

## The effect of amended order on firm resilience through supply chain coordination

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### ABSTRACT

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Pandemic Covid 19 has resulted in manufacturing companies experiencing disruptions in fulfilling customer orders and changes in product forecasting results from calculation. Manufacturing companies essential in handling covid experience increased demands, while other companies not related to covid experienced a decrease even in cancellation of orders. Order changes determine the company's performance. This research is related to the effect of order changes on firm resilience through supply chain coordination. The distribution of questionnaires to manufacturing companies in Indonesia is done by sending a google form link in the social media group. Data obtained as many as 446 questionnaires and analyzed using the partial least square technique. The study results showed that amended orders positively impacted 0.728 to the internal operational coordination, the positive influence of 0.201 to coordinate with the supplier, and positive effect with a coefficient of 0.213 to coordination with the customer. Internal operational coordinated influence coordinated with the customer of 0.593 and coordinated with the customer of 0.515. Supply chain coordinated impact on the company's supply chain resilience determined by internal operational coordination by 0.371, coordinated with the supplier of 0.183 and coordinated with the customer of 0.199. The practical contribution of the research is to make managers able to build a coordinated Supply chain to overcome amended orders and increase supply chain deficiencies.

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### 1. Introduction

Pandemic Covid 19 provides drastic changes to the decline of economic and business growth. The governments of each country take policies to combat the spread of covid and maintain economic stability. The covid-19 pandemic has led to uncertainty and irregularities in health and economic aspects. This pandemic also disrupted the company's supply chain on both the upstream and downstream sides due to travel restrictions and the presence of panic buying (Nikolopoulos et al., 2021). Companies trying to maintain operations can run well and regularly. But the company's efforts were unable to anticipate the magnitude of the changes that occurred globally (Orlando et al., 2021). Companies are also trying to find a balance between demand and supply called supply chain flow balance (Jambulingam and Kathuria, 2020). Therefore, coordination along the supply chain is essential so that the supply chain can provide products according to demand (Hu et al., 2021). It is known that the Covid pandemic resulted in disruption in the same way with restrictions on activities between regions and countries. Supply chain activity on the upstream side causes the supply of goods from suppliers not to run normally, while downstream, there is panic buying that causes supply chain flow to be disrupted (Nikolopoulos et al., 2021). The covid-19 pandemic demanded changes to the company's work system, information system, order fulfillment procedures, goods management, and distribution systems. Companies are required to use artificial intelligence to get information and knowledge from external organizations in predicting future changes flexibly and tailored to the needs of the Company (Giovanni, 2021).

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The company always strives to harmonize internal systems and external systems in improving performance and maintaining the company's competitiveness (Prajogo et al., 2016; He et al., 2020). Companies need to utilize internal and external resources to provide the best value for customers and increase collective competitiveness (Li et al., 2018). The coordination between the company, supplier, and the customer provides business resilience in the era of disruption (Birkie et al., 2017). The company's coordination with suppliers in various aspects, such as information sharing related to stock level information and future demand forecasts, is crucial to anticipate uncertainty of demand from customers (Jambulingam and Kathuria, 2020). In addition, disruption also causes uncertainty in the volume of raw material orders to suppliers. This condition requires decisions regarding the volume and type of products that can change at any time (Esmaeili-Najafabadi et al., 2019). Changes in order determination of suppliers are inevitable because these changes adjust to changes in orders from customers. External uncertainty results in changes within the company, especially in the provision of customer orders (He et al., 2020). This order change occurs mainly in line with the changing needs in anticipation of the spread of covid 19. The changes can be divided into two groups: an increase in the volume for products in the pandemic and a decrease in demand for non-essential products. Products that are important in overcoming the spread have a relatively high demand for manufacturing companies. In contrast, non-essential products change delivery schedules, production processes, and even order cancellations (Paul and Chowdhury, 2021). As a result of the changes, the company routinely makes operational decisions regarding the volume and type of products to be processed by adjusting the amount of inertial raw materials (Sarvestani et al., 2019).

Changes in customer orders require changes in production by internal companies (Tarigan et al., 2019). The company's ability to adapt internal processes to external order changes successfully maintains firm resilience (Abeysekara et al., 2019). Communication and coordination with external parties, especially with customers, becomes essential in following internal processes following external processes. The company must build exemplary communication and collaborate with customers to provide fast information to the company's internals to adjust to the changes that occur. Internal operation coordination will adjust as much as possible and again inform customers about the company's ability to fulfill the order (Hu et al., 2021). Changes from orders from customers must be immediately forwarded to suppliers in the hope that suppliers can also adjust supply according to the customer order. Companies need to bank incentives to suppliers if they can meet demand and otherwise provide appropriate sanctions if they are not willing to meet the company's demands (Shnaiderman and Ben-Baruch, 2016). In addition, the timeliness of delivery is needed to ensure the company's appropriate and optimal inventory level. Of course, this can happen if the company coordinates with suppliers. Likewise, internal operation coordination is essential through increasing internal integration to increase flexibility, visibility, transparency, reliability, and real-time and utilization data integration (Tarigan et al., 2021; Siagian et al., 2020). Internal operation coordination between functions enables the company to optimize the production process to provide added value for customers (Zhang et al., 2014; Tarigan et al., 2019).

Internal Operation Coordination conducted between related functions in the company is believed to build customer trust. Internal coordination and collaboration between functions within the company through the placement of personnel who can integrate effectively result in firm resilience that is better in responding quickly to disruption (Liu and Lee, 2018). Management's ability to manage information and activities between functions in the Company internal affects coordination with suppliers and coordination with customers. Enterprise resources planning enables finding out related order information such as the order's status and the appropriately communicated to the supplier (Tarigan et al., 2020). As a result, enterprise resources planning is essentially able to quickly respond to customer orders in a timely and correct amount (Xu, 2020; Tarigan et al., 2020). For this reason, the company must coordinate with suppliers to provide resources with the amount and quality needed to maximize profits (Sarvestani et al., 2019). Companies that cooperate with suppliers in vendor-managed inventory (VMI) can achieve inventory balance in meeting customer demand (Lee et al., 2015).

