

-RESEARCH ARTICLE-

SUPPLY CHAIN RESILIENCE STRATEGY TO GENERATE BUSINESS PERFORMANCE IN DYNAMIC ENVIRONMENTAL CHANGE

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—Abstract—

The COVID-19 pandemic has resulted in substantial and fluid environmental shifts, presenting notable obstacles for the continuity of business operations. The pharmaceutical industry has experienced a decline in performance due to the changing industrial landscape caused by the pandemic. The objective of this study was to examine the influence of supply chain management resilience on corporate performance in the face of ongoing environmental changes. Furthermore, the study aimed to investigate the impact of knowledge management capabilities, strategic agility, and supply chain integration on the development of resilience in the supply chain management process within the pharmaceutical sector of Indonesia. The research employed quantitative methods, specifically descriptive and explanatory studies. The statistical model used was the Structural Equation Model (SEM), specifically PLS-SEM. The study included a sample of supply chain and operations managers or directors from 243 pharmaceutical companies in Indonesia. The findings of the study indicate that both supply chain resilience and strategic agility have a positive and significant impact on business performance. However, the study presents a counterargument to prevailing assumptions by suggesting that the mere presence of knowledge management capability does not have a direct influence on business performance. On the contrary, it becomes evident as a vital facilitator, greatly augmenting both strategic agility and supply chain resilience. Furthermore, the study reveals a mediating role for supply chain resilience, emphasizing its ability to amplify the positive impacts of supply chain integration on business performance. The interplay between knowledge management capability, strategic agility, and supply chain integration underscores the intricate dynamics shaping resilience. It is worth noting that, despite the anticipation that dynamic environmental changes would impact supply chain resilience and business performance, the study did not find any significant moderation effect. Given these insights, it is important for the pharmaceutical industry to reassess the significance of knowledge management capabilities as a means of strategic improvement rather than a direct influencer. Embracing this nuanced perspective can promote resilience in the face of ever-changing environmental conditions, ultimately leading to the industry's strong growth.

Keywords: Strategic Agility, Knowledge Management Capability, Supply Chain Integration, Dynamical Environmental Change, Business Performance, Supply Chain Resilience

INTRODUCTION

The COVID-19 outbreak has led to significant environmental changes, posing a major challenge for businesses. This disruption has the potential to impact operations and company survival, ultimately affecting performance. In March 2020, the World Health Organisation (WHO) officially declared COVID-19 a global pandemic. The global

COVID-19 pandemic has had a significant impact on the sustainability of production, supply, and consumption of various commodities worldwide. This pandemic is a prime example, leading to significant worldwide and domestic closures of numerous manufacturing units, logistics, markets, and other supply chain activities.

As per a report on pharmaceutical drug products published by a business research company, the market value of the global pharmaceutical industry reached \$1,217.10 billion in 2019, reflecting a 6.7% increase. According to a report by The Business Research Company in 2020, the market value experienced a decrease of 0.6% or reached \$1,209.60 billion. This decline is significant as it marks the first time in decades that such a decrease has occurred. Globenewswire-USA published a report indicating a modest increase in the global pharmaceutical industry's market value in 2021, reaching \$1,250.24 billion. The report also predicts that by 2025, the market will experience further growth, reaching \$1,700.97 billion. [Table 1](#) presents the market value and growth trends of the global pharmaceutical industry. It is worth noting that market growth experienced a decline in 2020 due to the pandemic's impact.

Table 1. Market Value of Global Pharmaceutical Industry

Year	Market Value	Market Growth	Remarks
2019	\$1,217.10 Bio	+6.7%	
2020	\$1,209.60 Bio	-0.6%	The decreased was due to pandemic where impact to all areas of pharmaceutical value chain
2021	\$1,250.24 Bio	+1.8%	
2022-2025	\$1,700.97 Bio	+8.0%	

Source: the business research company report (2020), and Research and Markets (2021)

Table 2. Market growth of Indonesian Pharmaceutical Industry

Year	Market Value	Remarks
2019	+2.9%	
2020	-4.2%	The deceased was due to pandemic where impact to all areas of Pharmaceutical value chain
2021	+1.6%	
2022-2025	+3.13%	Average growth per year

Source: IQVA research (2021)

A similar situation also arose in the pharmaceutical industry market in Indonesia. Research published by IQVIA in September 2021 revealed that the pharmaceutical industry in Indonesia experienced a 4.2% decrease in market value in 2020. However, it saw a 2.9% increase in 2019 and a slight growth of 1.6% in 2021. Based on projections, there is an expected growth rate of 3.13 percent between 2022 and 2025. Experts predict that the market value will reach 97,400 billion IDR by 2025. The expectation of expansion supports this. According to [Table 2](#), the decline in the pharmaceutical industry market in 2020 can be attributed to the changing dynamics of the industrial environment and the impact of the COVID-19 pandemic. These factors have affected the overall performance of the pharmaceutical industry, making it volatile.

