.

In conclusion, the data collection has been very rigorously planned in this study to seek richness, detail, and reliability from the data. Pilot testing, probing questions, and ethical considerations made semi-structured interviews an excellent base over which supplier selection and supply chain management practices can be explored within the manufacturing company. These methods made sure that the information collected was complete and a reflection of the experiences and insights into the lives of the participants, thus adding to the study's overall truthfulness and repeatability.

Table 5. Data Collection Method

Component	Description
Data Collection Method	Semi-structured interviews
Purpose	To record detailed and nuanced insights on supplier selection and supply chain management practices
Interview Focus	<ul style="list-style-type: none"> - End-to-end supplier selection process - Criteria for supplier evaluation - Challenges in supplier management - Strategies for aligning supplier practices with strategic goals
Interview Guide Development	Based on themes from the literature review; flexible to explore new themes
Pilot Study	Conducted with two individuals meeting selection criteria to refine interview questions
Main Data Collection	<ul style="list-style-type: none"> - Face-to-face interviews with five respondents - Duration: 60 to 90 minutes - Location: Quiet, private room on company premises for confidentiality
Recording Method	Audio-recorded with consent, transcribed verbatim
Probing Questions	Used to gather detailed responses and add depth to the data
Field Notes	Taken during interviews for contextual information and initial impressions
Validity and Reliability	<ul style="list-style-type: none"> - Member checking - Triangulation with company documents or reports
Ethical Considerations	Informed consent, confidentiality, voluntary participation
Outcome	Comprehensive, detailed, and reliable data reflecting participants' experiences and insights

3.5 Data Analysis

In this study, thematic analysis was performed with the purpose of establishing the veracity and depth of the findings presented. Thematic analysis is one of the most widely used approaches within qualitative analytic techniques for identifying, analyzing, and eventually reporting patterns or themes that have appeared in the data in question (Braun & Clarke, 2006). It is applied to research the complex and nuanced experiences associated with supplier selection and supply chain management.

Analysis commenced shortly after the transcription of the audio-taped interviews. The verbatim transcriptions included all expression elements of the participants, such as significant pauses, laughter, or other non-verbal cues that might add light to the data. This careful transcription procedure is essential to guaranteeing that the basis for further analysis is correct and complete data (Kvale & Brinkmann, 2009). To increase accuracy, the researcher listened to the recordings several times while referring to the transcriptions and correcting them as needed.

After the transcriptions were completed, the researcher entered into an initial familiarization with the data. Such a phase involves reading and re-reading the transcripts to get to know the data and gain a general idea of what it is all about. This process is important for identifying preliminary patterns and themes that might result from the data (Creswell & Poth, 2017). After familiarization, the data was coded systematically. Coding identifies significant pieces of data and labels (codes) that describe their content. This process is very inductive and deductive. On one hand, some codes were drawn right from the data; others were informed by the research questions and existing literature on supplier selection and supply chain management (Saldana, 2016). The use of qualitative data analysis software, such as NVivo, facilitated the organization and management of the large volume of data, allowing for efficient coding and retrieval of data segments.

Once the initial codes were generated, the procedure that followed was the development of broader thematic headings. According to Braun and Clarke (2006), a theme is a kind of pattern within the data that captures something important about the questions under research and expresses a level of patterned response or meaning. This involved clustering related codes into potential themes and reviewing them to ensure they accurately reflected the data. Following this, themes were defined and redefined by reviewing and reworking them repeatedly to ensure clarity and coherence, through which it was also checked whether each theme was in line with the entire data set and confirmed to be prevalent and salient.

Some strategies have been used to ensure the credibility and trustworthiness of the analysis, as was done. Member checking was done, where participants were provided with the identified themes and interpretations to give their comments and responses. The process further confirmed whether the findings reflected their experiences and views of what happened. Additionally, there were peer debriefing sessions with colleagues who were conversant with qualitative research to make an external validation of the process of analyzing data, ensuring that no biases or preconceptions colored the data analysis.

The final stage of the process involved writing up the findings. Each theme was developed and, where relevant, supported with data extracts to provide broad, detailed coverage under which the sub-themes or minor themes are identified. The narrative included direct quotations from the participants to illustrate key points and enrich the analysis. The integration of these findings with the existing literature helped to contextualize the results and highlight their contribution to the fields of supplier selection and supply chain management.

The researcher maintained a reflective journal in the data analysis process, recording thoughts and decisions and keeping track of probable biases or predispositions. Such reflexivity is essential in qualitative research to ensure transparency and rigor during the data analysis process. There is a need for such reflexivity in qualitative research to maintain openness and rigor during the process of data analysis (Finlay, 2002). In conclusion, the data analysis for this research is a systematic and iterative thematic analysis that is rigorously supported by coding, the development of the themes, and strategies to ensure credibility and trustworthiness are maintained. This approach allowed the researcher to derive meaningful and insightful findings that will contribute to a better understanding of supplier selection and supply chain management practices in complex manufacturing environments.

Table 6. Data Analysis

Component	Description
Analysis Method	Thematic analysis
Purpose	To identify, analyze, and report patterns or themes in the data
Transcription Process	Verbatim transcriptions including all expression elements, reviewed multiple times for accuracy
Familiarization	Reading and re-reading transcripts to identify preliminary patterns and themes

Component	Description
Coding Process	Systematic coding of significant data pieces, both inductive and deductive; use of NVivo for data management
Theme Development	Clustering related codes into themes, reviewing, and refining them for clarity and coherence
Credibility Strategies	- Member checking: Participants reviewed identified themes and interpretations - Peer debriefing: External validation by colleagues familiar with qualitative research
Writing Up Findings	Detailed development of themes with data extracts, direct quotations, and integration with existing literature
Reflective Journal	Recording thoughts, decisions, and potential biases to ensure transparency and rigor
Outcome	Systematic and iterative thematic analysis, resulting in meaningful and insightful findings on supplier selection and supply chain management in complex manufacturing environments

3.6 Ethical Considerations

Qualitative research demands that high ethical considerations be applied, more so if the study is based on personal and professional experiences shared extensively by participants. I took into consideration an extensive set of ethical standards during the study in a bid to ensure that every participant was respected and protected throughout the process. The ethical framework for this study was guided by principles of respect for persons, beneficence, and justice, as outlined by the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). By acquiring informed consent from study participants, the first principle to be adhered to in conducting ethical research is ensured. Informed consent perhaps includes the most basic moral considerations that assure the individual involved in the study has full awareness of what study is being carried out, their roles, and what the participants' rites are. Informed information sheets were given to the participants, and all were explained about the purpose of conducting the study, the procedures used, probable risks, and benefits (Orb, Eisenhauer, & Wynaden, 2001). They were also informed that they had a right to withdraw from the study without any consequences. Written consent was obtained before interviews commenced to ensure that participation would be undertaken with free will and that involvement would be based on an informed understanding of the study.

Another ethical consideration is regarding confidentiality. The rationale for this is based on the premise that privacy and anonymity stimulate free and open interaction during the interviews by all participants (Kaiser, 2009). To ensure the above, all transcripts and reports used pseudonyms to safeguard the identities of participants. All identifying information was edited out of the information, and recordings and interviews were kept away from unauthorized persons. In addition, the participants had been assured that their data would only be used for academic purposes and that the results would be presented in a way that individual respondents could not be identified.