Therefore, the company needs to build cooperation to synergize in the supply chain flow in determining the amount of inventory adjusted to customer demand. For example, suppliers can design contracts to make inventory replenishment decisions, thus minimizing penalty costs imposed (Lee et al., 2016). Coordination of the Company with suppliers enables the company to provide a rapid response to customer demand efficiently and effectively (Jambulingam and Kathuria, 2020). Internal coordination must set clear and precise specifications and quantities of materials in determining the supplier's order winner in support of quality products (Sahoo, 2021). Other research states that companies need to integrate suppliers with internal operations to improve operational efficiency by controlling the company's yang inventory (Prajogo et al., 2016). A study stated that the coordination built by the company with suppliers in providing original equipment manufacturers in India was carried out with coordination strategy, namely informal strategy for equipment maintenance and formal strategy for technology suppliers (Bandyopadhyay and Kim, 2021). The coordination that the company builds with suppliers needs to be done concretely in contractual agreements to understand incentives and penalties for both parties (Shnaiderman & Ben-Baruch, 2016).

In addition to cooperation with suppliers, the company is also critical to communicate and coordinate with customers. The company's ability to coordinate with customers can minimize penalties through fast-built coordination between internal parties and external parties (Lee et al., 2016; He et al., 2020). Coordination carried out by the company with the customer is vital, especially in establishing orders, shipping information, bills and payments, and the return of products that do not meet the qualifications for customers (Jambulingam & Kathuria, 2020). A study states that coordination in the supply chain can use artificial intelligence applications to provide economic benefits to retailers with cheaper production costs (Giovanni,

2021). Coordination built by the company with wholesalers is done by implementing VMI-consignment contracts to increase profits and sales (Hu et al., 2018). Coordination made by the company with customers typically and suddenly, such as providing information on the progress of production status following the availability of raw materials (Tarigan et al., 2019), has an impact on increasing firm resilience (Xu, 2020). Coordination built by the company by involving customers to play an active role in the company can benefit the Company (Abeysekara et al., 2019). Coordination between the company's external functions (customer and supplier) can anticipate changes and disruptions, maintain sustainability, increase firm resilience, and generate low production and logistic costs (Zhang et al., 2014). Companies need to reset internal resources anticipating the impact of disruption and increasing firm resilience (Ambulkar et al., 2015). Integration built by the company with the customer improved financial performance and customer-related performance outcomes (Afshan & Motwani, 2018).

The Covid-19 pandemic resulted in uncertainty and order changes experienced by almost all manufacturing companies (Paul and Chowdhury, 2021). To overcome unexpected disruption by pandemic outbreaks, companies with managers need to meet internal conditions related to production capacity, external conditions related to market demand, and supply from suppliers (Chen et al., 2021). The company's ability to overcome disruptions in the supply chain, such as adaptability, and respond quickly so that the company's operations take place is typically called firm resilience (Paul & Chowdhury, 2021). The company is required to build resilience to overcome the obstacles that occur by maintaining and controlling the sustainability of business processes by initializing the company's condition and the company's speed in ensuring supply (Siagian et al., 2021; Chunsheng et al., 2019).

Organizations must be able to withstand disruptions that occur suddenly and beyond the company's estimates (Birkie et al., 2017). Being able to overcome them quickly to become normal again is a manifestation of firm resilience (Orlando et al., 2021). Companies must find reliable suppliers to be able to reduce the occurrence of disruptions in the production process. The company needs this in determining resilient suppliers to maintain supply chain resilience (Hosseini et al., 2019). Companies must also conduct firm resilience practices through collaboration with partners to improve the agility and firm performance of the Company (Abeysekara et al., 2019). Order changes must be responded to quickly by manufacturing companies. Based on the above description, the study aims to assess the effect of customer order changes on firm resilience through supply chain coordination that includes coordination with suppliers, customers, and internal coordination of the company. This study sets out three outlines of the research question, first testing the impact of order change on internal operational coordination, coordination with suppliers, and customer. Second, the effect of internal operational coordination on coordination with suppliers, coordination with customers, and firm resilience.

The remainder of the paper is organized as follows: The literature review and hypotheses development are covered in Section 2, while the methodology, which explains the population, sampling, and data analysis techniques, is covered in Section 3. The statistical results to examine the measurement and inner model are provided in section 4, which deals with the analysis and results. Section 5 concludes with a discussion that analyzes the study's findings. Finally, Section 6 discusses the retraction of the conclusion based on the results and debate.

## **2. Literature Review**

Supply chain coordination is vital for the company to build competitiveness by conducting solid coordination and coordination with suppliers and customers (Li et al., 2018). Supply chain coordination is challenging but enables companies to maintain competitiveness (Bandyopadhyay and Kim, 2021). Research presented by Lee et al. (2016) shows that coordination with suppliers and customers allows companies to maintain inventory efficiently and effectively from stockout conditions. Enterprise resources planning (ERP) is an information system that integrates all internal and external company functions (Tarigan et al., 2020). With the implementation of ERP, the company can monitor the demand and status of customer orders, and at the same time, provide information to suppliers to supply the company's needs on time and number (Xu, 2020).

### *2.1. Order Management*

Pandemics have resulted in many changes in estimating excess demand, and companies are critical to maintaining a balance between supply and demand. This activity is essential so companies can estimate changes in order, especially when there is panic buying in products such as groceries and electronic products (Nikolopoulos et al., 2021). For example, garment companies in Sri Lanka experienced relatively rapid order changes during the pandemic and became a corporate operational challenge (Abeysekara et al., 2019). Orders sent by the company against suppliers such as order quantity and delivery time targets determine the stability of production processes and inventory levels (Shnaiderman & Ben-Baruch, 2016). Disruption always results in a sudden change of order and requires quick decision-making in selecting the right supplier (Esmaili-Najafabadi et al., 2019). Xu (2020) revealed that order handling is divided into two, namely order handling, which usually is the visibility of order progress process (VOP), and sudden order handling, namely exception handling process (eXH). VOP aims to increase the visibility of order progress by continuously monitoring the production process and providing formal information about the status of customer orders. But eXH seeks to give customers and suppliers information regarding the hasty handling of orders and their relation to supply issues. Orders received by the company to be served to pay attention to the status of continuous production, raw material needs, resources, and potential suppliers to obtain maximum profits

(Sarvestani et al., 2019). Amended orders used as research indicators are changes in the number of products during pandemic times, product variance, product prices, and product delivery schedules during pandemic times.

