

**The Impact of Innovation, Empowerment, and Resilience on Supply Chain
Velocity at PT XYZ Indonesia: Moderating Role of COVID-19**



**THESIS
BY
WIDI JATMIKO (22121004)**

**Thesis Supervisor
Prof. Ir. M. Aman Wirakartakusumah, M.Sc., Ph.D.**

**BACHELOR OF BUSINESS ADMINISTRATION
IPMI INSTITUTE
JAKARTA 2026**

**The Impact of Innovation, Empowerment, and Resilience on Supply Chain
Velocity at PT XYZ Indonesia: Moderating Role of COVID-19**

**Prepared by:
Widi Jatmiko (22121004)**

A THESIS
**Submitted in a partial fulfillment of the requirements for the degree of
Bachelor of Business Administration**

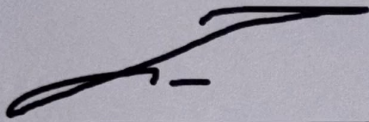
CERTIFICATE OF APPROVAL

Name & Student ID : Widi Jatmiko (22121004)
Topic : The Impact of Innovation, Empowerment, and Resilience
On Supply Chain Velocity at PT XYZ Indonesia:
Moderating Role of COVID-19

We hereby declare that this Thesis is from student's own work, has been read and presented to IPMI Institute Board of Examiners, and has been accepted as part of the requirements needed to obtain a Bachelor of Business Administration Degree and has been found to be satisfactory.

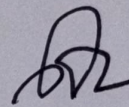
Jakarta, August 2026

Examined by



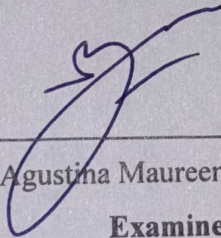
Prof. Dr. Ir. Dedi Fardiaz, M.Sc.

Chair of Examiner



Prof. Ir. M. Aman Wirakartakusumah, M.Sc., Ph.D.

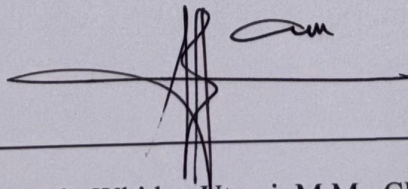
Thesis Advisor



Dr. Liza Agustina Maureen Nelloh, S.E., M.M., C.D.M.

Examiner

Acknowledged by,



Prof. Dr. Ch. Whidya Utami, M.M., CLC., CPM (A)

Vice Rector of Academic Affairs and Student Affairs

NON-PLAGIARISM DECLARATION FORM

This Thesis is a presentation of our original research work. Wherever contribution of others is involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. Also, this work is being submitted in partial fulfilment of the requirements for the Bachelor of Business Administration degree and has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Jakarta, August 2026



WIDI JATMIKO

TABEL OF CONTENT

APPROVAL FORM.....	i
NON-PLAGIARISM DECLARATION FORM.....	ii
ACKNOWLEDGMENT.....	x
ABSTRACT.....	xi
CHAPTER I:	1
INTRODUCTION	1
Research Background.....	1
1.1.1 Research Problem and Gap	3
1.1.2 Novelty.....	4
Research Questions	4
Research Objective.....	4
Research Benefit	5
1.4.1 For Academicians.....	5
1.4.2 For Practitioners	5
1.4.3 For Policy makers.....	5
1.5 Research Limitation	5
1.6 Research Outline	6
CHAPTER II:	8
LITERATURE REVIEW	8
2.1 Value chain theory	8
2.2 Resource-based view.....	8
2.3 Just-in-time.....	9
2.4 Total quality management (TQM).....	9
2.5 Available-to-promise (ATP)	9
2.6 Stakeholder theory.....	9
2.7 PESTLE Analysis.....	10
2.8 Quick response manufacturing (QRM).....	10
2.9 Defining Variables.....	10
2.9.1 Supply chain empowerment.....	10
2.9.2 Supply Chain Innovation.....	11

2.9.3 Supply Chain Resilience	11
2.9.4 Supply Chain Velocity.....	11
2.9.5 Lock down Covid 19 Policy.....	11
2.9.6 Analytical Hierarchy Process	11
2.10 Supply Chain Performance Indicators (Case Fill rate at PT XYZ).....	13
2.11 Previous research.....	14
2.12 Hypothesis Development	18
2.13 Research Framework.....	19
CHAPTER 3:	21
RESEARCH METHODS	21
3.1 Research Design.....	21
3.2 Population and Sampling	22
3.3 Data Collection Method	23
3.4 Variables and Definitions of Operational Variables	23
3.5 Data Analysis Techniques	29
3.5.1 A Descriptive Analysis of the Situation.....	29
3.5.2 Partial Least Squares Analysis Using Structural Equation Modeling (SEM) (PLS)	30
3.5.2.1 Outer Model Modeling Structural Equation Modeling	30
3.5.2.1.1 Convergent Validity Partial Least Square	30
3.5.2.1.2 Discriminant Validity	30
3.5.2.1.3 Reliability.....	31
3.5.2.2 Structural Equation Modeling and the Partial Least Squares Method for the Inner Model	31
3.5.2.2.1 The Determination of Coefficients.....	31
3.5.2.2.2 The Relevance of Predictions (Q2)	32
3.5.2.2.3 Examination of the Hypotheses.....	32
3.6 Analytical Hierarchy Process (AHP).....	32
CHAPTER 4	35
FINDINGS, ANALYSIS AND DISCUSSIONS.....	35
4.1 Descriptive Analysis.....	35
4.1.1 Responded Profile	35

4.1.2 Managerial Level.....	35
4.1.3 Major of education	35
4.1.4 Work in FMCG Industry	36
4.1.5 Gender	36
4.1.6 Years of service	37
4.1.7 Work in Business Unit on FMCG PT XYZ.....	37
4.1.8 Level of Management of work level	38
4.2 Descriptive Statistic.....	38
4.2.1 Indicators of Supply Chain Empowerment (SCE)	39
4.2.2 Indicators of Supply Chain Innovation (SCI)	40
4.2.3 Indicators of Supply Chain Resilience (SCR).....	41
4.2.4 Indicators of Supply Chain Velocity (SCV).....	42
4.2.5 Indicators of Covid Lock Down (CLD) as A Moderating.....	43
4.3 Outer Model SEM-PLS result.....	44
4.3.1 Collinearity Assessment	44
4.3.2 Convergent Validity.....	45
4.3.2.1 Loading Factor Analysis.....	45
4.3.2.2 Average Variance Extracted (AVE)	50
4.3.3 Discriminant Validity	51
4.3.4 Composite Reliability.....	52
4.3.5 Cronbach's Alpha	53
4.4. Inner Model SEM-PLS Results.....	54
4.4.1 Coefficient of Determination (R ²)	54
4.4.2 Effect Size (f ²)	55
4.4.3 Predictive Relevance (Q ²) Result	56
4.5 Hypothesis Testing Results	57
4.5.1 The Effect of Supply Chain Empowerment on Supply Chain Velocity	58
4.5.2 The Effect of Supply Chain Innovation on Supply Chain Velocity	58
4.5.3 The Effect of Supply Chain Resilience on Supply Chain Velocity	59
4.5.4 The Moderating Effect of Covid Lock Down on Supply Chain Velocity	59
4.6 Analysis and Discussion.....	59

4.7 Analytic Hierarchy Process (AHP) Analysis and Expert Judgement.....	60
4.7.1 Synthesis of Interview	60
4.7.2 Analysis and Result Hybrid.....	62
CHAPTER 5	63
CONCLUSION AND RECOMMENDATION	64
5.1 Conclusions	64
5.2 Managerial Implications.....	65
5.3 Recommendations	66
5.4 Limitations and Future Research Directions.....	67
REFERENCES	68
APENDIX.....	71
APENDIX A. Result of Survey.....	71
APENDIX B: Results of SmartPLS 4 data processing	71
APENDIX C. Interview AHP with Expert :.....	74
APENDIX D. Invitation email for Expert Judgement:	88
APENDIX E. Survey Google Form	90
APENDIX F. Company Profile PT XYZ.....	98

LIST OF FIGURES

Figure 1.1 Economic impact (value added loss)	2
Figure 1.2 Flowchart Research Process.....	6
Figure 2.1 Figure 2.1 VRIO Framework.....	8
Figure 2.2 Figure 2.2 AHP Framework.....	11
Figure 2.3 Research framework.....	19
Figure 4.1 Graphic of Loading Factor.....	45

LIST OF TABLES

Table 2.1 Case Fill Rate on FMCG Companies PT XYZ (FY19 – FY25)	13
Table 2.2 Previous Study List	14
Table 2.3 Research Framework AHP.....	20
Table 3.1 Screening Question.....	23
Table 3.2 Profile Respondent.....	23
Table 3.3 Defining Operational Variable Supply Chain Empowerment.....	24
Table 3.4 Defining Operational Variable Supply Chain Innovation.....	25
Table 3.5 Defining Operational Variable Supply Chain Resilience.....	26
Table 3.6 Defining Operational Variable Supply Chain Velocity.....	27
Table 3.7 Defining Operational Variable Lock Down Covid-19.....	27
Table 3.8 Paire wise comparison AHP Metrix	33
Table 4.1 Respondent Profile Level of Management.....	34
Table 4.2 Respondent Profile Major of education.....	34
Table 4.3 Work in FMCG Industry.....	35
Table 4.4 Data of Gender.....	35
Table 4.5 Years of services.....	36
Table 4.6 Work in business unit	36
Table 4.7 Management of work level.....	37
Table 4.8 Likert Scale Interval.....	38
Table 4.9 Descriptive Statistic of Supply Chain Empowerment.....	39
Table 4.10 Descriptive Statistic of Supply Chain Innovation.....	40
Table 4.11 Descriptive Statistic of Supply Chain Resilience.....	41

Table 4.12 Descriptive Statistic of Supply Chain Velocity.....	42
Table 4.13 Descriptive Statistic of Lock Down Covid.....	43
Table 4.14 Collinearity Statistics (VIF).....	44
Table 4.15 Factor Analysis - Supply Chain Empowerment.....	45
Table 4.16 Loading Factor Analysis - Supply Chain Innovation.....	47
Table 4.17 Loading Factor Analysis - Supply Chain Resilience.....	48
Table 4.18 Loading Factor Analysis - Supply Chain Velocity.....	49
Table 4.19 Loading Factor Analysis Covid-19 Lock Down as Moderating.....	50
Table 4.20 AVE Analysis.....	51
Table 4.21 Cross Loading Result.....	52
Table 4.22 Composite Reliability.....	52
Table 4.23 Cronbach's Alpha parameter.....	53
Table 4.24 Cronbach's Alpha Result.....	53
Table 4.25 R- Square.....	54
Table 4.26 F Square.....	54
Table 4.27 Hypothesis Result.....	56
Table 4.28 Pairwise Matrix (A1)	60
Table 4.29 Pairwise Matrix (A2)	61
Table 4.30 Final Weight (Average).....	61

ACKNOWLEDGMENT

Firstly, I would like to express my gratitude to Allah SWT for all the blessings that had been given to me in the process of making this Thesis as this would amount to nothing without such blessings. I would also like to be thankful to **Mr. Prof. Ir. M. Aman Wirakartakusumah, M.Sc., Ph.D.** as my Thesis Supervisor who have provided me with guidance, direction, and support in mentoring me to achieve the aim of this Thesis.