In addition, the research design was made in such a way as not to cause any physical or psychological damage to the participants. The interview questions were designed respectfully and non-threateningly for the participants to feel comfortable sharing their experiences, and even then, they were encouraged to opt not to answer questions that made them feel uncomfortable or that intruded on their privacy.

The other ethical problem was regarding the management of power dynamics between the researcher and the participants. The researcher took a reflexive approach after acknowledging that unequal power relations can influence the research process and the level of information obtained by the researcher. This approach involves the awareness and handling of any power dynamics that may affect the interactions with the informants (Berger, 2015). Efforts were made to establish a rapport with the respondents and create trust so they would feel valued and respected throughout the research process.

The principle of justice was followed in a manner that showed an insistence on ensuring the choice of participants would be done fairly and equitably. The participants were chosen using a purposive sampling method such that the findings from the study related to and applied to the research questions at hand. In this way, the respondents had the proper expertise and experience in the subject area. This way, they ensured they had related findings in as close a relationship as possible to the research questions. Great care was taken not to exert any form of coercion or undue influence in soliciting the potential participants, and a diversity of backgrounds among the participants was included so that a wide range of perspectives might be covered.

Table 7. Ethical Considerations

Component	Description
Ethical Framework	Guided by principles of respect for persons, beneficence, and justice
Informed Consent	<ul style="list-style-type: none"> - Participants provided with information sheets - Explained purpose, procedures, risks, and benefits - Right to withdraw without consequences - Written consent obtained
Confidentiality	<ul style="list-style-type: none"> - Use of pseudonyms - Identifying information removed - Data kept secure and used only for academic purposes - Results presented to ensure individual anonymity
Respectful Interaction	<ul style="list-style-type: none"> - Interview questions designed respectfully and non-threateningly - Participants could opt out of uncomfortable questions
Power Dynamics	<ul style="list-style-type: none"> - Reflexive approach to manage power dynamics - Establishing rapport and trust with participants
Principle of Justice	<ul style="list-style-type: none"> - Fair and equitable participant selection - Purposive sampling to ensure relevant expertise - Avoidance of coercion - Inclusion of diverse backgrounds
No Harm to Participants	<ul style="list-style-type: none"> - Ensuring no physical or psychological harm - Respectful and non-threatening interview design

4. Analysis of the Results

4.1 Analysis of Demographics

The selection of participants from a wide range of roles and levels of experience provided a view that was well-rounded concerning supplier selection and management processes in the company. The procurement manager himself brought over ten years of working experience with him to the company, bringing knowledge of long-term supplier relationships and strategic procurement decisions. With 5 to 10 years of experience, the procurement specialist gave insight into tactical plastic parts procurement, underpinning key operation challenges, and the decision-making process at the mid-level.

The Head of Engineering, for example, who had no direct procurement experience, provided valuable views on the technical and engineering issues involved in the selection of suppliers, especially for mold manufacturing. So, it is an important role that fills the gap between

engineering requirements and procurement capabilities, ensuring that the technical specifications and quality standards are satisfied.

The supply chain analyst, 2–5 years into the job, discussed how the justification behind analytics and data-driven supplier management in the current day and age is more of a focus area. Therefore, the role becomes quite critical in the modern science of supply chain management, where data analytics and performance metrics play a strong role in the decision-making and optimization of processes.

In conclusion, the demographic analysis of the participants highlights the wide expertise and perspectives in the procurement and supply chain management departments of the company. This diversity enriches the study by covering key dimensions in supplier selection and management—from strategy and tactics to more technical and analytical considerations. This analysis shows the critical role that various functions and levels of experience play in structuring effective supplier selection and supply chain management strategies within complex manufacturing environments.

Table 1. Demographics Table

Participant	Position/Role in the Company	Years of Experience in Procurement/Supply Chain		Area of Focus	
Participant 1	Procurement Manager	More than 10 years		Supplier Management	Relationship
Participant 2	Procurement Specialist	5-10 years		Plastic Parts Procurement	
Participant 3	Head of Engineering	Never	Worked in Procurement/Supply Chain	Mold Manufacturing and Supply	
Participant 4	Supply Chain Analyst	2-5 years		Supplier Management	Relationship

4.2 Analysis of the Participants' Responses

Participants' responses are critical in understanding procurement practices in such a complex manufacturing environment with regards to a complete process of supplier selection, in particular difficulties in mold manufacturing and supply, and how quality and reliability for judgment and assessment of suppliers do come into play.

End-to-End Process of Supplier Selection

All participants described a well-organized, multi-dimensional approach to supplier selection with a clear definition of project requirements as the first step. Participant 1

explained that it would start by "identifying the project needs and requirements," then filling these needs through the existing suppliers or seeking new ones via the industry networks, trade shows, and recommendations. This approach points to the dependency on existing relationships and industry knowledge for establishing potential suppliers.

In the same vein, Participant 2 identified that project needs must also be established and tested with existing suppliers so that they can determine if they can deliver and become part of placing or considering new supplier options, such as for trade shows and industry networks. This importance is further supported by Participant 3 through current supplier consultations and utilization of industry networks and recommendations, focusing on the criteria of demand capability, lead time, cost, and environmental commitments.

Participant 4 approached the search by defining project needs and looking for existing suppliers to consult, then identifying new suppliers using networks and recommendations. Critical criteria for the selection of suppliers were also touched on by this participant, and among these, he cited "the ability to meet demand, lead time, cost, and commitments to sustainability and fair treatment of personnel."

Challenges in the Making and Supply of Molds

All participants recognized the complexity of mold manufacturing and the related challenges. Participant 1 expressed that the "challenge of design complexity, confidentiality of technical parameters, ensuring common understanding on demand, delivery requirements in time-quality-cost, and effective project planning" was considerably high. This makes for a good illustration of the multidimensionality of challenges in this area, embracing technical, logistical, and project management aspects.

Participant 2 expressed the same view and said this about the problems: "managing complex design requirements, confidentiality of technical specifications, ensuring mutual understanding of project requirements, and delivery timelines with quality and cost constraints." This identifies the balance or tradeoff aspect required in delivering to the technical specifications vis-à-vis practicalities in both time and cost.

Participant 3 felt that complex designs, managing confidentiality, matching demands on the project, and meeting delivery and quality requirements over the long term were "challenges." This again underscores the need for alignment and confidentiality in handling complex designs.

Participant 4 also struggled with the following: "difficult design needs, information that has to be kept confidential, a mutual understanding of demand, and ensuring long-term quality

requirement fulfillment in delivery." This stressing of mutual understanding and long-term quality requirement fulfillment raises mold manufacturing to a current ongoing necessity.

Evaluation of Potential Suppliers' Quality and Reliability

In determining the quality and reliability of the various suppliers considering potential, all the participants laid great emphasis on certifications, equipment status, and the current customer base. As pointed out by Participant 1, the basis for assessment includes "certifications, the status of their equipment, their current customer base, and the parts produced for other customers." The need for face-to-face visits to sense the potential of collaboration and adaptability was also brought out.

Participant 2 also stated that "certifications, equipment status, and their current customer base" were accessed. At the same time, personal visits and face-to-face meetings further provided insight into the suppliers' capacities and readiness to develop."

