

The effect of digital ERP implementation, supply chain integration and supply chain flexibility on business performance

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CHRONICLE

Article history:

Received: January 2, 2024

Received in revised format: March 18, 2024

Accepted: May 23, 2024

Available online: May 23, 2024

Keywords:

Digital ERP

Internal supply chain integration

External supply chain integration

Supply chain flexibility

Business performance

ABSTRACT

Globalization entails manufacturing companies improving their competitiveness to be superior to competitors. This study investigates the role of ERP implementation in improving business performance through supply chain integration, external supply chain integration, and flexibility. The research surveyed manufacturing companies that were implementing ERP technology adequately. Data was collected from 99 manufacturing companies in East Java that have implemented ERP. The study used judgmental sampling with criteria for employees who have worked for two years and permanent employees and have a role as a critical user or end user of one of the ERP modules in the company department. Data analysis used SmartPLS software version 4.0. The results showed that ERP implementation enhances internal supply chain integration by 0.708, external supply chain integration by 0.491, and supply chain flexibility by 0.244. By responding quickly to interdepartmental needs and integrating systems between functions, internal supply chain integration affects external supply chain integration by 0.373, supply chain flexibility by 0.249, and business performance by 0.196. External supply chain integration affects supply chain flexibility by 0.445 and performance by 0.360. Moreover, supply chain flexibility, described by the flexibility of employee working hours as needed, on-time product delivery, and production processes, impacted business performance by 0.378. The study results provide practical contributions for corporate information technology managers to invest in upgrading ERP software and hardware to maintain integration with a single database in making quick and appropriate decisions. A theoretical contribution to increase competitiveness with supply chain strategy and technology integration.

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1. Introduction

Business changes continue to change rapidly, which has made supply chain management crucial in maintaining smooth processes in manufacturing companies (Yu et al., 2021). The formed supply chain involves various parties, from suppliers to end customers (Lii & Kuo, 2016). Supply chain management is vital in ensuring business processes run efficiently and effectively in meeting market demands constantly changing and evolving rapidly (Masa'deh et al., 2022). Changes that occur require implementing information technology that can provide information in real-time to assist companies in making decisions along the supply chain flow by implementing Enterprise Resource Planning (ERP) (Tarigan et al., 2021b; Tarigan et al., 2020b). The advantages of ERP are an integrated management system between business functions, sharing information and data, and generating and accessing information in real-time in supply chain management (Jagoda & Samaranyake, 2017). An ERP system can predict the behavior of the internal and external environment so that organizations can plan and control environmental factors to help in decision-making with information obtained quickly (Badewi et al., 2018). ERP implementation in

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ISSN 2561-8156 (Online) - ISSN 2561-8148 (Print)

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doi: 10.5267/j.ijdns.2024.5.017

the company can be done by adjusting technology-driven to process-driven processes to provide optimal benefits (Panayiotou et al., 2015; Garg & Khurana, 2017). ERP adjustments by upgrading software and hardware can produce quality information and provide data for decision-making (Tarigan et al., 2019b). ERP implementation in companies must be aligned with business objectives, supporting decision-making, and fulfilling customer requirements (Abu-Hussein et al., 2016). The ERP system can integrate all business functions in the company (Jayamaha et al., 2023; Rasanjali et al., 2024). ERP implementation must focus on the strategic value of organizations to be optimal (Ali & Miller, 2017). ERP capability can have an impact on data management integration in the company with good collaboration with partners and process change within the company (Tarigan et al., 2021a). Implementing ERP systems provides many benefits and is an effective solution in overcoming data asynchronous and challenges related to supply chain management (Almajali et al., 2016). ERP can help optimize roles and functions in supply chain management, starting from raw material procurement, manufacturing processes, and product delivery in an integrated manner between all cross-functions (Shajrawi & Aburub, 2023). ERP implementation can also improve operational efficiency by accelerating the flow of information between various parties in the supply chain (Sebayang et al., 2021; Ripamonti & Galuppo, 2016). ERP implementation as a single database can be an integration system in companies that connect cross-functionally to produce tangible and intangible advantages (Rouhani & Mehri, 2018). Supply chain integration through ERP can also increase visibility and collaboration between companies and their suppliers, thus enabling increased efficiency and speed in the procurement process (Ataseven et al., 2020; Wijaya, 2022). ERP sustainability, described by data integration and ERP system stability, affects the improvement of internal supply chain integration and supply chain external integration (Pirmanta et al., 2021).

ERP systems in supply chain management allow the integration and synchronization of all information and data related to the company's internal and external partners in the supply chain (Sebayang et al., 2021). The company's enterprise system can positively impact buyer-supplier integration by sharing information and joint decisions in controlling inventory (Ochoa et al., 2017). ERP implementation in building supply chain integration facilitates more accurate and timely decision-making in optimizing resource allocation, inventory control, production, and distribution (Tarigan et al., 2021b; Panayiotou et al., 2015). The company's supply chain partners can influence companies to share knowledge and produce effective ERP implementation (Li et al., 2017). This condition makes ERP well integrated into manufacturing companies so that it can improve purchasing strategy by establishing a system that considers potential suppliers and evaluates them continuously (Tarigan et al., 2020a). Enhanced ERP can fully integrate the company, which impacts increasing external supply chain integration, namely supplier integration (Tarigan et al., 2021b). Adopting integrated systems with cloud technology information can influence supply chain integration (Shee et al., 2018; Gupta et al., 2018). With the adoption of information technology, companies can support excellent and reliable supply chain integration to improve company performance (Yu et al., 2017).

With the implementation of the ERP system, companies can integrate and manage all aspects of the supply chain (Negi, 2021). ERP practically includes managing information, money flow, and goods from suppliers to consumers as part of a supply chain integration system (Acar et al., 2017). The ability of ERP to integrate internal organizational functions in sharing data and accessing information in real time increases company competitiveness (Sebayang et al., 2021; Gupta et al., 2018). ERP implementation in the company is a form of representation of business activities visible in real-time in the system by integrating internal processes that can be integrated with real-time data flows according to practical conditions (Tarigan et al., 2020b). ERP implementation can also impact cross-functional integration between departments and quality information when providing financial reports (Tarigan et al., 2019a). The condition of enhanced ERP, as described by the quality function and information quality of ERP in manufacturing companies, can influence internal supply chain integration in sharing decisions related to company goals and inventory levels (Tarigan et al., 2021b). It can be said that ERP can be used to quickly coordinate different functionalities in the company with integrated information technology (AL-Shboul, 2019). Other functions in ERP implementation allow companies to be more flexible with information technology connected to processes in building competitiveness with improved organizational performance (Ahmed et al., 2024).