### *2.2. Internal Operation Coordination*

Internal coordination of organizations is a supply chain process between functions within the company that aims to carry out close and organized coordination for the smooth flow of information and materials (Prajogo et al., 2016). Internal coordination of companies can reduce data duplication, improve synchronization between functions, and improve planning accuracy in enhancing supply chain performance (Jambulingam & Kathuria, 2020; Tarigan & Siagian, 2021). Internal coordination of manufacturing aims to organize and carry out activities and processes that refer to meeting customer needs. Internal coordination is well used to provide real-time information between functions (Tarigan et al., 2021). Internal coordination in manufacturing companies is carried out in holding meetings between departments, assigning team members, and building a solid team between functions (Li et al., 2018). The company's ability in internal coordination is the company's ability to monitor overall operational processes, access inventory data in real-time, use computer technology in business design and improvement, respond to market changes quickly, and reduce lead times (Abeysekara et al., 2019). Internal coordination in the manufacturing company can be done in activities such as holding meetings between functions periodically, improving production processes, developing new products, and connections between departments that run well (Li et al. 2018; Tarigan et al., 2019). Internal integration as a form of coordination and collaboration of internal operations is determined by adopting data integration as a form of coordination between functions running well, coordinating changes that are carried out quickly, coordinating data changes running well, integration of data on time, and data access in real-time between functions (Tarigan et al., 2021; Suprpto et al., 2017). Research indicators established to measure internal operation coordination are periodic meetings conducted between functions, access to data in real-time as a form of coordination, coordination of changes and product manufacturing by involving between functions, and product development by involving cross-functions.

### *2.3. Coordination with supplier*

Coordination with suppliers can be done with the strategic alliance, namely cooperation in developing new products of the company and sharing knowledge in using technology to meet customer needs (Bandyopadhyay & Kim, 2021). Coordination with partners supports the company's success in the future through continuous collaboration with suppliers. Coordination with suppliers, also called by another term, is supply logistic integration to involve suppliers in inter-organization process activities so that processes and material flows can run orderly and directed (Prajogo et al., 2016). In addition, coordination with suppliers' partnership can reduce inventory levels and more transparent planning to overcome uncertainty from customer demand (Jambulingam & Kathuria, 2020; Tarigan & Siagian, 2021). The coordination built with suppliers can be in the form of vendor-managed inventory (VMI). The MI implies that both parties share the responsibility such as sharing information, determining production items, establishing delivery schedules, establishing economic production, determining delivery frequency and shipment, establishing inventory balance to be more flexible and optimal in improving customer satisfaction (Lee et al., 2015).

Coordination of manufacturing companies with suppliers can overcome and remove obstacles through the active role of manufacturing, such as sending its employees to suppliers to coordinate with suppliers under the specifications required by the company (Li et al., 2018; Chen et al., 2021). Coordination with suppliers will also improve supplier qualifiers to provide quality materials to improve the company's performance (Sahoo, 2021; Tarigan & Siagian, 2021). Furthermore, the company's coordination with suppliers' impacts reducing the company's inventory level, decreasing incoming material costs, reducing supplier rejection rate, and improving timeliness and volume of material delivery (Prajogo et al., 2016). Supplier coordination as a form of company coordination with suppliers measured by measurement items is the participation of suppliers in the forecasting process, design process, increased production, and meeting the company's needs (Li et al., 2018; Tarigan et al., 2021).

### *2.4. Coordination with customer*

In addition to coordination with suppliers, the company is also critical to coordinate with customers related to the product order process, customer order fulfillment, billing and payment, and customer product return (Jambulingam & Kathuria, 2020). Coordination built by manufacturing and customers involves both parties building close and intensive communication about order processes and information about products with the aim that customers get product-related information in real-time (Li et al. 2018; Suprpto et al., 2017). Manufacturing interaction with customers through close communication provides feedback for manufacturing, such as related product quality and specifications that customers want (He et al., 2020). The company's ability to provide products by applying artificial intelligence improves economic benefits for retail (Giovanni, 2021). Customer coordination is expressed by how the company communicates intensively with the primary customer, the follow-up to customer feedback, and the frequency of regular contact with the primary customer (Li et al., 2018). Wholesaler price and fairness can increase profit and production quantity through the VMI-consignment contract (Hu et al., 2018). The company can build coordination with customers to build a fast and precise supply chain flow to maintain accurate inventory, avoid material stockouts, and keep the efficiency and effectiveness of stock (Lee et al., 2016). Coordination with customers in this study adopts Afshan and Motwani research (2018) on integration with customers. Four indicators are used to assess

the coordination with the customer, namely, sharing information intensely with major customers about market information conditions, information with main customers through information technology, involving customers in determining planning and forecasting, and involving customers in developing new products.

### 2.5. Firm Resilience

Corporate resilience is a form of firm toughness in overcoming sudden and unexpected events. The company builds a resilience system to return to normal and can increase its competitiveness, known as firm resilience (Orlando et al., 2021). The company seeks to build supply chain resilience by maintaining resilient suppliers to reduce the impact of disruption (Hosseini et al., 2019; Birkie et al., 2017). The company's resilience in overcoming uncertainty in disruption conditions can identify risks, make continuous improvements, and become normal again (Tarigan et al., 2021; Ambulkar et al., 2015). The ability to cope with any sudden change from the company externally through making changes in the company internal is so-called resilience practice (Siagian et al., 2021). The company seeks to identify disruptions to business operations and partners and address them so that the risks and threats that occur are as small as possible (Abeysekara et al., 2019). Firm resilience can be said to be a company's ability to be more vigilant, quickly respond, and overcome obstacles in environmental disruption conditions (Liu and Lee, 2018). The company builds resilience to overcome the barriers that occur by paying attention to the company's situation when disruption occurs, the company's speed in covering suppliers, maintaining, and controlling the sustainability of business processes, and finding the best solution in overcoming disruption (Siagian et al., 2021; Chunsheng et al., 2019). In addition, the company improves cultural and operational competency to provide improvements to resilience engineering to be able to quickly adapt, maintain stability and balance (Eltantawy, 2016; Chen et al., 2021). Firm resilience measurements show the extent to which companies can cope with changes in supply chain disruption, adapt quickly to disruption, respond to disruption, and maintain business continuity (Liu and Lee, 2018). This study adopts indicators in Tarigan et al. (2021) research with five items: the company's ability to provide safety stock during disruption, maintain production capacity in the event of a disruption, serve customer demand, adapt during turmoil, and the company's ability to meet customer orders.