Participant 3 assessed potential suppliers on the basis of certifications, equipment status, and customer base," and face-to-face meetings are very vital when assessing potentials in collaboration and adaptability. The point that is being brought out here is that an individual gets to understand more about a supplier's capabilities when there is direct interaction. Quality and reliability were factors that Participant 4 considered in this regard, mentioning that he may assess these with "certifications, equipment status, current customer base, and conduct face-to-face meetings to evaluate collaboration potential." This unanimous emphasis across participants underlines the point of personal touch in the assessment of suppliers. The analysis of the responses further gave a clear argument that there is a methodical and structured supplier selection approach toward precise requirements for the project, domain networks, and robust evaluation criteria.

In this regard, challenges in mold manufacturing and supply are multi-faceted, striking a balance amidst technical specifications, confidentiality, and practical constraints. The evaluation of the quality and reliability of potential suppliers is very much dependent on certifications, equipment status, and direct interactions through face-to-face meetings, therefore justifying the need for extensive and personal evaluation processes that would guarantee supplier capability and alignment with company needs.

In addition, the responses from the respondents shed insight into specifics of the factors influencing supplier selection decisions, risk management strategies for single sourcing in mold production, and modes used to navigate complexities during supplier selection. The

analysis was done on the critical themes emerging from their responses, highlighting commonalities and specific strategies among the participants.

Cost, Lead Time, and Minimum Order Quantity (MOQ) as Influential Factors in the Selection of a Supplier All the participants agreed that cost and lead time were important variables in their selection criteria. Participant 1 mentioned that "cost and lead time are major contributors," and this was echoed by Participant 2, who commented that "cost and lead time are primary factors." This indicates that all stakeholders consider these factors necessary for timely procurement with efficiency. Participants had differing opinions about the role of MOQ in this context. When asked about it, Participant 1 said MOQ becomes essential "when the part in question is used only in one product model, making it equally significant as cost and lead-time." Participant 2 argued that a high MOQ would have enormous consequences for decisions, especially for parts used in specific product models. Participant 3 and Participant 4 echoed the same, in which MOQ is a significant factor in inventory and production planning.

Risk Management in Mold Production

Inherent risks emanate from single sourcing, and the participants elaborated on ensuring such risks can be mitigated. According to Participant 1, managing the risks involves "involving multiple potential suppliers in the RFQ process and making mold production the responsibility of the selected supplier." This strategy makes sure that there is competitive bidding, and its responsibility is shared with the supplier in such a manner that the organization is not entirely dependent on one single source.

Participant 2 also observed that the risks of single sourcing are mitigated by using several potential suppliers in the RFQ process and that the responsibility of making molds is put on the definitely chosen supplier. Participant 3 said that there is a policy in place for such a situation, which does include numerous potential suppliers in the RFQ process, indicating that the approach is diversified. Participant 4 supported these strategies and said that one such strategy involved having several potential suppliers to mitigate the risks involved.

Navigating Complexities Associated with Supplier Selection

The participants elaborated on the complexities involved in the supplier selection process and strategies to deal with them. For instance, Participant 1 referred to communication and supplier understanding of the project and design as typical complexities. The company's strategies are clear communication, providing accurate specifications, sharing samples (3D printed or machined parts), and following up closely on mold design.

The second participant stated that, in the complex situation that arises from the communication gaps and differences between the understandings of project requirements in different cultures, most things fall through, and hence, clear communication with detailed specifications and regular check-ins are necessary. The participants also included other similar strategies: Participant 3 wrote that complexities often arise out of communication, and "hence, 'clear communication, detailed specifications, sample sharing, and regular follow-ups' are essential strategies."

Common Strategies and Best Practices

Several common strategies and best practices are identified in these responses. Recurring themes in the given responses are clear and compelling communication, a prerequisite to ensuring that mutual understanding is maintained between the company and its suppliers. Well-defined specifications and incredible detail, along with proper follow-up with the suppliers, are essential for discretion in the extended complexities of supplier selection to ensure that such suppliers meet the desired standards and timelines. Sharing of samples, especially 3D-printed or machined parts, is pointed out to be an actionable way of fusion of expectations and verification of capabilities. It helps in bridging the gaps in understanding and ensuring that everyone has a clear and tangible reference to the required specifications. Many potential suppliers should be used in the process of RFQ since utilizing many is essential for risk management. This is because it lessens the independent reliance on one particular supplier and opens ways for competition.

Such a practice reduces the risks associated with single sourcing, improves the company's bargaining position, and enables a comprehensive assessment of supplier capability.

Thus, the responses of the participants pointed towards the criticality of cost, lead time, and MOQ criteria for supplier selection and a nuanced understanding of how these interplay in different contexts. Strategies to manage single-sourcing risks pointed to two other imperatives: diversification and shared responsibility. Those navigating supplier selection complexities focused on clear communication, detailed specifications, and sample sharing. Insights like these show that supplier selection and management are multi-faceted phenomena in the context of complex manufacturing and provide best practices for enhancing procurement processes.

Furthermore, the participants provided an outlook on supplier relationship management within the procurement process that emphasized effective communication, transparency, and collaboration. However, issues regarding procurement alignment with strategic goals

and future procurement strategies were deferred in their responses to the procurement team. The scope of this analysis is limited to the views that the participants hold about supplier relationship management and the resulting implications for the procurement process in a complex manufacturing environment.

Supplier relationship management

All participants highlighted that good supplier relationships will assist in containing the procurement process. Participant 1 believed that "clear communication and relationships with suppliers are important" and cited that transparency and being fair, along with close collaboration on payment plans and open accounts, were needed for these changes in planning and typical B2B volumes. This implies that open communication and fair dealing with suppliers are ways to manage the dynamic nature of procurement in complex manufacturing.

Participant 2 responded, "Strong supplier relationships are needed to manage the frequent changes." This quest for transparency and fairness through better communication and joint planning only draws attention to proactivity in managing suppliers' relationships in high-frequency change and volume environments.

Strong relationships guarantee effective management of the changes that occur now and then and ensure transparency and fairness to the suppliers, as Participant 3 reflected. The unanimity of thoughts among the participants on this point shows that they share a perception that supplier relationships are an essential step towards smooth procurement operations.

Participant 4 further commented that proper relationship management ensures clarity of communication and transparency due to the frequently changing planning. This again points to the importance of being transparent and clear in communication regarding the issues that are arduous and dynamic in nature, characterizing procurement processes.

Implications for the Procurement Processes

The fact that supplier relationship management is most important and considered by the entire group of participants has major implications for the procurement process in complex manufacturing environments.

- i. *Communication and Transparency: Clear, effective communication is another good way to involve and engage suppliers in all activities. Getting updates on various operations and endeavors helps instill trust, which will go a long way toward ensuring the two parties agree upon the expectations and requirements.*

- ii. *Equity and Partnership: Fair dealing and a collaborative approach with suppliers can strengthen ties and thus shape the desired outcomes. This encapsulates fair remittance schedules, transparent account handling, and mutual problem-solving.*
- iii. *Adaptability and responsiveness: the high frequency of planning changes and the volume associated with B2B must be adapted and responsive. Strong relationships with suppliers enable this adaptation and change, making things happen much faster than expected and enabling better handling of unexpected disruptions.*
- iv. *Strategic Alignment: Though the respondents were a bit reluctant to provide entirely descriptive answers on strategic alignment of procurement and progression in procurement strategies, it is evident that solid supplier relations facilitate the achievement of overarching strategic objectives. Healthy relationship management is effective for sustainability and innovation because the suppliers, being aware of the values and goals of the firm, conduct themselves accordingly.*

Deferred Questions

The two aspects of strategic alignment and the development of procurement strategies might be carried out by specialized teams within the procurement department, further enforcing the notion of modern procurement functions as being complex and having a high degree of specialization. This analysis of participants' responses reveals that supplier relationship management is the key to effective procurement processes in complex manufacturing environments. The consistent emphasis on communication, transparency, fairness, and collaboration across participants attests more to how these elements aid in managing procurement that is dynamic and high volume in nature.