Operationally, ERP implementation can optimize inventory management by minimizing the risk of shortage or excess stock that can disrupt the smooth running of operational processes (Negi, 2021). ERP implementation also makes companies more effective in planning production and quality control (Kharuddin et al., 2015; Schniederjans, 2018). ERP implementation in supply chain management can also help companies monitor and manage relationships with suppliers and customers more efficiently (Tarigan et al., 2021a). ERP practice in the company internally can be described by the utility, practical use, and necessary information to improve supply chain orientation (Acar et al., 2017). The efforts made by companies in adopting ERP can impact green supply chain management, with work planning and arrangements being made automatically (Santoso et al., 2022; Wungkana et al., 2023). Information integration in ERP requires synchronization of internal integration with external integration to have good continuity and improve the company's supply chain capabilities (Yuan et al., 2022). Supply chain integration includes internal, supplier, and customer integration (Qiao & Zhao, 2023). Internal integration enhances customer and supplier integration, enabling agile supply chains to provide flexible responses for manufacturing companies (Jajja et al., 2018; Yu et al., 2019). Supply chain integration formed in organizations can improve supply chain risk management by maintaining flexible demand (Munir et al., 2020; Doetzer & Pflaum, 2021). Supply chain integration with electronic cooperation in business activities and cross-organization information sharing impacts operational performance (Vafaei-Zadeh et al., 2020; Setiawan et al., 2023). Information technology formed in companies is integrated with supply chain partners so that they can adopt online transactions and collect information from the market for analysis (Sundram et al., 2020). Upstream

integration, downstream integration, and within-firm supply chain integration impact improving financial performance in manufacturing companies in Sweden (Beheshti et al., 2014; Basana et al., 2022). Supply chain integration is a strategic combination of internal and external activities of the organization that involves supply chain members working together for mutual benefit and improving performance (Masa'deh et al., 2022).

Besides, information technology in companies can impact increasing flexibility in the supply chain process within supplier relationships and internal and customer relationships (Doetzer & Pflaum, 2021). Information technology implemented in companies can impact increasing flexibility to respond to customer needs (Putra et al., 2020). Cloud supply chain integration impacts supply chain performance (Shee et al., 2018). Supply chain integration consisting of internal, supplier, and customer integration impacts organizational flexibility by increasing space to adjust distribution facilities, delivery modes, and schedules (Shukor et al., 2021). Supply chain integration in companies allows more flexibility to align with external partners' business processes to adjust strategies together for increased competitiveness (Siagian et al., 2022; Hartono et al., 2023). Supply chain integration obtained by sharing production planning and collaborative forecasting with partners can increase the supply chain flexibility of manufacturing companies (Siagian et al., 2021). Supply chain integration and flexibility impact supply chain performance (Chunsheng et al., 2020). Supply chain flexibility in companies consists of sourcing, operating systems, distribution, and information flexibility (Rojo et al., 2018).

Based on the explanation above, the research objective was determined as follows: First, investigate whether ERP implementation affects internal supply chain integration, external supply chain integration, and the supply chain flexibility of the company. Second, whether internal supply chain integration affects external supply chain integration, flexibility, and business performance. Third, whether external supply chain integration affects supply chain flexibility and business performance, and fourth, whether supply chain flexibility affects business performance.

2. Literature Review

2.1. ERP implementation

ERP implementation is divided into three major parts: pre-implementation, implementation cycle, and post-implementation (Jagoda & Samaranayake, 2017). The pre-implementation stages are set in three main ways: system options, ERP selection method, and readiness assessment. ERP implementation in the company when at the implementation cycle stage is critical to the success of an ERP system (Tarigan et al., 2020b). The implementation cycle involves concrete steps to turn plans and strategies into concrete actions in the organization's daily operational processes by adjusting ERP functionality and organizational needs (Panayiotou et al., 2015). ERP implementation is determined by support from leaders, adequate employee training, and ease of use of the ERP system (Almajali et al., 2016). When implementing ERP, it is necessary to provide comprehensive and adequate employee training to provide maximum value (Jayamaha et al., 2023). The success of ERP implementation can be seen from the implementation of integration between functions in producing information quality that impacts improving company performance (AL-Shboul, 2019; Rouhani & Mehri, 2018; Tarigan et al., 2019b). Predetermined costs determine ERP implementation in companies, on-time project implementation, and specification of project ERP (Abu-Hussein et al., 2016; Garg & Khurana, 2017).

ERP is related to risk management, inventory management, logistics, production, sales and distribution, and others (Acar et al., 2017). Implementing a good supply chain involves cross-functional and departmental cooperation within the organization and strong collaboration with external business partners by optimizing the role of ERP (Tarigan et al., 2021b). ERP implementation aims to achieve operational efficiency, reduce costs, increase customer satisfaction, and provide added value for all stakeholders in the supply chain (Kharuddin et al., 2015; Ripamonti & Galuppo, 2016; Badewi et al., 2018).

ERP systems can integrate every business process in a company or organization so that each of this information can be used by all parts of the company or organization (Rasanjali et al., 2024; Tarigan et al., 2021a). ERP is a modular software system that integrates key functional areas of a company's business processes into one unified system (Tarigan et al., 2019a; Ali & Miller, 2017). ERP standardizes, simplifies, and integrates business processes such as finance, human resources, procurement, distribution, and other departments (Manggala, 2020). A good supply chain involves cross-functional and departmental cooperation and strong collaboration with external business partners (Santoso et al., 2022). ERP implementation in companies by building collaboration with supply chain partners in knowledge sharing (Li et al., 2017). ERP implementation is an integrated system between business functions in the company to produce productivity and efficiency levels (Garg & Khurana, 2017; Tarigan et al., 2020a). Research by Tarigan et al. (2020) determined that the indicators used are providing accurate data between part functions, completeness of available data between functions in the company, being able to provide transparent cross-functional data, reliable available data in decisions, and data integration in real time between functions in the company. Sebayang et al. (2021) measured ERP implementation in terms of compatibility with the indicators set, namely software and hardware that suits needs, is easy to customize, and has the capability of ERP. Enterprise systems in companies can build supplier-buyer integration to improve company performance through inventory management capability (Ochoa et al., 2017). Pirmanta et al. (2021) stated that ERP sustainability is measured by data integration, system ERP stability, software and hardware upgrades, and technology utilization.

2.2. *Supply Chain Integration*

Supply chain integration is vital for companies to integrate internally and externally to run simultaneously (Dhaigude et al., 2020). Supply chain integration is a collaboration strategy with partners to effectively and efficiently manage intra- and inter-organizational activities related to the flow of products, services, information, finance, and joint decision-making (Jajja et al., 2018). Supply chain integration consists of upstream and downstream integration (Beheshti et al., 2014; Basana et al., 2022). Supply chain integration allows companies to coordinate successfully in all activities, from procuring raw materials to finished products that meet customer needs (Lii & Kuo, 2016; Hartono et al., 2023; Wijaya, 2022). Internal supply chain integration seeks to integrate and coordinate various functions with various internal departments of an organization (Qiao & Zhao, 2023; Setiawan et al., 2023). Internal supply chain integration includes various processes and activities, such as production, inventory, distribution, logistics, purchasing, demand management, and others (Munir et al., 2020). Internal supply chain integration aims to improve operational efficiency, reduce costs, accelerate the flow of products and information, and improve response to market changes (Tian et al., 2021). By integrating various operational aspects, organizations can create better cooperation between different teams and departments and better understand how each part of the internal supply chain affects each other (Yu et al., 2019). Internal integration in companies requires synchronization of data flows and processes within the organization to facilitate coordination and collaboration (Sebayang et al., 2021; Liu et al., 2016). Yu et al. (2017) stated that the information technology companies use to build integrated supply chains can benefit companies.

