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The Impact of Management Style and Supply Chain Coordination on the Lean Projects Implementation to Improve the Operational Performance of Indonesia's Manufacturing Industry

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Abstract

The Indonesian manufacturing industry contributes significantly to economic growth in the globalization era. The capability of company leaders to manage excellently determines manufacturing's competitiveness and sustainable performance to survive in current conditions. This study examines the impact of management style and supply chain coordination on operational performance through lean project adoption. The research surveyed manufacturing companies in Indonesia by distributing questionnaires with Google form links to industry practitioners. The survey obtained 172 manufacturing companies with purposive sampling, which is at least the staff level in the company and permanent employees. Data processing is carried out by structural equation modeling and meets the goodness of fitness. The processing results showed that management style influenced internal supply chain coordination by 0.729, external supply chain coordination by 0.221, and lean project manufacture by 0.152. The company's internal supply chain coordination impacts increasing external supply chain coordination by 0.512, lean project manufacture by 0.375, and operational performance by 0.405. External supply chain coordination impacted the increase in lean project manufacturing by 0.396, and operational performance of 0.234. Lean project manufacturing in the company impacts operational performance by 0.172. The practical contribution of the research provides insight for supervisors and managers always to be consistent and committed to lean manufacturing practices and build strong internal and external coordination. The theoretical contribution of research can enrich the theory of a resource-based view with sustainable supply chain and leadership transformation.

Keywords: Management style, supply chain coordination, lean project manufacture, operational performance

1. Introduction

The manufacturing industry faces increasingly complex challenges amid increasing global competition (Yang et al., 2015). One of Indonesia's most significant economic sectors, the manufacturing industry can contribute highly to gross domestic income and become a mainstay (Tanjung et al., 2021). Globalization pressures manufacturing companies to increase productivity and remain competitive internationally. The production cost of the manufacturing industry in Indonesia is still inefficient, with low labor productivity (Siagian et al., 2022). Full support from

the government in the form of policies to encourage the manufacturing industry to innovate by implementing technologies and systems that increase competitiveness (Siagian & Tarigan, 2021).

Therefore, manufacturing companies need to adopt systems or knowledge transformation to produce new products, services, and process innovations that can make companies create high-quality and efficient products (Sunder & Prashar, 2024). One of the approaches that has proven effective in improving operational efficiency, reducing waste, and maximizing value added is implementing lean projects in manufacturing companies (Rasanjali et al., 2024; Hao et al., 2021). Lean manufacturing implemented in companies can prevent waste, produce more efficient production for companies, and manage environmentally concerned grants (Mathiyazhagan et al., 2021). In addition, manufacturing companies in Indonesia design more effective strategies for improving operational efficiency and competitiveness (Siagian & Tarigan, 2021). Manufacturing companies face pressure from competitors in the manufacturing industry, so they must improve productivity and efficiency (Huang et al., 2022; Tanjung et al., 2021). It needs that management style by managing workforce development (Siddique & Siddique, 2020) and supply chain coordination in companies can optimize the implementation of lean project manufacturing to improve business performance (Abreu-Ledón et al., 2018; Christian et al., 2024).

The management style in a manufacturing company should build a high level of innovation for the company by involving all functionalities and external partners (Li et al., 2018). Moreover, the management leadership style formed in the company (Ling et al., 2020) can increase internal coordination and external partners in carrying out the innovations that have been set (Weerasekara & Bhanugopan, 2023). The company's management style involves all company components collaborating intensively with suppliers to improve operational efficiency and product quality (Foerstl et al., 2013; Nogueira et al., 2018). In line with the management style, the successful implementation of lean projects also contributes to environmental sustainability (Cherrafi et al., 2018) through resource waste reduction, which leads to environmental negative impacts elimination (Jing et al., 2021). Management style is one part of organizational culture (Gonçalves et al., 2016) and is vital in implementing lean factory projects (Hardcopf et al., 2021). Effective management must provide clear goals and strategically direct resources to achieve organizational goals (Ramos et al., 2016). The company is trying to implement a new system to use information technology to suit the organization's needs (Iris & Cebeci, 2014; Basana et al., 2022). The management style has proven to be one of the key factors for the successful implementation of lean practice (Tortorella et al., 2018) because this style encourages innovation and human resource development by generating ideas and new knowledge (Sunder & Prashar, 2024). Management in the company can empower the internal department on an ongoing basis and include the activeness of external partners (Chaudhry et al., 2019).

Meanwhile, supply chain coordination is an essential element in successfully implementing lean project production in manufacturing (Huang et al., 2023). Good coordination between suppliers, manufacturers, and distributors allows companies to reduce uncertainty in the production process (Hao et al., 2021; Jambulingam & Kathuria, 2020). The company's ability to make a real-time enterprise resources planning information system by using information technology that can be shared with external partners (Wang et al., 2023). Supply chain coordination between companies and partners can strengthen the collaboration of both parties in improving company performance (Vanichchinai, 2019; Bandyopadhyay & Kim, 2022). Supply chain, cross-functional, and cross-company coordination can increase company capability with mass customization (Zhang et al., 2014). Companies can improve the integration of internal systems, and external partners can achieve higher efficiency (Huang et al., 2022). Manufacturing companies

need to build strong coordination with supplier partners (Pramajaya & Haryanto, 2021) and customers so that there are no obstacles to the sustainability of the production process, primarily related to limited technology and resources (Huo et al., 2015; Lee et al., 2016; Hu et al., 2018; Kang et al., 2018). Management that focuses on developing innovation and human resources (Siddique & Siddique, 2020) can increase the effectiveness of lean project implementation in manufacturing. Companies that successfully adopt lean projects in manufacturing stated that there was an increase in production cost efficiency, more optimal production time, and customer satisfaction by using information technology in the form of enterprise resource planning (Iris & Cebeci, 2014). Implementing lean manufacturing makes the company's production process increasingly accurate, as shown in the accuracy of meeting the production schedule (Tortorella et al., 2017).

As mentioned above, the lean project in manufacturing is an approach designed to reduce waste in the company's supply chain process (Cherrafi et al., 2018). Lean project in manufacturing is a recognized and accepted company that can control the production process, raw material management process, and distribution of final products to end consumers by using efficient and effective resources (Oliveira-Dias et al., 2023; Anosike et al., 2021). The company strives to create maximum value for customers with resources that are used efficiently and effectively, which is the goal of lean production (Tiwari et al., 2020). Implementing lean projects for companies is essential in increasing the company's competitiveness by providing added value for customers (Sunder & Prashar, 2024). Lean manufacturing is one approach companies use to bind operational performance by eliminating waste and balancing work stages (Yang et al., 2015). Lean systems in companies focus on waste minimization to increase the use of resource efficiency and increase value added for customers (Jakhar et al., 2018; Hao et al., 2021). Manufacturing companies in Indonesia face many obstacles, so adequate coordination with top management is needed (Siagian et al., 2022). Companies can coordinate with external partners to increase their competitive advantage (Li et al., 2018).

The biggest challenges in implementing lean projects are often related to changes in organizational culture (Hardcopf et al., 2021). Completing projects requires leaders who can provide the team direction, motivation, and support to create a work environment that supports change (Misbahuddin et al., 2024; Fadhillah et al., 2023). The importance of coordination in the supply chain also cannot be ignored because it can give a competitive advantage in the marketplace (Jambulingam & Kathuria, 2020). Poor coordination in the flow of supply chains can lead to delays in the delivery of raw materials, product damage during distribution, or even unnecessary waste (Novais et al., 2020; Cheng et al., 2016). Moreover, the company is adopting information technology-based supply chain coordination to increase process efficiency and lower operational costs (Anastasia et al., 2024).

This study examines the relationship between management style, supply chain coordination, lean project implementation, and its impact on business performance in the Indonesian manufacturing industry. By understanding these relationships, companies can be better prepared to face future challenges and improve their competitiveness in the global market. In addition, the results of this research are also expected to contribute academically to the development of more effective management strategies.