Even though the questions around strategic alignment and evolution could not be readily answered, the discussions below will shed light on how strong relationships with suppliers are placed to support larger strategic agendas and support changes within the manufacturing sector over time. The analysis thus firmly holds on to the critical need for procurement departments to take relationship management as a core strategic function of crucial importance for efficiency and effectiveness in operations over the long term.

The comments in response to what needs to be changed and improved within the subject company about the supplier selection and management process, among others, and what needs to be done to improve the effectiveness of operations and quality of products provide

an obvious sign of what is essential. To make the provided feedback more succinct, the following analysis distills specific commonalities, themes, and critical recommendations.

Essential Changes/Improvements in the Processes of Supplier Identification and Management

All respondents found it necessary to enhance communication regarding procedures for procurement and selection criteria among all stakeholders. Participant 1 said it is critical "to improve communication of procurement steps, processes and selection criteria to all stakeholders." Similarly, Participant 2 expressed that "enhancing communication of procurement processes and criteria to all stakeholders" was vital, and best practice, as reflected by Participant 3: "Enhancing the communication of procurement processes and incorporating supplier performance evaluations are necessary improvements." Participant 4 said that "critical improvements required enhancing communication and incorporating performance metrics in the supplier selection process."

Such commonality across all participants implies clearly that there is a critical role of good and effective communication in efforts to align all stakeholders and make them informed about procurement processes. This means that improved communication will be translated into better collaboration, transparency, and more understanding of criteria and procedures in procurement.

Participants also expressed that involving performance metrics in supplier selection was paramount. "Account support (payment terms, financial support, etc.)," along with "quality, delivery, etc.," was observed by Participant 1 while selecting a supplier. Further supporting this opinion, Participant 2 added that the selection process should incorporate "performance appraisals and account support." Participant 3 was pretty firm on "incorporating evaluations of supplier performance," and Participant 4 added in by reiterating that it is essential to "incorporate performance metrics in the supplier selection process."

Performance metrics help in evaluating suppliers against actual performance criteria, which makes them more informative and objective the decision-making process. This way, a better chance of quality and reliability from selected suppliers is given, leading to better supply chain efficiency.

Enhancing Operational Efficiency and Product Quality

The suggestions for operational effectiveness and quality of the products made by the participants were: Participant 1 - "Increasing accuracy in specifications, standardizing parts, simplifying designs, and adapting to DFMA practices will further enhance product quality."

This indicates that a product with proper dimensions, standard parts, and a straightforward design will result in a good number of enhancements in the quality of the product.

Participant 2 responded in similar terms: "Use of performance metrics in the selection and the adaptation of DFMA practices will enhance operational efficiency and product quality."

Participant 3 said, "Communication, use of performance metrics, and DFMA practices are vital in improving efficiency and quality." Participant 4 similarly agreed that "enhanced communication of procedures, performance metrics, and adoption of DFMA practices" would make things much better in terms of efficiency and quality.

The repeated recommendation of DFMA practices signals a shared perception of the importance of designing products with manufacturing efficiency in mind. In this respect, DFMA tools can be applied to lower complexity, reduce production costs, and increase product quality.

Deferred Questions on Technologies and Tools

All interviewees related the question of which technologies or tools are used by the procurement department to support a more efficient process in the selection and management of suppliers back to the procurement team. This demonstrates that it may be these specialized teams within the confines of the procurement departments that manage the details of technological acquisition and systems, which warrant further research in this area to be complete under the landscape of technology supporting the activities of procurement. An analysis of the responses identifies several critical areas that need improvement about supplier selection and management processes. In effect, communication should be maximized regarding the processes of procurement and the criteria on which the decision-making is done since this will be a form of transparency and working together. Performance measures are supposed to be integrated within selecting suppliers so that it becomes objective complete of reason, and suppliers ensure the realization of the expected standards. The implementation of DFMA practices is a continuous suggestion for the improvement of operational efficiency and product quality through design simplification and parts standardization. Although the nature of the exact technologies and tools used by the procurement function was not explained, this would be an area worthy of investigation to see how technological improvements around the procurement processes are being facilitated.

5. Discussion

The research aimed at understanding the selection of suppliers and management in the supply chain, focusing on one of the leading complex manufacturers located in Athens, Greece. The method chosen refers to qualitative research, with semi-structured interviews between some of the key professionals in the field of supply chain. Important critical areas that came to light include mold manufacturing challenges, supplier evaluation criteria, and strategies for risk management. The findings can be interpreted with relevance to and in consonance with the existing literature on supply chain management. This was viewed as a systematized, multidimensional supplier selection process initiated with a precise definition of project requirements that led to supplier identification through industry networking, trade shows, and recommendations. Supporting evidence for such a structured approach in supplier selection is also provided by Chai, Liu, and Ngai (2013). Key criteria identified for the selection of suppliers include their ability to meet demand, lead time, cost, and sustainability commitments.

In line with this, Govindan et al. (2013), participants identified mold-making and supply as highly problematic elements of a project. As the need for effective communications, detailed specifications, and adequate follow-up to control these challenges indicates, the issue can be traced back to the need for effective project management and close working with suppliers. This aligns with Handfield and Nichols (2002), who stressed that solid supplier relationships and effective communication are key elements in controlling complex manufacturing needs. The participants focused on the need for face-to-face contact and direct interaction when considering the ability of suppliers, which again tied into building trust and ensuring that the technical specifications matched the skills of the supplier. The activities that were closely identified as critical include the need to carefully evaluate the quality and reliability of potential suppliers.

In this case, the participants stated that the evaluation should border around supplier certification, the status of the equipment, and finally, the customer base of the potential suppliers. These findings agree with those of Foster (2008), which listed quality certifications and availability of equipment as among the core deliverable factors in the area of supplier evaluation. The second approach identified as being of great importance regarding capability assessment was recognizing the need for personal contact or face-to-face meetings. These findings relate to the opinions proposed in this category by indicating

that personal engagement is necessary while engaging suppliers to determine capabilities and cultivate some form of collaboration accurately.

All emerged as critical factors in supplier selection determination: cost, lead time, and MOQ. Respondents expressed sentiments that, in the context of production schedules and attempts to manage operational efficiency, those characteristics were essential to their business.

In particular, MOQ's role in impacting inventory and production planning was noted to have a particular urgency, especially where parts are specific to select models. This, therefore, reinforces the idea that in choosing a supplier, one has to take a balanced perspective, taking not only cost considerations but also operational constraints, echoing Christopher (2016), who further emphasized that supply chain capabilities have to be crafted based on business agendas.

Management of the risks from single sourcing for mold production involves several potential suppliers in the RFQ process and assigning liability for the mold production to the selected supplier. This way, bidding plays down to competitive bidding and shared responsibility, which can reduce the risks of depending on a single supplier. This follows the argument by Christopher and Holweg (2011) for diversification and risk-sharing strategies to enhance supply chain resilience.