Supply chain integration has a vital role in increasing the efficiency and competitiveness of a company (Freije et al., 2022; Siagian et al., 2022). Supply chain integration, which consists of internal and external integration, has a vital role in increasing the efficiency and competitiveness of a company (Birasnav & Bienstock, 2019; Yu et al., 2021). Supply chain integration is better for connecting companies with their external suppliers and customers so that coordination runs well and is mutually beneficial (Sundram et al., 2020; Masa'deh et al., 2022). High integration between partners in the supply chain can make companies more responsive to fluctuating demand through increased visibility of information and operational knowledge (Yu et al., 2019; Basana et al., 2023). In addition, highly integrated supply chain partners have the potential to reduce lead time, reduce cost, and eliminate late delivery to customers (Siagian et al., 2021). Integration of external supply chains is critical to gaining competitive advantage in a global environment (Shee et al., 2018; Setiawan et al., 2023). Supply chain integration formed in companies can create value in the products or services provided (Tian et al., 2021).

2.5. *Supply Chain Flexibility*

In today's rapidly changing world, supply chain flexibility is essential in ensuring the smooth running of business activities and the resilience of a country's economy. Their research concluded that supply chain flexibility is the key to overcoming changes in the business environment, such as fluctuations in market demand, regulatory changes, and unpredictable obstacles. Supply chain flexibility is vital in changing environmental situations (Negi, 2021). Supply chain flexibility to provide strong customer responsiveness makes companies adapt quickly to market changes and respond quickly to changes in customer demand (Yu et al., 2019). Supply chain flexibility is closely related to the company's ability to reconfigure essential supply chain resources to maintain competitiveness (Rojo et al., 2018). The company's flexibility in material procurement, manufacturing, and distribution processes helps companies adjust internally to external changes (Chunsheng et al., 2020). Supply chain flexibility (SC flexibility) is a company's ability to adapt supply chain practices following environmental changes to improve performance (Doetzer & Pflaum, 2021). Suppliers' ability to anticipate sudden changes to support manufacturing to meet Shukor's (2020) customer demands determines the company's flexibility. Corporate flexibility cannot be determined independently but requires cooperation with partner companies Blome (2019). The flexibility set by manufacturing companies depends on and relates to vendor flexibility in complying with delivery times, order sizes, and volume flexibility (Wungkana et al., 2023). Manufacturing flexibility is the ability of the enterprise to make changes related to the production level, often creating new products, to increase the enterprise's competitiveness. Khalaf (2019). The flexibility of companies formed with information technology can refer to meeting customer needs (Putra et al., 2020).

2.6. *Business Performance*

With ERP systems in supply chain management, companies can achieve better business performance (Tarigan et al., 2021b). Integration formed in various aspects of business and optimizing inventory management, production planning, and relationships with suppliers and customers are critical factors in achieving the company's strategic goals (Tian et al., 2021). The application of ERP in supply chain management allows companies to identify and minimize risks that may arise in the supply chain, such as the risk of understock or excess stock, which can disrupt the company's smooth operation (Sebayang et al., 2021). ERP implementation also drives increased operational efficiency through automated production planning and monitoring orders, inventory, and delivery status (Santoso et al., 2022). With the ERP system, companies can better see all supply chain activities and coordinate more effectively with suppliers and customers. Business performance set in ERP integration to produce competitive advantage is determined by cost and inventory reduction, customer satisfaction and responsiveness, and increased company utility (Tarigan et al., 2020a; Wungkana et al., 2023). Munir et al. (2020) determined that operational performance as part of business performance includes flexible performance, quality performance, and delivery performance. Operational performance is a benefit for companies in implementing technology so that integration occurs with partners to

improve performance with customer service level items, product quality, product support, delivery dependability, customer services, delivery speed, and volume flexibility (Vafaei-Zadeh et al., 2020). Companies are expected to be able to respond quickly to changes in customer demand or product quality problems and low production costs compared to competitors to increase customer satisfaction (Sundram et al., 2020; Yu et al., 2019; Masa'deh et al., 2022; Schniederjans, 2018). Supply chain integration is vital in improving company performance (Beheshti et al., 2014; Siagian et al., 2021). The company's operational performance can reduce operational costs by outsourcing (Wong et al., 2021). Supply Chain Management implementing cloud technology information can help companies achieve their strategic goals (Shee et al., 2018; Gupta et al., 2018). Masa'deh et al. (2022) stated that operational performance comprises flexibility, delivery, quality, and cost. One of the main objectives of applying information technology in companies as an integrated form is enterprise resource planning to satisfy customers and achieve efficiency at an affordable cost (Yu et al., 2021).

2.6. Constructs relationships

2.6.1. ERP implementation relationship with internal and external supply chain integration

Integration in companies by using information technology to make transactions quickly and using it electronically in purchase orders, invoices, and information systems to track can impact supply chain integration (Vafaei-Zadeh et al., 2020). Construction companies must use internal and external resources appropriately to make the best business choices by optimizing business objectives with technology (Birasnav & Bienstock, 2019). A competitive environment requires an ERP system as a technology to integrate various business functions internally and externally to improve customer response and strengthen supply chain relationships (Rasanjali et al., 2024; Yu et al., 2019). Four hundred sixty-five manufacturing companies with ERP sustainability can impact supply chain integration with internal and external integration (Pirmanta et al., 2021). ERP implementation in supply chain management allows for better integration between various internal functions of the company (Tarigan et al., 2021b). The ERP system allows information and data to be easily accessed and shared between departments (Negi, 2021). ERP implementation can make cross-functional between departments adequately (Tarigan et al., 2019a). ERP implementation makes cross-functional internal integration through a single database able to provide accurate data between departments, completeness of data, and able to make data transparent (Tarigan et al., 2020a).

Implementing ERP as a form of information technology in companies makes it possible to integrate data in real time (Sebayang et al., 2021; Liu et al., 2016). Practical ERP allows for better cooperation in production planning, inventory management, product distribution, and accounting made in modules (Acar et al., 2017). Information technology integration formed in companies can improve the capabilities owned by supply chain members (Yuan et al., 2022). Internal integration in using ERP in the supply chain by producing good quality information can improve the company's operational efficiency (Santoso et al., 2022; Tarigan et al., 2019b). Different departments can work synergistically and support each other in activities (Tarigan et al., 2020b). For example, the production department can quickly receive new orders from the sales department through an ERP system and directly start the production process without waiting for orders manually (Abu-Hussein et al., 2016). This internal integration also allows companies to identify and minimize risks in the supply chain, such as shipping delays or stock shortages (AL-Shboul, 2019). In addition to internal integration, it can support external integration in the supply chain (Liu et al., 2016). Companies can build better relationships with suppliers and customers through external integration assisted by ERP technology (Singh et al., 2022). ERP implementation in supply chain management allows companies to establish closer customer relationships (Tarigan et al., 2021a). Companies can use CRM systems integrated with ERP to collect and analyze customer data. This data can be used to understand customer preferences and improve their experience with the company's products or services.