His respected knowledge of theory to analyze the essence of each problem that I have in the making of this Thesis and his perspective had always been encouraging in conducting this study. Much appreciation to all the faculty members of the IPMI Institute for all the knowledge and guidance provided throughout my studies.

I also have the greatest gratitude for my family who always help me and support me mentally so I can finish on time. To all My fellow friends, specially to BBA Pro batch 2022 who always encourage me in the making of this Thesis. I'm truly grateful for the support no matter how small it was.

ABSTRACT

The COVID-19 pandemic created unprecedented disruptions in global supply chains, particularly within the Fast-Moving Consumer Goods (FMCG) industry. These disruptions highlighted the importance of maintaining supply chain velocity to ensure product availability and customer satisfaction. This study investigated the influence of Supply Chain Empowerment, Supply Chain Innovation, and Supply Chain Resilience on Supply Chain Velocity in an FMCG company in Indonesia, with COVID-19 lockdown policies examined as a moderating factor. The research adopts a hybrid methodology combining Structural Equation Modeling–Partial Least Squares (SEM-PLS) and the Analytic Hierarchy Process (AHP). Data were collected from 50 employees and managers involved in supply chain operations at PT XYZ Indonesia. The SEM-PLS results indicate that Supply Chain Innovation is the most influential factor affecting Supply Chain Velocity, exhibiting the strongest positive relationship among the variables studied ($\beta = 0.357$, $t = 1.681$, $p = 0.046$). Supply Chain Empowerment and Supply Chain Resilience also show positive relationships with Supply Chain Velocity, although their effects are not statistically significant. The structural model explains 56.7% of the variance in Supply Chain Velocity. Furthermore, COVID-19 lockdown policies significantly moderate the relationship between internal supply chain capabilities and velocity ($\beta = 0.339$, $t = 1.844$, $p = 0.033$), acting as both a constraint and a catalyst for organizational adaptation. The AHP analysis supports the quantitative findings by ranking Supply Chain Innovation as the highest strategic priority (47.9%), followed by Supply Chain Empowerment (36.3%) and Supply Chain Resilience (15.9%). Despite the challenges imposed by mobility restrictions and operational disruptions, PT XYZ successfully maintained an average Case Fill Rate of approximately 99%, exceeding its target of 97.8%. The findings suggest that innovation-driven agility, supported by employee empowerment and resilient operational capabilities, is critical for sustaining supply chain performance during periods of severe disruption.

Keywords: Supply Chain Velocity, Supply Chain Innovation, Supply Chain Empowerment, Supply Chain Resilience, FMCG, COVID-19 Lockdown, SEM-PLS, AHP.

CHAPTER I:

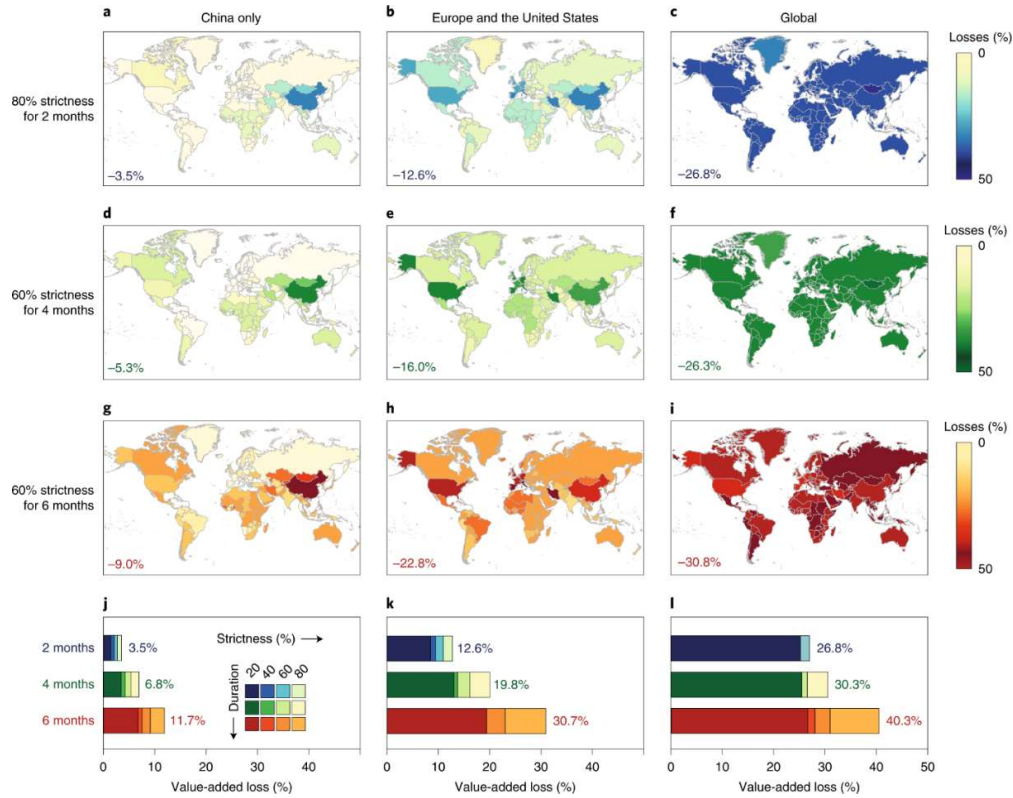
INTRODUCTION

Research Background

The COVID-19 pandemic that has hit the world since the end of 2019 has had a tremendous impact on various economic sectors, especially on the velocity of supply chain. In many cases, the pandemic has revealed previously unseen vulnerabilities, causing major disruptions in the distribution of goods, supply shortages, and difficulties in operational management. Many companies have been forced to face decreased production, increased logistics costs, and uncertainty in demand. Kanike, U. K. (2023). One of the affected is the Fast-Moving Consumer Goods (FMCG) industry, which is a product needed by all end users to meet their daily needs (Purnawidya, Y. C., & Raharjo, S. T. (2023). FMCG product grouping or categorization, for example, consists of personal care, household needs, soft drinks, bathroom cleaners (toiletries), detergents, batteries, stationery, cosmetics, pharmaceuticals, food packages and others. These product groups are the result of the production process carried out by FMCG industry producers.

This phenomenon poses a major challenge for supply chain management in ensuring operational continuity and rapid recovery. Therefore, understanding how supply chain velocity can be built and maintained during a crisis such as a pandemic is crucial. Research on supply chain velocity during the COVID-19 pandemic needs to be conducted to explore the factors that influence this speed, as well as its impact on business performance in FMCG companies. Andrean, R., & Marwan, M. (2025). explains that Supply Chain Management can basically be said to be a production process starting from obtaining raw materials from suppliers then the processing materials into finished goods, the process of storing goods before the distribution process, to the process of sending raw materials to retailers that can be reached by consumers.

Where the COVID-19 Pandemic has tested the supply chain of FMCG companies when activity restrictions (lockdown) are carried out, does it have an impact on the speed of supply chain activities (Guan, D.... & Gong, P,2020).



Source: Articles Global supply-chain effects of COVID-19 control measures, June 2020.

Figure 1.1 Economic impact (value added loss) of COVID19 under lock down scenario

a–i, Maps of the results from 9 scenarios out of the first three sets of 36 modelled scenarios, with different combinations of spatial spread (China only (**a,d,g**), Europe and the United States (**b,e,h**), and global (**c,f,i**)), lockdown duration and strictness (80%–2 month (**a–c**), 60%–4 month (**d–f**) and 60%–6 month (**g–i**);

see Methods; Table 1). Strictness represents the level of reductions in transportation capacity and labor availability relative to pre-pandemic levels. The percentages at the bottom left of each map indicate the global value-added losses for each scenario; shading denotes the regional distributions of these losses. **j–l**, A summary of all 36 scenarios, showing the sensitivity of global value-added losses to duration (different stacks) and strictness (shading of stacked bars) for the China only (**j**), Europe and the United States (**k**), and the global scenarios (**l**).

PT XYZ was established in 2003 after acquiring PT Bayer Indonesia's consumer-goods division. The company operates two manufacturing plants—in Jakarta and Surabaya—with approximately 750 employees. The Jakarta Plant, located in the Jakarta Industrial Estate Pulo Gadung, serves as both a manufacturing and distribution hub for finished goods under the global Home Care and Bleach business units. The Jakarta facility employs eight key technologies, one manual packaging line, and ten semi-automated production lines dedicated to core FMCG products such as disinfectants, surface cleaners, and insecticides. These products are distributed nationally through integrated logistics partners, forming a continuous supply-chain cycle from raw-material procurement to end-consumer delivery. The company's long-standing supply-chain structure and local manufacturing base made it an ideal case for examining how empowerment, innovation, and resilience contributed to sustaining operational velocity during the COVID-19 pandemic.

This study adopts the philosophy of professional business research. Rather than aiming solely to extend theory, the study integrates experiential learning with evidence-based analysis to develop practical and actionable recommendations for improving supply chain performance in PT XYZ.