According to the 2022 report from the Food and Drug Monitoring Agency (BPOM), there were 243 licensed pharmaceutical companies operating in Indonesia. The provisions and procedures outlined in No. 1799/Menkes/Per/II/2010 for granting pharmaceutical industry business licenses guided the granting of these license (RI, 2022). Pharmaceutical companies are required to adhere to Good Manufacturing Practice (GMP) guidelines when carrying out their operational activities, which include developing, procuring, manufacturing, distributing, and administering drugs to patients. Gabungan Perusahaan Farmasi Indonesia (GP Farmasi) represents the Indonesian pharmaceutical industry, encompassing all pharmaceutical companies and special facilities in Indonesia, including local, joint venture, and foreign companies. On August 16, 1969, GP Farmasi Indonesia founded itself (GP Farmasi Indonesia, n.d.). Furthermore, 26 foreign pharmaceutical companies make up the IPMG-International Pharmaceutical Manufacturers Group (IPMG, 2021). On multiple occasions, both organisations have engaged in extensive discussions and partnerships with government agencies, such as the Indonesian Ministry of Health and BPOM, to address the impact of the pandemic and ensure the provision and security of drug supplies for COVID-19 patients, including industry relaxation measures.

The pandemic has also caused delays in the launch of new medicinal products, leading to changes in health care consumption trends. Consumers are now turning to telemedicine or online purchases, resulting in demand fluctuations and stock-outs. Additionally, there are challenges with employee availability, production, distribution, and transportation capacity, which are impacting the entire supply chain operations (Ayati et al., 2020). In 2020, there was a 0.6% decline in the global market value, followed by a modest 1.8% growth in 2021. The pandemic had a significant impact on the Indonesian pharmaceutical industry, with a decrease in market value of 4.2% in 2020, followed by a slight increase of 1.6% in 2021 (IQVA, 2021). The retail pharmacy sector (2020: -10.3%, 2021: -4%), the drugstore sector (2020: -1.2%, 2021: -13.1%), and the hospital sector (2020: -8.9%; 2021: +8%) were primarily responsible for the market value decline, according to the market research prognosis (2021).

In 2020, the pharmacy sector made up a mere 3.9% of the overall market. However, the Indonesian pharmacy market exclusively sells over-the-counter products. The increasing trend of patients seeking treatment at hospitals and primary care clinics has led to a decrease in the popularity of over-the-counter products. In 2021, the hospital sector experienced a significant 8% rise. This sector is responsible for the hospitals' dedication to providing care for COVID-19 patients, the ongoing implementation of JKN, improvements in public hospital facilities, and the remarkable expansion of the private hospital sector. Thus, the impact of Indonesia's pharmaceutical industry surpasses that of the global market, suggesting that Indonesia is more susceptible to supply vulnerabilities. In this scenario, it is crucial for companies to implement effective business risk management strategies in order to identify and minimise potential risks.

The pharmaceutical industry operates within an intricate value chain and is highly susceptible to disruptions.

Uncertainty in the industry's environment can lead to supply chain disruptions, which can impact various aspects such as drug procurement, production, distribution,

dispensing, and product transportation. Such disruptions can significantly affect the availability of essential products, especially given the importation of many crucial components used in drug manufacturing and packaging. Thus, it is crucial for pharmaceutical companies to possess the flexibility to handle disruptions and maintain the strength of their supply chains. When it comes to addressing interruptions in company operations, supply chain risk management plays a crucial role. Enhancing the visibility of data and fostering better coordination throughout the supply chain, including with suppliers and consumers, is crucial. By integrating supply chains, companies can enhance their procurement processes and gain better visibility into demand. This, in turn, helps mitigate the effects of production and supply disruptions, such as those caused by pandemics and natural disasters (Chaudhuri et al., 2018).

In a world of constant change, organisations must cultivate strategic agility—the capacity to swiftly adjust to shifts in the market and the environment. Being able to adapt to new ideas, technologies, innovations, and socio-economic changes is crucial in today's ever-changing world (Shams et al., 2021). Adapting quickly to a rapidly changing environment is crucial for sustaining business performance. Knowledge management plays a crucial role in developing robust supply chains and fostering strategic agility within organisations (Lim et al., 2017). An organization's ability to generate, obtain, and exchange knowledge is critical. Knowledge management encompasses the infrastructure and processes that empower organisations to utilise existing knowledge and generate new knowledge (Gold et al., 2001). The integration of knowledge management capabilities with supply chain management enables companies to enhance their performance and effectively respond to dynamic environmental changes (Attia & Salama, 2018).

Indonesia has a thriving pharmaceutical industry, thanks to its large population and growing demand for medical services. This industry not only serves local needs but also plays a significant role in the regional landscape. Developing more resilient supply chains will be a business imperative and, for pharmaceuticals. Similar to other industries, the pharmaceutical sector in Indonesia has encountered considerable challenges as a result of the pandemic. These challenges include disruptions in the supply chain, increased production costs, and difficulties in distribution. The pharmaceutical industry was selected as the research focus because of its crucial role in supplying vital health products, particularly in the context of the ongoing global pandemic. By bringing a range of different perspectives to the strategy challenge, it can enrich and strengthen the way in which strategy is both viewed and enacted. In Indonesia, it is essential to stay updated with the ever-changing industry environment to ensure the availability of effective drugs and medical products. The main focus of this research is to gain insight into how supply chain management resilience impacts corporate performance in the face of constantly changing environmental conditions. In addition, this study seeks to investigate the roles of knowledge management capabilities, strategic agility, and supply chain integration in promoting resilience. This research aims to address the knowledge gap surrounding the adaptation of Indonesia's pharmaceutical industry in response to current global challenges.