### 2.6 Hypothesis development

#### 2.6.1 Relationship between Amended Order and internal operational coordination

Coordination with the customer aims to include establishing the ordering process, fulfillment process and return product. This process requires internal coordination between functions and must be well organized (Jambulingam & Kathuria, 2020). Furthermore, the company assigns the order of raw materials to the supplier following the customer's order. To ensure that suppliers can meet raw material orders on time (Suprpto et al., 2017), companies need to provide incentives and penalties to customers. Planning agreements with suppliers takes coordination within the company operationally (Shnaiderman & Ben-Baruch, 2016). The significant disruptions that occur today risk higher wholesale prices and affect supplier selection, while the situation with little disruption is decision-making (Esmaili-Najafabadi et al., 2019). Customer order handling needs to monitor production progress and status orders to be forwarded to customers in the form of continuity information or progress of customer order fulfillment (visibility of order progress process) (Xu, 2020). Based on the description above, the first hypothesis can be formulated:

**H<sub>1</sub>:** *Amended order affects internal operational coordination.*

#### 2.6.2 Relationship between Amended Order, coordination with supplier and customer

The order fulfillment process requires coordination with customers to determine the number of orders and order delivery, to be further communicated to the supplier so that the supply chain flow runs smoothly and orderly (Prajogo et al., 2016). In addition, orders received by the company need to pay attention to the availability of materials and the potential for delivery from suppliers (Tarigan & Siagian, 2021). In the event of a change in order from a customer, the company immediately coordinates with the supplier to change the material's specifications, quantities, and requirements. Companies that work with many reliable suppliers will be able to keep up with the changes and ultimately increase firm resilience (Abeysekara et al., 2019). If the company makes changes to customer orders for some reason, then the company must immediately communicate well to the customer. This coordination aims to consider the number and type of products to be served and does not need to place material orders repeatedly, excessively, or deficiency that results in customer dissatisfaction (Sarvestani et al., 2019).

Synchronization of customer needs requires coordination with customers, then continued in internal manufacturing by doing design and production calculations and estimating material needs (Li et al., 2018). The company's ability to coordinate with suppliers to delay delivery when demand decreases are one form of resilience practice (Abeysekara et al., 2019). Coordination is conducted within the company and sharing business decisions, knowledge sharing, and sharing innovation to increase supply chain coordination (Zhang et al., 2014). The company's coordination with customers and suppliers is very important to be in sync with the established planning. Previous research has stated that the company's ability to provide original equipment needed by manufacturers requires coordination with suppliers. Coordination with suppliers is not only on the provision of equipment but also includes maintenance and transfer technology from suppliers to maintain equipment performance in maintaining the sustainability of the production process (Bandyopadhyay and Kim, 2021). Based on the above argument, the second and third hypotheses can be formulated as follows:

**H<sub>2</sub>:** *Amended order has an impact on improving coordination with suppliers.*

**H<sub>3</sub>:** *Amended order affects coordination with customers.*

### 2.6.3 *Relationship between internal operational coordination, coordination with supplier and customer*

The company's supply chain integration results from internal integration and external integration to produce an efficient and effective flow of information and materials (Tarigan et al., 2021; Siagian et al., 2020; Tarigan et al., 2019). For example, through coordination with suppliers, manufacturing companies can coordinate with suppliers in the form of knowledge sharing between organizations through the delivery of employees of the company to the supplier company, and vice versa supplier employees are involved in the provision of products according to the specified specifications (Li et al. 2018). In addition, the company's coordination with external partners in planning can help manufacturers balance material supply with customer orders and optimize production and inventory (Zhang et al., 2014). Therefore, the company builds coordination with suppliers in the hope of being able to provide materials and make process improvements to produce new materials. In contrast, customer coordination gets precise order planning and fulfillment of finished product needs (Siagian et al., 2021).

Coordination within the company is needed to determine the technology of the equipment required formal coordination between engineers in the company and suppliers intensively so that the procurement part can determine the specifications of the equipment needed to be further communicated to suppliers (Bandyopadhyay and Kim, 2021). Well-coordinated supply logistic integration between company and supplier is crucial in material procurement to support the company's operations (Prajogo et al., 2016). Coordination between the company's internal functions in setting material specifications is crucial in establishing order qualifiers to improve the company's performance (Sahoo, 2021; Siagian et al., 2020). In addition, previous research stated that artificial intelligence applied by manufactured companies produces lower production rates with lower inventory rates and increased economic benefits for retailers (Giovanni, 2021). Internal coordination can improve the on-time delivery of materials from suppliers, and suppliers can understand the sudden change in demand from the company (Tarigan et al., 2021).

Manufacturing capabilities can communicate effectively with customers and provide product information needed by customers so that delivery can run in real-time and get feedback from customers about the products required (Li et al. 2018). Efficient and effective order handling requires internal coordination of status order information in real-time to be communicated to customers. Providing this information to customers in real-time enhances customer satisfaction and improves supply chain response (Xu, 2020). Internal integration as a form of internal coordination can impact coordination with customers because of the company's ability to make production planning changes and the company's ability to meet orders from customers continuously (Tarigan et al., 2021; Siagian et al., 2020).