1.1.1 Research Problem and Gap

While several studies have discussed supply chain speed in the context of natural disasters, climate change, or economic crises, few studies have specifically examined supply chain speed during a global pandemic such as COVID-19. Most of the existing studies have focused on more general risk mitigation or crisis management strategies without delving deeper into the specific factors that influence supply chain speed in the context of a global health crisis. There is limited empirical evidence on how internal factors (empowerment, innovation, resilience) interact with external disruptions (lockdown policies) to influence supply chain velocity in Indonesia's FMCG sector.

1.1.2 Novelty

This study offers a significant contribution by delving deeper into the factors that support supply chain speed specifically in the context of the COVID-19 pandemic, which is a unique and unprecedented crisis on a global scale. This study will examine supply chain speed from various dimensions, ranging from the adaptability and flexibility of the supply chain system, collaboration with business partners, to the implementation of technology in dealing with disruptions caused by the pandemic. In addition, this study will also assess the role of government lockdown policies in supporting or hindering supply chain speed during the pandemic. This study will identify the best strategies that companies can use to maintain the smoothness of their supply chains in the future, even in the face of similar crises.

Research Questions

Based on the phenomenon explained, the research gap, and the novelty offered, this study will focus on the following questions:

1. Does supply chain innovation in FMCG companies PT XYZ affect supply chain velocity post the COVID-19 pandemic?
2. Does supply chain empowerment in FMCG companies PT XYZ affect overall supply chain velocity post the COVID-19 pandemic?
3. Does supply chain resilience in FMCG companies PT XYZ affect supply chain velocity post the COVID-19 pandemic?
4. Do lockdown policies from Government in Indonesia play moderating rules in relationship between Supply chain innovation, supply chain empowerment and supply chain resilience effect on supply chain velocity with parameter Case Fill Rate post the COVID-19 pandemic?

Research Objective

To investigate the relationship between supply chain empowerment factors and supply chain velocity post the COVID-19 pandemic in FMCG companies in Indonesia.

To investigate how supply chain innovation affects the ability of businesses to survive in volatile markets post the COVID-19 pandemic in FMCG companies in Indonesia.

To investigate whether supply chain resilience can have an impact on supply chain velocity post the COVID-19 pandemic in FMCG companies in Indonesia.

Investigating lockdown policy affects moderating in relationship between supply chain innovation, supply chain empowerment and supply chain resilience effect on supply chain velocity post the COVID-19 pandemic.

Research Benefit

1.4.1 For Academicians

This research is expected to contribute to the development of theories on supply chain empowerment, Innovation in the supply chain, and resilience in the supply chain. In addition, it enriches the existing literature related to the relationship between these three factors.

1.4.2 For Practitioners

Provides recommendations for FMCG companies in Indonesia to be more adaptive in facing market uncertainty and introduces the importance of supply chain speed in facing the lockdown policy during and post the COVID-19 pandemic using Crisis Management Model.

1.4.3 For Policy makers

Moreover, as Indonesia is one of a large population in the world, pandemic affect is triggering the global macro-economic situation. During the COVID-19 period, the government's role is needed in controlling ongoing economic activities, therefore, this research is expected to help the government in implementing strict policies but still safe in carrying out economic activities.

1.5 Research Limitation

The research is only focused on supply chain staff, supervisor and Managers in FMCG Company PT XYZ in Indonesia and cannot be used to refer to the outside

of this demographic. Lastly, the factors covered in this research are only supply chain empowerment, supply chain innovation and supply chain resilience with supply chain velocity using Analytical Hierarchy Process. This research is not to be utilized if you want to identify the relationship between supply chain velocity to any factor outside of the 3 factors mentioned above. In addition to this, the method of research is derived from self-reporting primary data collection. Respondents can be conscious when filling out questionnaires and provide inaccurate information, or information that they deem acceptable by society.

1.6 Research Outline

This study comprises 5 main chapters.

The 1st chapter contains the presentation of the research problem. It includes the background, problem identification, limitations, objectives, advantages, schedule, and systematics of the research.

The 2nd chapter contains theories about supply chain management, the variables that influence it, its performance, and the theoretical framework and hypotheses.

The 3rd Chapters covers the methodology used to gain data, provides discussion on the design of research methodology used and the sampling methods. The third chapter also covers the techniques used to gain data and provide breakdowns on the indicator of each variable. The data analysis techniques employed in this research are elaborated upon, encompassing descriptive analysis, outer model PLS (Partial Least Squares) to assess validity and reliability and Inner Model PLS involving assessment of Goodness of fitness and Hypothesis thinking and AHP (Analytical Hierarchy Process) with interviews from Expertise.

The 4th Chapters that explain the proof of the hypothesis, answer to questions in the problem formulation, and explanations of the results of testing and data analysis.

The 5th Chapter summarizes the results, constraints, and recommendations for further research. About how to proceed when checking the effects of multiple variables on Supply chain. This insight aims to benefit both academicians and practitioners interested in studying Supply chain.

The steps involved in research are presented in flowchart below, providing a clear overview of progression from problem identification to conclusion and recommendation as Figure 1.2.

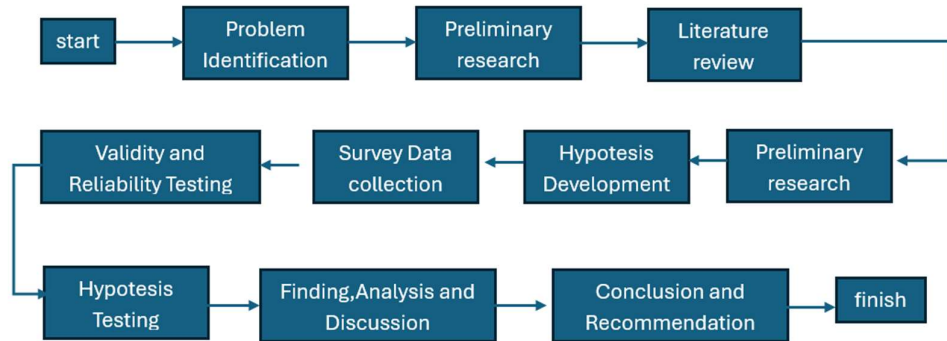


Figure 1.2. Flowchart Research Process

CHAPTER II:

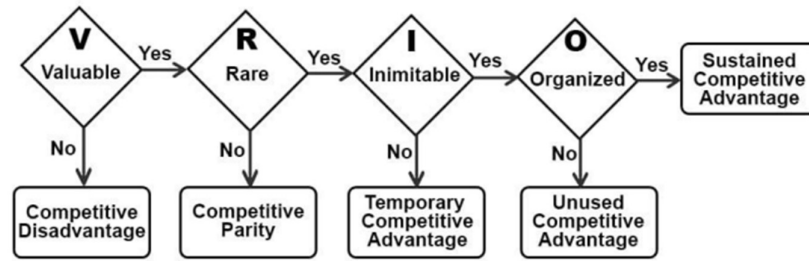
LITERATURE REVIEW

2.1 Value chain theory

Porter's value chain model breaks down a company's activities into a series of processes that create value for customers. In a supply chain context, this includes activities like inbound logistics (receiving materials), operations (manufacturing), outbound logistics (distribution), marketing and sales, and service (Porter, 1985). Applied to supply chains emphasizes how businesses can improve their competitive advantage by analyzing and optimizing their value activities. It categorizes activities into primary and support activities, highlighting the importance it emphasizes ratio and flexibility within the supply chain.

2.2 Resource-based view

Furthermore, Barney and Harterly (2019) extend these insights, presenting resources as tangible and intangible assets controlled by firms for strategy formulation and implementation. Tangible resources are visible and measurable, encompassing possessions such as property, plant, equipment, and cash. On the other hand, intangible resources are abstract and immeasurable, including elements like employees' knowledge and skills, the firm's reputation, and its organizational culture. The RBV theory operates on two key assumptions: resources vary across organizations, and resources not currently held by an organization may need to be quickly developed or acquired by other entities. To deepen the understanding of competitive advantage, Barney (1991) introduced the VRIO framework, encompassing Value (V), Rareness (R), Imitability (I), and Organization (O). This framework is instrumental in comprehending competitive advantages and distinguishing temporary advantages from sustainable ones. Given the value, rarity, difficulty of imitation, and non-sustainability of talents, they assume significant importance for organizations, emerging as a source of competitive advantage, especially when no strategically equivalent resources are available.



Sources: Usmani (2022)

Figure 2.1 VRIO Framework

2.3 Just-in-time

This theory emphasizes the reduction of the process inventory and associated carrying costs. Svensson (2001) and Bayo-Moriones et al. (2008). According to this theory, all products should be produced and delivered at the right time, right place, right quality and right quantity.

2.4 Total quality management (TQM)

According to this theory not only the quality of products and processes but also the quality of all activities in the supply chain should be improved continuously to generate a competitive advantage (Curkovic and Pagell ,1999).

2.5 Available-to-promise (ATP)

This theory highlights that customer order enquiries should be responded based on resource availability in the organization. So, all customer requirements will be provided in due time (Ball et al,2004).

2.6 Stakeholder theory

This theory suggests that stakeholders often increase pressures on companies to decrease negative impacts of externalities and increase positives ones. It means that internal or external groups can influence organizational activities (Freeman,1984).

2.7 PESTLE Analysis

The PESTLE analysis framework proves essential for organizations across various industries, including PT XYZ. This study aims to understand dynamics shaping business performance. Ultimately, leveraging the insights from PESTLE analysis becomes instrumental in fostering sustainable development and ensuring long-term success in the ever evolving and intricate business landscape.

There is unequal information among supply chain partners. Managing organization under this asymmetrical information faces many problems. Trustworthy relationships among partners can recover this difficulty (Simpson et al ,2007).

2.8 Quick response manufacturing (QRM)

Focus on reducing internal and external lead times across organization. It is not limited to production process rather the lead time of all activities in the organization (office process, design, inventory, distribution, etc.) should be reduced (Suri,2011).

2.9 Defining Variables

Before delving into the analysis, it is essential to define the key variables in the research. In this subchapter, definitions are provided for each variable, to provide readers with a clear understanding of what is being talked about and to provide better context on the independent and dependent variables of this research.