ERP implementation in supply chain management allows for better external integration in supply chain processes (Tarigan et al., 2020a). With a practical ERP system, companies can easily communicate and collaborate with suppliers and business partners with top management support (Acar et al., 2017). ERP implementation in companies with customer relationship management and supply chain management modules to build external supply chain integration so that employees or company managers can use it when developing the organization (Rouhani & Mehri, 2018). ERP implementation allows companies to share real-time data, information, and production plans with suppliers (Sebayang et al., 2021). Better external integration in the company can improve efficiency and accuracy in inventory management, shipping, and supplier coordination (Weli, 2018). Companies can monitor inventory directly and inform suppliers of inventory needs (Tarigan et al., 2020b). Companies can view the availability of raw materials from suppliers and make orders automatically to ensure a timely and sufficient supply to meet customer demands. Enterprise systems formed in companies can make integrated management systems, and e-business influences buyer-supplier integration by increasing strategic information and joint decisions (Ochoa et al., 2017). ERP practically makes it easier for companies to coordinate with supply chain members in determining essential decisions and share problems with external partners (Acar et al., 2017). Information quality in companies to produce accurate, timely, complete, adequate, and reliable information can be shared with company partners electronically as a form of supply chain integration (Vafaei-Zadeh et al., 2020). Information technology companies use to produce accurate and correct data can be shared with external partners so that coordination and communication run well and supply chain integration increases (Sundram et al., 2020).

Implementing information technology in supply chain management also allows companies to identify and mitigate risks associated with supply chains (Doetzer & Pflaum, 2021). Companies can monitor and analyze supply chain risks, such as supplier shipment delays or production failures. With the ERP system, companies can set contingency plans and make the right decisions to reduce or arguably improve the efficiency of a process. Integrating data and information in ERP, companies can gain better visibility into supplier activities and performance. Based on this argument, the following hypotheses are proposed/

H₁: *ERP implementation affects internal supply chain integration.*

H₂: *ERP implementation has a positive effect on external supply chain integration.*

2.6.2. The relationship between ERP implementation and supply chain flexibility

The application of ERP in supply chain management can increase supply chain flexibility. With the ERP system, companies can easily adjust and change production or availability plans (Singh et al., 2022). ERP implementation allows companies to increase competitiveness by responding to changing customer needs more quickly and increasing flexibility (Tarigan et al., 2020a; Ahmed et al., 2024). Companies can track real-time inventory data and the accuracy of available data to build cooperation with suppliers to ensure material availability and determination of long-term contracts (Tarigan et al., 2020a). ERP implementation also allows companies to predict inventory and customer demand (Pirmanta et al., 2021) to avoid excess or lack of inventory (Birasnav & Bienstock, 2019). In addition, ERP systems also allow companies to carry out more efficient inventory management by optimizing existing inventory and avoiding excess stock or lack of stock that can hamper supply chain performance. Implementing information technology in supply chain management can also increase visibility and collaboration between companies with suppliers and other business partners to increase supply chain flexibility (Rojo et al., 2018). By integrating data and information in the ERP system, companies can gain better visibility into supplier activities and performance (Negi, 2021). Companies can work with suppliers by building high flexibility in achieving better product quality and innovation in the supply chain (Putra et al., 2020). Hence, the hypothesis is postulated.

H₃: *ERP implementation affects supply chain flexibility.*

2.6.3. The relationship between internal supply chain integration and external supply chain integration

The relationship between internal and external supply chain integration and the influence of supply chain processes is inter-related. It significantly impacts the efficiency and quality of supply chain processes (Ataseven et al., 2020). Internal supply chain integration involves collaboration and coordination between departments and internal functions within the company (Freije et al., 2022; Munizu et al., 2024). This internal integration enables efficient and accurate information and data transfer between relevant departments, such as marketing, procurement, production, and warehouse (Wijaya, 2022). Integration of every function within the company has the necessary access to make the right decisions and take appropriate actions to meet customer demands (Yu et al., 2021). With good internal integration, companies can improve operational efficiency, reduce operational costs, and improve timeliness in supply chain processes (Liu et al., 2016). Internal integration in companies that is determined by compatibility with all relevant internal processes and processes can be linked smoothly has an impact on increasing external integration so that the standards of process relations with partners are increasingly smooth and information sharing is increasing (Willis et al., 2016). This external integration is essential in optimizing the flow of goods and information throughout the supply chain, ensuring the availability of suitable raw materials at the right time, and increasing the speed of response to customer requests (Chiang & Huang, 2021). Good external integration can improve the reliability and accuracy of shipping goods from suppliers, reduce the risk of understock or overstock, and maintain product quality (Qiao & Zhao, 2023). Internal integration impacts increasing customer integration by 0.588 and supplier integration by 0.695 in 770 manufacturers (Jajja et al., 2018). Internal cross-functional integration impacts external cross-functional integration by increasing information sharing and planning (Basana et al., 2023). The following hypothesis is postulated.

H₄: *Internal supply chain integration positively affects external supply chain integration.*

2.6.4. Internal supply chain integration relationship with supply chain flexibility

The relationship between internal supply chain integration and supply chain flexibility in the supply chain process is essential to increase the company's responsiveness and adaptability to changes that occur in the market and customer demand (Rojo et al., 2018). Supply chain integration formed in companies, especially internal integration, impacts flexible manufacturing performance (Munir et al., 2020). Internal integration in the supply chain gives companies better access to relevant information and data to quickly identify changes in demand and market trends (Ataseven et al., 2020). Internal integration also allows companies to coordinate better between departments and internal functions so that production and delivery processes can be adjusted quickly and efficiently according to customer requests (Syahputra, 2016). Internal integration impacts agility performance by 0.333 (Jajja et al., 2018). Internal integration also strengthens team collaboration involving internal company stakeholders so that they can make better decisions and implement more effective actions to deal with changes inside and outside the company (Sundram et al., 2020). On the other hand, external integration in the supply chain allows companies to establish closer relationships with outside business partners, such as suppliers, manufacturers, and distributors (Doetzer & Pflaum,

2021). This internal integration allows faster and more accurate information exchange within the company to generate flexibility by adjusting the distribution, transportation modes, and delivery schedules (Shukor et al., 2021). Different things stated by Willis et al. (2016) that internal integration determined by ensuring compatibility among all relevant internal business processes cannot impact changeover and modification flexibility performance in Indian companies. Supply chain integration by increasing share inventory level, share production planning, and collaborative forecast can produce supply chain flexibility in the manufacturing process and distribution (Siagian et al., 2021). This argument proposes a hypothesis as follows.