**H<sub>4</sub>:** *Internal operational coordination has an impact on improving coordination with suppliers.*

**H<sub>5</sub>:** *Internal operational coordination has an impact on improving coordination with customers.*

### 2.6.4 *Relationship between internal coordination and firm resilience*

Internal coordination through internal integration between functions has a positive impact on firm resilience. For example, companies can accurately calculate the availability of safety stock to adjust quickly to the disruption (Tarigan et al., 2021). In addition, employee empowerment by improving technical capabilities and operational competencies empower employees to develop best practices to create product uniqueness and maintain firm resilience (Eltantawy, 2016). Furthermore, coordination and collaboration between internal functions through individual placement that can coordinate effectively will increase firm resilience, such as quick response to disruption (Liu and Lee, 2020). Proactive internals determined by the company by planning regular communication and systematic processes in handling disruptions have an impact on firm resilience (Birkie et al., 2017). Other research also concluded that companies need to perform resource configuration in internal operations to be in harmony with changes in the external environment to increase firm resilience (Ambulkar et al., 2015). The above argument formulates the sixth hypothesis:

**H<sub>6</sub>:** *Internal operational coordination affects firm resilience.*

### 2.3.7 *Relationship between coordination with supplier and customer with firm resilience.*

The company's coordination with suppliers will provide a strong relationship and enable the company to know the supplier's potential. Supplier resilience in the face of disruption is a reliable potential for companies to increase firm resilience (Hosseini et al., 2019). The supplier's ability to overcome barriers and damage from disruption and quickly escape such disruption enables the company to maintain better performance in the long run (Eltantawy, 2016). In addition, coordination with customers is critical to provide products by normal VOP orders to monitor the status of customer orders and with eXH for hasty order monitoring. VOP and eXH are used in the recovery process during disruption through good coordination between all functional elements in the company to improve firm resilience (Xu, 2020). Integration with customers through information technology in information sharing can improve customer and financial-related performance outcomes to have better competitiveness (Afshan & Motwani, 2018). The company's ability to build proactive externals by continuously scanning

business processes and developing good relationships with suppliers as well as building long-term relationships with customers has an impact on firm resilience (Birkie et al., 2017). The mathematical model approach used by Sarvestani et al. (2019) states that coordination with customers' needs to be considered to know the number of product orders and product types to obtain maximum income and maintain firm resilience. Based on the above description, hypotheses numbers 7 and 8 can be proposed as follows:

**H7:** *Coordination with suppliers has an impact on the ability to build firm resilience.*

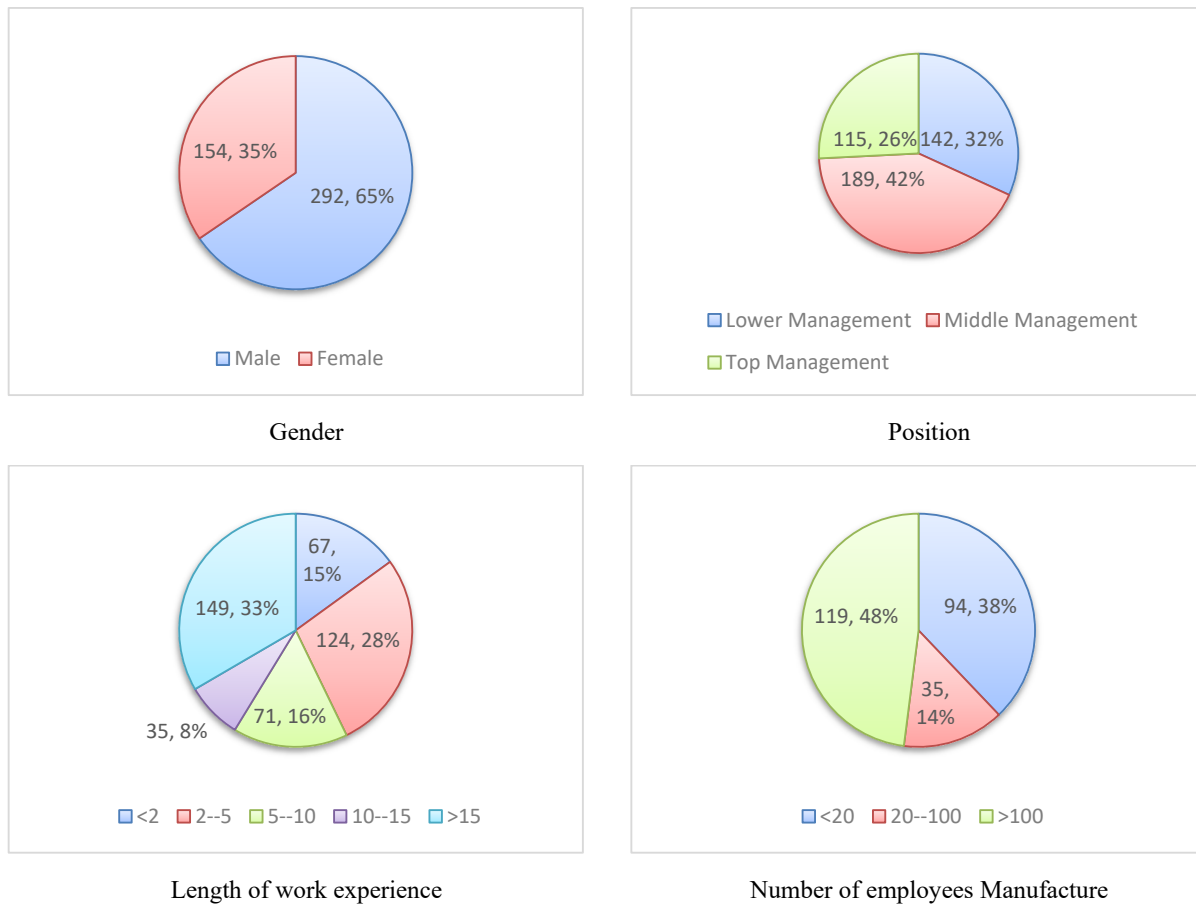
**H8:** *Coordination with customers has an impact on the ability to build firm resilience.*

**3. Methodology**

**3.1 Sample and Data collection**

This research is causal cross-sectional design by testing the correlation between variables with other variables. The data collection was conducted by disseminating questionnaires to practitioners in various manufacturing industries in East Java. During the Covid 19 pandemic, many manufacturing companies made order changes caused by changes in people's behavior, especially in essential products, in overcoming covid due to the great demand and scarcity of products in the community. Meanwhile, products that are not related to handling covid experience many cancellations of orders from customers to companies. Respondents to the study were industry manufacturing practitioners closely related to order changes, namely in the marketing, production, purchasing, production planning, and warehouse management in Indonesia. Questionnaires were given to respondents who worked at manufacturing companies by sending google form links via email, WhatsApp groups, and Facebook. Respondents who answered questionnaires are 622 manufacturing companies, and 446 questionnaires (a response rate of 71.70%) are considered valid and can proceed with further analysis.