2. Literature Review

2.1. Management style

Management is a process in which a company leader can influence others to achieve common goals and build enthusiasm and integrity in every action (Chaudhry et al., 2019). Management is important for achieving the desired results (Ramos et al., 2016). As a dynamic process, management focuses on achieving goals and how a leader can inspire, motivate, and create a conducive work environment for all parties (Gonçalves et al., 2016). Management as a leader is flexible and dynamic, which is important in the leader's ability to influence group members to continue to develop according to the organization's needs (Adeshola et al., 2023). In this context, the leader is responsible for ensuring each team member has a clear direction and enough motivation to achieve the goals that have been set (Chawewong & Naipinit, 2023). This process involves effective communication and a deep understanding of each team member's needs and potential.

Effective leadership can positively influence team members (Weerasekara & Bhanugopan, 2023). Management leads and empowers team members to bring out their best abilities (Siddique & Siddique, 2020). With the right motivation, team members can feel valued and more committed to achieving the organization's goals. Effective management can also instill confidence in team members to face challenges with optimism (Tuan et al., 2022). Management style can reflect a leader with the skills, behaviors, and approaches used to interact with others. This management style can vary depending on the situation and needs of the organization (Afifa & Nguyen, 2023). Successful management can adapt its leadership style to the condition of the team and the challenges faced, either through a more charismatic, democratic, or transformational approach (Sarraz, 2017).

The intelligence of a manager is an important element in determining the organization's success. This intelligence includes intellectual abilities and emotional intelligence that allow leaders to understand team members' feelings, needs, and aspirations (Fadhillah et al., 2023). With intelligence, management can make strategic decisions that benefit the organization and support team members' welfare (Hartati et al., 2025). Each management style has a unique way of leading. This uniqueness can be seen in how a leader faces challenges, overcomes conflicts, and inspires others (Le et al., 2023). As a successful leader, management in a company is usually able to build trust and create a work atmosphere that supports collaboration. This uniqueness is often a determining factor in the success of an organization (Adeshola et al., 2023). Management that makes a company transformational is a leader who can think proactively, innovate, and manage change in a way that motivates team members to follow the same goals (Misbahuddin et al., 2024).

Management as a transformational leader has distinctive characteristics, with a high awareness of the needs of subordinates, the ability to build trust, and the ability to inspire strong commitment (Nogueira et al., 2018). Management can understand the importance of supporting the growth of individuals in the team so that they feel valued and have an important role in the organization (Afifa & Nguyen, 2023). Management style can be transformational to inspire its followers to exceed the limits of their abilities (Fadhillah et al., 2023). Transformational management prioritizes the interests of the company and the community over personal interests, which allows teams to work more harmoniously to achieve organizational goals (Afifa & Nguyen, 2023). This approach also helps to create a sense of collective responsibility within the organization.

Transformational management empowers team members by developing innovative organizational concepts (Tuan et al., 2022). In the business context, this approach improves operational efficiency and strengthens the organization's competitiveness in an ever-changing

market (Chawewong & Naipinit, 2023). By empowering team members, leaders can encourage the creation of innovative solutions to face business challenges (Ling et al., 2020).

A strong commitment to achieving organizational goals is at the core of transformational management (Le et al., 2023). The management style of a strong leader can keep the team's focus on the main goal, even in stressful situations (Chaudhry et al., 2019). By building trust and providing consistent motivation, a work atmosphere that supports collaboration and innovation can be created (Kafetzopoulos & Gotzamani, 2022). Management as a leader often uses the power of charisma and interpersonal abilities to motivate team members (Sarraz, 2017). By building confidence and creating an inclusive work environment, leaders can inspire team members to work together to achieve common goals (Tortorella et al., 2018). Solid collaboration, supported by clear goals from management, is key to the success of a led organization (Misbahuddin et al., 2024). The indicators used to measure manufacturing companies that have the highest leadership are professionals so that they are determined by the management style adopting Ramos et al. (2016) that management always acts to focus on results, management is oriented to the external of the company, management adjusts internal projects to match external changes, management has high initiative to solve problems. Management can be flexible to new circumstances.

2.2. Supply chain coordination

Supply chain coordination is coordinated by companies with external partners in maintaining information, materials, and the flow of funds appropriately in the supply chain management (Oliveira-Dias et al., 2023). Supply chain coordination consists of internal and external supply chain coordination (Zhang et al., 2014). Internal organizational coordination is a key element in the supply chain that aims to integrate the procurement system within the company (Luo et al., 2015). This process involves close collaboration between various functions to ensure the smooth flow of information so that the company can achieve maximum operational efficiency (Jambulingam & Kathuria, 2020). With adequate internal coordination, companies can minimize data duplication between departments. Internal coordination in the company can align various functions to focus on organizational goals (Vanichchincal, 2021). Internal coordination allows companies to jointly improve strategic planning (Bastina et al., 2022). This coordination improves supply chain performance, ultimately strengthening the company's competitiveness in the market (Hu et al., 2018).

In manufacturing, internal coordination is essential to ensure that activities and procedures are according to the standards set together to meet customer needs (Novais et al., 2020). Companies must develop strategic measures to meet market demand and improve service quality. The companies can improve internal coordination by integrating functions with enterprise resource planning so that information can be accessed in real-time (Wang et al., 2023). Internal coordination allows all company parts to work synchronously to achieve organizational goals and be more efficient (Lee et al., 2016). Internal coordination must be carried out correctly (Bandyopadhyay & Kim, 2022). In its implementation, the company often holds regular meetings between departments to align the work plan and reaffirm its overall goals (Siagian et al., 2022). In addition, forming cross-functional teams is an effective solution to increase collaboration and strengthen synergy between organizational functions.

The company's ability to carry out internal operational coordination is a decisive role of management (Christian et al., 2024). The management style in each function can monitor the overall operational system in the department using reliable information technology (Hartati et al., 2025). Information technology appropriately used in their respective functions can enable

companies to access real-time inventory data. Companies can use information technology with resource management in decision-making to reduce the risk of errors (Anastasia et al., 2024). The company's response to market changes also reflects the effectiveness of internal coordination. Companies that can respond quickly to change usually have strong cross-functional coordination and efficient internal processes (Foerstl et al., 2013).

Internal integration is an important part of internal coordination, which includes the management of information technology in the company so that fast communication can be adequately made solidly (Huo et al., 2015). Internal coordination allows companies to anticipate sudden and external changes that can be responded to quickly (Vanichchincal, 2021). Companies can coordinate changes quickly and appropriately to meet customer requests (Huang et al., 2022). With supply chain coordination, every function in the company can work harmoniously to support operational goals (Li et al., 2018). The speed of managing processes or data changes is one of the results of good coordination. Companies that can adopt changes quickly will be more adaptive to market needs and able to maintain competitiveness. In practice, coordination between functions in manufacturing companies conducts regular meetings between leaders as heads of departments in their respective functions (Cheng et al., 2016). Coordination is carried out by involving cross-functions in overcoming changes that occur in external partners and producing new developments for the company (Kang et al., 2018). Effective internal organizational coordination helps companies improve operational efficiency, optimize information flow, and strengthen supply chain performance (Zhang et al., 2014). Internal coordination is important for ensuring long-term success in the competitive business world. The indicators used to measure internal supply chain coordination by adopting Siagian et al. (2022) are routine coordination within the company, coordination of reports between functions periodically, coordination in determining responses to external changes, and coordination in product development.

External supply chain coordination is the coordination built by companies with supplier partners and customers to maintain a balance in the supply chain flow (Abreu-Ledón et al., 2018). Coordination between companies and external parties is strategic better to understand customer needs, particularly in product development (Huang et al., 2022). These efforts improve the company's ability to meet market demand and also help create stronger relationships with external partners (Anastasia et al., 2024). Continuous coordination is key for companies to achieve long-term success amid increasingly fierce competition (Li et al., 2018).

One form of external coordination is to involve external partners in the process of inter-organizational cooperation (Huo et al., 2015). The goal is to ensure that the flow of processes and materials runs orderly and directed so that the company can promptly provide products that match customer orders. This step is essential to maintain customer satisfaction while improving efficiency in the supply chain. In addition, coordination with customers is also an important element in managing demand for finished products. Through effective communication, companies can ensure that customer needs are met accurately in terms of quality and delivery time (Lee et al., 2016). In this way, the company's relationship with customers can be well maintained, supporting business sustainability (Jambulingam & Kathuria, 2020). To improve supply chain efficiency, the company collaborates with external partners to reduce the inventory of raw materials and finished products (Novais et al., 2020). Supply chain coordination with external partners aims to reduce uncertainties arising from fluctuations in customer demand and the availability of materials from suppliers (Hu et al., 2018). By optimizing inventory, companies can save on operational costs and reduce the risk of wasting resources.