H₅: *Internal supply chain integration has a positive effect on supply chain flexibility.*

2.6.5. External supply chain integration and supply chain flexibility

The relationship between external supply chain integration and supply chain flexibility in the supply chain process is essential in increasing connectivity and collaboration between companies and external business partners, such as suppliers and distributors (Chunsheng et al., 2020). External integration in the supply chain allows companies to share more accurate and real-time information with business partners to adopt faster and more informed decisions in the face of changing customer demands (Putra et al., 2020). Supplier integration impacts agile supply chains as a form of flexibility of 0.270 in companies, while customer integration impacts 0.129 in 770 manufacturing companies (Jajja et al., 2018). External integration also allows companies to create more robust and mutually beneficial long-term relationships with external business partners to gain better access to resources, knowledge, and expertise possessed by business partners. With good external integration in the supply chain, companies can achieve higher flexibility in the supply chain process (Doetzer & Pflaum, 2021). Coordination with the company's external partners can better identify and take advantage of emerging business opportunities with various parties involved in the supply chain process (Rojo et al., 2018). In this context, some critical process integration indicators are well-integrated logistics, adequate material flows, and optimal logistics activities (Chiang & Huang, 2021). External integration in the supply chain can also increase supply chain flexibility because it allows access to a broader and more diverse range of resources so that companies have more choices in managing risk and increasing responsiveness to changes in customer demand (Shukor et al., 2021). External integration of the supply chain involves linking processes well with external partners and sharing information on time to facilitate processes with external partners with volume, change, and modification flexibility performance (Willis et al., 2016). Based on this discussion, the hypothesis is formulated

H₆: *External supply chain integration affects supply chain flexibility.*

2.6.6. The relationship between supply chain integration and business performance

Internal integration in the supply chain positively impacts business performance in supply chain processes (Tarigan et al., 2021b). Companies with good internal and external supply chain integration perform better (Dhaigude et al., 2020). Supply chain integration is formed in companies to exchange information with external partners and carry out business activities, affecting operational performance (Vafaei-Zadeh et al., 2020). Supply chain integration in companies by carrying out frequent contact activities with each other (Munizu et al., 2024) and information systems and compatible communication impacts firm performance by increasing market share growth and cost reduction (Sundram et al., 2020).

In addition, internal integration can also create better engagement and collaboration between departments and functions within the company, reduce errors and excess inventory, and increase the visibility and transparency of information in the supply chain (Tian et al., 2021). Internal solid integration in the supply chain can significantly improve business performance in supply chain processes (Lii & Kuo, 2016; Setiawan et al., 2023). Companies can integrate all internal business processes with one integrated platform, such as production, distribution, procurement, and finance. This allows companies to gain better visibility over the entire supply chain, identify problems and nonconformities, and provide timely solutions (Hartono et al., 2023). With internal integration and implementation of information technology in the form of ERP in the supply chain, companies can achieve higher efficiency, accelerate response time to customer requests, reduce operational costs, and increase customer satisfaction (Yu et al., 2017; Yu et al., 2021).

The relationship between external supply chain integration in supplier integration and business performance in the company's supply chain process has a positive relationship (Tarigan et al., 2021b; Wong et al., 2021). Companies with a high external supply chain integration level tend to have better business performance (Freije et al., 2022). External supply chain integration can include close cooperation with external supply partners such as suppliers and distributors (Chiang & Huang, 2021). External integration in companies, consisting of supplier integration, can significantly impact firm performance, and different things for customer integration do not impact firm performance (Lii & Kuo, 2016). With good downstream and upstream integration in logistics processes and material flows, companies can improve operational efficiency and reduce production costs (Beheshti et al., 2014). In addition, external supply chain integration can also include inventory optimization and good coordination with suppliers, which can help companies reduce delivery lead times and improve the quality of products produced (Wong et al., 2021). Good external supply chain integration can also help companies better answer customer needs and demands, thereby increasing customer satisfaction and strengthening the company's position in the market (Shee et al., 2018). Supply chain integration with information technology can positively impact a company's business performance (Basana et al.,

2022). Good external supply chain integration can improve operational efficiency, reduce production costs, and increase customer satisfaction (Yu et al., 2021). Supply chain management with ERP implementation can also help companies achieve improved product quality. Good supply chain integration can help companies better answer customer needs and demands to increase flexibility, delivery, quality, and cost (Masa'deh et al., 2022). The company seeks to involve external institutions to integrate it to improve performance and increase competitiveness (Siagian et al., 2022). Based on this discussion, two hypotheses are determined

H7: *Internal supply chain integration has a positive effect on business performance.*

H8: *External supply chain integration has a positive effect on operational performance.*

2.6.8. The relationship of supply chain flexibility with business performance

The relationship between supply chain flexibility and business performance can strengthen supply chain resilience to quickly adjust to external changes (Chunsheng et al., 2020). Studies conducted by Hong et al. show that companies with a high degree of flexibility in their supply chains tend to have better business performance. Supply chain flexibility can include a firm's ability to cope quickly and effectively with changes in market demand, such as changing production volumes or replacing manufactured products (Schniederjans, 2018). In addition, supply chain flexibility can also include the ability of companies to adapt their operations to changes in the business environment, such as changes in government policies or unstable market conditions. By having high flexibility in the supply chain, companies can quickly adapt to changes that occur and take appropriate actions to maintain good business performance. In addition, implementing ERP technology can also strengthen flexibility in the supply chain (Shajrawi & Aburub, 2023). By integrating business processes in the supply chain, companies can have higher flexibility in responding to changes in customer demand, optimizing inventory that allows faster delivery of goods, and reducing unnecessary operational costs (Siagian et al., 2021). Hence, the last hypothesis is postulated.

H9: *Supply chain flexibility positively affects business performance.*

Fig. 1 shows the research concept framework, which can be determined based on the introduction and explanation of the literature review.

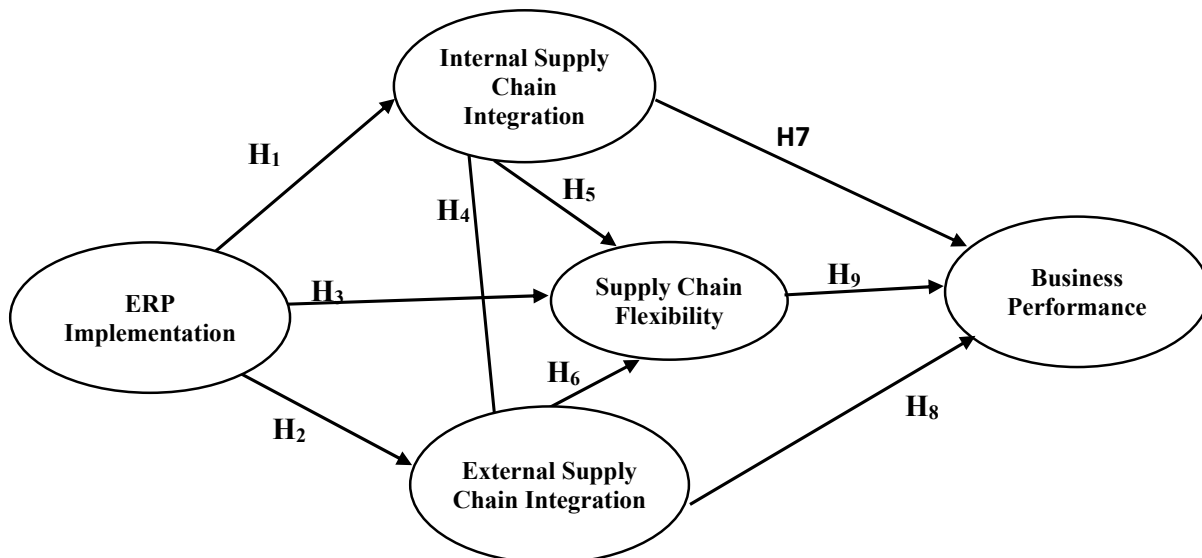


Fig. 1. Research concept framework.