The composition of respondents based on gender, position, experiences, and number of employees is presented in Fig. 1.



**Fig. 1.** Description of Respondent Characteristics

Respondents' characteristics based on gender were 65% (292 respondents) male and 35% (154 respondent) female. Manufacturing companies in Indonesia use more male labor. Manufacturing companies use more labor (labor-intensive), and still few companies use fully automatic. Characteristics of respondents based on the position obtained lower management

level 32% and middle up management 68%. This position shows that the order changes that occur in the company are the responsibility of middle management to coordinate between functions, while for lower management is the level of implementation. The work experience of the respondents is less than two years 15%, between 2 to 5 years 16% and over five years at 69%. This work experience shows that respondents have understood order changes require coordination across supply chain flows to maintain firm resilience. The category of manufacturing companies is divided into three categories, which are small businesses (less than 20 workers) 21%, medium (20 to 100 workers) 52%, and large businesses (more than 100 workers) 27%.

### 3.2 Measurement of Construct

Research indicators are assessed using validity tests for each statement item (indicator) and reliability tests for research variables. All of the statement items made in the study used five Likert scales with one strongly disagree to 5 strongly agree. Statement items used to measure amended orders are changes in the number/volume of products during the relatively low pandemic period (A.01), changes in product variance during the relatively low pandemic period (A.02), changes in product prices during the relatively low pandemic period (A.03) and changes in product delivery schedules during relatively low pandemic times (A.04). Statement items used to measure internal operational coordination are meetings between functions periodically (CIO.1), real-time data access as a form of coordination (CIO.2), coordination of changes, and product manufacturing involving inter-functions (CIO.3), and product development involving cross-functional (CIO.4). Finally, statement items used to measure coordination with suppliers are supplier participation in the forecasting process (CwS.1), supplier participation in the design process (CwS.2), supplier participation in improving the production process (CwS.3), and supplier participation in meeting the company's needs (CwS.4).

Statement items used to measure coordination with customers are intense sharing of information with major customers about market information conditions (CwC.1), sharing information with major customers through information technology (CwC.2), involving customers in establishing planning and forecasting (CwC.3), and customers involved in new product development (CwC.4). Statement items used to measure firm resilience are the company's ability to provide safety stock during disruption (Firm R.1), the company's ability to maintain production capacity in the event of a disruption (Firm R.2), the company's ability to serve customer demand (Firm R.3), the company's ability to adapt during disruption (Firm R.4), and the company's ability to meet customer orders (Firm R.5).

In understanding the characteristics of the sample, the study used average value and standard deviation as a descriptive analysis. At the same time, testing the correlation between variables used partial least squares (PLS) by assessing the value of the path coefficient between variables and the value of t-statistic values. The validity and reliability test results as a form of a goodness of fit research model are shown in Table 1.

**Table 1**  
The goodness of fit measurement

Indicator	factor Loadings	Mean	Standard deviation	Cronbach Alpha	Composite Reliability	AVE
<b>Amended order</b>		4.301	0.781			
A.O1	0,691	4.442	0.731	0.720	0.826	0.544
A.O2	0,719	4.141	0.882			
A.O3	0,731	4.282	0.812			
A.O4	0,805	4.352	0.673			
<b>Internal operational coordination</b>		4.117	0.8780			
CIO.1	0,533	3.845	1.095	0.774	0.848	0.535
CIO.2	0,797	4.327	0.691			
CIO.3	0,871	4.275	0.648			
CIO.4	0,792	4.103	0.757			
CIO.5	0,608	4.025	1.022			
<b>Coordination with customer</b>		4.026	0.938			
CwC.1	0,776	3.870	0.979	0.739	0.834	0.558
CwC.2	0,680	4.166	0.912			
CwC.3	0,793	3.969	0.973			
CwC.4	0,733	4.101	0.857			
<b>Coordination with supplier</b>		4.131	0.827			
CwS.1	0,678	4.052	0.983	0.731	0.829	0.548
CwS.2	0,797	4.274	0.691			
CwS.3	0,781	4.103	0.775			
CwS.4	0,699	4.094	0.818			
<b>Firm resilience</b>		4.108	0.912			
Firm R.1	0,772	4.094	0.979	0.784	0.853	0.540
Firm R.2	0,685	3.883	1.114			
Firm R.3	0,854	4.368	0.703			
Firm R.4	0,695	4.087	0.796			
Firm R.5	0,651	4.105	0.851			

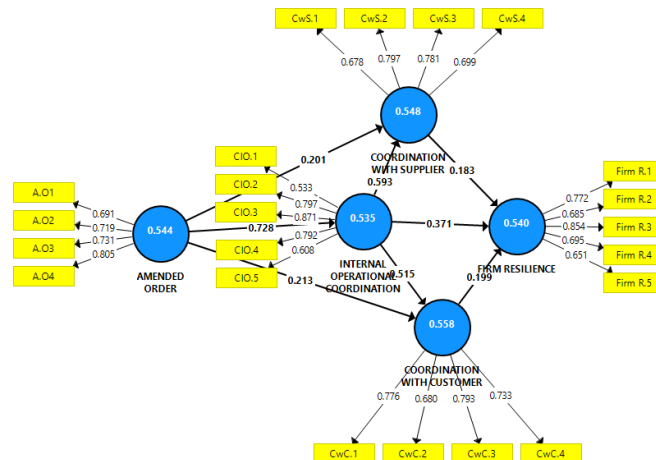


Table 1 shows the goodness of fit value for all measurement indicators where all factor loading values and AVE values are greater than 0.500. These results suggest the measurement item can describe a measured variable called a validity test. The reliability measurement of the indicator block can be seen from the reliability value above 0.700 for Cronbach alpha and composite reliability, which indicates all indicators meet values above 0.700. The average value for variable amended orders is 4.302, and the average of each indicator is between 4.137 - 4.442. These average results show that changes in customer orders (Amended orders) during the covid period turned out to have relatively little change due to products produced by manufacturing companies in Indonesia focusing on meeting domestic needs. Manufacturing production in Indonesia focuses more on low demand uncertainty where customers order products based on needs. Demand from the community is relatively stable because the government does not lock down large-scale restrictions, especially people who are unable to be still assisted by the government to meet basic needs.