This research is important for investigating the impact of resilience in the supply chain management process on company performance in the face of dynamic environmental

changes. This research holds significant value as it delves into the intricate dynamics of the industry and explores the various factors that are closely intertwined with it. This research is crucial as it investigates the impact of knowledge management capabilities, strategic agility, and supply chain integration on establishing resilience in the supply chain management process. This is crucial because it contributes to the success of the Indonesian pharmaceutical industry.

LITERATURE REVIEW

Resource Based View and Dynamic Capability

[Barney et al. \(2001\)](#) states that a company's resources and capabilities that possess value, rarity, inimitability, and irreplaceability (also referred to as VRIN characteristics) form the foundation of a long-lasting competitive advantage for the company. The theoretical framework of the company's resource-based perspective elucidates how companies can gain a competitive edge in their sector and sustain this advantage over time. [Barney et al. \(2001\)](#) highlight that the resources and capabilities encompass a wide range of assets, including both tangible and intangible ones. These assets encompass the company's capabilities, organisational procedures, routines, and the information and knowledge it possesses. The expansion of the resource-based paradigm in strategic management and related fields has been noteworthy and subject to debate over the years. This development has involved a substantial amount of theory creation and extensive empirical testing.

[Chien and Tsai \(2012\)](#) further elaborate on the resource-based paradigm by introducing the concept of dynamic capacity. Dynamic capacity focuses on the ability to adjust and reorganize resources in response to a constantly changing environment. According to Teece, dynamic capacity is a combination of knowledge, cognition, and process. Teece first introduced this capability in 1997. [Teece \(2018\)](#) outlines a three-step process for attaining a competitive advantage. This process involves gaining a deep understanding of the market, seizing opportunities, and strategically adapting the company's knowledge, competencies, and resources. This theory suggests that organisations must adjust to their external environment in order to survive. It is based on certain assumptions and can be used to analyse how companies react to external pressures from other organisations and proactively address changes in the business environment. This enables organisations to deliver value to stakeholders. This can be seen as a dynamic capability that is influenced by the company's resources and also shapes the organization's future resources, potentially leading to improved business performance ([Mishra et al., 2019](#)).

Resilience Theory

The concept of resilience has become an increasingly important subject in recent years, resulting in a wide range of literature on the topic. People often describe resilience as the ability to recover from industrial disruptions. It involves taking proactive measures to prepare for adverse events, typically through resistance and anticipation. As per [Burnard et al. \(2018\)](#), resilience refers to the ability to anticipate, minimise, and adjust to disruptions and changes within an organisational setting without being thrown off

balance. The capacity to manage dynamic environmental change is a crucial aspect of resilience, highlighting the system's ability to adapt and respond to disturbances. [Carlson et al. \(2012\)](#) describe resilience as an organization's ability to anticipate, withstand, absorb, respond, adjust, and bounce back from unexpected events. In addition, resilience is defined as the capacity to bounce back from disruptions. To successfully handle disruptive events, it is crucial to build and integrate resilience into the processes and culture of an organisation. Disruption events are sudden occurrences that can impact how organisations respond, stemming from both internal and external sources.

Industrial Organization Theory

Industrial organisation is a field of study within microeconomics that focuses on analysing the economic behaviour of companies in markets where competition is not perfect. This resource provides insights into understanding and forecasting behaviour in different situations, such as internal processes, collaborations with suppliers and customers, and competitive environments. Industrial organisation is closely tied to market performance, encompassing factors such as firm profitability, production, and allocation efficiency, as well as a commitment to promoting equal employee opportunity and fostering diversity of speakers and ideas ([Wirth & Bloch, 1995](#)). The study of how the external environment and conditions affect a company's actions is the focus of industrial organisation. It is crucial for companies to adapt to the ever-changing industry landscape in order to remain profitable and stay ahead of their competitors.

In this scenario, it is crucial for companies to possess the capacity to adjust their strategies and operations. In order to maintain and improve the company's business performance, it is crucial to seek out breakthroughs that have the potential to bring about significant changes. The COVID-19 pandemic serves as a prime illustration of how the external environment has influenced the behaviour of companies. The landscape of competition has shifted from tangible products to intangible services, while traditional physical platforms have been replaced by digital platforms. In the pharmaceutical industry, digital platforms have emerged to adapt to the evolving industrial landscape. These platforms address various aspects such as product introduction to doctors, distribution, marketing, interconnection principles, and supplier and customer collaboration. Businesses that fail to adapt to the current circumstances are at risk of losing their market share and overall performance.

Knowledge Management

Knowledge management can achieve efficient coordination of an organization's people, organisational structure, processes, and technology. This process focuses on enhancing value by promoting innovation and reutilization. To achieve this objective, it is crucial to encourage the production, sharing, and application of knowledge, as well as to remember significant findings and best practices for the organisation's ongoing learning process. It covers both knowledge and information, with knowledge being more subjective, derived from personal experiences, values, perceptions, and encounters. Knowledge management, according to multiple sources, entails the systematic capture, organization, management, and distribution of knowledge within an organization. We do this to streamline work processes, reuse successful approaches, and reduce redundant

efforts across projects. This comprehensive approach involves recognising, gathering, evaluating, retrieving, and exchanging information found in databases, documents, policies, procedures, and the valuable skills and experiences of individual employees. In the realm of academia, knowledge management encompasses the intricate process of generating, acquiring, and transferring knowledge, which in turn shapes the behaviour of organisations.