In manufacturing, companies often face challenges sourcing materials and components that meet specifications. Coordination with suppliers also provides high-quality materials to improve the company's operational performance (Huo et al., 2015). Close relationships and intensive collaboration with partner companies can ensure that each material received can meet production needs while contributing to better results (Kang et al., 2018).

In addition, coordination built with external partners also involves effective contract management (Luo et al., 2015; Bandyopadhyay & Kim, 2022). Companies must establish intensive communication regarding product procurement to ensure that all requirements specified in the contract can be met (Jambulingam & Kathuria, 2020). This strengthens the relationship with partners and increases trust between the two parties (Pramajaya & Haryanto, 2021). By building good coordination with external parties, companies can create a solid supply chain flow (Zhang et al., 2014). This flow ensures that inventory remains in accurate quantities so that companies can avoid the risk of stock shortages (Luo et al., 2015). In addition, efforts to maintain the efficiency and effectiveness of the company's overall operations can provide strong competitive support to the market. The indicators used to measure external supply chain coordination adopt the research of Huo et al. (2015), namely, the leading supplier actively participates in the procurement process, the leading supplier actively participates in the design process, the main supplier improves the process in order to meet the company's needs better, maintains a good relationship with customers, and the company maintains maximum service to customers.

2.3. Lean project

Lean projects in manufacturing are a best practice in production that aims to make optimal use of resources and eliminate waste to provide economic value to customers (Rasanjali et al., 2024; Jakhar et al., 2018). This concept focuses on reducing waste, not overproducing it (Jing et al., 2021). Lean projects in manufacturing can eliminate waiting time and defective products (Jakhar et al., 2018). Lean manufacturing can eliminate activities that do not add value to the manufacturing process (Sunder & Prashar, 2024). Lean projects are an effective tool for identifying worthless activities in the manufacturing industry and seeking to reduce or eliminate them to increase productivity and efficiency (Hardcopf et al., 2021). This practice is not only limited to the internal manufacturing process but also includes the operation of the entire supply chain, including relationships with suppliers and the distribution of products to customers (Huang et al., 2023).

In a rapidly changing business environment, organizations face supply chain challenges such as market demand fluctuations, global competition, and changing customer needs (Jakhar et al., 2018). Therefore, lean manufacturing was developed to maximize resource utilization by minimizing waste in each production line (Mathiyazhagan et al., 2021). Lean projects are designed to respond to a dynamic and competitive business environment by creating flexible, adaptive, and efficient production systems (Oliveira-Dias et al., 2023). This concept also allows companies to respond to customer demands, both internal and external, directly and quickly, thus creating a competitive advantage (Vanichchincai, 2021; Siagian & Tarigan, 2021).

Lean projects aim to reduce excess inventory, reduce storage costs, and accelerate capital turnover (Yang et al., 2015). By reducing inventory and finished goods, lean projects accelerate the procurement of raw materials from customers and delivery to customers (Abreu-Ledón et al., 2018). Each production stage is designed to be completed on time according to plan so that products can be delivered to customers according to the promised schedule as a form of sustainable performance (Hao et al., 2021). Thus, lean projects ensure the production process runs efficiently without wasting time or resources (Tortorella et al., 2017).

One of the key elements of lean production projects is controlling the production process to avoid overproduction, namely, production that exceeds market needs (Novais et al., 2020). Overproduction leads to raw material waste and affects storage and distribution efficiency (Cherrafi et al., 2018). With the implementation of lean projects in manufacturing companies, they can manage waiting time at each production stage so the process runs smoothly according to schedule (Novais et al., 2020). The lean production and Lean Six Sigma systems support the efficiency of improving processes by minimizing waste and output variations (Tiwarei et al., 2020). Lean manufacturing implementation can increase value added in companies (Tortorella et al., 2018). Transportation and distribution control ensures that goods move through the supply chain effectively by minimizing work-in-process (Christian et al., 2024). Lean projects, in practice, also help improve product quality by minimizing defective products by implementing strict production standards (Sunder & Prashar, 2024). This allows companies to reduce costs incurred due to rework or rejection of products. In addition, companies can better manage inventory, which positively impacts financial and operational performance by using enterprise resource planning (Iris & Cebeci, 2014). By integrating lean projects into the manufacturing system, companies can produce low-cost, timely, high-quality goods that meet customer expectations (Jing et al., 2021).

Lean projects in manufacturing are a very relevant strategy to overcome competitive challenges in the era of globalization. Lean manufacturing with indicators just in time, setup time reduction, cellular manufacturing, and waste elimination (Cherrafi et al., 2018). Reducing waste in each production line improves efficiency and helps companies adapt to changing market demands (Siagian & Tarigan, 2021; Hao et al., 2021). By applying lean manufacturing principles, companies can create more excellent added value for customers while maintaining operational sustainability (Anosike et al., 2021). The indicators used to measure lean projects as a form of practice in manufacturing companies are just in time (Jakhar et al., 2018; Iris & Cebeci, 2014; Sunder & Prashar, 2024; Cherrafi et al., 2018; Abreu-Ledón et al., 2018), total quality management (Jakhar et al., 2018; Iris & Cebeci, 2014; Sunder & Prashar, 2024), employee involvement or human resources management (Jakhar et al., 2018; Sunder & Prashar, 2024; Abreu-Ledón et al., 2018), 5 S (Iris & Cebeci, 2014) and waste reduction (Cherrafi et al., 2018).

2.4. Operational performance

Operational performance is a fundamental element related to the efficiency and effectiveness of a company's internal operations (Huo et al., 2015). This performance reflects the company's ability to produce products or services that meet customer requirements regarding quality, quantity, and timeliness (Foerstl et al., 2013). Operational performance is a measurable result and a reflection of successfully implementing a strategy to achieve the organization's goals.

In the context of manufacturing companies, operational performance is one of the primary measures of success (Tortorella et al., 2017). Companies must be able to produce products efficiently, minimize waste, and adapt to changes in market demand that are often influenced by external factors, such as fluctuations in raw material prices, changes in consumer preferences, and global competitive pressures (Oliveira-Dias et al., 2023). To achieve this goal, companies need to have an integrated operational system where every activity in the value chain, from procurement strategy, procurement of raw materials, and production process to distribution of finished products, is effectively coordinated (Luo et al., 2015).

The company's operational activities include various aspects, such as production planning, inventory management, and quality control. Production planning is important in determining the capacity required to meet customer demand, while inventory management ensures the availability

of raw materials and finished goods in optimal quantities (Huo et al., 2015). On the other hand, quality control aims to ensure that the products produced meet the standards set to meet customer expectations. By integrating these three aspects, companies can improve the efficiency of operational processes while ensuring the sustainability of the supply chain.

Operational performance is also a tangible implementation of the company's strategic plan carried out by employees at various levels of the organization (Hartati et al., 2025). This implementation depends on the quality of the company's human resources, including employees' ability, competence, motivation, and dedication. Each individual has a specific role in achieving the company's operational goals (Sunder & Prashar, 2024). For this reason, companies need to create a work environment that supports productivity and innovation and provide continuous training to improve employee competence.

In addition, operational performance is not only limited to internal efficiency but also includes the company's ability to respond to changes in the external environment (Novais et al., 2020). In dynamic market conditions, flexibility is a key success factor. Companies that can quickly adjust their production capacity according to changing customer demands will have a competitive advantage (Christian et al., 2024). This requires close coordination between various departments, including marketing, production, and logistics (Vanichchincrai, 2021). Companies must ensure that their operational activities are efficient, environmentally friendly, and sustainable (Chawewong & Naipinit, 2023). Operational performance provides economic benefits and positively impacts the environment and society (Kafetzopoulos & Gotzamani, 2022).

Good operational performance is one of the determining factors for a company's success in the long term (Tortorella et al., 2017). Companies can create significant added value by managing the quality of activities related to the flow and movement of goods, from raw materials supplied to finished goods that reach the end consumer (Cheng et al., 2016). This improves customer satisfaction and strengthens the company's position in the market. The indicators used to measure the company's operational performance proposed by Oliveira-Dias et al. (2023) are efficiency, inventory turnover, cycle time, on-time delivery, and fast delivery. In the study, it was determined that the measurement items for operational performance were productivity (Tortorella et al., 2017), delivery service level (Tortorella et al., 2017; Sunder & Prashar, 2021), cost reduction (Tortorella et al., 2017; Sunder & Prashar, 2024), inventory level (Tortorella et al., 2017; Sunder & Prashar, 2024; Hardcopf et al., 2021), quality product (Tortorella et al., 2017; Sunder & Prashar, 2024; Hardcopf et al., 2021), safety (Tortorella et al., 2017) and flexibility to change volume (Hardcopf et al., 2021).