3. Research Methods

This type of research uses a quantitative approach to examine a particular population or sample. Quantitative research is a study that uses numerical data and statistical analysis. Quantitative research also requires sampling from the population. Data collection is done using research instruments, and data analysis is performed using statistical tools to test the hypotheses set. This study aims to determine the magnitude of the influence of ERP implementation on business performance through internal supply chain integration, external supply chain integration, and supply chain flexibility. The population in this study is manufacturing companies that have implemented enterprise resource planning (ERP) systems. Researchers traced companies that fall into this category and found they have implemented ERP technology as an integration system in internal and external companies. As many as 324 companies have implemented ERP for over five years (Tarigan, 2014). Data collection as a research sample is used in non-probability sampling with purposive sampling, namely determining samples based on criteria set by researchers. The criteria set are companies that have implemented information technology in the form of ERP for more

than five years, employees declared as respondents are permanent employees, and have worked for at least two years. Finally, the minimum employee level is staff positions in ERP systems companies. Researchers determine the number of samples based on variables, namely at least 10 x 5 variables, which are at least 50 manufacturing companies that have implemented ERP and adjusted to the number of manufacturing companies in the East Java area so that 99 companies are obtained. The operational definition of research is an understanding of variables used to determine the research variables in detail. Operational definitions can also help other researchers who want to research using the same variables.

ERP implementation is an information technology package integrated between business functions in the company to produce productivity and efficiency levels. The research indicator set to measure ERP implementation research is that ERP can integrate data between departments in the company (ERP1) (Tarigan et al., 2020; Pirmanta et al., 2021; Siagian & Tarigan, 2020; Tarigan et al., 2019) ERP makes it easier for companies to control operational processes (ERP2) (Siagian & Tarigan, 2020), company ERP hardware is always adjusted and updated (ERP3) (Sebayang et al., 2021; Tarigan et al., 2020; Pirmanta et al., 2021; Tarigan et al., 2019), the company's ERP software is always adjusted and updated (ERP4) (Sebayang et al., 2021; Tarigan et al., 2019; Pirmanta et al., 2021) and corporate ERP greatly assists management in determining decisions (ERP5) (Ochoa et al., 2017; Siagian & Tarigan, 2020). Internal supply chain integration is the adequate integration of internal functions in the company to increase efficiency and effectiveness. The items used to measure internal supply chain integration are that the company has been able to respond quickly to interdepartmental needs well (ISC1) (Shukor et al., 2021), the company has a reliable integrated system between functions (ISC2) (Sebayang et al., 2021; Willis et al., 2016), the company has an integrated system from material receipt to product delivery (ISC3) (Shukor et al., 2021), the company holds coordination meetings between departments adequately (ISC4) (Shukor et al., 2021) and employees between departments in the company are adequately trained according to change their behaviors and processes appropriately as a result of new knowledge (ISC5) (Willis et al., 2016). External supply chain integration is a strong coordination that the company can rely upon with supplier partners and suppliers. The measurement item used in external supply chain integration is that the company provides appropriate information for external partners (ESC1) (Ochoa et al., 2017; Shukor et al., 2021), the company involves external partners in solving the problems faced (ESC2) (Ochoa et al., 2017), the company involves external partners in determining long-term planning (ESC3) (Siagian et al., 2021; Basana et al., 2023), the company provides company information as needed for external partners related to inventory (ESC4) (Shukor et al., 2021; Willis et al., 2016; Siagian et al., 2021) and companies provide production planning information to external partners (ESC5) (Ochoa et al., 2017; Shukor et al., 2021; Willis et al., 2016; Siagian et al., 2021; Basana et al., 2023). Supply chain flexibility is the company's ability to respond to changes in the supply chain flow. The measurement items used for supply chain flexibility are companies have flexibility in planning (SCF1) (Shukor et al., 2021), companies provide flexibility in employee working hours as needed (SCF2), companies have flexibility in product delivery (SCF3) (Rojo et al., 2018; Shukor et al., 2021), companies have flexibility in ordering products (SCF4) (Rojo et al., 2018; Shukor et al., 2021), companies have flexibility in the production process (SCF5) (Rojo et al., 2018; Siagian et al., 2021) and companies have flexible ordering processes (SCF6) (Rojo et al., 2018; Shukor et al., 2021; Siagian et al., 2021). Business performance is the performance produced in business activities for an organization in a certain period. The measurement items used for business performance are companies able to produce customer order product variances (BP1) (Siagian et al., 2021), companies can produce customer order product quality (BP2) (Santoso et al., 2022; Siagian et al., 2021; Masa'deh et al., 2022), the company can produce the Number of customer order products (BP3) (Siagian et al., 2021; Masa'deh et al., 2022), timely delivery of products to customers (BP4) (Santoso et al., 2022; Masa'deh et al., 2022), company productivity has increased (BP5) (Sebayang et al., 2021; Hartono et al., 2023), the company's ability to respond to customer complaints decreased (BP6) and the level of satisfaction increased (BP7) (Santoso et al., 2022; Siagian et al., 2021; Masa'deh et al., 2022). Data collection using questionnaires in the form of statements or questions that must be chosen one of the answers that best suits the conditions of medium and large companies is determined by respondents. The questionnaire is distributed through social media by sending a Google form link to answer it.

Data collection using a questionnaire in the form of a statement that must select one of the answers that best suits the conditions of medium and large companies is determined by respondents with a five-point Likert scale ((strongly disagree = 1) - (strongly agree = 5). The data analysis method used by researchers to test hypotheses using the Partial Least Square (PLS) program with SmartPLS software version 4. Research using PLS has two models that need to be tested, including the inner and outer models. The outer model is a validity test and reliability test. The inner model is a model that examines relationships between variables. Measurement of the inner model using the R-square of the dependent latent variable using Q-Square predictive relevance for the constructed model. Bootstrapping is a stability and estimation procedure evaluated using a t-test describing the influence between latent constructs called path coefficient estimation—the statistical test value t whose purpose is to express the significance of each influence between variables. The statistical test value t is significant if the statistical test value > 1.96 for $\alpha = 5\%$.

4. Research Data Analysis

The data collection used questionnaires given through a Google form link to respondents at manufacturing companies in East Java that have implemented enterprise resource planning technology. Table 1 demonstrates the respondents' profiles.

Table 1
Respondent Profile

Item profile	Description	Sum	Percentage
Long time in the company	2 years < - < 3 years	5	5 %
	3 years ≤ - < 5 years	67	68 %
	5 years ≤ - < 8 years	25	25 %
	≥ 8 years	2	2 %
Duration of ERP Implementation in the Company	1 year < - ≤ 3 years	43	44
	3 years < - ≤ 5 years	27	27
	> 5 years	29	29
Number of Workers	< 100 officers	8	8 %
	100 ≤ - < 1000 pegawai	3	3 %
	≥ 1000 pegawai	88	89 %
Types of ERP used	SAP	35	36 %
	Oracle	16	16 %
	People soft	15	15 %
	JD Edwards	12	12 %
	Baan	6	6 %
	Orlandsoft	3	3 %
	MFG Pro	10	10 %
	Self Development	2	2 %
Position	Owner	4	4 %
	Manager	23	23 %
	Supervisor	25	25 %
	Senior staff	14	14 %
	Junior staff	33	34 %
Department	Marketing	33	34 %
	Purchasing	25	25 %
	Production	9	9 %
	Information technology	18	18 %
	Human Resources Development	3	3 %
	Finance	11	11 %

Table 1 indicates that respondents have worked for 3 to 5 years of experience, as many as 67 respondents (68%) followed by more than five years 27 respondents (27%). The work experience of respondents in the company provides an overview of their ability to understand the work process adequately and have good skills.