Strategic Agility

Strategic agility refers to an organization's ability to adjust and adhere to its strategic direction in a timely manner, leading to improved corporate performance (Weber & Tarba, 2014). Embracing strategic agility enhances the sustainability of firm performance and enables effective adjustments to organisational strategy in a dynamic business environment (Ofoegbu & Akanbi, 2012). The success of a company is determined by how its strategic agility compares to that of its rivals, clients, suppliers, business associates, and public policy (Amniattalab & Ansari, 2016).

Supply Chain Resilience

Various metrics for assessing supply chain resilience have been proposed, encompassing aspects such as sustainability, information sharing, collaboration, agility, risk and revenue sharing, structure, visibility, and trust (Soni et al., 2014). Supply chain resilience refers to a proactive approach in managing risks in the supply chain. It involves vulnerability analysis, risk assessment, and sustainability planning (Scholten et al., 2014). The capacity of the supply chain to endure disruptions and restore operational capabilities after disruptions is essential in this approach. This relies on two key capacities: resilience and recovery (Melnik et al., 2014). Supply chain resilience is the ability of a supply chain to adapt and minimise the likelihood of sudden disruptions. It involves maintaining structural and operational controls to mitigate the impact of disturbances and implementing efficient reactive plans to overcome disruptions and restore the supply chain to a resilient operational state (Kamalahmadi & Mellat-Parast, 2016).

Supply Chain Integration

Supply chain integration consists of three components: internal integration, supplier integration, and customer integration (Piprani et al., 2020). Internal integration involves coordinating cross-functional teams within the organisation, including procurement, supply chain, manufacturing, marketing, and finance. Internal integration in the supply chain involves obtaining accurate information from partners and implementing strategies to sustain business performance. Internal integration is important for creating strong information processing capabilities within supply chain partners. This allows for efficient utilisation of information from suppliers and customers, leading to improved decision-making and risk mitigation. Supply chain integration is founded on internal integration, which removes functional barriers and facilitates information exchange among internal departments. This process reduces uncertainty and facilitates efficient supply chain risk management during unforeseen disruptions.

Dynamical Environmental Change

A dynamic change is characterized by an ever-changing, unpredictable, evolving, and fluctuating environment. [Volberda and H \(1997\)](#) describes it as a closely connected context that experiences significant shifts in its surroundings. The dimension of dynamic environmental change refers to environments that vary in terms of their stability, complexity, and predictability. The concept of static-dynamic encompasses various aspects, including the intensity and frequency of change, the number and interconnectedness of elements, and the availability and predictability of information and change. Technological advancements, shifts in customer behaviour and preferences, fluctuations in prices and costs, varying demands, and the emergence of new competitors can all contribute to changes in the business environment.

Understanding and predicting market turbulence is crucial for businesses, as it involves analysing variations in customer behaviour and preferences, price and cost structure, demand fluctuations, and the entry of competitors. Businesses must be able to identify potential risks and opportunities and adjust their strategic focus on product innovation to maintain their performance ([Calantone et al., 2003](#)). The extent of environmental factors, such as supply chain disruptions from natural disasters and pandemics, influence the degree of change based on the number of elements involved. There is a significant risk of disruption for events that occur infrequently but have a significant impact ([El Baz & Ruel, 2021](#)). Disruptions in a company's supply chain network can have a negative impact on the smooth flow of supplies between suppliers, manufacturers, and customers.

Business Performance

Assessing business performance involves evaluating how well an organisation utilises its resources to achieve optimal results. The achievement of organisational goals and the way the firm operates are reflected in this ([Dess & Robinson Jr, 1984](#)). The importance of financial criteria compared to broader operational criteria is emphasised in the first-dimensional classification scheme, while the second dimension examines two distinct data sources: primary and secondary ([Venkatraman & Ramanujam, 1986](#)). This perspective on company success focuses on fundamental outcomes that are measured using financial metrics, which are seen as indicators of the firm's economic goals. This approach frequently considers metrics like sales growth and profitability, assessing them through ratios such as return on investment, return on sales, return on equity, and earnings per share. In addition, gaining a deeper understanding of business performance would require considering non-financial indicators and other measures of technological efficiency within the realm of business performance. These factors include market share, the launch of new products, product quality, the success of marketing strategies, and the production of value-added goods ([Venkatraman & Ramanujam, 1986](#)).

RESEARCH HYPOTHESIS

The hypotheses are started with:

H1: *The effect of supply chain resilience for business performance.*

- H2:** *The effect of knowledge management capability for business performance.*
H3: *The effect of strategic agility for business performance.*
H4: *The effect of knowledge management capability for supply chain resilience.*
H5: *The effect of strategic agility for supply chain resilience.*
H6: *The effect of knowledge management capability for strategic agility.*
H7: *The effect of knowledge management capability for supply chain integration.*
H8: *The effect of supply chain integration mediating of supply chain resilience for business performance*
H9: *The effect of supply chain resilience moderator of dynamical environmental change for business performance.*