2.5. Relationship between concepts

2.5.1. Management style and internal supply chain coordination

Management style is important in increasing the company's internal supply chain coordination effectiveness. The management style starts by creating a common goal clearly and inspiringly to provide a unified direction for all departments that create innovation with new products, processes, and services (Sunder & Prashar, 2024). Coordination is established for each part of the organization by establishing a hierarchy to understand the role of achieving common goals so that cross-functional collaboration can run more harmoniously (Zhang et al., 2014). Management style can encourage effective and transparent communication at all levels of the organization (Ramos et al., 2016). With open communication channels, each team can exchange relevant information and decide on goals, efficiency, and productivity (Ling et al., 2020).

Organizational culture with a management style can motivate and empower employees through a personal approach that emphasizes appreciation for each department's contribution (Hardcopf et al., 2021). Employees who feel valued tend to be more engaged and ready to collaborate with other teams, creating more muscular internal coordination (Gonçalves et al., 2016). Management style encourages a culture of cooperation that facilitates synergy between departments as internal supply chain coordination so that it can avoid obstacles (Jakhar et al., 2018). This approach allows each part of the organization to work as a well-coordinated unit (Tuan et al., 2022).

In dealing with conflicts that may arise during the coordination process (Vanichchincrai, 2021), management can manage conflicts positively through mediation and problem-solving based on organizational values (Siddique & Siddique, 2020). A management style can resolve conflicts (Chaudhry et al., 2019) and strengthen relationships between individuals or teams, ultimately improving internal coordination (Fadhillah et al., 2023). Additionally, by providing space for innovation, transformational leaders can ensure that new ideas can be integrated effectively through good coordination between various organizational functions (Misbahuddin et al., 2024). Management style creates an adaptive, innovative, and harmonious work environment (Chawewong & Naipinit, 2023), thereby increasing the efficiency and success of the organization in achieving its strategic goals (Sarfraz, 2017). Management capability in project procurement can impact internal supply chain integration by using information technology to integrate all functions' roles (Hartati et al., 2025). The first hypothesis (H1) can be determined based on the above argument.

H1: Management style affects internal supply chain coordination

2.5.2. Management style and external supply chain coordination

Management style can build relationship commitment that affects external supply chain coordination by increasing the organization's ability to coordinate effectively with external partners such as suppliers, distributors, and customers in the supply chain (Huo et al., 2015). A management style that focuses on the company's long-term goals (Siddique & Siddique, 2020) and collaboration with external partners goes well (Kafetzopoulos & Gotzamani, 2022). Management style is important in creating strong and synergistic relationships with external partners in completing telecommunication projects (Misbahuddin et al., 2024).

Management style can develop shared goals that can be used as a guideline for all external supply chain partners (Hartati et al., 2025). Sharing the company's internal goals and strategies with external partners can create synergies supporting shared goals. Management style encourages open and collaborative communication with external partners (Chaudhry et al., 2019). Effective communication is a key element in supply chain coordination with external partners by enabling the exchange of accurate and timely information regarding production needs (Vanichchincrai, 2021). Strong coordination with external partners by meeting market demand according to customer demand so that it can prepare for distribution well (Zhang et al., 2014). Management style in workforce development in empowering employees and strong teamwork encourages transparency (Ling et al., 2020), increasing trust and strengthening long-term relationships with external partners (Abreu-Ledón et al., 2018).

Management style motivates external partners to innovate and improve performance (Fadhillah et al., 2023). Inspiration and encouragement from leaders can help external partners understand the importance of creating added value in the supply chain. Management can adopt new technologies to produce reasonable and appropriate efficiency improvements (Le et al., 2023).

Leaders in companies can develop innovative products that meet the needs of end customers (Afifa & Nguyen, 2023). External supply chain coordination has become more proactive and adaptive to market changes (Cheng et al., 2016). Management style encourages collaborative conflict resolution within the company (Gonçalves et al., 2016). In supply chain relationships, external partners can maintain effective communication to avoid conflicts and operational constraints (Jakhar et al., 2018). The management style can mediate this conflict by encouraging productive dialogue and finding mutually beneficial solutions (Ramos et al., 2016). This approach solves problems and strengthens relationships between supply chain partners. Management style encourages process integration in external supply chains (Chawewong & Naipinit, 2023).

Management style encourages the use of technology that can connect all partners in a digital-based supply chain (Kafetzopoulos & Gotzamani, 2022). This integration allows for more efficient coordination regarding demand planning, inventory control, and distribution of goods to the market. Management style improves external supply chain coordination by creating transparent communication, strengthening relationships with external partners, and encouraging innovation throughout the supply chain (Hartati et al., 2025). With a collaborative and strategic approach, management ensures that the entire external supply chain works harmoniously to achieve common goals and provides added value by implementing lean manufacturing (Tortorella et al., 2018). Therefore, the second hypothesis (H2) is proposed as follows.

H2: Management style affects external supply chain coordination

2.5.3. Management style and lean project

Management style significantly influences the successful implementation of lean project practices in manufacturing because both focus on improving efficiency, product quality, and resource empowerment (Sunder & Prashar, 2024). Management style plays an important role in creating clear goals and providing direction on the main goals of lean production (Hardcopf et al., 2021). As the company's management, the owner can always direct components to reduce waste and create added customer value (Weerasekara & Bhanugopan, 2023). Management can unite all individuals to commit to higher efficiency goals (Ramos et al., 2016). Management style encourages a culture of change urgently needed in projects (Chaudhry et al., 2019). Management style can overcome resistance to change by motivating employees to see change as an opportunity for innovation (Ling et al., 2020).

Lean project manufacturing also requires strong cross-functional coordination (Oliveira-Dias et al., 2023). The management style supports this by encouraging department collaboration through open communication and synergy (Hartati et al., 2025). Management style motivates employees personally and rewards each individual's contribution (Adeshola et al., 2023). Leaders can create a sense of shared responsibility to support the implementation of lean projects (Tortorella et al., 2018). In facing conflicts or challenges during the implementation process, management uses a collaborative approach to solve problems constructively (Tuan et al., 2022).

Management style also plays a role in encouraging innovation relevant to lean project production of manufacturing companies (Hardcopf et al., 2021). Leaders can inspire employees to create new solutions to reduce waste, improve quality, or simplify the production process as a form of lean management (Nogueira et al., 2018). By integrating innovative technologies and practices, lean project manufacturing can be carried out more efficiently and adaptively to changing market needs (Anosike et al., 2021). The management style ensures that continuous monitoring and evaluation are part of the work culture (Fadhillah et al., 2023) so that the organization focuses on short-term results and continuous improvement (Hao et al., 2021). The combination of

management style and lean project manufacturing allows organizations to achieve higher operational efficiency and provide more excellent added value to customers (Yang et al., 2015). The explanation above can be set as the third hypothesis (H3).
H3: Management style affects lean projects.

2.5.4. Internal Supply Chain Coordination and External Supply Chain Coordination

Supply chain coordination implemented by companies results from synergy between internal and external integration of the organization, which is designed to create an efficient and effective flow of information, materials, and resources (Bandyopadhyay & Kim, 2022). In the context of manufacturing companies, collaboration with suppliers is the primary key to creating an integrated supply chain (Huo et al., 2015). Knowledge exchange between organizations is a form of employee involvement, where manufacturing companies send employees to work alongside suppliers to understand technical needs (Basana et al., 2022), while employees from suppliers are empowered in manufacturing companies to ensure that products meet expected specifications (Jakhar et al., 2018).

Good external collaboration also makes companies more responsive when facing supply chain challenges (Luo et al., 2015). By involving external partners in planning, companies can balance material availability with customer demand (Vanichchincrai, 2021). In addition, production and inventory optimization can be achieved through continuous process improvements carried out with suppliers (Lee et al., 2016). Good coordination with suppliers can result in new materials that align with the company's needs (Zhang et al., 2014), while collaboration with customers can clarify order planning and ensure the smooth fulfillment of finished products (Siagian et al., 2022).