2.9.1 Supply chain empowerment

The independent variable, Supply chain empowerment, by enhancing transparency, enabling collaborative decision-making, and improving agility, positively impacts supply chain velocity. This means that empowering employees and partners across the supply chain can lead to faster and more efficient movement of goods and information (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W. (2016)

2.9.2 Supply Chain Innovation

The independent variable, Supply chain innovations significantly impact supply chain velocity by streamlining processes, improving efficiency, and enhancing overall performance. Innovations like automation, technology, and data analysis can accelerate the flow of goods, reduce bottlenecks, and improve the speed of order fulfillment (Kwak, D. W., Seo, Y. J., & Mason, R,2018)

2.9.3 Supply Chain Resilience

The independent variable, Resilient supply chains are more flexible and agile, meaning they can quickly adapt to changing market conditions and customer demands. This allows for quicker responses to disruptions and a faster turnaround time (Juan, S. J., Li, E. Y., & Hung, W. H ,2022).

2.9.4 Supply Chain Velocity

For our final dependent variable, Supply chain velocity refers to the speed and efficiency at which goods move through a supply chain, from initial processing to final delivery to the customer. It's a measure of how quickly a company can react to demand, reduce costs, and enhance customer satisfaction. A high-velocity supply chain is characterized by streamlined processes, reduced lead times, and increased responsiveness (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W,2016).

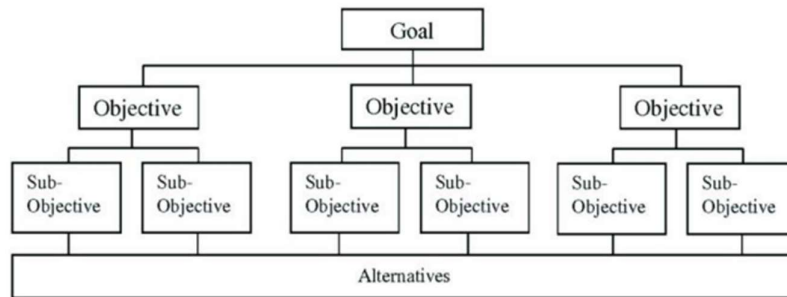
2.9.5 Lock down Covid 19 Policy

There are three lockdown scenarios simulated in our modified SEIRD with the starting date is 26 April 2020 when the immediate lockdown was enacted-and a-week-gaps, respectively. Despite their conflicting restrictions and consequences, they might offer when enforced as a national strategy, are deemed to be suggestive for a prompt conquer to the Coronavirus Disease-19 (COVID-19) outbreak. (Nurlaila, I., Hidayat, A. A., & Pardamean, B,2021.

2.9.6 Analytical Hierarchy Process

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making method that helps individuals or organizations evaluate and prioritize alternatives

based on a set of criteria. Professor Thomas L. Saaty developed the AHP in the 1970s to support researchers who were analyzing complex decision problems (Golden, Wasil, & Harker, 1989). The AHP is based on a pairwise comparison of the elements in each level of the hierarchy (Khan and Ali, 2020).



Source: The AHP (Khan and Ali, 2020)

Figure 2.2 AHP Framework

In AHP, decision-makers start by defining the overall goal or objective they want to achieve. They then identify the criteria that are relevant to the decision and arrange them in a hierarchical structure, with the goal at the top and the criteria at the lower levels. The criteria can be further divided into sub-criteria, forming a tree-like structure. Once the hierarchy is established, decision-makers assess the relative importance or weights of the criteria through pairwise comparisons. Pairwise comparisons involve comparing each criterion to every other criterion and assigning a numerical value indicating their relative importance.

These comparisons are typically done using a scale, such as Saaty's 1-9 scale, which represents the degree of importance or preference. After the pairwise comparisons, the AHP calculates the weights of the criteria using mathematical algorithms. These weights reflect the relative importance of each criterion in achieving the overall goal. The consistency of the judgments is also checked to ensure the reliability of the decision-making process. Once the criteria are determined, decision-makers proceed to evaluate the alternatives against each criterion. Again, pairwise comparisons are used to assess the performance or effectiveness of each alternative in relation to the criteria. The judgments are converted into numerical values using the same scale as before. The AHP then

synthesizes the evaluations by combining the criteria weights and alternative assessments.

This synthesis process generates a priority ranking of the alternatives based on their overall performance and contribution to the goal. AHP is widely used in various fields, including business, engineering, healthcare, and environmental management, to make complex decisions involving multiple criteria. It provides a structured and systematic approach to decision-making, allowing decision-makers to consider both qualitative and quantitative factors, prioritize alternatives, and justify their choices based on a rigorous methodology. This study will utilize the outcome as the AHP Tools to help formulate improvement in competitiveness and performance of PT XYZ and create specific strategies that can be identified and recommended for achieving these objectives.

Scale of relative importance:

1	Equal importance
2	Moderate importance
5	Strong Importance
7	Very Strong Importance
9	Extreme Importance
2,4,6,8	Intermediate values
1/3,1/5,1/7,1/9	Values for Inverse Comparison

With Consistency ratio < 0.10

2.10 Supply Chain Performance Indicators (Case Fill rate at PT XYZ)

A central performance metric in this study is the Case Fill Rate (CFR), defined as the percentage of customer orders filled completely and on time. CFR reflects both supply chain velocity and customer services efficiency-two critical indicators of responsiveness in the FMCG industry.

During the pandemic period (Fiscal Year 20 until Fiscal Year 21), PT XYZ consistently exceeded its CFR target of 97.8 percent, achieving an actual rate of 99 percent on average.

Cluster/Country	FY19	FY20	FY21	FY22	FY23	FY24	FY25
TOTAL APAC	97.4%	97.7%	95.7%	95.0%	97.2%	97.2%	98.4%
<i>China</i>	98.2%	98.0%	96.5%	94.7%	95.9%	97.3%	98.5%
<i>Hong Kong</i>	99.7%	99.9%	99.6%	96.1%	99.7%	98.5%	98.7%
<i>Taiwan</i>	96.7%	97.5%	97.2%	88.8%	98.1%	95.1%	97.3%
GREATER CHINA	98.2%	98.0%	96.7%	94.3%	96.2%	97.1%	98.4%
<i>Japan</i>	98.6%	98.2%	97.1%	99.9%	99.6%	98.6%	99.9%
<i>South Korea</i>	99.2%	99.5%	100.0%	100.0%	100.0%	100.0%	100.0%
NORTH ASIA	98.7%	98.5%	97.7%	99.9%	99.6%	98.8%	99.9%
<i>Indonesia</i>	96.0%	98.9%	99.4%	98.9%	99.0%	98.7%	98.7%
<i>Thailand</i>	96.9%	97.1%	96.5%	97.2%	98.4%	98.0%	98.3%
<i>Philippines</i>	97.2%	95.7%	92.4%	89.1%	92.4%	94.7%	95.9%
<i>Malaysia</i>	95.4%	94.6%	94.3%	88.5%	95.0%	95.0%	96.6%
<i>CLM</i>	100.0%	100.0%	100.0%	100.0%	99.6%	99.6%	99.7%
<i>Singapore</i>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<i>Vietnam</i>	98.7%	97.4%	98.4%	96.9%	99.1%	99.3%	98.1%
ASEAN	96.7%	97.4%	96.9%	95.5%	97.3%	97.6%	98.0%

Table 2.1 Case Fill Rate on FMCG Companies PT XYZ (FY19 – FY25).

Source: APAC Report PT XYZ July 2025

This outcome demonstrates that the company maintained effective order-fulfilment performance despite constraints in transportation, labor mobility, and raw-material sourcing imposed by lockdown measures. Such sustained results highlight the relevance of investigating which organizational factors—empowerment, innovation, and resilience—most strongly supported this performance under crisis conditions.

2.11 Previous research

In this next chapter a compilation of literature reviews regarding the factor Supply chain empowerment, Supply Chain Innovation, Supply Chain Resilience and

Supply chain velocity have reinforced the reasoning behind the hypothesis in chapter 2.12

Author (years)	Objective	Methodology	Findings	Gap
Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W. (2016).	The research aimed at examining the relationships between supply chain visibility, supply chain velocity, supply chain alignment and supply chain relief agility using a case of humanitarian agencies in responding to Bududa Land Slide disasters in Eastern Uganda	The methodology involved a survey research approach, with a cross-sectional design collecting data from humanitarian agencies in Bududa, Uganda, using questionnaires	The study found that humanitarian supply chains often struggled to respond quickly and effectively to sudden disasters, despite the presence of multiple agencies involved	While supply chain characteristics like visibility, velocity, and alignment are important for commercial supply chains, their specific impact on the ability of humanitarian organizations to respond to disasters quickly (relief agility) was not well understood
Kwak, D. W., Seo, Y. J., &	to investigate the relationship	employed a quantitative research	supply chain innovation has a	lack of comprehensive understanding

Mason, R. (2018)	between supply chain innovation, risk management capabilities, and competitive advantage in global supply chains	approach, using statistical methods to analyze data and explore the relationships between variables	positive impact on supply chain risk management capabilities, which in turn enhances competitive advantage	and a more nuanced approach to the relationship between supply chain innovation, risk management capabilities, and competitive advantage
Juan, S. J., Li, E. Y., & Hung, W. H. (2022)	The research aims to understand how resilience in the supply chain affects its overall operational effectiveness when faced with unexpected events or challenges	a quantitative, correlational approach using a web survey to collect data from 113 manufacturing companies in Taiwan	The study shows that these components of supply chain resilience positively impact supply chain performance, especially during disruptions	Previous research often focused on SCR components in isolation, neglecting their interconnected nature. The study aims to integrate these components into a single, unified framework
Nurlaila, I., Hidayat, A.	Simulated three	Secondary date. The data	The period duration	The model would not be

A., & Pardamean, B. (2021, April)	different scenarios of lockdown and evaluated what would be plausible consequences for each option	of COVID-19 pandemic in Indonesia used in this work is publicly available from the official website of Indonesia COVID-19 task force	lockdown must be adjusted by the government by considering a lot of multi aspect constraints	able to offer an absolute number; it is worth deeper thought especially in the perspectives of socioeconomic consequences which might be unaffordable for a nation given the damages COVID-19 has caused by far
-----------------------------------	--	--	--	---

Table 2.2 Previous Study List

The table above has also already provided reference to a few studies that have provided some context regarding the variables that are used. The findings have also helped support this study's hypotheses regarding how Supply chain velocity is affected by Supply chain empowerment, supply chain innovation and supply chain resilience. For starters, one journal written by Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W titled "Supply chain visibility, supply chain velocity, supply chain alignment and humanitarian supply chain relief agility" has findings that Supply chain empowerment level positively affect Supply chain velocity. Humanitarian supply chains often struggled to respond quickly and effectively to sudden disasters, despite the presence of multiple agencies involved (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W,2016).