Supplier selection was said to be very complex. The latter needs clear communication, detailed specifications, and sample sharing. Participants emphasized that one ought to provide as much accurate information as possible to the suppliers and follow up on them regularly to ensure the project requirements are met. This echoes best practices in selecting suppliers: clear communication and thorough capability evaluation (Monczka et al., 2015). Effective SRM turned out to be critical to effectively managing the procurement process in complex manufacturing environments. The participants stated that solid supplier relationships should be based on a high level of transparency, fairness, and collaboration. This is strongly related to findings by Cousins et al. (2008), who stated that trust and cooperation are paramount if a supply chain is to be efficient and resilient.

Strategies identified through the study to increase operational efficiency and product quality included using performance metrics in supplier selection, adopting DFMA practices, and improving communication of procurement processes. The above strategies concur with Womack and Jones (2003), who maintained that integrating performance metrics and

DFMA practices provides an opportunity for improved manufacturing efficiency and product quality.

On the other hand, the results also reflect the importance of advanced technologies or tools to support the procurement process. The information on used environments was not captured in detail and left to the respective teams in the specialized units of the purchasing department. This area would require more probing. Technologies like the Internet of Things, artificial intelligence, and blockchain have been identified as having potential abilities to enhance supply chain visibility and decision-making capabilities with improved operational efficiency.

In conclusion, the research thus shows some of the critical findings in the practice of supplier selection and management in a complex manufacturing environment. It highlights valued systematic and all-encompassing manners in selecting suppliers, effective supplier relationship management, and integration of performance metrics and DFMA practice to enhance operational efficiency and quality of products. These insights contribute to theory and are eminently helpful for applications in practice in supply chain management, providing quite several recommendations that can be acted upon by companies that are doing business in a similar environment. On this ground, the study also points out the necessity for innovative and adaptive supply chain practices to grapple with the complexities of modern manufacturing to stay competitive.

6. Conclusion

6.1 Answering to Research Questions

The current study focused on the sophisticated supplier selection and supply chain management processes at one of the largest complex manufacturing firms in Athens, Greece. It was adopted to find out in-depth knowledge regarding the strategies, challenges, and best practices that procurement professionals implement in a high-stake manufacturing environment through qualitative research techniques using semi-structured interviews. It was informed by four central questions that sought an understanding of the strategic practices in supplier selection, the impact of advanced technologies on efficient supply chains, the integration of sustainability practices, and how procurement professionals' experiences influence supplier management practices.

A literature review was the starting point for this research, which, critically done, was meant to create a theoretical base of frameworks concerning strategic supplier selection and

efficient supply chain management in multilayer and complex industries of today, such as aerospace, automotive, and electronics. This formed the basis upon which an interview guide had to be developed, in which questions were framed in line with the study's objectives. In this study, informants were purposively sampled and included a procurement manager, a procurement specialist, a supply chain analyst, and the head of engineering. Their position and years of experience placed them in a position to provide an all-rounded view of the intricacies associated with supplier management.

The interviews in the study examined the end-to-end process of supplier selection, which traces a structured approach starting from the definition of the requirements of the projects, using industry networks, and evaluating potential suppliers according to stringent criteria such as cost, lead time, and sustainability commitments. Procurement professionals highlighted that clear communication with detailed specifications is necessary for a mutual understanding between the company and its suppliers.

The difficulties in the mold manufacturing and supply of this critical component of the company's operations were also studied. The issues pointed out by participants in this area related to technical specification handling, confidentiality, and effective project planning. Methods used to overcome such problems included follow-ups, clear communication, and building trust through face-to-face meetings to ensure that the supplier was following the requirements of the projects. These findings align with existing literature, highlighting the importance of solid project management and close collaboration with suppliers in the quest to master the complexity of complex manufacturing.

The research question assessed the impact of advanced technologies, such as IoT, blockchain, and advanced analytics, through a case study whereby it was established that this integration had been fundamental to remarkable improvements in supply chain visibility, decision-making, and operational efficiency. The participants sensed that, with such technologies, real-time product locations, predictive maintenance, and inventory management had significantly reduced costs while enhancing service levels. An example drawn from the use of blockchain for food traceability by Walmart illustrated the transformative power of these technologies in supply chain management.

Sustainability became an important theme, and most respondents shared how the company integrated environmental and social responsibility within its supply chain operations. The study showed that sustainability programs, such as carbon reduction and ethical labor standards, were part of the company's procurement agenda. This focus on sustainability

strengthened not only the image of organizations but also guaranteed long-term supply security, therefore complying with a broader development of corporate social responsibility. The research has also shed light on what procurement professionals experience and perceive in undertaking what is essential to their insights for supplier selection and management. These participants stories highlighted the importance of performance metrics, DFMA practices, and continuous improvement in enhancing operational efficiency and enabling the production of better-quality products. Their detailed accounts gave examples regarding trekking through the complexities of supplier selection, risk management, and developing close relations with suppliers.

It is concluded that this study has very effectively addressed the research questions and provided insight into strategies and practices within supplier selection and supply chain management taking place in a complex manufacturing environment. Advanced technologies and sustainability-infused practices formed the key to improving efficiency in the supply chain while meeting strategic aims. The interviews with procurement professionals highlighted the complexities associated with supplier selection and the delivery of operational competence, which call for clear communication, performance metrics, and collaborative relationships. The research adds valuable knowledge to the existing body of literature on supply chain management and provides actionable recommendations for practitioners within similar industrial contexts.

In summation, this study brought to light the details of supplier selection and supply chain management in one of the crucial complex manufacturing industries located in Athens, Greece. The research adopted a qualitative methodology and collected data using semi-structured interviews from key professionals connected with the area of the supply chain for identification of processes, challenges, and practices in dealing with suppliers in a complex manufacturing environment. The results provide an overall view of the most critical factors and best practices that underlie effective supplier management and contribute to high efficiency in operations and competitive advantage.

6.2 Limitations

This study is essential for highlighting the supplier selection and supply chain management practices of a complex manufacturing company, but not without some limitations. These include methodological constraints, scope and sample size, and the generalizability of the

findings. Discussion of these limitations is paramount in giving context to the results and understanding the scope within which the findings can be applied.

First, this study is characterized by one of the implications of using qualitative research methods, especially semi-structured interviews. Since qualitative research is subjective, most findings are based on the participants' opinions and experiences, with abundant explanation and detail. Although this enables an in-depth exploration of the data with rich detail, the implication exists that the findings are influenced by specific individuals who participate in a given study. By so doing, it could, therefore, lead to biases based on personal experiences or instead on the specific context in which participants engage in their practice. Creswell and Poth point out that this, at times, subjects the general scope of findings to other contexts or organizations in which the experience may be representative of all procurement professionals in complex manufacturing settings.

Another limitation regarding the research methodology is the sample size. While this might be effective for qualitative research, it is unquestionable that this study is based on four interviews. A larger sample size from aspects of supplier selection and supply chain management across different roles and departments within the company would give broad representation. Also, this would have allowed more triangulation of the data, rendering the findings more reliable and valid in general (Guest, Bunce, & Johnson, 2006).