On the internal side, internal integration of the organization plays an important role in managing coordination between functions within the company (Hu et al., 2018). This includes alignment between production, logistics, and procurement departments to determine raw material specifications and select suppliers with a high potential to meet company standards (Cheng et al., 2016). With good internal integration, the company can improve the timeliness of material delivery, mitigate the risk of delays, and respond quickly to fluctuations in market demand (Kang et al., 2018). In addition, internal coordination also includes more scalable and flexible inventory management to support the company's overall operations (Jambulingam & Kathuria, 2020).

The role of digital technology in supply chain coordination cannot be ignored. Integrating information technology allows companies to share real-time information with suppliers and customers (Li et al., 2018). By using systems such as Enterprise Resource Planning (ERP), companies can provide real-time customer order status updates and increase transparency in supply chain management (Rasanjali et al., 2024; Wang et al., 2023). In addition, companies can also leverage analytics data to predict customer demand and dynamically adjust production strategies. The advantages of supply chain integration are seen in operational efficiency and increased customer satisfaction (Foerstl et al., 2013). By effectively utilizing customer feedback, companies can continue to improve their products and services (Christian et al., 2024). The results of the explanation above can be determined by the fourth hypothesis (H4).

H4: Internal supply chain coordination impacts external supply chain coordination

2.5.5. Supply chain coordination and lean project

4 Supply chain integration (SCI) is the process of aligning activities between various actors in the supply chain between suppliers, companies, distributors, and customers to achieve an efficient flow of information, materials, and resources (Mathiyazhagan et al., 2021). Meanwhile,

lean project manufacturing is a method that focuses on eliminating waste at every stage of manufacturing production process activities to increase customer value. Supply chain integration and lean project manufacturing aim to improve operational efficiency and create added value for companies (Huang et al., 2023).

Lean project manufacturing relies on the timely and on-demand supply of materials and information to avoid wastage (Tortorella et al., 2017). Supply chain integration allows companies to collaborate with suppliers to ensure the availability of raw materials according to schedules and specifications to support the implementation of lean project production manufacturing (Novais et al., 2020). Company management, such as supervisors, can design supply chain integration to align communication between departments with lean production principles to receive materials when needed to reduce storage costs (Hardcopf et al., 2021).

Supply chain integration affects lean projects because it can reduce waste in waiting times, excess inventory, and inefficient processes can be reduced or even eliminated (Oliveira-Dias et al., 2023). SCI helps reduce this waste through a transparent flow of information between supply chain partners and enterprise resource planning integration technology (Rasanjali et al., 2024). Information technology allows companies to share data between manufacturers, suppliers, and customers in real-time, thereby reducing waiting times and increasing accuracy in planning material needs (Siagian & Tarigan, 2021).

SCI allows companies to collaborate with external partners to develop leaner process innovations. Suppliers can be involved in redesigning product components to reduce material waste during production (Mathiyazhagan et al., 2021). This coordination approach strengthens lean principles for efficient and resource-saving processes (Huo et al., 2015). Lean projects often face challenges in changing customer needs or dynamic market conditions. The implementation of enterprise resources planning in lean manufacturing to produce integration in the company so that it can respond to changes faster because of good coordination with supply chain partners (Iris & Cebeci, 2014). Sudden changes in demand from customers to companies so that data is integrated with suppliers to immediately adjust their production capacity to meet project needs without delaying delivery schedules as a form of sustainable supplier (Jakhar et al., 2018).

Good coordination is key in a lean project to ensure all parties understand the company's priorities (Vanichchincal, 2021). SCI supports this communication through an information integration system that allows real-time data exchange. Thus, decisions can be made quickly based on the results of coordination with the latest data, reducing the risk of miscommunication that can lead to wasting time and resources. SCI allows companies to use data analytics to optimize the supply chain. In lean projects, data analytics can predict material needs, identify potential bottlenecks, and plan more streamlined project schedules (Nogueira et al., 2018). With a data-based approach, lean project implementation can run more efficiently, with lower risk and more predictable outcomes (Tortorella et al., 2017).

Internal and external coordination as a form of supply chain integration in a company can ensure that every stage in the supply chain supports demand fulfillment (Huang et al., 2022). Coordination with customer partners can make it easier for companies to provide information to supplier partners (Siagian et al., 2022; Hu et al., 2018). Coordination with suppliers allows companies to set strict quality standards, while information transparency allows for early detection of potential problems, thus maintaining lean project manufacture (Abreu-Ledón et al., 2018). Supply chain integration supports lean project manufacturing by reducing energy waste and material use efficiency (Novais et al., 2020). Coordination with supply chain partners can lead to more environmentally friendly solutions, such as using recycled materials and reducing carbon

emissions in material transportation. Coordination with external partners can help lean projects achieve sustainability goals while maintaining efficiency (Hao et al., 2021). Internal coordination of companies and external partners helps companies eliminate waste, improve efficiency, and create more customer value (Vanichchincrai, 2021; Bandyopadhyay & Kim, 2022). This synergy allows companies to achieve successful lean manufacturing implementations (Christian et al., 2024) and build long-term competitive advantages in their operations (Yang et al., 2015). As a result of the explanation above, the fifth (H5) and sixth (H6) hypotheses can be determined.

H5: Internal supply chain coordination affects lean projects.

H6: External supply chain coordination influences lean projects.

2.5.6. Supply chain coordination and operational performance

Supply chain integration has an important role in supporting the company's operational performance through better coordination among various parties in the supply chain. Supply chain coordination involves collaboration between suppliers, manufacturers, distributors, and customers to ensure the smooth flow of information, goods, and services (Siagian et al., 2022). By integrating all processes in a company, it can manage its activities more structured, thereby increasing operational efficiency (Huang et al., 2023). Supply chain integration allows companies to coordinate well with external and internal partners to maintain product quality and timely and efficient delivery (Jambulingam & Kathuria, 2020).

Strong coordination between the company's internal and external partners allows for reduced waste in operational processes (Basana et al., 2022). The coordination formed can benefit more effective inventory management and the realization of the proper production process (Lee et al., 2016). The integrated flow of information allows companies to coordinate effectively in quick and data-driven decisions (Novais et al., 2020). Internal coordination will impact the external so that all parties can access market demand information in real-time (Li et al., 2018). Companies can adjust production plans to customer orders with a timely and uninterrupted supply of raw materials (Huang et al., 2022). Coordination that companies carry out with external partners can reduce costs associated with process inefficiencies (Kang et al., 2018).

Supply chain integration formed in companies allows for better information management through real-time data sharing among partners in the supply chain (Cheng et al., 2016). All components within the company can easily access information on market demand data, production schedules, and inventory levels, which can be shared with external partners. Coordination formed in companies can help reduce uncertainty in manufacturing operational planning (Wang et al., 2023). With good coordination between all components in the company, it can optimize its production process to meet customer needs. This good coordination also strengthens communication and trust between supply chain partners (Zhang et al., 2014).

Close coordination impacts the quality of processes and products companies produce (Siagian et al., 2022). With the coordination of the company using an integrated information system, every stage in the supply chain can be monitored to ensure that products and services meet the predetermined standards (Huo et al., 2015). Supplier partners can deliver high-quality raw materials on schedule, thus supporting a better production process (Foerstl et al., 2013). Quality improvement improves the company's operational performance through higher-quality products and more satisfactory customer service.

Supply chain coordination can improve a company's ability to quickly respond to market changes (Basana et al., 2022). In the dynamic business world, customer needs and market conditions can change anytime. Good coordination between the company and external partners

can immediately adjust production capacity, distribution patterns, and supply of goods to meet market demand (Hu et al., 2018). Strong coordination can result in a quick response to customers, resulting in a competitive advantage for the company because it provides better service than competitors (Anastasia et al., 2024).

Coordination with internal and external partners has an impact on reducing operational costs. Good coordination in the supply chain helps companies optimize the flow of goods and information, thereby reducing logistics, storage, and transportation costs (Lee et al., 2016). Coordination with external partners can share inventory data in real time so that companies can reduce the risk of overstocking, which results in high storage costs (Bandyopadhyay & Kim, 2022). The coordination formed makes efficient resource management can support increased profitability while strengthening the company's financial position.