Table 2
The results of the validity and reliability test for the outer model

Research Items	Factor loading	Cronbach Alpha	Composite Reliability	AVE
ERP Implementation (ERPI)		0.872	0.874	0.663
ERP11	0.828			
ERP12	0.899			
ERP13	0.798			
ERP14	0.787			
ERP15	0.750			
Internal Supply Chain Integration (ISCI)		0.819	0.824	0.576
ISCI1	0.752			
ISCI2	0.724			
ISCI3	0.767			
ISCI4	0.729			
ISCI5	0.821			
External Supply Chain Integration (ESCI)		0.868	0.870	0.657
ESCI1	0.864			
ESCI2	0.752			
ESCI3	0.850			
ESCI4	0.811			
ESCI5	0.769			
Supply Chain Flexibility (SCF)		0.892	0.892	0.652
SCF1	0.707			
SCF2	0.823			
SCF3	0.753			
SCF4	0.830			
SCF5	0.846			
SCF6	0.873			
Business Performance		0.746	0.753	0.502
BP1	0.789			
BP2	0.871			
BP3	0.707			
BP4	0.822			
BP5	0.826			
BP6	0.879			
BP7	0.868			

In a review of the length of ERP implementation in companies that have just implemented ERP for less than three years, 43 respondents (44%) show that the majority have long implemented ERP for more than three years, as many as 56 respondents (56%). Companies that have implemented ERP with sufficient experience so that the role of ERP in building external partners is decisive and well-integrated. The number of workers in companies with large company categories totaling more than 100 workers is 88 companies (89%). Table 1 shows that the ERP type used in East Java manufacturing companies is SAP type in as many as 35 companies (36%). Manufacturing companies can already invest in ready-made ERP, so the development of ERP independently is minimal, amounting to 2 companies. Internal functions related to external partners are marketing function 33 respondents (34%) and purchasing 25 respondents (25%) to build coordination and communication in the member supply chain. Table 2 shows the results for the outer model test determined by conducting a validity test with loading factors. The lowest value for each variable in ERP implementation with the company's ERP items greatly assisting management in determining decisions (ERPI5) with loading factor of 0.750, internal supply chain integration with company items having a reliable inter-function integrated system (ISCI2) 0.724, external supply chain integration with company measurement items involving external partners in solving the problems faced (ESCI2) of 0.752, supply chain flexibility with company items having flexibility in planning (SCF1) of 0.707 and business performance with company items able to produce the number of customer order products (BP3) of 0.707. The validity test result has met the requirements with a loading factor for overall measurement items with values greater than 0.500. The values of Cronbach alpha and composite reliability as forms of reliability tests in Table 2 are more significant than 0.700, and the AVE (Average Variance Extracted) value is greater than 0.500. The validity and reliability test as an outer model test has met the requirements.

The inner processing model is shown in Fig. 2 and Table 3.

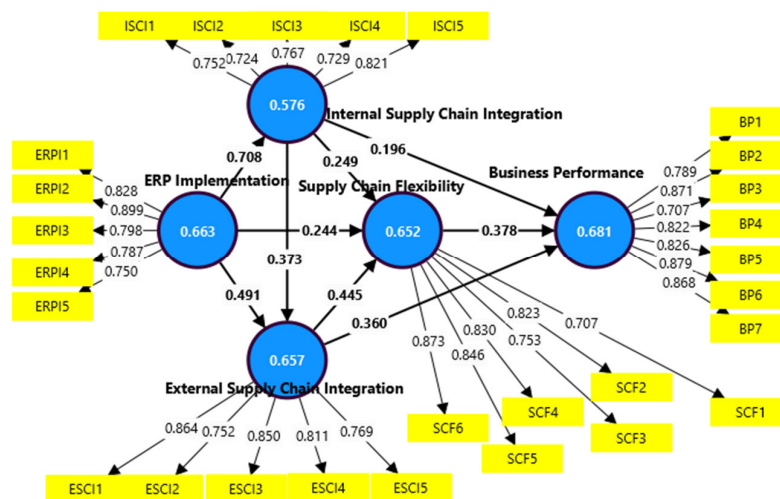


Fig. 2. Results of Partial Least Square Output Research

Table 3
Results of hypotheses testing (H1-H9)

Direct Path	Path Coefficient	T statistics	P values	Remark
ERP Implementation → Internal Supply Chain Integration (H1)	0.708	11.982	0.000	Accepted
ERP Implementation → External Supply Chain Integration (H2)	0.491	4.830	0.000	Accepted
ERP Implementation → Supply Chain Flexibility (H3)	0.244	2.702	0.007	Accepted
Internal Supply Chain Integration → External Supply Chain Integration (H4)	0.373	3.948	0.000	Accepted
Internal Supply Chain Integration → Supply Chain Flexibility (H5)	0.249	2.408	0.016	Accepted
External Supply Chain Integration → Supply Chain Flexibility (H6)	0.445	5.136	0.000	Accepted
Internal Supply Chain Integration → Business Performance (H7)	0.196	1.996	0.046	Accepted
External Supply Chain Integration → Business Performance (H8)	0.360	2.851	0.004	Accepted
Supply Chain Flexibility → Business Performance (H9)	0.378	2.871	0.004	Accepted

The hypotheses test results are indicated in Table 3. All hypotheses are accepted with a calculated t-statistic value greater than 1.96 and a p-value lower than 0.05 (significant statistical test value > 1.96 for $\alpha = 5\%$). The first hypothesis is accepted that ERP implementation significantly influences internal supply chain integration. ERP implementation in companies ERP can integrate data between departments in the company and make it easier for companies to control operational processes, impacting internal integration with the better integration system owned by the company from material receipt to product delivery. ERP implementation gives the company a single database that can be accessed in real time for all departments. This condition ensures that the company has adequate coordination and communication. This study confirms the results of research that state that ERP implementation influences improving internal supply chain integration (Vafaei-Zadeh et al., 2020; Birasnav & Bienstock, 2019; Rasanjali et al., 2024; Yu et al., 2019; Pirmanta et al., 2021; Tarigan et al., 2021b; Negi, 2020; Tarigan et al., 2019a; Tarigan et al., 2020a; Sebayang et al., 2021; Liu et al., 2016; AL-Shboul, 2019). The second accepted hypothesis

is that ERP implementation significantly increases external supply chain integration. ERP implementation is indicated by the company's ERP hardware and software, is always adjusted, and updated, and can integrate data between departments in the company, have an impact on external supply chain integration, resulting in increased sharing of production planning information and involving external partners, suppliers, and customers in long-term planning. The results of the study support previous research, which states that ERP implementation affects improving external supply chain integration (Yuan et al., 2022; Abu-Hussein et al., 2016; Tarigan et al., 2021a; Tarigan et al., 2020a; Acar et al., 2017; Sebayang et al., 2021; Ochoa et al., 2017; Sundram et al., 2020).