Table 1 also shows each internal operational coordination indicator's score with an average value of 4.117 for its variables, and the average score of each indicator is between 3.845 - 4.321. This finding shows that internal operational coordination during the Covid-19 period has been going well. The coordination between functions has been running intensively due to restrictions on employee work carried out by the government to maintain the spread of the virus among employees. The lowest value is at the meeting between functions periodically (CIO.1) of 3.84. At the beginning of the pandemic, it was difficult for middle management to coordinate between functions that had been met in a room for coordination meetings that were then not allowed. One month after the pandemic, many technological advances were discussed online using Zoom and Google meet as a forum for coordination meetings between departments. Coordination with customers is obtained with an average value of 4.03, and for measurement, items are at 3.87 - 4.17. Coordination with customers has been done by the company relatively well. The lowest value is in sharing information intensely with major customers about the market information condition (CwC.1) of 3.87. Companies, especially the company's marketing department in the early stages of the pandemic, have difficulty coordinating with major customers about order changes. But the use of manufactured products for the domestic market has enhanced the coordination to recover quickly. Coordination with suppliers is obtained with an average value of 4.13, and measurement items are between 4.052 - 4.273, which shows coordination with the supplier is still going well. Then the score on firm resilience is obtained with an average value of 4.101, and the measurement item is between 3.881 - 4.372. Firm resilience with the lowest item in the company's ability to maintain production capacity in a disruption (Firm R.2) of 3.883 and the highest in the company's ability to serve customer demand (Firm R.3) of 4.37. Manufacturing companies still try to maintain quality by changing working hours from 1 shift to two shifts. The employees working on the production floor are arranged in such a way as to enter regular work still, but the worksite is adjusted to the company's production area. When the demand for existing products increases in quantity, the company could meet customer demand well. Firm resilience is balanced on the company's supply chain flow as needed with intensive internal and external coordination.

**4. Analysis and Results**

The results of the analysis of the data available using smartPLS are displayed in the form of a research model shown in Fig. 2. Then the path coefficient value, t statistic value, and p-value for the direct relationship between variables are displayed in Table 2.



**Fig. 2.** Path Analysis Result

The path coefficient value of each direct relationship indicates that all path coefficient values are positive. At the same time, the T statistical value is at a value greater than 1.96 as a cut-off value limit for a significant level of 5%. The same result is also shown as the value of probability (p-Value), less than 0.05, a cut-off value limit for a significant level of 5%. This analysis shows that empirical data in this study support the causal relationship between two variables according to the research hypothesis.

**Table 2**  
Path Coefficient of Direct Effect

DIECT EFFECT	Path Coefficient	(ST.DEV)	T Statistics	P Values
(H1) Amended order -> Internal operational coordination	0.728	0.025	29.297	0
(H2) Amended order -> Coordination with supplier	0.201	0.056	3.56	0
(H3) Amended order -> Coordination with customer	0.213	0.061	3.518	0
(H4) Internal operational coordination -> Coordination with supplier	0.593	0.052	11.497	0
(H5) Internal operational coordination -> Firm resilience	0.371	0.067	5.556	0
(H6) Internal operational coordination -> Coordination with customer	0.515	0.062	8.254	0
(H7) Coordination with supplier -> Firm resilience	0.183	0.066	2.771	0.01
(H8) Coordination with customer -> Firm resilience	0.199	0.053	3.774	0

## 5. Discussion

During disruption by Covid-19, manufacturing companies in Indonesia are trying to increase firm resilience to survive and gradually become normal. Manufacturing companies undergo amended orders from customers, such as changes in delivery schedules and supplier quantity. The results of the research hypothesis are known that amended orders impact increases internal operational coordination (H1). Amended orders with the largest loading occurred with changes in product prices during the pandemic period relatively low (A.03) with an average of 4.285 and loading factor of 0.731 and changes in product delivery schedules during the pandemic period relatively low (A.04) with an average of 4.345 and loading factor of 0.805. Order changes that occur can positively impact improving internal operational coordination with real-time data access as a form of coordination (CIO.2) and involve functions in coordinating changes and product manufacturing (CIO.3). The results of this study support the results of the survey, which states that the amended order can affect increasing internal operational coordination (Jambulingam & Kathuria, 2020; Shnaiderman & Ben-Baruch, 2016; Esmaili-Najafabadi et al., 2019; and Xu, 2020). The results of the second hypothesis obtained by amended orders positively and significantly impact coordination with suppliers. Amended orders that occur with changes in the volume/quantity of materials, prices, and delivery schedules make coordination with suppliers stronger. The company carries out coordination with suppliers by increasing the participation of suppliers in the design process and supplier participation in improving the production process. The results of the study are in line with the results of the analysis put forward by Prajogo et al. (2016), Abeysekara et al. (2019), and Sarvestani et al. (2019) that amended orders increase coordination with suppliers. The third hypothesis is said to be positive, and significantly amended order impacts coordination with customers by 0.213. The influence of amended orders determined by changes in the company's relatively affordable prices and changes in delivery schedules during Covid-19 increased coordination with customers with the active role of companies sharing information intensely with major customers about market information conditions and involving customers in determining planning and forecasting. The results support the research results that state that amended orders improve coordination with customers (Li et al., 2018; Abeysekara et al., 2019; Zhang et al., 2014; Bandyopadhyay and Kim, 2021).