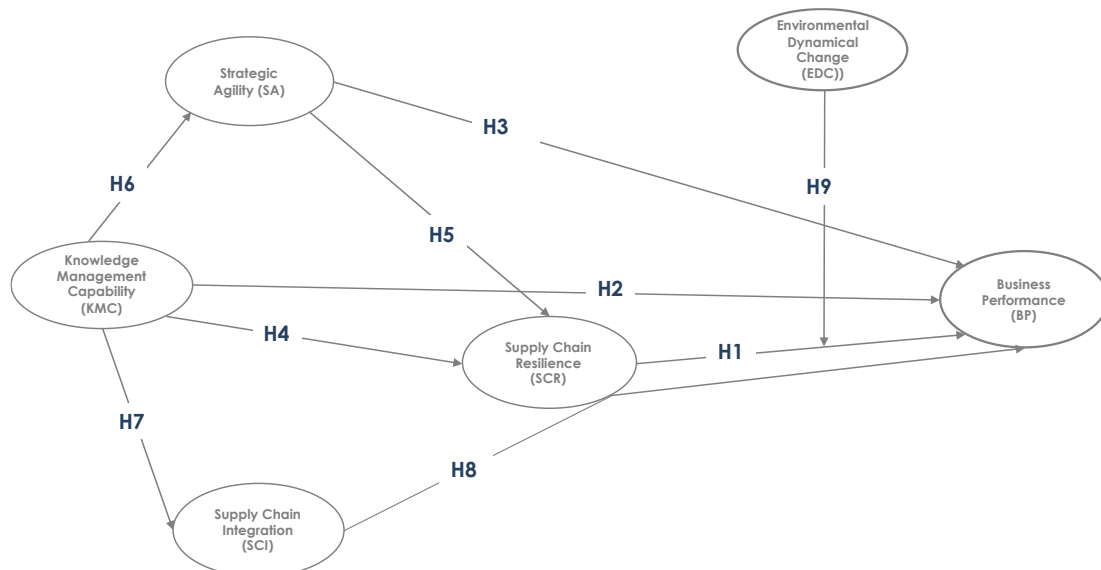


Figure 1. Conceptual Framework

METHODOLOGY

This research employs descriptive and explanatory studies. This research uses multivariate analysis to investigate the relationships between variables and test hypotheses related to business phenomena. The study's focus is on a pharmaceutical company based in Indonesia. The manager or director in charge of the company's supply chain or operations is the individual under observation or survey. This study was conducted during a specific period and focused on a particular subject. It employed quantitative methods that relied on empirical evidence and statements. Quantitative methodology allows for the simultaneous analysis of data to validate hypotheses and minimize bias (Harden et al., 2004).

The data were analysed using the Structural Equation Model (SEM) statistical model with PLS-SEM. An empirical evaluation involves a quantitative process that measures the extent to which a programme or policy meets or falls short of specific standards or norms. Louis et al., 2000 commonly refer to this process as the empirical method. This approach was selected to evaluate hypotheses and achieve research objectivity, which is attained through thorough and rigorous investigation and holds credibility within the

broader academic sphere (Creswell, 1994). In order to obtain comprehensive research results, researchers will conduct in-depth interviews with various supply chain actors or operational experts, managers, or directors who are relevant to the research findings.

This study is aimed at supply chain or operations managers or directors in the pharmaceutical industry in Indonesia. Its goal is to validate a conceptual model that looks into the links between knowledge management skills, strategic agility, supply chain integration, and resilience for business performance. These experts, who represent their organizations, provide insights on variable correlations using a one-time cross-sectional survey within a specific time frame.

The research methodology is crucial for ensuring the quality and validity of a study. It requires a thorough justification, particularly regarding the choice of the Partial Least Squares Structural Equation Modelling (PLS-SEM) within the broader Structural Equation Model (SEM) framework. PLS-SEM provides increased flexibility and is capable of accurately modelling complex relationships between variables, making it suitable for comprehensive studies like those examining supply chain resilience and business performance. Its ability to withstand distributional assumptions makes it well-suited for a wide range of sample sizes. In addition to the quantitative analysis, the inclusion of in-depth interviews adds valuable qualitative insights. These interviews, which gather detailed insights from industry stakeholders, enhance the research's comprehensive understanding, which is especially important given the ever-changing landscape of Indonesia's pharmaceutical sector in the face of global challenges.

RESULTS AND DISCUSSION

Outer Model Analysis

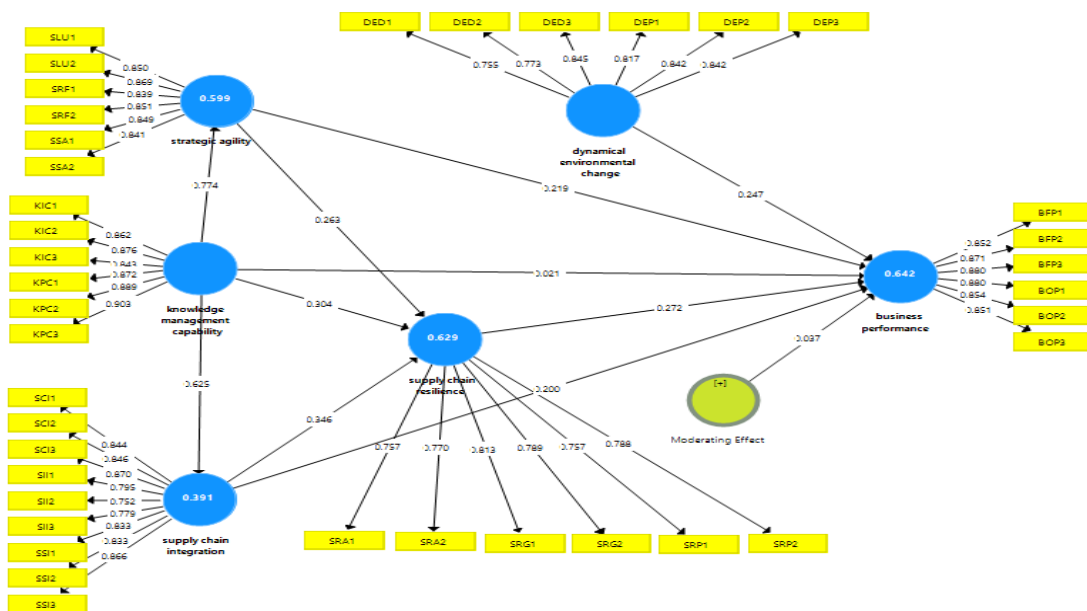


Figure 2. Outer Model
 Source: Primary Data Processed (2023)