These references support the fact that supply chain innovation has a positive impact on supply chain risk management capabilities, which in turn enhances competitive advantage. (Kwak, D. W., Seo, Y. J., & Mason, R,2018). However, there is also evidence that components of supply chain resilience positively impact supply chain performance, especially during disruptions (Juan, S. J., Li, E. Y., & Hung, W. H,2022).

Of all literature reviews compiled, many studies support that Supply chain resilience, Supply chain innovation and supply chain empowerment are positively correlated to Supply chain velocity. But in others hand Lockdowns, are negatively mediator effect for Supply Chain Velocity, were despite their conflicting restrictions and consequences they might offer when enforced as a national strategy, are deemed to be suggestive for a prompt conquer to the Coronavirus Disease-19 (COVID-19) outbreak. (Nurlaila, I., Hidayat, A. A., & Pardamean, B,2021.)

2.12 Hypothesis Development

Based on research objective, this research has 5 hypotheses formed regarding the relationship of said variables and based on the Analytical Hierarchy Process (AHP).

Supply chain Empowerment (SCE) and supply chain velocity (SCV)

Humanitarian supply chains often struggled to respond quickly and effectively to sudden disasters, despite the presence of multiple agencies involved (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W,2016).

H1: Supply chain Empowerment (SCE) positively affects supply chain velocity (SCV)

Supply chain Innovation (SCI) and supply chain velocity (SCV)

Study has shown positive correlation between supply chain innovation and supply chain velocity. Supply chain innovation has a positive impact on Supply chain risk management capabilities, which in turn enhances competitive advantage. (Kwak, D. W., Seo, Y. J., & Mason, R,2018).

H2: Supply chain Innovation (SCI) positively affect supply chain velocity (SCV)

Supply chain resilience (SCR) and supply chain velocity (SCV)

Components of supply chain resilience positively impact supply chain performance, especially during disruptions (Juan, S. J., Li, E. Y., & Hung, W. H,2022).

H3: Supply chain resilience (SCR) positively affects supply chain velocity (SCV)

Covid lock down (CLD) moderating supply chain empowerment (SCE), supply chain innovation (SCI), supply chain resilience (SCR) and supply chain velocity (SCV)

Natural disasters, particularly the 2011 Tohoku earthquake and tsunami (JET) and the 2011 Thai floods (TF), have significant negative impacts on the corporate performance of end assemblers and their suppliers (Gunessee S, Subramanian N, Ning K,2018).

H4: Covid lock down (CLD) negatively moderating supply chain empowerment (SCE), supply chain innovation (SCI), supply chain resilience (SCR) affects supply chain velocity (SCV).

From expert judgment using the Analytical Hierarchy Process (AHP)

H5: Based on the Analytical Hierarchy Process (AHP), which factor should be prioritized to improve Supply Chain Velocity at PT XYZ Indonesia?

2.13 Research Framework

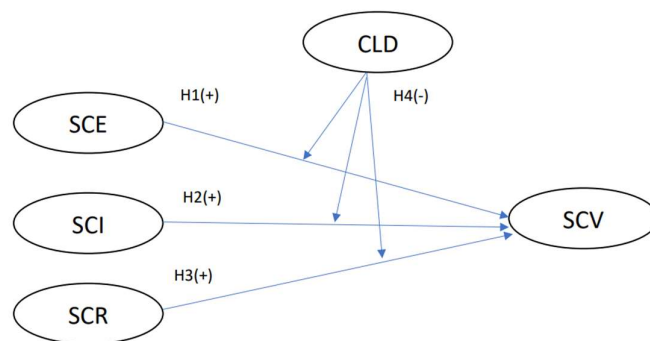


Figure 2.3 Research framework

H1(+): Supply chain Empowerment (SCE) positively affects supply chain velocity (SCV).

H2(+): Supply chain Innovation (SCI) positively affects supply chain velocity (SCV).

H3(+): Supply chain resilience (SCR) positively affects supply chain velocity (SCV).

H4 (-): Covid lock down (CLD) negatively moderating supply chain empowerment (SCE), supply chain innovation (SCI), supply chain resilience (SCR) affects supply chain velocity (SCV).

Table 2.3 Research framework (AHP)

Criteria	Expert 1	Expert 2	Final Weight
SCE			H5 (%)
SCI			H5 (%)
SCR			H5 (%)

H5 (%) From 3 factors, 1 factor should be prioritized to improve Supply Chain Velocity at PT XYZ Indonesia.

CHAPTER 3:

RESEARCH METHODS

3.1 Research Design

Research design refers to the structure or plan that guides the collection and analysis of data in a scientific study. It outlines the strategies and methods used to address research questions or hypotheses. This study aims to measure the strength of association for five variables: Supply chain Empowerment, Supply chain Innovation, Supply chain resilience, Lockdown COVID-19 and Supply chain velocity. Particularly for Managerial level on supply chain FMCG Industries.

In the context of this study, this research is conducted quantitatively. Quantitative research is a form of research that involves numerical data collection, and interpreting numerical values that are derived from the research method used. The research method mentioned involves using statistical techniques to gain a deeper comprehension of the correlation between these variables. To put more emphasis on quantitative research, it can be defined as a method of empirical investigation into social phenomena or human problems. Quantitative methods are research methods that involve testing theories that are in a similar context to the variables studied and are analyzed with statistics to determine if the theory is proved or disproved by quantitative output.

This study's research method falls into correlational research. Correlational research is a research approach that examines the degree of association, whether it is positive or negative, between two or more variables (Wilson & Joye, 2017).

In this case, the degree of association that we want to delve into is that of Supply chain Empowerment, Supply chain Innovation, Supply chain resilience, Lockdown covid and Supply chain velocity. Coming back to this study, the correlational research design method is a good method of research design to measure association within investment decisions. According to Smith and Jones (2019), correlational research is valuable for measuring the relationship between investment decisions

and other variables. Further reinforced by Brown and Miller research suggests that correlational studies offer a valuable approach for examining the relationship between investment decisions and other variables. (Brown & Miller 2020). Lastly, the data collection design used is survey design. Survey design refers to the methodology and structure used to collect data from a sample population to gather information on various variables of interest (Groves et al., 2009).

3.2 Population and Sampling

This study focuses on Managerial level of supply chain FMCG Companies PT XYZ in Indonesia. Kumar (2000) provides a definition of population as the complete set of entities possessing specific predefined characteristics relevant to a research problem. Conversely, according to Aaker et al. (2004), a sample involves surveying only a portion of the entire population to draw conclusions about that population. Moreover, Hair et al. (2014) explain the determination of a research sample using the 10 times rule for SEM-PLS. This study utilized convenience sampling as its preferred sampling technique. Convenience sampling entails gathering samples from individuals or sources that are readily available in proximity or through online platforms (Thomas et al., 2017). However, the limitation of this method is that the sample is only representative of a certain number of Managerial levels of supply chain FMCG Industries in Indonesia. Some examples are to be Managerial level of supply chain not FMCG Industries.

This study has a survey and 15 questions, applying the 10 times rule comes to a value of 50 respondents. The population of this study consists of who are enrolled in Managerial level of supply chain FMCG Industries in Indonesia. Understanding these factors is crucial for Managerial level of supply chain FMCG Industries in Indonesia, as it can influence their strategy and decision-making processes, potentially interacting with variables such as Supply chain Empowerment, Supply chain Innovation, Supply chain resilience, Lockdown covid and Supply chain velocity. This can be said to be inclusive or understood terms most likely for Managerial level of supply chain FMCG Industries in Indonesia who are enrolled in Supply Chain Management.

3.3 Data Collection Method

Data can be classified into two main categories. Primary and secondary sources. Primary data is data that is gathered directly based on firsthand sources and newly retrieved. This study was collected through an online questionnaire with google form by email or WhatsApp group internal and distributed to individuals that are members of the Supply Chain PT XYZ. The main reason that online distribution method is chosen is because of the convenience, high response rate, and wide-reaching sample scope. To ensure the accuracy of the sample, the survey includes a qualifying question about the respondent's status of enrollment to verify the study's validity. Due to the targeted respondents being Supply chain members on PT XYZ, the surveys are spread through google form.

The in-depth interview method. The interview participants were purposely sampled and included key stakeholders such as Plant Managers, Managers, and subject matter experts. These participants were selected based on their expertise and relevance to the research topic

3.4 Variables and Definitions of Operational Variables

In scientific research, variables play important roles in shaping the research effects. Variables are described as characteristics or conditions which could trade or range within a test. Among these variables, the impartial variable sticks out as the only manipulated or managed by way of the researcher to look at its impact at the base variable The structured variable, however, is the outcome or reaction that is measured based on adjustments within the impartial variable (APA, 2020).

This study consists of 5 types of variables, with 3 of which being independent variables: Supply Chain Empowerment, Supply Chain Innovation, Supply Chain Resilience and 1 of which being a dependent variable, Supply Chain Velocity and lastly Lock Down COVID-19 as Variable Moderating.

The independent variable, Supply Chain Empowerment, Supply Chain Innovation, Supply Chain Resilience, refers to an individual's view of their primary source of supply chain activity.