Good coordination allows companies to provide products that meet customer needs and deliver goods on time (Basana et al., 2022). The coordination formed can increase customer loyalty while creating a positive brand image. High customer satisfaction is ultimately one of the leading indicators of successful operational performance. Supply chain integration is important in a company's operational strategy to achieve optimal performance (Luo et al., 2015). By adopting SCI, the company's coordination can improve operational efficiency and effectiveness and strengthen its competitiveness in the global market. This argument determines the seventh (H7) and eighth (H8) hypotheses.

H7: Internal supply chain coordination affects operational performance.

H8: External supply chain coordination influences operational performance.

2.5.7. Lean project and operational performance

Lean project in manufacturing is a management approach that focuses on eliminating waste in the production process to create efficiency and effectiveness as a form of company performance (Mathiyazhagan et al., 2021). Lean manufacturing projects aim to provide customers with optimal value by using resources to produce efficient production processes (Sunder & Prashar, 2024). Lean project manufacturing can help companies improve operational performance through efficiency, productivity, responsiveness, cost, value creation, and better quality (Cherrafi et al., 2018).

The contribution of lean manufacturing to operational performance is the reduction of waste (Tortorella et al., 2017). Implementing lean manufacturing as a project by identifying and eliminating activities that do not provide added value, such as overproduction, unnecessary waiting times, or excess inventory, so that companies can reduce operational costs (Rasanjali et al., 2024). The efficiency resulting from this waste reduction allows companies to allocate resources better, thereby improving inventory management, on-time delivery, product quality, and order flexibility (Hardcopf et al., 2021).

Lean projects in manufacturing, such as process control and improvement, workforce development, and customer focus, impact business performance (Abreu-Ledón et al., 2018). Lean projects in companies such as Lean Six Sigma focus on continuous improvement; the company can prevent product defects from the beginning of the production process (Kafetzopoulos & Gotzamani, 2022). This reduces the costs of repairing or returning products and creates higher customer satisfaction. Quality products are the leading indicator of a company's operational success (Tiwari et al., 2020). Lean manufacturing helps companies manage inventory more efficiently (Christian et al., 2024). Companies can focus on producing goods according to market demand, avoiding overstocking and reducing storage costs (Iris & Cebeci, 2014). On-demand production allows companies to be more flexible in responding to changes in market demand,

thereby improving company performance (Anosike et al., 2021). Lean production in manufacturing can improve operational performance through employee empowerment (Siagian & Tarigan, 2021). Employees are actively involved in the process of continuous improvement and problem-solving. By providing training and encouraging collaboration, companies create a proactive and innovative work culture (Jakhar et al., 2018). This improves operational efficiency and creates a more productive work environment, indicating sustainable performance (Hao et al., 2021).

The lean project practice approach to manufacturing also accelerates production cycle times, improving product delivery timeliness (Sunder & Prashar, 2024). A more organized production flow allows companies to meet customer demands more quickly, thus creating a competitive advantage (Yang et al., 2015). Punctuality in delivery also strengthens the company's relationship with customers, a crucial element in successful operations (Tortorella et al., 2017). Implementing lean manufacturing helps companies face challenges in maintaining operational sustainability (Oliveira-Dias et al., 2023). With efficient and value-oriented resource management, companies can reduce negative impacts on the environment and remain competitive in an increasingly tight market (Tiwari et al., 2020). As a result of the explanation above, the ninth hypothesis (H9) can be determined.

H9: Lean projects manufacture affect operational performance.

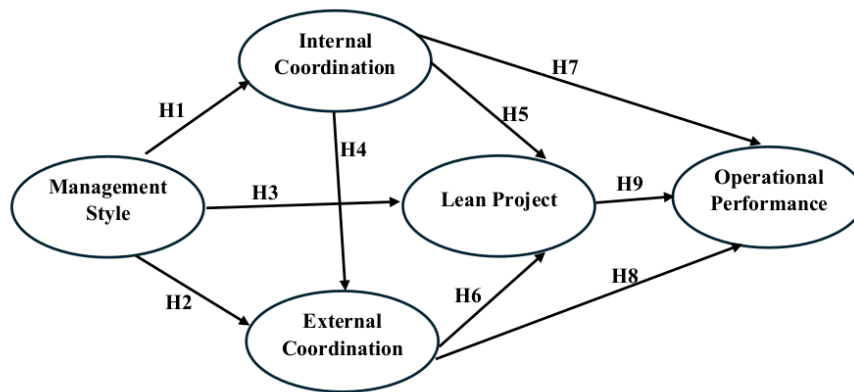


Figure 1. Research Concept Framework

3. Research Methods

The research applies a quantitative method to examine the proposed hypothesis with a cross-sectional data design based on a survey using a questionnaire given to industrial manufacturing practitioners in Indonesia. The independent variables are management style with five items adopting Ramos et al. (2016): management always acts to focus on results (MS1), management is oriented to the external side of the company (MS2), management adjusts internal projects to match external changes (MS3), management has the high initiative to solve problems (MS4). Management can be flexible to new circumstances (MS5). The first intervening variable,

namely internal supply chain coordination adopted from Siagian et al. (2022), with four items: routine coordination within the company (ISCC1), coordination of periodic inter-functional reports (ISCC2), coordination in determining responses to external changes (ISCC3), and coordination in product development (ISCC4). The second intervening variable of external supply chain coordination adopts the research of Huo et al. (2015), with five items namely, the leading supplier actively participates in the procurement process (ESCC1), the leading supplier actively participates in the design process (ESCC2), the leading supplier improves the process better to meet the company's needs (ESCC3), maintains a good relationship with customers (ESCC4), and the company maintains maximum service to customers (ESCC5). The third intervening variable is lean project as a form of practice in manufacturing companies with five items, namely, just in time (LP1) (Jakhar et al., 2018; Iris & Cebeci, 2014; Sunder & Prashar, 2024; Cherrafi et al., 2018; Abreu-Ledón et al., 2018), total quality management (LP2) (Jakhar et al., 2018; Iris & Cebeci, 2014; Sunder & Prashar, 2024)), employee involvement/human resources management (LP3) (Jakhar et al., 2018; Sunder & Prashar, 2024; Abreu-Ledón et al., 2018), 5 S (LP4) (Iris & Cebeci, 2014) and waste reduction (LP5) (Cherrafi et al., 2018). Finally, operational performance with seven measurement items are productivity (OP1) (Tortorella et al., 2017), delivery service level (OP2) (Tortorella et al., 2017; Sunder & Prashar, 2021), cost reduction (OP3) (Tortorella et al., 2017; Sunder & Prashar, 2024), inventory level (OP4) (Tortorella et al., 2017; Sunder & Prashar, 2024; Hardcopf et al., 2021), quality product (OP5) (Tortorella et al., 2017; Sunder & Prashar, 2024; Hardcopf et al., 2021), safety (OP6) (Tortorella et al., 2017) and flexibility to change volume (OP7) (Hardcopf et al., 2021).

This study surveyed manufacturing companies in Indonesia, with 26 closed-ended items, to measure the five variables used. Measurement for each measurement item using a Likert scale with a range of "1 (strongly disagree) to 5 (Strongly agree)". Data was collected from industry manufacturing practitioners with at least 2 years of working in the company and who have become permanent employees. The practitioners assigned to the research are staff who have experience working on lean projects in companies with related departments, including production, engineering, warehouse, marketing and distribution, and others. Data collection using Google Forms and spreading links to social media groups in the form of Instagram, WhatsApp, Facebook, and others

4. Research analysis and discussion

The results of the questionnaire distribution that have been obtained are 172 manufacturing companies that have filled out measurement items for the closed-ended questionnaire. The results of the questionnaire distribution were analyzed on the respondents' profiles. Based on the research data collection, the characteristics of the research as a profile are obtained in Table 1.