Validity Test

Table 3. Average Variant Extracted

Variable	AVE	Description
Moderating Effect	1.000	Valid
Business Performance	0.747	Valid
Dynamical Environmental Change	0.661	Valid
Knowledge Management Capability	0.764	Valid
Strategic Agility	0.722	Valid
Supply Chain Integration	0.681	Valid
Supply Chain Resilience	0.607	Valid

Source: Primary Data Processed (2023)

The process for determining the legitimacy of a survey. The validity of this investigation was examined using convergent validity. [Hair et al. \(2019\)](#) and [Henseler \(2021\)](#) conducted research that deems an instrument valid when the average variant extracted (AVE) value exceeds 0.5. All the variables included in this study have an AVE value of more than 0.5, which suggests their suitability for analysis based on the AVE value results.

Reliability Test

The reliability test includes references to the Cronbach's alpha and composite reliability values. The composite reliability value falls within the range of 0.7 to 0.95, with the upper limit representing the composite reliability value and the lower limit indicating Cronbach's alpha value above 0.7. It is likely that there is duplication in the indicators used if a value higher than this reference is found ([Hair et al., 2019](#)).

Table 4. Reliability Test

Variable	Cronbach's Alpha	Composite Reliability	Description
Moderating Effect	1.00	1.000	Reliable
Business Performance	0.933	0.947	Reliable
Dynamical Environmental Change	0.898	0.921	Reliable
Knowledge Management Capability	0.938	0.951	Reliable
Strategic Agility	0.928	0.940	Reliable
Supply Chain Integration	0.941	0.950	Reliable
Supply Chain Resilience	0.872	0.903	Reliable

Source: Primary Data Processed (2023)

No redundancy is evident from the reliability test results in the table above. All variables have a Cronbach's alpha value greater than 0.7 and a composite reliability value between 0.7 and 0.95. The results indicate the reliability of all the study's indicators.

Inner Model Analysis

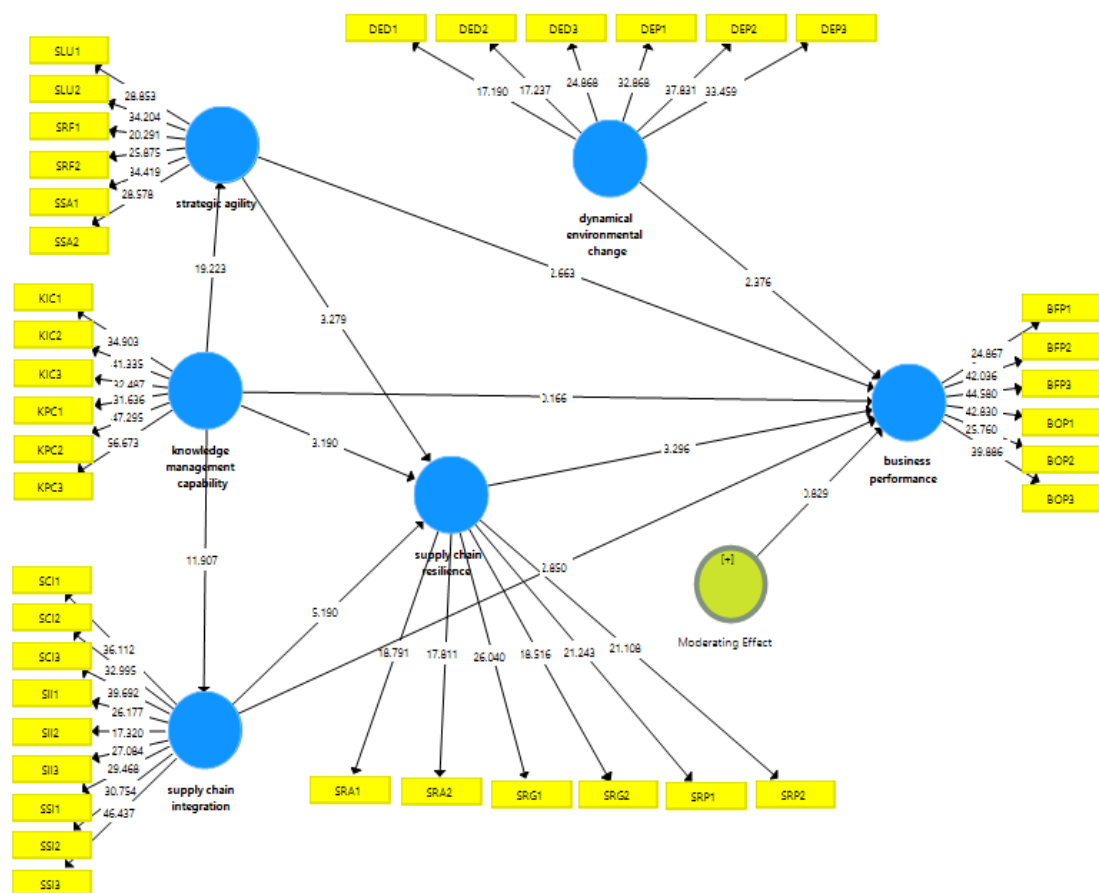


Figure 4. Inner Model
Source: Primary Data Processed (2023)