The third hypothesis (H3) is accepted as ERP implementation positively and significantly affects supply chain flexibility. Manufacturing companies in East Java that implement ERP in SAP, Oracle, Peoplesoft, JD Edwards, Baan, Orlandsoft, MFG Pro, and Self Development programs can make companies more flexible in production and ordering processes. The company's ability to increase flexibility with real-time data and fast interdepartmental coordination makes it better competitive than similar companies. This research is based on previous research that stated that ERP implementation influences increasing supply chain flexibility (Singh et al., 2022; Tarigan et al., 2020a; Ahmed et al., 2024; Pirmanta et al., 2021; Rojo et al., 2018; Negi, 2021; Putra et al., 2020). The fourth hypothesis (H4) is stated to be accepted so that internal supply chain integration has a positive effect on external supply chain integration. Internal supply chain integration is described as responding quickly to interdepartmental needs well, and interdepartmental employees provide adequate training to change their behaviors and processes appropriately because new knowledge impacts external supply chain integration. External partners are involved in long-term planning and information sharing in production planning to provide benefits to the company on an ongoing basis. The results confirm previous research that states internal supply chain integration affects external supply chain integration (Freije et al., 2022; Munizu et al., 2024; Wijaya, 2022; Yu et al., 2021; Willis et al., 2016; Chiang & Huang, 2021; Jajja et al., 2018; Basana et al., 2023).

The fifth hypothesis (H5) is accepted by the statement that internal supply chain integration positively affects supply chain flexibility with t-statistics above 1.96. Internal supply chain integration companies have an integrated system from material receipt to product delivery, and holding coordination meetings between departments adequately impacts supply chain flexibility. Flexible organization allows the company to have flexible product delivery and product ordering. Companies with high flexibility can compete strongly with rapid changeovers following customer needs. This research is in line with previous research that states internal supply chain integration has a positive effect on supply chain flexibility (Rojo et al., 2018; Munir et al., 2020; Ataseven et al., 2020; Jajja et al., 2018; Sundram et al., 2020; Doetzer & Pflaum, 2021; Shukor et al., 2021; Siagian et al., 2021). The sixth hypothesis shows that external supply chain integration positively affects supply chain flexibility. The company's external supply chain integration involves external partners in solving problems and establishing long-term planning. This can produce supply chain flexibility by issuing flexibility in employee working hours as needed, in product delivery, and in ordering products. The results confirm the results of previous studies that external supply chain integration has an impact on increasing supply chain flexibility (Chunsheng et al., 2020; Putra et al., 2020; Jajja et al., 2018; Doetzer & Pflaum, 2021; Rojo et al., 2018; Chiang & Huang, 2021; Shukor et al., 2021; Willis et al., 2016). Moreover, the seventh hypothesis (H7) accepted that internal supply chain integration positively and significantly affects business performance. Internal supply chain integration in manufacturing companies in East Java with adequate coordination meetings between departments and an integrated system between functions that can reliably improve business performance by producing an adequate number of products and quality customer orders. Internal coordination makes planning and production processes sustainable to produce quantity and quality products according to customer requirements successfully. The results of this study support the results of research which states that internal supply chain integration affects business performance (Dhaidude et al., 2020; Vafaei-Zadeh et al., 2020; Sundram et al., 2020; Tian et al., 2021; Lii & Kuo, 2016; Setiawan et al., 2023; Hartono et al., 2023; Yu et al., 2017; Yu et al., 2021).

Similarly, external supply chain integration significantly affects business performance, with t-statistics 2,851 (>1.96) declared acceptable for H8. These results show that external supply chain integration by the company provides appropriate information for external partners, involves external partners in solving problems faced, participates in long-term planning, and impacts business performance by increasing product variance, product quality, and the number of products according to customer orders. The results of the study support the results of research that states external supply chain integration affects business performance (Tarigan et al., 2021b; Wong et al., 2021; Freije et al., 2022; Chiang & Huang, 2021; Beheshti et al., 2014; Wong et al., 2021; Shee et al., 2018; Basana et al., 2022; Yu et al., 2021; Siagian et al., 2022; Masa'deh et al., 2022). The ninth hypothesis (H9) of supply chain flexibility affecting business performance is accepted. Supply chain flexibility is described by flexibility in planning, the flexibility of employee working hours as needed, and a flexible ordering process that impacts business performance with increasing product variance, product quality, and satisfaction. Supply chain flexibility formed in the company can maintain organizational needs so that customer orders can be fulfilled. The results of this study support the results of research which states that supply chain flexibility affects business performance (Chunsheng et al., 2020; Schniederjans, 2018; Shajrawi & Aburub, 2023; Siagian et al., 2021). Manufacturing companies in East Java have implemented ERP, performed good maintenance, and upgraded software and hardware to produce good cross-functional integration and strong cross-organization. By controlling operational processes and assisting management in determining decisions assisted by ERP systems, manufacturing companies can increase supply chain integration so that business processes can be well controlled. Manufacturing companies can respond quickly so that departmental needs run well and coordination meetings between

departments have been adequate. These are carried out weekly, and several companies set up morning coffee. Supply chain integration is carried out with external partners by providing access rights and involving corporate partners to understand the company's business processes. The company's ability to involve all members in the supply chain can increase flexibility in product ordering, product changes, and product delivery time. This research makes a practical contribution to improving ERP software and hardware for information technology department managers, as well as the improvement of the competency of key users and end users. ERP, which has been implemented, allows managers to make decisions on time and be directly communicated internally and externally. The theoretical contribution of the resulting research is to enrich the supply chain strategy to increase the company's competitiveness by implementing integrated information technology through ERP implementation and customization.

5. Conclusion

This study investigates the effect of ERP implementation, internal supply chain integration, external supply chain integration, and supply chain flexibility on business performance. The results are highlighted below. Manufacturing companies have built adequate systems to make them efficient and effective by implementing enterprise resource planning. The integration formed internally with ERP implementation allows cross-functional coordination to run well. ERP implementation that can integrate data between departments in the company and facilitate operational process control impacts supply chain integration and flexibility. Supply chain integration with internal and external supply chain integration impacts supply chain flexibility with planning, employee working hours as needed, and product delivery. With an integrated system between reliable functions and coordination meetings between departments, internal supply chain integration can adequately impact external supply chain integration. Internal and external supply chain integration are forms of supply chain integration. Supply chain flexibility in the company has an impact on improving business performance with product variances, product quality, and the number of products ordered by increasingly regular customers. Manufacturing companies that always maintain ERP by customizing products with software and hardware upgrades on an ongoing basis to match external and internal changes in the company. The company's ability to maintain ERP implementation on an ongoing basis can improve supply chain integration, flexibility, and business performance to increase competitiveness.

Acknowledgments

Authors would like to thank DRPM and Higher Education Indonesia for providing the post graduate grant in funding this research and Petra Christian University for the research funding package.

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