One further weakness, when considering the generalizability of the findings, is that only one Greek company based in Athens is the subject of the study. Identified practices, challenges, and strategies may correspond more to specific organizational cultures this company has cultivated, to the company's particular market position, and to regional economic conditions. The extended findings may thus not be directly transferable to other companies within different geographical locales or industrial sectors. On the other hand, aerospace supply chain dynamics and supplier relationships may differ greatly from those experienced in automotive or electronics manufacturing simply because of differences in regulation, technology requirements, and market pressures.

What is more, there was no in-depth analysis of the technological tools and systems the procurement department relies on to assist supplier selection and management processes. An appreciation of the roles advanced technologies like IoT, AI, and blockchain can play in improving the procurement process would have given a more wholesome view of current practices and future directions in managing supply chains. These questions were deferred by the delegates to specialized teams. The absence of detailed granularity regarding these

technological aspects significantly limits the study's ability to provide recommendations for leveraging technology appropriately to improve supplier selection and management.

Another significant limitation is the possibility of social desirability bias, in which participants present responses that are thought to be expected or favored rather than their honest opinion. It can affect the authenticity of the data collected and the analysis that will be done afterward. This is a hierarchical organizational setting, and even though respondents make efforts to ensure that anonymity is held, and views are openly expressed, it may still impact employees' willingness to share their opinions if they believe that their perspective may appear to be opposed to the practices of the company (Patton, 2015).

Thus, in attempting to fathom meanings and contexts created by people, generalizations that can be objectively or universally made are severely constrained by the interpretive paradigm. While this may be of help for an in-depth investigation into complex phenomena associated with particular contexts, this approach is not likely to result in the usual sought-for generalizations empirically in the research field of supply chain management. The research findings are thus best applied to generating insight and hypotheses testable in the future through quantitative studies rather than taken as clear-cut conclusions applicable in all contexts.

Besides, nowadays, the ways supply chains across the world function have been changing with every passing year and technological innovation. The practices and strategies found effective today need, in all probability, to be rethought as new technologies come to the forefront and market conditions change. Research must thus be perennial; it should keep abreast of these changes that take place to ensure that supply chain management is relevant and applicable (Christopher, 2016).

Nevertheless, and for that reason, this paper reveals supplier selection and supply chain management in a complex manufacturing setting—hardly without a relatively common subjectivity to a qualitative study, a narrow sample size and scope, social desirability bias, and a lack of technological tools. The generalizability of rapidly transforming industrial conditions is far from trivial. By acknowledging these limitations, the findings are appropriately framed, and what is left out is almost as appropriate as what stands out for the need for further research to develop and validate these first insights.

6.3 Recommendations for future research

This study has helped develop an overall understanding of supplier selection and supply chain management in a complex manufacturing environment. However, the results also raise several concerns that warrant further investigation. In the future, it could be expanded by increasing the sample size and having various companies from different industries and locations. A broader approach of this nature would increase the generalizability of the findings and, more importantly, give a wide view of supplier selection and supply chain management practices. Strategies can be compared across industries—such as aerospace, automotive, and electronics—to highlight industry-specific best practices and challenges. Although this study used qualitative methods to gain deeper insights, future research can be complemented with quantitative methods. This would allow measuring the extent of specific practices or assessing the influence of several factors on supply chain performance and thus validating these qualitative findings. This mixed-methods approach will provide a more robust and empirical basis for conclusions and recommendations. Further research into the applications and effects of advanced technologies such as IoT, blockchain, and AI on supply chain efficiency is essential for the future. Organizations would find it very instrumental to learn how different technologies are integrated into the processes of a supply chain and what type of effects they have on key performance metrics. Moreover, studying the barriers to technology adoption and drivers of successful implementation may also shed light on best practices for other organizations. The most prominent theme that emerged in this study concerned the integration of sustainability into supply chain management. Studies on the long-term impact of sustainable supply chain practices on organizational performance, competitive advantage, and stakeholder satisfaction are still missing and should be pursued. One such approach is comparative research between firms with robust sustainability programs relative to others with lesser achievements. Another dimension may be how changes in regulations or consumer expectations served as a stimulus to drive and implement sustainability initiatives in supply chain management practice.

This is to say that this research has a salient finding: the impact of developing a strong supplier relationship. Further studies may focus on the various means of relationship-building, including trust-building processes, communication practices, and integrative efforts. Longitudinal studies could further demonstrate how supplier relationships change over time and affect supply chain resilience, innovation capacity, and overall performance.

When managing global supply chains, it may also be important to determine how much of a role cultural differences play in international supplier relationships. Given the complexities and risks that exist in single-sourcing and mold manufacturing, this study leads to the conclusion that future research should be about developing and testing frameworks for risk management. Case studies and empirical research applications could estimate how different strategies for mitigating these risks, such as diversification, supplier audits, and contingency planning, work in practice. This could yield practical guidelines for balancing cost efficiency with risk management in supplier selection.

Supply chain practices have to be aligned and adjusted, considering the fast pace of changing market conditions and advancing technological environments. One critical connection that future studies leave unexplored is how market dynamics associated with economic shifts, geopolitics, or technological disruption influence decisions about supplier selection and supply chain strategy. This would help an organization become better prepared for and adapt to a changing supply chain landscape through scenario studies and forecasts.

The ethical dimensions of supply chain management need to be detailed in future studies. Understanding the impact of ethical sourcing, fair labor practices, and corporate social responsibility on supplier selection and supply chain performance will enhance the quality of the output and provide a more comprehensive understanding of the wider implications. Ethical considerations become crucial in sustaining brand image and achieving long-term viability.

Such recommendations are based on significant findings from the study, encouraging further investigation into supplier selection and supply chain management. Addressing them will allow future research to create more resilient, efficient, and sustainable supply chains within this complex manufacturing industry.

References

- Aissaoui, N., Haouari, M., & Hassini, E. (2007). Supplier selection and order lot sizing modeling: A review. *Computers & Operations Research*, 34(12), 3516-3540. <https://doi.org/10.1016/j.cor.2006.01.014>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
- Bryant, A., & Charmaz, K. (2007). *The Sage handbook of grounded theory*. Sage.
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Chai, J., Liu, J. N. K., & Ngai, E. W. T. (2013). Application of decision-making techniques in supplier selection: A systematic review of literature. *Expert Systems with Applications*, 40(10), 3872-3885. <https://doi.org/10.1016/j.eswa.2012.12.040>
- Charmaz, K. (2014). *Constructing grounded theory*. Sage.
- Choi, T. Y., & Hartley, J. L. (1996). An exploration of supplier selection practices across the supply chain. *Journal of Operations Management*, 14(4), 333-343. [https://doi.org/10.1016/S0272-6963\(96\)00091-5](https://doi.org/10.1016/S0272-6963(96)00091-5)
- Christopher, M. (2016). *Logistics & supply chain management* (5th ed.). Pearson UK.
- Christopher, M., & Holweg, M. (2011). "Supply Chain 2.0": Managing supply chains in the era of turbulence. *International Journal of Physical Distribution & Logistics Management*, 41(1), 63-82. <https://doi.org/10.1108/09600031111101439>
- Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Sage.
- Cousins, P. D., Lamming, R. C., Lawson, B., & Squire, B. (2008). *Strategic supply management: Principles, theories and practice*. Pearson Education.
- Creswell, J. W., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.
- Deif, A. M. (2011). A system model for green manufacturing. *Journal of Cleaner Production*, 19(14), 1553-1559. <https://doi.org/10.1016/j.jclepro.2011.05.010>
- Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE handbook of qualitative research* (5th ed.). Sage Publications.
- Dyer, J. H., & Hatch, N. W. (2006). Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships. *Strategic Management Journal*, 27(8), 701-719. <https://doi.org/10.1002/smj.543>