R-Square Test:

When the R-square value is 0.75, it indicates a considerable level of significance or strength. When the R-square value is 0.50, it is considered to be moderate. When the R-square value is 0.25, it is considered to be weak (Hair et al., 2019; Sarstedt et al., 2021). However, if the R-square value exceeds 0.9, it might be considered as overfitting.

Table 5. R-Square Test

Variable	R-Square	R-Square Adjusted
Business Performance	0,642	0,627
Strategic Agility	0,599	0,596
Supply Chain Integration	0,391	0,387
Supply Chain Resilience	0,629	0,621

Source: Primary Data Processed (2023)

The R-Square value of 0.642 indicates that 64.2% of the influence on the Business Performance variable can be attributed to Strategic Agility, Knowledge Management Capability, Supply Chain Integration, Supply Chain Resilience, and Dynamic Environmental Change. The R-Square value of 0.599 for Strategic Agility indicates that 59.9% of its impact can be attributed to Knowledge Management Capability. The R-Square value of 0.391 suggests that Knowledge Management Capability accounts for 39.1% of the impact on Supply Chain Integration. The R-Square value of 0.629 indicates that 62.9% of the influence on Supply Chain Resilience can be attributed to Strategic Agility, Knowledge Management Capability, and Supply Chain Integration.

Q-Square Test

The R-Square model test can be evaluated by examining the Q-Square correlation coefficient to determine the significance of the variable model. The Q-Square algorithm is used to estimate the values of observations generated by a model and the parameters of the model. This test assesses the diversity of data within a research construct and the degree to which the construct explains the variables being studied. The Q-square value greater than zero indicates the model's significance, while a Q-square value equal to or less than zero indicates a lack of predictive relevance in the model. The range of Q2 values is typically 0 to 1, with a higher value indicating a more accurate model. The size of Q2 in route analysis is comparable to the coefficient of total determination.

$$Q^2 = 1 - \{(1 - R_{12}) \times (1 - R_{22}) \times (1 - R_{32}) \times (1 - R_{42})\}$$

$$Q^2 = 1 - \{(1 - 0,6422) \times (1 - 0,5992) \times (1 - 0,3912) \times (1 - 0,6292)\}$$

$$Q^2 = 1 - \{(0,588) \times (0,641) \times (0,847) \times (0,604)\}$$

$$Q^2 = 1 - (0,193)$$

$$Q^2 = 0,807 \text{ (80,7\%)}$$

The Q Square factor has been calculated to have a value of 0.807. The research model accounts for 80.7% of the variation observed in the study data. By contrast, the study model does not account for the remaining 19.3% of characteristics. Therefore, this study model is highly effective in predicting outcomes based on these findings.

HYPOTHESIS TEST

Supply Chain Resilience to Business Performance

The study highlights the significant influence of supply chain resilience on business performance. There is a significant correlation between supply chain resilience and company success, as indicated by a p-value of 0.001, which is below the threshold of 0.05. Additionally, the t-statistic value of 3.296 exceeds the critical value of 1.986. The positive path coefficient suggests that improving supply chain resilience can enhance corporate profitability by positively influencing the firm's performance. Regardless of the acceptance of the initial hypothesis (H1), resilient supply chains play a crucial role in enhancing overall corporate performance.

Knowledge Management Capability to Business Performance

The study explores the impact of the knowledge management capability variable on

business performance. The t-statistic value is 0.166, which is lower than the critical value of 1.986. Additionally, the p-value is 0.434, which is higher than the significance level of 0.05. These findings indicate that the ability to manage knowledge should have a significant impact on a company's performance. Despite the path coefficient value suggesting a positive influence, the impact could potentially be even more significant. Put simply, the research findings suggest that knowledge management capability does not have a significant impact on improving business performance, confirming the acceptance of the second hypothesis (H2).

Table 6. Direct and Indirect Effect

Hypothesis	Effect	T Statistics	P Value	Description
H1	Supply Chain Resilience → Business Performance	3.296	0.001	Positive and Significant
H2	Knowledge Management Capability → Business Performance	0.166	0.434	Positive and Significant
H3	Strategic Agility → Business Performance	2.663	0.004	Positive and Significant
H4	Supply Chain Integration → Supply Chain Resilience → Business Performance	2.643	0.004	Positive and Significant
H5	Knowledge Management Capability → Supply Chain Resilience	3.190	0.001	Positive and Significant
H6	Strategic Agility → Supply Chain Resilience	3.279	0.001	Positive and Significant
H7	Knowledge Management Capability → Strategic Agility	19.223	0.000	Positive and Significant
H8	Knowledge Management Capability → Supply Chain Integration	11.907	0.000	Positive and Significant
H9	Moderating Effect → Business Performance	0.829	0.204	Not Significant

Source: Primary Data Processed (2023)

Strategic Agility to Business Performance

The study highlights the significant influence of strategic agility on company performance, as indicated by the t-statistic value of 2.663 (which surpasses 1.986) and a p-value of 0.004 (lower than 0.05). This suggests a strong correlation, confirming the beneficial impact of strategic agility on business performance. The findings suggest that having a strong strategic agility can have a positive impact on business performance.