Table 1. Characteristics of Research Respondents

Characteristic	Description	Qty	Percentage
Gender	Male	105	61%
	Female	67	39%
Department	Engginering/Maintenance	23	13%
	Production/Planning	79	46%

	Sales & Marketing & Export-Import	15	9%
	Warehouse and Inventory	32	19%
	Purchasing/Procurement	23	13%
Corporate structure position	Top Management	26	15%
	Manager	71	41%
	Supervisor/Senior Staff	42	24%
	Staff	33	19%
Work experience	2-3 Years	23	13%
	3-7 years	38	22%
	More than 7 years	111	65%
Lean proyek implementation	2-5 years implementation	15	9%
	5-10 years implementation	39	23%
	More than 10 years	118	69%

Based on Table 1, it is shown that the majority of respondents are male because they are related to company operations, as many as 105 respondents (61%). The company has implemented lean projects in manufacturing, with the most significant respondents from production/planning, as many as 79 people (46%), followed by warehouse and inventory, as many as 32 people (19%). This condition shows that lean project manufacturing changes the company's operational area. Table 1 shows that the corporate structure position in charge of implementing lean manufacturing at the manager level amounted to 71 people (41%), followed by supervisors/senior staff, which amounted to 42 people (24%). The results of the questionnaire distribution to manufacturing companies were obtained by 111 respondents (65%) who have had work experience in the industry for more than 7 years, and 118 companies (69%) stated that lean projects have been practically carried out in companies for more than 10 years. Lean implementation in the most prominent companies is in the 5 S (sort, set in order, shine, standardize, and sustain), total quality management, and just in time.

The advanced processing stage to answer the research hypothesis is carried out in the initial stage, namely the goodness of fit test shown in Table 2.

Table 2. Goodness of fit reliability and validity measurement

Measurement Items	Mean	Loading Factor	Cronbach Alpha
Management style (Composite Reliability = 0.800)	3,988	-	0,855
Management always acts to focus on results (MS1)	4.328	0.872	
Externally oriented management of the company (MS2)	4.122	0.784	
Management adjusts internal projects to match external changes (MS3)	3.686	0.509	
Management has a high initiative to solve problems (MS4)	3.645	0.714	
Management can be flexible to new circumstances (MS5)	4.25	0.771	

Internal supply chain coordination (Composite Reliability = 0.744)	4,135	-	0,839
Regular coordination is carried out within the company (ISCC1)	4,198	0.778	
Coordination of periodic inter-functional reports (ISCC2)	4,233	0.849	
Coordination in determining responses to external changes (ISCC3)	4,081	0.681	
Coordination in product development (ISCC4)	4,209	0.696	
External supply chain coordination (Composite Reliability = 0.805)	4,107	-	0,866
Major suppliers actively participate in the procurement process (ESCC1)	4,209	0.667	
Major suppliers actively participate in the design process (ESCC2)	4,099	0.858	
Major supplier improves its processes to meet company needs (ESCC3)	4,209	0.51	
Maintaining good relationships with customers (ESCC4)	3,913	0.888	
The company maintains maximum service to customers (ESCC5)	4,105	0.795	
Lean project Manufacture, (Composite Reliability = 0.875)	4,252	-	0,910
Just-in-time implementation company (LP1)	4,209	0.747	
Total quality management (LP2) implementation company	4,384	0.818	
Perusahaan employee involvement/human resources management (LP3)	4,192	0.879	
The company implements the 5 S (LP4)	4.18	0.819	
Implementation waste reduction berjalan baik (LP5)	4,297	0.822	
Operational performance (Composite Reliability = 0.818)	4,097	-	0.866
Productivity meningkat (OP1)	4,302	0.773	
Delivery service level meningkat (OP2)	3.64	0.593	
Cost reduction (OP3)	4,308	0.857	
Inventory level is well controlled (OP4)	4,076	0.747	
Quality product meningkat (OP5)	4,041	0.662	
Implementasi safety (OP6)	4,221	0.687	
Flexibility to change volume (OP7)	4,093	0.507	

The goodness of fit model in Table 2 for validity is qualified with a cross-loading value for all measurement items greater than 0.500 (the lowest cross-loading value for the flexibility to change volume (OP7) item is 0.507). The goodness of fit for composite reliability is more significant than 0.700 (the lowest value in the Internal supply chain coordination variable is 0.744), and the Cronbach Alpha value is more significant than 0.700 (the lowest value in the Internal supply chain coordination variable is 0.839). The goodness of fit research model has met the requirements of goodness of fit. The respondents' perception of variable management style, with a mean of 3,645-4,328, illustrates that the company has focused on continuous improvement to achieve the set targets. Management has been able to innovate and improve the company's system to improve manufacturing companies' performance.

Internal supply chain coordination 4,081-4,198 shows that good decisions have been made within the company. The company's management has built good cross-functional coordination in adjusting to external conditions and making improvements within the company. The company has established periodic daily coordination with a definite schedule by stipulating the sharing of results of each department in manufacturing. External supply chain coordination with a mean value of 3,913-4,209 shows that the company has coordinated with suitable partners. The leading supplier

improves its processes to meet the company's needs, and the leading supplier actively participates in the raw material procurement process. The company has established adequate coordination with external partners. The Manufacture lean project is perceived at a value of 4,180-4,384, which indicates that it has been running adequately for a long time. Manufacturing companies in Indonesia are more focused and prioritize implementing total quality management by trying to obtain ISO 9001 and ISO 14,000 certifications. The company's total quality management is the leadership's focus to ensure good quality products. The resulting operational performance is at a value of 3,640-4,308. The company has produced cost reductions and increased productivity as its focus is to produce operational performance to build strong competitiveness.

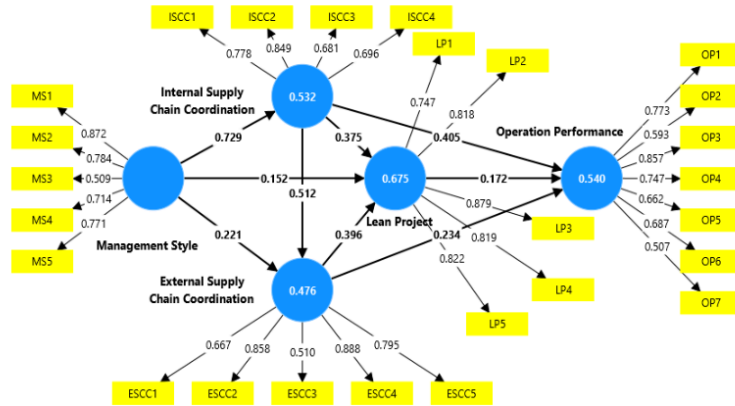


Figure 2. Research model and Analysis results

Table 3. The hypothesis test result

Direct Coefficient	Path Coefficient	T-statistics	P values
Management Style -> Internal Supply Chain Coordination (H1)	0.729	17.695	0.000
Management Style -> External Supply Chain Coordination (H2)	0.221	2.191	0.028
Management Style -> Lean Project (H3)	0.152	1.671	0.091
Internal Supply Chain Coordination -> External Supply Chain Coordination (H4)	0.512	5.841	0.000
Internal Supply Chain Coordination -> Lean Project (H5)	0.375	4.869	0.000
External Supply Chain Coordination -> Lean Project (H6)	0.396	4.347	0.000
Internal Supply Chain Coordination -> Operation Performance (H7)	0.405	3.739	0.000
External Supply Chain Coordination -> Operation Performance (H8)	0.234	2.525	0.012
Lean Project -> Operation Performance (H9)	0.172	1.699	0.089

Figure 2 and Table 3 show the analysis results and hypothesis tests to answer the research objectives. The results of the first hypothesis were obtained by the management style for internal supply chain coordination of 0.729 with t-statistics of 17,695 (>2.64) and p-value of 0.000 (<0.01).

The first hypothesis was obtained that management style has a significant effect on internal supply chain coordination. The management style that the company has is adjusting internal projects to match external changes and always acting to focus on results that impact improving internal supply chain coordination. The company's internal organization can conduct regular coordination and reports between functions periodically to adjust to the company's external conditions. The results of the study support the results of previous research, which stated that management style affects internal supply chain coordination (Sunder & Prashar, 2024; Ramos et al., 2016; Ling et al., 2020; Hardcopf et al., 2021; Jakhar et al., 2018; Misbahuddin et al., 2024; Hartati et al., 2025).