Table 3.1 Screening Question

Screening Question		
No	Question	Indicator
1	Are you a Managerial level of supply chain FMCG Industries PT XYZ in Indonesia?	Yes/No
2	Is your Major related to business or enrolled job on supply chain?	Yes/No

Table 3.2 Profile Respondent

Profile Respondent		
No	Question	
1	Do you work in the FMCG Industry?	Yes No
2	What is your Gender?	Male Female
3	How long you have been working in Supply chain role	Less than 1 year More than 1 year
4	What Industri of FMCG do you work now?	Insecticide Repellent Bleach Polish
5	What level of work do you work now at the Managerial level of supply chain?	Staff Supervisor Manager Director

Table 3.3 Defining Operational Variable Supply Chain Empowerment

Variable	Definition	Code	Item	Scale
Supply Chain Empowerment (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W,2016).	Empowering employees and partners across the supply chain can lead to faster and more efficient movement of goods and information	SCE 1	I was encouraged to make operational decisions without waiting for higher-level approval	5-Likert Scale
		SCE 2	Information about supply disruptions was shared openly across departments	5-Likert Scale
		SCE 3	My supervisor trusted me to take immediate corrective actions when facing logistics problems	5-Likert Scale

Table 3.4 Defining Operational Variable Supply Chain Innovation

Variable	Definition	Code	Item	Scale
Supply chain Innovation (Kwak, D. W., Seo, Y. J., & Mason, R, 2018)	streamlining processes, improving efficiency, and enhancing overall performance.	SCI 1	My company implemented digital tracking or data analytics tools to improve real-time decisions.	5-Likert Scale
		SCI 2	We redesigned workflows or routes to adapt to new delivery restrictions	5-Likert Scale
		SCI 3	Cross-functional collaboration (e.g., marketing–logistics) increased during the disruption to find creative solutions	5-Likert Scale

Table 3.5 Defining Operational Variable Supply Chain Resilience

Variable	Definition	Code	Item	Scale
Supply Chain Resilience (Juan, S. J., Li, E. Y., & Hung, W. H ,2022). H ,2022). R., Tumuhairwe, R., & Tusiime, W,2016).	Resilient supply chains are more flexible and agile, meaning they can quickly adapt to changing market conditions and customer demands. This allows for quicker responses to disruptions and a faster turnaround time can lead to faster and more efficient movement of goods and information	SCR 1	We had alternative suppliers or backup plans for critical materials	5-Likert Scale
		SCR 2	Our teams could re-prioritize production or delivery schedules quickly when disruptions occurred	5-Likert Scale
		SCR 3	We coordinated closely with logistics partners to recover operations after unexpected shutdowns	5-Likert Scale

Table 3.6 Defining Operational Variable Supply Chain Velocity

Variable	Definition	Code	Item	Scale
Supply Chain Velocity (Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W,2016).	a measure of how quickly a company can react to demand, reduce costs, and enhance customer satisfaction. A high-velocity supply chain is characterized by streamlined processes, reduced lead times, and increased responsiveness	SCV 1	Our order-to-delivery time decreased compared to before the disruptions	5-Likert Scale
		SCV 2	Customer orders were fulfilled within promised delivery windows	5-Likert Scale
		SCV 3	Information flow from sales to production became faster during the disruptions	5-Likert Scale

Table 3.7 Defining Operational Variable Lock Down Covid 19

Variable	Definition	Code	Item	Scale
Lock Down Covid 19 Nurlaila, I., Hidayat, A.	Despite their conflicting restrictions and consequences,	CLD1	Government lockdown policies reduce transportation	

A., & Pardamean, B. (2021, April)	they might offer when enforced as a national strategy, are deemed to be suggestive for a prompt conquer to the Coronavirus Disease-19 (COVID-19) outbreak		capacity and driver availability.	5-Likert Scale
		CLD 2	During COVID- 19 lockdown I still can work from home.	5-Likert Scale
		CLD 3	Frequent changes in lockdown regulations created uncertainty in planning supply operations	5-Likert Scale

3.5 Data Analysis Techniques

This research will be analyzed using SEM-PLS, as was previously stated, to determine whether the hypothesized theoretical model that has been shown above is consistent with the secondary data that has been collected from journal articles (theory).

3.5.1 A Descriptive Analysis of the Situation

The process of analyzing and testing each variable that is available is known as descriptive analysis. To accomplish this goal, the researcher makes use of structured statistical methods (SEM-PLS) and examines each variable's indicator.

3.5.2 Partial Least Squares Analysis Using Structural Equation Modeling (SEM) (PLS)

SEM is a method of multivariate analysis that combines factor analysis and regression analysis to investigate the relationships between variables in a research model that explores the relationship between indicators and latent variables or among latent variables, and that investigates the relationships between indicators and latent variables. PLS is a new method that shifts from a covariance-based SEM approach to a variant-based SEM approach. In general, variant-based structural equation models (SEMs) test causality, whereas PLS is a more predictive model (Santoso, 2015).

3.5.2.1 Outer Model Modeling Structural Equation Modeling

3.5.2.1.1 Convergent Validity Partial Least Square

The validity of convergence demonstrates how accurately two different measures reflect a particular configuration. Ambiguity is created because of incomplete convergent validity alternatives, which impedes the development of helpful interpretations of findings both within and between studies. There are two different ways to measure the validity of the convergence of a model: loading factors and AVE (Average Variance Extracted). (Hair J. F., 2006). A loading factor is a term used to describe the connection that exists between a variable and a latent component. A loading factor of 0.5 or higher is considered the bare minimum, while 0.7 or higher is the ideal number. AVE analysis is utilized to determine the extent to which each measured indicator is linked with its corresponding 34 latent construct, as well as the proportion of variation that can be attributed to the construct as opposed to measurement error. (et al. Hair, 2006).

3.5.2.1.2 Discriminant Validity

When determining the discriminant validity of a test, cross loading is an important metric to use. It is expected that each indicator will have a greater loading for the construction that is being evaluated compared to the loadings they have for the other constructors. The applicability of the model needs to be re-examined if

there is a sign that it has a stronger association with other hidden variables than it does with its own. (Henseler, 2014).

3.5.2.1.3 Reliability

According to Henseler et al., if multiple researchers working on the same research are leading to the same information, or if the same researcher with different times context is leading to the same information, or if a group of researchers who have shared data does not show significant differences, then it is likely that the information is accurate. After that, one can reasonably consider the data to be trustworthy. The Cronbach's alpha-factor and composite reliability must be greater than 0.7 for the research to be considered reliable. Reliability tests are used in research to determine how closely the measurements correspond to one another in terms of their symptoms. Composite reliability is a measurement used in structural equation modeling that determines how well underlying constructs serve variables (Henseler, 2014).

3.5.2.2 Structural Equation Modeling and the Partial Least Squares Method for the Inner Model

3.5.2.2.1 The Determination of Coefficients

Conduct an analysis using the coefficient of determination (R^2) to evaluate the degree to which the independent variable can account for the variation in the value of the dependent variable. The purpose of this test is to determine how accurately the size of the independent variable reflects the interpretation of the dependent variable. Because the coefficient of determination, or R^2 , has little to no value between 0 and 1, it is difficult for the definition of the independent variable to comprehend the dependent variable. If the value of R^2 for the independent variable is high or very close to 1, then it can explain almost all of the variation in the variable that is being controlled by it. The values of R^2 can range anywhere from 0 to 1. If R^2 is close to zero, this indicates that the dependent variable is constrained, whereas if R^2 is close to one, this indicates that the independent variable is robust. The R^2 values of 0.67, 0.33, and 0.19 for each PLS path model, respectively, indicate significance, moderate strength, and low level of significance.

Even if the path model structure describes an endogenous latent variable in terms of one or two extrinsic latent variables, an acceptable intermediate R2 value can still be obtained (Ghozali, 2014).

3.5.2.2.2 The Relevance of Predictions (Q2)

Calculating the Q2 statistics is one way that the quality of the PLS path model can be evaluated. The reasonable model ought to have the option to anticipate the endogenous inactive developments, as suggested by the Q2 rule. This is something that should be possible. To be regarded as an endogenous latent construct, the Q2 values that were measured by SEM need to be either greater than zero or equal to zero. In the meantime, if the Q2 value is negative, the predictive relevance of the model will be reduced or eliminated (Henseler, 2014).

3.5.2.2.3 Examination of the Hypotheses

To obtain the t-statistics, which is an essential component of hypothesis testing, one must first carry out the t-test. To determine whether there was a statistically significant connection between the different variables that made up the research framework, the t-test for this particular study made use of the bootstrapping method. If the value of a variable's bootstrap is greater than or equal to 1.96, this indicates that the variable has a significant effect, whereas values that are lower than 1.96 indicate that the effect is not very significant. The value of the path coefficient is helpful in determining whether variables have positive or negative effects, and this can be done by looking at the direction of the effect. After that, the bootstrapping method is used to test the hypotheses by calculating t-statistics and p-values while maintaining a significant level of 5%. (t-statistics: 1.96). According to (Ghozali, 2014), the following 36 are the criteria for accepting or rejecting the hypothesis: the t-statistic must be greater than 1.96.

3.6 Analytical Hierarchy Process (AHP)

Interviews were used to compare the Analytical Hierarchy Process (AHP) among experts in the field. This method allowed for the collection of data and facilitated the comparison and analysis of expert's opinions and judgments. The questions were designed to gather specific information related to the AHP and

were administered to experts in the relevant field. The primary data collection process also involved field observations conducted at PT XYZ. These observations provided valuable first-hand insights into the company's operations and practices, further enhancing the understanding of its impact on stakeholders.

A. Velocity

What operational definition of "speed" or "velocity" was most critical for PT XYZ during the COVID-19 crisis?

How did the COVID-19 lockdown specifically affect your team's ability to maintain the Case Fill Rate (CFR) above 97.8% target?

B. Empowerment

Can you describe a specific decision made by staff or supervisors, without senior management approval, that rapidly resolved a pandemic-induced logistical blockage? How did the established information transparency systems support immediate collaborative decision-making during volatility?

C. Innovation

How did PT XYZ's innovation efforts, such as adopting new digital tools or BDA, streamline processes during periods of staff shortage? Please elaborate on a new logistical route or method implemented to circumvent government movement restrictions.

D. Resilience

What were the three most critical proactive mechanisms (e.g., dual sourcing, inventory buffers) PT XYZ employed to ensure supply chain flexibility? Describe the time frame and resources required for your supply chain to recover from an unexpected supplier shutdown during the crisis.