Knowledge Management Capability to Supply Chain Resilience

The research findings demonstrate a strong correlation between knowledge management capability and supply chain resilience. This correlation is supported by a p-value of 0.001 and a t-statistic of 3.190, which exceeds the threshold of 1.986. The fourth hypothesis is supported by the findings, as the positive path coefficient indicates a significant positive impact of knowledge management capability on the resilience of supply chain operations.

Strategic Agility to Supply Chain Resilience

The impact of strategic agility on supply chain resilience is clearly demonstrated by the statistical analysis, with a t-statistic of 3.279 and a p-value of 0.001, surpassing the threshold of 1.986 and indicating statistical significance. The path coefficient indicates that strategic agility has a positive impact on the resilience of supply chain operations. Supporting the fifth hypothesis suggests that increased strategic agility plays a role in enhancing the resilience of the supply chain.

Knowledge Management Capability to Strategic Agility

The study reveals a significant relationship between knowledge management competency and strategic agility, as evidenced by a p-value of 0.000 and a t-statistic value of 19.223 (which exceeds the threshold of 1.986). The acceptance of the sixth hypothesis suggests that there is a positive relationship between knowledge management competency and strategic agility, as indicated by the positive path coefficient.

Knowledge Management Capability to Supply Chain Integration

The research emphasises the significant impact of knowledge management capability on supply chain integration, as evidenced by a t-statistic value of 11.907 and a p-value of 0.000 (below 0.05). Confirming the seventh hypothesis, it can be observed that the positive path coefficient indicates a significant and positive influence of effective knowledge management on the integration of supply chains.

Supply Chain Resilience Mediates Supply Chain Integration on Business Performance

The relationship between supply chain integration and business performance is strengthened by the presence of supply chain resilience. This is evidenced by a t-statistic of 2.643 and a p-value of 0.004. The path coefficient indicates a significant mediating effect, supporting the acceptance of the eighth hypothesis (H8).

Moderating Effect on Business Performance

The study finds that dynamic environmental changes have no notable impact on the correlation between supply chain resilience and business performance, with a t-statistic of 0.829 (below 1.986) and a p-value of 0.204 (above 0.05). Rejecting the ninth hypothesis (H9) implies that moderating dynamic environmental changes does not enhance the influence of supply chain resilience on business performance. Ultimately, the study highlights the importance of supply chain resilience, strategic agility, and knowledge management capability in improving business performance. It is suggested that companies, including those in the pharmaceutical industry, should consider investing in these areas to enhance their overall resilience and competitiveness. In addition, the study's findings differ from previous research, highlighting the importance of taking into account multiple factors when interpreting results from different studies.

The study highlights the significance of supply chain resilience, strategic agility, and knowledge management capability in improving business performance. Companies, including those in the pharmaceutical industry, should enhance their capabilities in these three areas. While knowledge management capability does not have a direct impact on business performance, it is still essential for companies to invest in knowledge management initiatives to enhance supply chain resilience and strategic agility. Supply chain integration can enhance business performance by improving supply chain resilience, thereby contributing to overall business resilience. Companies that possess strong strategic agility are more capable of adapting to dynamic environmental changes and sustaining a competitive advantage. The present study's findings diverge from those of ([Gunasekaran et al., 2015](#); [Tukamuhabwa et al., 2017](#)). While both studies may have employed similar methodologies and focuses, my findings suggest variations in dynamics or variables, resulting in distinct conclusions or interpretations. This highlights the significance of taking into account multiple factors, including context, methodology, and variables examined, when comparing and interpreting findings from different studies.

CONCLUSION

The study's findings indicate that supply chain resilience has a significant and positive impact on business performance, whereas knowledge management capability does not affect business performance. Strategic agility has a positive and significant impact on business performance. The positive and significant impact of supply chain integration on business performance is mediated by supply chain resilience. Knowledge management capability has a positive and significant impact on supply chain resilience, strategic agility, and supply chain integration. Dynamic environmental changes do not mediate the correlation between supply chain resilience and business performance. The pharmaceutical industry should prioritise improving its knowledge management capabilities to enhance business performance in the face of dynamic environmental

changes, thereby facilitating industry development.

This report concludes by emphasizing the elaboration of the main findings. The research findings indicate that supply chain resilience, strategic agility, and knowledge management capability are important factors in improving business performance, particularly in the pharmaceutical sector in Indonesia. The findings provide valuable insights for pharmaceutical companies in Indonesia, helping them understand how to integrate these elements into their business strategies for a competitive advantage.

Nevertheless, this report is not exempt from limitations, as is the case with any research. When interpreting the findings, it is important to consider the presence of unexplored variables and specific contextual factors that may influence the results. Recognizing these limitations and identifying future research opportunities is crucial for maintaining the validity and relevance of the findings.

These findings recommend pharmaceutical companies in Indonesia to further integrate their supply chains, enhance strategic agility, and continue investing in knowledge management capabilities. Implementing these recommendations can enhance business performance and assist companies in navigating the challenges of the current dynamic pharmaceutical industry.

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