- Ellram, L. M. (1995). Total cost of ownership: An analysis approach for purchasing. *International Journal of Physical Distribution & Logistics Management*, 25(8), 4-23. <https://doi.org/10.1108/09600039510099928>
- Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. *Qualitative Research*, 2(2), 209-230. <https://doi.org/10.1177/146879410200200205>
- Foster, S. T. (2008). Towards an understanding of supply chain quality management. *Journal of Operations Management*, 26(4), 461-467. <https://doi.org/10.1016/j.jom.2007.06.003>
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine Transaction.
- Govindan, K., Rajendran, S., Sarkis, J., & Murugesan, P. (2013). Multi criteria decision making approaches for green supplier evaluation and selection: a literature review. *Journal of Cleaner Production*, 98, 66-83. <https://doi.org/10.1016/j.jclepro.2013.06.046>
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59-82. <https://doi.org/10.1177/1525822X05279903>
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Sage Publications.
- Handfield, R. B., & Nichols, E. L. (2002). *Supply chain redesign: Transforming supply chains into integrated value systems*. Financial Times Prentice Hall.
- Hobbs, B. F. (2004). An optimization-based review of operational research models in complex manufacturing and service systems. *Computers & Industrial Engineering*, 46(2), 1-23. <https://doi.org/10.1016/j.cie.2004.05.003>
- Ho, W., Xu, X., & Dey, P. K. (2010). Multi-criteria decision making approaches for supplier evaluation and selection: A literature review. *European Journal of Operational Research*, 202(1), 16-24. <https://doi.org/10.1016/j.ejor.2009.05.009>
- Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research*, 57(3), 829-846. <https://doi.org/10.1080/00207543.2018.1488086>

- Kaiser, K. (2009). Protecting respondent confidentiality in qualitative research. *Qualitative Health Research*, 19(11), 1632-1641. <https://doi.org/10.1177/1049732309350879>
- Kshetri, N. (2018). Blockchain's roles in meeting key supply chain management objectives. *International Journal of Information Management*, 39, 80-89. <https://doi.org/10.1016/j.ijinfomgt.2017.12.005>
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing* (2nd ed.). Sage Publications.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Sage Publications.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.
- Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2015). *Purchasing and supply chain management*. Cengage Learning.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1609406917733847.
- Opdenakker, R. (2006). Advantages and disadvantages of four interview techniques in qualitative research. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 7(4). <https://doi.org/10.17169/fqs-7.4.175>
- Orb, A., Eisenhauer, L., & Wynaden, D. (2001). Ethics in qualitative research. *Journal of Nursing Scholarship*, 33(1), 93-96. <https://doi.org/10.1111/j.1547-5069.2001.00093.x>
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage Publications.
- Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management*, 20(1), 124-143. <https://doi.org/10.1108/09574090910954873>
- Saldana, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). Sage Publications.
- Sanders, N. R. (2016). How to use big data to drive your supply chain. *California Management Review*, 58(3), 26-48. <https://doi.org/10.1525/cmr.2016.58.3.26>

- Schwandt, T. A. (2015). *The Sage dictionary of qualitative inquiry* (4th ed.). Sage Publications.
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710. <https://doi.org/10.1016/j.jclepro.2008.04.020>
- Simatupang, T. M., & Sridharan, R. (2002). The collaborative supply chain. *The International Journal of Logistics Management*, 13(1), 15-30. <https://doi.org/10.1108/09574090210806333>
- Sousa, R., & Voss, C. A. (2008). Contingency research in operations management practices. *Journal of Operations Management*, 26(6), 697-713. <https://doi.org/10.1016/j.jom.2008.06.001>
- Wagner, S. M. (2012). Tapping supplier innovation. *Journal of Supply Chain Management*, 48(2), 37-52. <https://doi.org/10.1111/j.1745-493X.2012.03264.x>
- Womack, J. P., & Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation*. Free Press.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.
- Zhong, R. Y., Xu, X., Klotz, E., & Newman, S. T. (2017). Intelligent manufacturing in the context of Industry 4.0: A review. *Engineering*, 3(5), 616-630. <https://doi.org/10.1016/J.ENG.2017.05.015>

Appendix

Research Questionnaire

Demographic Information

1. Position/Role in the Company:

Procurement Manager

Procurement Specialist

Supply Chain Analyst

Other: _____

2. Years of Experience in Procurement/Supply Chain:

Never Worked in Procurement/Supply Chain

Less than 2 years

2-5 years

5-10 years

More than 10 years

3. Area of Focus:

Mold Manufacturing and Supply.

Plastic Parts Procurement.

Supplier Relationship Management.

Other: _____

Interview Questions

4. Can you describe the end-to-end process of selecting a supplier for a new project?
5. What specific challenges do you face when dealing with mold manufacturing and supply?
6. How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?
7. In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?
8. How does your company manage the risks associated with single sourcing for mold production?
9. Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?

10. How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?
11. What role does supplier relationship management play in the procurement process at your company?
12. How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?
13. Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?
14. What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?
15. In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?

Responses

Interview Responses

Participant 1: Procurement Manager

Position/Role in the Company: Procurement Manager

Years of Experience in Procurement/Supply Chain: More than 10 years

Area of Focus: strategic sourcing, supplier relationships, cost and contract management, compliance, inventory, and sustainability to optimize the procurement process.

4. Can you describe the end-to-end process of selecting a supplier for a new project?

The process starts with identifying the project needs and requirements. If the required part is similar to those already in use, we address the need to our existing pool of suppliers. For new parts or services, we initiate a search through industry networks, contacts from trade shows, recommendations from existing suppliers, and occasionally commercial chambers. The crucial criteria include the supplier's capability to meet demand, lead time, cost, commitment to environmental and sustainability targets, and fair treatment of personnel.

5. What specific challenges do you face when dealing with mold manufacturing and supply?

The main challenges include the complexity of design, maintaining the confidentiality of technical parameters, ensuring a common understanding of the demand, meeting delivery requirements in terms of time, quality, and cost, and effective project planning.

6. How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?

We assess based on their certifications, the status of their equipment, their current customer base, and the parts produced for other customers. For new suppliers, face-to-face meetings are essential to gauge their collaboration level and willingness to adapt to our needs.

7. In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?

Cost and lead time are major contributors. MOQ becomes particularly important when the part in question is used only in one product model, making it equally significant as cost and lead time.

8. How does your company manage the risks associated with single sourcing for mold production?

Risks are managed by involving multiple potential suppliers in the RFQ process and making mold production the responsibility of the selected supplier.

9. Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?

While specific examples cannot be shared due to non-disclosure agreements, typical complexities involve communication and supplier understanding of the project and design. Strategies include clear communication, accurate specifications, sharing samples (3D printed or machined parts), and closely following up on mold design.

10. How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?

Cannot answer at my level.

11. What role does supplier relationship management play in the procurement process at your company?

Given the frequent changes in planning and the typical B2B volumes, clear communication and relationships with suppliers are crucial. Transparency, fairness, and close collaboration regarding payment plans and open accounts are maintained.

12. How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?

Cannot answer at my level.

13. Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?

Enhanced communication of procurement procedures, steps, and selection criteria to all stakeholders is crucial. The supplier selection process should include performance metrics (quality, delivery, etc.) and account support (payment terms, financial support, etc.).

14. What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?

No special tools are used.

15. In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?

Improving communication of procurement procedures and criteria to all stakeholders is vital. Enhancing the supplier selection process by including performance metrics and account support will contribute significantly. Increasing the accuracy of specifications,

standardizing parts, simplifying designs, and adopting DFMA practices will further enhance product quality.

Participant 2: Procurement Specialist

Position/Role in the Company: Procurement Specialist
Years of Experience in Procurement/Supply Chain: 5-10 years
Area of Focus: Plastic Parts Procurement

4. Can you describe the end-to-end process of selecting a supplier for a new project?

Supplier selection starts with clearly defining project requirements and assessing whether existing suppliers can fulfill these needs. If new suppliers are required, we utilize trade shows, industry networks, and recommendations to identify prospects. Key criteria include the supplier's ability to meet demand, lead times, cost-effectiveness, and their environmental and sustainability commitments.

5. What specific challenges do you face when dealing with mold manufacturing and supply?

Challenges include managing complex design requirements, maintaining confidentiality of technical specifications, ensuring mutual understanding of the project requirements, and meeting delivery timelines while maintaining quality and cost targets.

6. How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?

We rely on certifications, equipment status, and their current customer base. Personal visits and face-to-face meetings provide additional insights into their capabilities and willingness to adapt to our requirements.

7. In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?

Cost and lead time are primary factors. MOQ becomes particularly important when dealing with parts used in specific product models, where high MOQ can significantly impact decisions.

8. How does your company manage the risks associated with single sourcing for mold production?

Single sourcing risks are mitigated by involving multiple potential suppliers in the RFQ process and making mold production the responsibility of the selected supplier.

9. Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?

Complexities often arise from communication gaps and differing understandings of project requirements. Clear communication, detailed specifications, and regular follow-ups are key strategies used to navigate these issues.

10. How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?

Cannot answer at this level.

11. What role does supplier relationship management play in the procurement process at your company?

Strong supplier relationships are crucial for managing frequent changes and ensuring transparency and fairness. Effective communication and collaborative planning are essential.

12. How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?

Cannot answer at this level.

13. Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?

Improving communication of procurement processes and criteria to all stakeholders is essential. The supplier selection process should incorporate performance evaluations and account support.

14. What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?

Nothing yet, but the need for implementing such tools or AI will arise soon.

15. In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?

Enhancing communication of procedures and criteria, incorporating performance metrics in the selection process, and adopting DFMA practices will improve operational efficiency and product quality.

Participant 3: Head of Engineering

Position/Role in the Company: Head of Engineering
Years of Experience in Procurement/Supply Chain: Never Worked in

Procurement/Supply

Chain

Area of Focus: Mold Manufacturing and Supply. Always in the frame of the responsibilities related with the Role of Engineering.

4. Can you describe the end-to-end process of selecting a supplier for a new project?

Supplier selection begins with defining project needs and consulting existing suppliers if applicable. For new requirements, we identify potential suppliers through industry networks, exhibitions, and recommendations. Criteria include demand capability, lead time, cost, and commitments to environmental and social responsibilities.

5. What specific challenges do you face when dealing with mold manufacturing and supply?

Challenges include managing complex designs, ensuring confidentiality, aligning on project demands, and meeting delivery and quality requirements over the long term.

6. How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?

We evaluate certifications, equipment status, and customer base. Face-to-face meetings help assess collaboration potential and adaptability.

7. In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?

Cost and lead time are key factors, while MOQ becomes crucial for parts used in specific product models.

8. How does your company manage the risks associated with single sourcing for mold production?

Risks are managed through a policy that includes multiple potential suppliers in the RFQ process, with mold production assigned to the selected supplier.

9. Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?

Complexities often stem from communication issues. Clear communication, detailed specifications, sample sharing, and regular follow-ups are essential strategies.

10. How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?

This question is best answered by the procurement team.

11. What role does supplier relationship management play in the procurement process at your company?

Strong relationships ensure effective handling of frequent changes and maintaining transparency and fairness.

12. How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?

This question is best answered by the procurement team.

13. Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?

Enhancing communication of procurement processes and incorporating supplier performance evaluations are necessary improvements.

14. What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?

This question is best answered by the procurement team.

15. In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?

Improving communication, incorporating performance metrics, and adopting DFMA practices are key to enhancing efficiency and quality.

Participant 4: Supply Chain Analyst

Position/Role in the Company: Supply Chain Analyst

Years of Experience in Procurement/Supply Chain: 2-5 years

Area of Focus: Analyzing data to optimize supply chain processes, improve efficiency, manage inventory, forecast demand, and enhance overall supply chain performance.

4. Can you describe the end-to-end process of selecting a supplier for a new project?

The process involves defining project needs, consulting existing suppliers, and identifying new suppliers through networks and recommendations. Key criteria include the ability to meet demand, lead time, cost, and commitments to sustainability and fair treatment of personnel.

5. What specific challenges do you face when dealing with mold manufacturing and supply?

Challenges include complex design requirements, maintaining confidentiality, ensuring a mutual understanding of demands, and meeting long-term delivery and quality requirements.

6. How do you assess the quality and reliability of potential suppliers, especially when technical parameters are not fully disclosed?

We look at certifications, equipment status, current customer base, and conduct face-to-face meetings to evaluate collaboration potential.

7. In what ways do cost, lead time, and minimum order quantity (MOQ) influence your supplier selection decision?

Cost and lead time are major factors, with MOQ becoming critical for parts used in specific product models.

8. How does your company manage the risks associated with single sourcing for mold production?

Risks are managed by involving multiple potential suppliers in the RFQ process and assigning mold production to the selected supplier.

9. Can you share an example where you had to navigate complexities in the supplier selection process? What strategies were employed to overcome them?

Communication issues are common. Clear specifications, sample sharing, and regular follow-ups help navigate these complexities.

10. How does the procurement department ensure alignment with your company's strategic goals, especially in terms of sustainability and innovation?

Cannot answer at this level.

11. What role does supplier relationship management play in the procurement process at your company?

Effective relationship management ensures clear communication and transparency, which are vital due to frequent planning changes.

12. How has the procurement strategy evolved in response to changes in the manufacturing sector or supply chain disruptions?

Cannot answer.

13. Looking forward, what changes or improvements do you believe are necessary in your company's supplier selection and management processes?

Enhancing communication and incorporating performance metrics in the supplier selection process are crucial improvements.

14. What technologies or tools does the procurement department utilize to streamline the supplier selection and management process?

Personally, I use ChatGPT for big data analysis. It is not official department approach, but it helps me.

15. In your opinion, how could your company improve its procurement processes to enhance operational efficiency and product quality?

Enhanced communication of procedures, performance metrics, and adoption of DFMA practices will improve efficiency and quality.

Author's Statement:

I hereby expressly declare that, according to the article 8 of Law 1559/1986, this dissertation is solely the product of my personal work, does not infringe any intellectual property, personality and personal data rights of third parties, does not contain works/contributions from third parties for which the permission of the authors/beneficiaries is required, is not the product of partial or total plagiarism, and that the sources used are limited to the literature references alone and meet the rules of scientific citations.