2 The results of the second hypothesis indicate that the management style affects the external supply chain coordination of 0.221 with t-statistics of 2.191 (>1.96) and a p-value of 0.028 (<0.05). The second hypothesis was obtained that management style had a significant effect on external supply chain coordination. The management style set in companies with management oriented to the external side of the company and having a high initiative to solve problems can impact external supply chain coordination. These results show that the company can build strong coordination with external partners by increasing the capabilities of key suppliers by improving processes to meet the company's needs and maintain maximum service to customers. The results of this study support the results of previous studies that state that management style affects external supply chain coordination (Huo et al., 2015; Siddique & Siddique, 2020; Misbahuddin et al., 2024; Chaudhry et al., 2019; Ling et al., 2020; Le et al., 2023; Gonçalves et al., 2016; Chawewong & Naipinit, 2023; Hartati et al., 2025).

Furthermore, the results of the third hypothesis reveal that the management style influences lean project manufacturing by 0.152 with t-statistics of 1.671 (>1.65) and p-value of 0.091 (<0.100). The third hypothesis shows that the management style significantly affected lean project manufacturing. The company's management style, which has high initiative in solving problems and flexible management to new circumstances, can impact lean project manufacturing. Manufacturing companies can adequately implement total quality management and 5S to generate customer value. The results of the study support the results of previous research which stated that management style affects lean project manufacturing (Sunder & Prashar, 2024; Hardcopf et al., 2021; Weerasekara & Bhanugopan, 2023; Ling et al., 2020; Oliveira-Dias et al., 2023; Tortorella et al., 2018; Fadhillah et al., 2023; Yang et al., 2015).

3 The results of the fourth hypothesis were obtained from internal supply chain coordination to external supply chain coordination of 0.512 with t-statistics of 5.841 (>2.64) and p-value of 0.000 (<0.01). The fourth hypothesis is that internal supply chain coordination significantly affects external supply chain coordination. Internal supply chain coordination, described as routine coordination, is carried out within the company, and coordination in determining responses to external changes affects external supply chain coordination. The formed supply chain coordination can allow the leading suppliers to participate actively in the procurement process and maintain good customer relationships. The results of the study support the results of previous research which stated that internal supply chain coordination increases external supply chain coordination (Bandyopadhyay & Kim, 2022; Huo et al., 2015; Basana et al., 2022; Jakhar et al., 2018; Vanichchincrai, 2021; Kang et al., 2018; Jambulingam & Kathuria, 2020; Rasanjali et al., 2024; Wang et al., 2023).

The results of the fifth hypothesis were obtained by internal supply chain coordination for lean projects of 0.375 with t-statistics of 4.869 (>2.64) and p-value of 0.000 (<0.01). The fifth hypothesis is that internal supply chain coordination significantly affects lean projects. Internal supply chain coordination in companies that are carried out with coordination in determining

responses to external changes and product development impacts lean project manufacturing. These results show that the company has tried to implement just in time and adequate employee involvement/human resources management. The research supports the results of research that states that internal supply chain coordination has an impact on lean project manufacturing (Huang et al., 2023; Novis et al., 2020; Hardcopf et al., 2021; Oliveira-Dias et al., 2023; Rasanjali et al., 2024; Mathiyazhagan et al., 2021; Jakhar et al., 2018).

The results of the sixth hypothesis were obtained from external supply chain coordination for lean projects of 0.396 with t-statistics of 4.347 (>2.64) and p-value of 0.000 (<0.01). The sixth hypothesis is that external supply chain coordination significantly affects lean projects. External supply chain coordination determined by key suppliers actively participates in the design process and maintains good customer relationships, which impacts lean project manufacturing. The results of this study support the researcher who states that external supply chain coordination toward lean project manufacturing (Huang et al., 2022; Siagian et al., 2022; Hu et al., 2018; Novis et al., 2020; Hao et al., 2021; Vanichchincrai, 2021; Bandyopadhyay & Kim, 2022).

The results of the seventh hypothesis were obtained by internal supply chain coordination on operation performance of 0.435 with t-statistics of 3.739 (>2.64) and p-value of 0.000 (<0.01). The seventh hypothesis is that internal supply chain coordination significantly affects operation performance. Internal supply chain coordination established by the company, which determines responses to external changes and product development, can result in operational performance. The company's ability to build strong internal coordination can result in increased productivity, well-controlled inventory levels, and product quality. The results of the study support research that states that internal supply chain coordination has an impact on operation performance (Basana et al., 2022; Novis et al., 2020; Huang et al., 2022; Kang et al., 2018; Wang et al., 2023; Basana et al., 2022).

The results of the eighth hypothesis were obtained by external supply chain coordination on operation performance of 0.234 with t-statistics of 2.525 (>1.96) and p-value of 0.012 (<0.05). The eighth hypothesis is that external supply chain coordination significantly affects operation performance. External supply chain coordination owned by the company and partners with leading suppliers, actively participates in the procurement process and maintains good relationships with customers, can improve operational performance by increasing flexibility to change volume, reduce costs, and increase delivery service levels. The results of this study support the results of previous research, which stated that external supply chain coordination affects operation performance (Siagian et al., 2022; Huang et al., 2023; Jambulingam & Kathuria, 2020; Li et al., 2018; Foerstl et al., 2013; Basana et al., 2022; Hu et al., 2018).

The results of the ninth hypothesis were obtained by lean project manufacturing on operation performance of 0.172 with t-statistics of 1.699 (>1.65) and p-value of 0.089 (<0.1). The eighth hypothesis is that lean project manufacturing significantly affects operation performance. Lean project manufacturing implemented by the company practically, such as total quality management, 5S, employee involvement/human resources management, and just in time, improves operation performance. Manufacturing companies can produce the implementation of safety systems and increase productivity with lean manufacturing projects. The results of this study support the results of previous research which stated that lean project manufacturing affects operation performance (Mathiyazhagan et al., 2021; Sunder & Prashar, 2024; Cherrafi et al., 2018; Rasanjali et al., 2024; Hardcopf et al., 2021; Abreu-Ledón et al., 2018; Siagian & Tarigan, 2021; Jakhar et al., 2018; Hao et al., 2021; Sunder & Prashar, 2024; Oliveira-Dias et al., 2023).

Research shows that the management style of manufacturing companies always focuses on results and adjusts internal innovations as projects to match external changes globally. The management style owned by the manufacturing company can improve internal supply chain coordination with regular coordination carried out internally and can determine the response to external changes. Management style can determine the cooperation model with external suppliers by actively participating in the procurement process, product design, and meeting the company's needs. The company's management style can also predict market changes with strong coordination with customer partners. Management style enables companies to coordinate supply chain management and lean manufacturing project implementation. Strong supply chain coordination in the company so that it can quickly implement lean manufacturing projects such as just-in-time, total quality management, 5S, and waste reduction. The company always strives to maintain strong supply chain coordination to improve operational performance, which determines the company's competitiveness adequately. Manufacturing companies can keep up with customer needs and market changes that can be coordinated immediately with supplier partners.

Contributions to managerial processes in manufacturing companies always focus on process results that can improve competitiveness. Management in the company needs to innovate processes by implementing lean production or lean manufacturing to optimize resources and produce added value for customers. Managers and supervisors in the company are given insight into maintaining the implementation of 5S, just in time, total quality management, and others in producing improved operational performance. Theoretical contributions to research enrich the theory of resources-based view with leadership style for company management and supply chain integration.

5. Conclusion

Manufacturing companies today have a high level of competition in obtaining products that meet the criteria set by the global market. Company management always strives to be a leader in their respective markets according to the characteristics of the products produced. The role of management style greatly determines the innovation carried out by the company by involving all cross functions. The company's management style is always highly proactive in solving problems to improve internal supply chain coordination. The company's management style can improve supply chain coordination by adjusting the project to the company's operations to match external changes. Management style can produce a lean implementation of a manufacturing project that runs effectively. Internal supply chain coordination, conducted regularly within the company, impacts external supply chain coordination. Internal and external supply chain coordination influences operational performance. Internal supply chain coordination with periodic and routine coordination of reports between functions can result in increased productivity, well-controlled inventory levels, and product quality. Supply chain coordination with external partners in empowering key suppliers to actively participate in the procurement process and maintain good customer relationships can improve operational performance regarding flexibility to change volume, cost reduction, and delivery service levels. Lean project manufacturing in a company can produce operational performance. Lean manufacturing as a project implemented practically, such as total quality management, 5S, employee involvement/human resources management, and just in time, improves operational performance in producing a safety system and increased productivity. Management styles in manufacturing companies can coordinate adequately internally and externally to produce a strong lean manufacturing implementation according to the company's operational performance and competitiveness conditions.

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