E. Lockdown Moderation

Please detail a specific Indonesian government policy (e.g., PSBB) that directly constrained your operations regarding labor or transport capacity. Did the government's approach to strictness and duration create more operational confusion or eventual stability for PT XYZ?

F. Synthesis & Future Strategy

Given the success in maintaining CFR, which factor—Empowerment, Innovation, or Resilience—do you believe was the single most vital component? How has this experience informed PT XYZ's future strategies for handling similar systemic crises?

Table 3.8 Paired wise comparison AHP Matrix

	SCE	SCI	SCR	Weighted Sum Value	Criteria Weight
SCE					
SCI					
SCR					

CHAPTER 4

FINDINGS, ANALYSIS AND DISCUSSIONS

4.1 Descriptive Analysis

4.1.1 Responded Profile

The respondents of this study should match the predetermined criteria was Staff, Supervisor, or Managerial level of supply chain FMCG Industries PT XYZ in Indonesia and related to business or enrolled job on supply chain and Operation. Then, the second section contains question to ask more detail regarding their profile which are: gender, years of working, FMCG Industri and managerial level at work at PT XYZ. The result of respondent's profiles is explained below.

4.1.2 Managerial Level

Respondents level of managerial is summarized in the table below

Table 4.1 Respondent Profile Level of Management

Level Of Managerial	Number of Respondents	Percentage
YES	26	52%
NO	24	48%

Source: Data questionnaire Survey

According to the information presented above, the level on managerial in this survey is 52% of the total and the largest is non-managerial level is 48%. This indicates that most respondents in this survey play an important role in supply chain management decision-making.

4.1.3 Major of education

Respondents major of education is summarized in the table below:

Table 4.2 Respondent Profile Major of education

Major Of Education	Number of Respondents	Percentage
YES	25	50%
NO	25	50%

From the information presented above, the majors related to business or enrolled jobs on supply chain in this survey are 50% of the total and not related on major of education with supply chain is 50%. This indicates that the majority of respondents in this survey, almost half of whom understand the basics of science and basic terms in the supply chain, are more accurate in providing survey answers.

4.1.4 Work in FMCG Industry

Respondents work in FMCG Industry is summarized in the table below

Table 4.3 Work in FMCG Industry

Work in FMCG Industry	Number of Respondents	Percentage
YES	50	100%
NO	0	0%

Source: Data questionnaire Survey

From the information presented above, respondents who work in FMCG Industry in this survey are 100% from the total and non is 0%. It captured all respondents are working in PT XYZ which operates in FMCG Industry.

4.1.5 Gender

Respondents gender is summarized in the table below

Table 4.4 Gender

Gender	Number of Respondents	Percentage
Man	40	80%

Woman	10	20%
-------	----	-----

Source: Data questionnaire Survey

From the information presented above, respondents gender in this survey are 80% are man and from the total and 20% are woman. This indicates that the respondents in this survey were mostly workers who were directly involved in handling logistics activities, where men were prioritized for security reasons in 24-hour operations.

4.1.6 Years of service

Respondents' years of services are summarized in the table below:

Table 4.5 Years of services

Years Of services	Number of Respondents	Percentage
Below 1 years	5	10%
Above 1 years	45	90%

Source: Data questionnaire Survey

From the information presented above, respondents' years of services in this survey are 90% are above one year from the total and only 10% are below 1 year's services. This indicates that the respondents in this survey were mostly permanent workers who had passed the one-year probationary period and had direct experience when the warehouse was operating during the Covid period.

4.1.7 Work in Business Unit on FMCG PT XYZ

Respondents' work in business unit is summarized in the table below

Table 4.6 Work in business unit

Business Unit	Number of Respondents	Percentage
Insecticide	28	56%
Insecticide – Bleach and Shoe Polish	22	44%

Source: Data questionnaire Survey

From the information presented above, respondents work in business unit Insecticide are 56% in this survey and 44% in insecticide, bleach and shoe polish. It captured some of respondents are handling more than 1 business unit. This indicates that the respondents in this survey were mostly workers who had experience handling various kinds of products.

4.1.8 Management Level of work

Respondents' level of management supply chain level is summarized in the table below

Table 4.7 Management of work level

Management Level	Number of Respondents	Percentage
Staff	19	38%
Line leaders	5	10%
Supervisor	13	26%
Manager	13	26%

Source: Data questionnaire Survey

From the information presented above, respondents work in position in Management Supply Chain level of staff is 38%, in line leaders are 10%, Supervisor are 26% and Manager are 26%. This indicates that the respondents in this survey consist of various levels of management so that the survey results are expected to provide more accurate information.

4.2 Descriptive Statistic

Through this part, the researcher will show and explain each piece of data obtained through the survey. Each data will be discussed in detail and Likert scale interpretation will be divided into each classification and indicators measurement breakdown of each variable discussed in this study. The Likert discussed in the table below.

Table 4.8 Likert Scale Interval

Likert Scale	Interval	Classification
1	1.00 – 1.79	Strongly Disagree
2	1.80 – 2.59	Disagree
3	2.60 – 3.39	Neutral
4	3.40 – 4.19	Agree
5	4.20 – 5.00	Strongly agree

Source: Research Gate

The result of the respondent survey through Google Survey Form was then imported to Smart PLS software to interpret and statistically analyze the SEM-PLS model. The result analyzed by Smart PLS will be explained in more detail in next section.

4.2.1 Indicators of Supply Chain Empowerment (SCE)

According to table below, the first of Indicator of SCE which states “I was encouraged to make operational decisions without waiting for higher-level approval”. Shows results with a value of 4.180 which indicates most respondents agree with the statement. The second indicator of SCE states “Information about supply disruptions was shared openly across departments”. Which shows results of lower value than the first indicator, 4.160. The third indicator of SCE states “My supervisor trusted me to take immediate corrective actions when facing logistics problems”. This shows results with a value of 3.880 which indicates most respondents also agree with the statement. The mean average score of the SCE variable is 4.073 and the standard deviation is 0,861, thus researchers can conclude that respondents agree with the overall statement of Supply Chain Empowerment.

Table 4.9 Descriptive Statistic of Supply Chain Empowerment

No	Variable	Indicator	Mean	Standard Deviation
		SCE 1: I was encouraged to make operational	4.180	0.886

1	Supply Chain Empowerment	decisions without waiting for higher-level approval		
2		SCE 2: Information about supply disruptions was shared openly across departments	4.160	0.841
3		SCE 3: My supervisor trusted me to take immediate corrective actions when facing logistics problems	3.880	0.857

Source: Data Processing SEM-PLS 2026

4.2.2 Indicators of Supply Chain Innovation (SCI)

According to table below, the first of Indicator of SCI which states “My company implemented digital tracking or data analytics tools to improve real-time decisions”. Shows results with a value of 3.920 which indicates most respondents agree with the statement. The second indicator of SCI states “We redesigned workflows or routes to adapt to new delivery restrictions”. Which shows results with lower value than the first indicator, 4.280. The third indicator of SCI states “Cross-functional collaboration (e.g., marketing–logistics) increased during the disruption to find creative solution”. This shows results with a value of 4.220 which indicates most respondents also agree with the statement. The mean average score of the SCI variable is 4.140 and the standard deviation is 0.803, thus researchers can conclude that respondents agree with the overall statement of Supply Chain Innovation.

Table 4.10 Descriptive Statistic of Supply Chain Innovation

No	Variable	Indicator	Mean	Standard Deviation
----	----------	-----------	------	--------------------

1	Supply Chain Innovation	SCI 1: My company implemented digital tracking or data analytics tools to improve real-time decisions.	3.920	0.868
2		SCI 2: We redesigned workflows or routes to adapt to new delivery restrictions	4.280	0.665
3		SCI 3: Cross-functional collaboration (e.g., marketing–logistics) increased during the disruption to find creative solutions	4.220	0.878

Source: Data Processing SEM-PLS 2026

4.2.3 Indicators of Supply Chain Resilience (SCR)

According to table below, the first of Indicator of SCR which states “We had alternative suppliers or backup plans for critical materials”. Shows results with a value of 4.140 which indicates most respondents agree with the statement. The second indicator of SCR states “We redesigned workflows or routes to adapt to new delivery restrictions”. Which shows results with higher value than the first indicator, 4.300. It means respondents strongly agreed. The third indicator of SCR states “Our teams could re-prioritize production or delivery schedules quickly when disruptions occurred”. This shows results with a value of 4.300 which indicates most respondents strongly agree with the statement. The mean average score of the SCR variable is 4.247 and the standard deviation is 0.730, thus researchers can conclude that respondents strongly agree with the overall statement of Supply Chain Resilience.

Table 4.11 Descriptive Statistic of Supply Chain Resilience

No	Variable	Indicator	Mean	Standard Deviation
1	Supply Chain Resilience	SCR 1: We had alternative suppliers or backup plans for critical materials	4.140	0.849
2		SCR 2: We redesigned workflows or routes to adapt to new delivery restrictions	4.300	0.671
3		SCR 3: Our teams could re-prioritize production or delivery schedules quickly when disruptions occurred	4.300	0.671

Source: Data Processing SEM-PLS 2026

4.2.4 Indicators of Supply Chain Velocity (SCV)

According to table below, the first of Indicator of SCV which states “Our order-to-delivery time decreased compared to before the disruptions”. Shows results with a value of 3.340. Which indicates most respondents are neutral with the statement. The second indicator of SCV states “Customer orders were fulfilled within promised delivery windows”. Which shows results with higher value than the first indicator, 4.360. It means respondent are strongly agree, the third indicator of SCV states “Information flow from sales to production became faster during the disruptions”. This shows results with a value of 3.760. It indicates most respondents also agree with the statement. The mean average score of the SCV variable is 3.820 and the standard deviation is 0.893, thus researcher can conclude that respondents strongly agree with the overall statement of Supply Chain Velocity.