The company's ability to coordinate efficiently and effectively within the company determines coordination with the company's externals. The fourth hypothesis of internal operational coordination has an impact on increasing coordination with suppliers positively by 0.593 and significantly. Internal coordination by involving all functions and data integration in real-time as a means of coordination between functions can impact coordination with suppliers (Siagian et al., 2020). Internal coordination of the company can lead to increased supplier involvement in improving the production process and meeting the company's needs. Manufacturing companies bring in employees from suppliers to see the production process and share knowledge in using the material. Some manufacturing companies send employees to several major supply companies about the specifications of the products the company needs. The results support the results of research that state that internal operational coordination has an impact on improving coordination with suppliers ((Tarigan et al., 2021; Li et al., 2018; Zhang et al., 2014; Siagian et al., 2021; Bandyopadhyay and Kim, 2021; Prajogo et al., 2016; Sahoo, 2021). The exact relationship obtained by the fifth hypothesis of internal operational coordination positively and significantly affects the coordination with customers. Middle and top management in the company can coordinate internally well, and all functions coordinate regularly. Coordination can provide accurate information and conditions to increase the involvement of key customers in establishing market planning and forecasting and sharing information intensely with major customers about market information conditions. Coordination involving the primary external customer determines the incentive of coordination within the company. This research is in line with research that states that internal operational coordination affects coordination with customers (Giovanni, 2021; Li et al., 2018; Xu, 2020; Tarigan et al., 2021).

Internal operational coordination has a positive impact of 0.371 on the ability to build firm resilience. This result shows that the power of middle and top management to coordinate internally and involve all the functions related to the supply chain flow to get the response and changes that occur in the company's external. Coordination conducted intensely and efficiently makes the company serve customer demand (Firm R.3) and provide safety stock during disruption (Firm R.1). Commitment from the company's management in seeking innovation by involving external parties is highly required to maintain the balance of order demand and material availability as a form of firm resilience. This research supports the results of research that states that internal operational coordination influences the ability to build firm resilience (Tarigan et al., 2021; Eltantawy, 2016; Liu and Lee, 2020; Ambulkar et al., 2015).

Coordination with suppliers that have been formed well with the company also supports firm resilience. The seventh hypothesis of coordination with suppliers had a positive impact of 0.183 on significantly building firm resilience. This finding shows that the involvement of suppliers in the forecasting process and supplier commitment in meeting the needs of the company can maintain firm resilience. Supplier involvement can contribute to the balance of order demand and material availability on an ongoing basis (Hosseini et al., 2019; Eltantawy, 2016; Birkie et al., 2017). The last direct effect hypothesis of the eighth coordination with customers had a positive impact of 0.199 on building firm resilience. Coordination with customers used by the company with measurements on the company's ability to provide safety stock in the event of a disruption (Firm R.1) and the company's ability to maintain production capacity in the event of a disruption (Firm R.2) and the company's ability to meet customer orders (Firm R.5) can increase firm resilience. The results of this study are in line with the results of research that states coordination with customers affects firm resilience (Xu, 2020; Afshan and Motwani, 2018; Sarvestani et al., 2019; Birkie et al., 2017). The company's ability to engage internally and externally in responding to order changes during a pandemic can increase firm resilience. Manufacturing companies in Indonesia have the largest consumers in the country, so the change in orders does not significantly impact. The difficulty of manufacturing companies during the pandemic era is the availability of materials because the primary raw materials are brought in from abroad. The obstacle that occurs in fulfilling orders is a decrease in production capacity. The relatively slight decline in capacity is due to government policies through large-scale restrictions based on district mapping areas and no lockdowns. However, working hours arrangements are still left to manufacturing companies. The ability of middle up management to regulate the rhythm of the company's work can still improve firm resilience.

## 6. Conclusion

As has been previously defined, this study examines the effect of amended order on firm resilience through supply chain coordination. In this study, supply chain coordination comprises three dimensions: internal operation coordination, supplier coordination, and customer coordination. Based on previous research, this study has developed eight direct hypotheses (H1-H8). The result shows that all hypotheses are supported by the empirical data from the manufacturing industry in East Java, Indonesia. Amended order affects internal operational coordination (H1), coordination with suppliers (H2), coordination with customers (H3). Furthermore, internal operational coordination has an impact on improving coordination with suppliers (H4), coordination with customers (H5), and firm resilience (H6). Moreover, coordination with suppliers impacts the ability to build firm resilience (H7), and coordination with customers has an impact on the ability to build firm resilience (H8).

### 6.1 Theoretical Contribution

Based on ambidexterity theory, this paper divides supply chain coordination into three dimensions to seek the contribution of each dimension in enhancing firm resilience. The result indicated that internal operation coordination, supplier coordination, and customer coordination are essential in strengthening the firm's resilience. In addition, this paper enriches the research on the antecedents of firm resilience, which, in this paper, are amended change, internal operation coordination, coordination with supplier, and coordination with the customer. Therefore, this paper enriches the research on firm resilience in correlation with supply chain coordination. This paper constructs a model that involves five constructs simultaneously: order change, internal operation coordination, supplier, coordination with the customer, and firm resilience. The empirical results demonstrate that the improvement of firm resilience in responding to the order change requires internal operation coordination and coordination with supplier and customer.

### 6.2 Managerial Implication

The Covid-19 Pandemic has seriously disrupted Indonesia's rapid economic growth. Many enterprises have realized that to cope with the increasingly severe disruption effect. The management needs to incorporate internal and external parties in response to the order change. Enterprise managers should involve all internal functions together with suppliers and customers to respond to any order change from customers. Enterprises must evaluate their existing system from usual tradition to the most responsive system, such as using up-to-date information technology.

### 6.3 Limitations and Future Research

There are some limitations to this paper. First, the analysis in this study does not examine the mediating role of the intervening variable. Second, this research surveyed the population coverage, which includes only the manufacturing companies in East Java, Indonesia. Future research is suggested to explore the role of the intervening constructs, in this study, internal operation coordination, coordination with supplier, and coordination with the customer.

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