Table 4.12 Descriptive Statistic of Supply Chain Velocity

No	Variable	Indicator	Mean	Standard Deviation
1	Supply Chain Velocity	SCV 1: Our order-to-delivery time decreased compared to before the disruptions	3.340	1.032
2		SCV 2: Customer orders were fulfilled within promised delivery windows	4.360	0.656
3		SCV 3: Information flow from sales to production became faster during the disruptions	3.760	0.991

Source: Data Processing SEM-PLS 2026

4.2.5 Indicators of Covid Lock Down (CLD) as A Moderating

According to table below, the first of Indicator of CLD as moderating which states “Government lockdown policies reduce transportation capacity and driver availability”. Shows results with a value of 3.920. Which indicates most respondents agree with the statement. The second indicator of CLD states “During Covid 19 lockdown I still can work from home”. Which shows results with higher value than the first indicator, 4.040. It means respondent are agree, the third indicator of CLD states “Frequent changes in lockdown regulations created uncertainty in planning supply operations”. This shows results with a value of 4.020. It indicates most respondents also agree with the statement. The mean average score of the CLD variable is 3.993 and the standard deviation is 0.988, thus

researcher can conclude that respondents agree with the overall statement of Supply Chain Velocity.

Table 4.13 Descriptive Statistic of Lock Down Covid

No	Variable	Indicator	Mean	Standard Deviation
1	Covid19 Lock Down	CLD 1: Government lockdown policies reduce transportation capacity and driver availability.	3.920	0.997
2		CLD 2: During COVID-19 lockdown I still can work from home.	4.040	0.979
3		CLD 3: Frequent changes in lockdown regulations created uncertainty in planning supply operations	4.020	0.990

Source: Data Processing SEM-PLS 2026

4.3 Outer Model SEM-PLS result

This study collected data from 50 respondents in PT XYZ Indonesia and its surrounding regions with a 30-100 number of respondents suitable for a Structural Equation Modelling Partial Least Square (SEM-PLS) statistical analysis. The first few statistical tests analyze the outer model of the study's framework, using validity and reliability measurements.

4.3.1 Collinearity Assessment

Before analyzing the structural relationships, collinearity among predictor constructions was assessed using the Variance Inflation Factor (VIF). According to Hair et al. (2019), VIF values should be below 5 to avoid multicollinearity issues.

All VIF values are below the recommended threshold, indicating that multicollinearity is not a concern and the structural model can be reliably interpreted.

Table 4.14 Collinearity Statistics (VIF)

Predictor	VIF
SCE → SCV	2.077
SCI → SCV	2.766
SCR → SCV	3.60
CLD (Moderator)	2.368

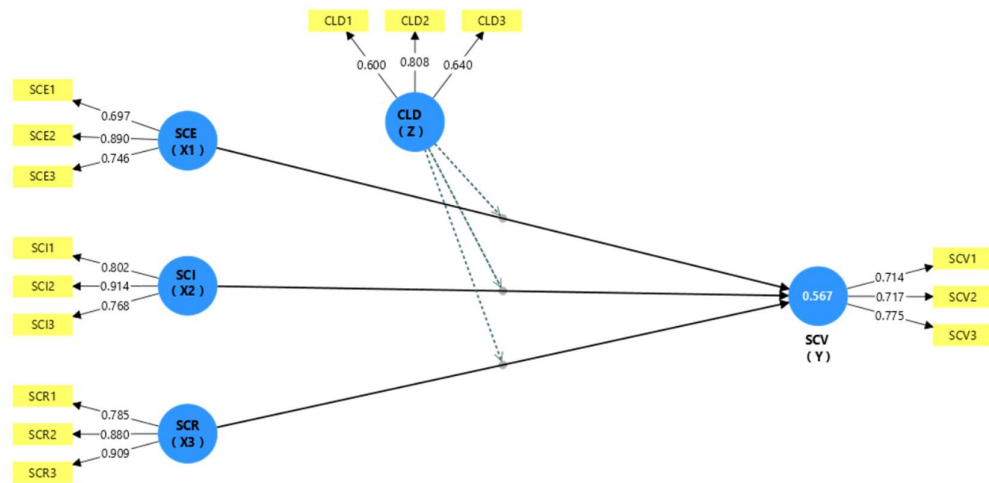
Source: Data Processing SEM-PLS 2026

4.3.2 Convergent Validity

The purpose of convergent validity test is to describe the degree to which two or more measures of the same construction are related to each other (Henseler et al., 2014). To assess convergent validity, the researcher tested the Loading Factors and AVE (Average Variance Extracted) of each item that correlates to all variables in this study. Loading factors and AVE will be covered in the section below.

4.3.2.1 Loading Factor Analysis

Loading factor analysis refers to the relationship between a variable and a latent factor. Loading is a measure of how much a particular variable contributes to the underlying construction being measured by the factor analysis (Hair et al., 2006). Hair et al. (2006) also stated, the loading factor should be at minimum 0.5 or higher and 0.7 or higher as the ideal value. The figure below shows that the loading factor of all items is above 0.5.



Source: Data Processing SEM-PLS 2026

Figure 4.1 Graphic of Loading Factor

Therefore, we can conclude that the loading factor of this study is ideal as it stated above. In the next section, we will cover in detail the loading factor analysis of each variable in this study.

Summary of Loading Factor Analysis

The summary of loading factor analysis in this study can be seen on the table below. To sum up, the loading factor of all indicators is above 0.5, which is acceptable and validly measures each latent variable in this study. The highest loading factor is SCI 2, We redesigned workflows or routes to adapt to new delivery restrictions with a score of 0.914 and the lowest loading factor is CLD1, Government lockdown policies reduce transportation capacity and driver availability. With a score of 0.600.

Table 4.15 Factor Analysis - Supply Chain Empowerment

No	Variable	Indicator	Loading Factor	Valid / No Valid
1		SCE 1: I was encouraged to make operational	0.697	Valid

	Supply Chain Empowerment	decisions without waiting for higher-level approval		
2		SCE 2: Information about supply disruptions was shared openly across departments	0.890	Valid
3		SCE 3: My supervisor trusted me to take immediate corrective actions when facing logistics problems	0.746	Valid

Source: Data Processing SEM-PLS 2026

Table 4.16 Loading Factor Analysis - Supply Chain Innovation

No	Variable	Indicator	Loading Factor	Valid / No Valid
1	Supply Chain Innovation	SCI 1: My company implemented digital tracking or data analytics tools to improve real-time decisions.	0.802	Valid
2		SCI 2: We redesigned workflows or routes to adapt to new delivery restrictions	0.914	Valid

3		SCI 3: Cross-functional collaboration (e.g., marketing–logistics) increased during the disruption to find creative solutions	0.768	Valid
---	--	--	-------	-------

Source: Data Processing SEM-PLS 2026

Table 4.17 Loading Factor Analysis - Supply Chain Resilience

No	Variable	Indicator	Loading Factor	Valid/ No Valid
1	Supply Chain Resilience	SCR 1: We had alternative suppliers or backup plans for critical materials	0.785	Valid
2		SCR 2: Our teams could re-prioritize production or delivery schedules quickly when disruptions occurred	0.880	Valid
3		SCR 3: We coordinated closely with logistics partners to recover operations after	0.909	Valid

		unexpected shutdowns		
--	--	-------------------------	--	--

Source: Data Processing SEM-PLS 2026

Table 4.18 Loading Factor Analysis - Supply Chain Velocity

No	Variable	Indicator	Loading Factor	Valid/ No Valid
1	Supply Chain Velocity	SCV 1: Our order-to-delivery time decreased compared to before the disruptions	0.714	Valid
2		SCV 2: Customer orders were fulfilled within promised delivery windows	0.717	Valid
3		SCV 3: Information flow from sales to production became faster during the disruptions	0.775	Valid

Source: Data Processing SEM-PLS 2026

Table 4.19 Loading Factor Analysis - Covid Lock Down as Moderating

No	Variable	Indicator	Loading Factor	Valid/ No Valid
1	Covid Lock Down	CLD 1: Government lockdown policies reduce transportation capacity and driver availability.	0.600	Valid
2		CLD 2: During COVID-19 lockdown I still can work from home.	0.808	Valid
3		CLD 3: Frequent changes in lockdown regulations created uncertainty in planning supply operations	0.640	Valid

Source: Data Processing SEM-PLS 2026

4.3.2.2 Average Variance Extracted (AVE)

AVE analysis assesses the extent to which each observed indicator is associated with its corresponding latent construct and how much variance is explained by the construct relative to measurement error. The minimum acceptable value of AVE is 0.5 and higher than 0.7 is considered as highly acceptable (Hair et al., 2021). As we can see from the table below, the AVE value of all variables is above 0.5. The AVE value of Supply Chain Empowerment (SCE) is 0.611 which is considered valid; the AVE value of Supply Chain Innovation (SCI) is 0.689 which is considered valid; the AVE value of Supply Chain Resilience (SCR) is 0.739

which is considered valid; the AVE value of Supply Chain Velocity (SCV) is 0.541 which is considered as valid and highly acceptable; the AVE value of Covid Lock Down (CLD) is 0.474 which is considered as not valid but if we rump up into 1 digit after coma it will be 0.5. So, it will be valid with minimum in border line number.

Table 4.20 AVE Analysis

Variable	AVE	Valid/Not Valid
Supply Chain Empowerment (SCE)	0.611	Valid
Supply Chain Innovation (SCI)	0.689	Valid
Supply Chain Resilience (SCR)	0.739	Valid
Supply Chain Velocity (SCV)	0.541	Valid
Covid Lock Down (CLD)	0.474	Valid in border line

Source: Data Processing SEM-PLS 2026

4.3.3 Discriminant Validity

Discriminant validity is a measure of whether latent variables in a model are distinct from one another. It ensures that the latent variables are measuring different aspects or dimensions of a phenomenon, rather than being redundant or overlapping. When each measurement item has a poor correlation with all other variables except the one that is related to, it shows that measures from various variables are distinct and do not converge on other variables (Hair et al., 2021).

From the table below, we can see that the cross-loading values of each variable with its own indicator are higher compared to other indicators that are not related. The cross-loading scores of SCE1 (0.697), SCE2 (0.890), and SCE3 (0.746) are higher with their own latent variables rather than with other latent variables. The cross-loading scores of SCI1 (0.802), SCI2 (0.914), and SCI3 (0.768) are higher with its own latent variables rather than with other latent variables. The cross-loading scores

of SCR1 (0.785), SCR2 (0.880), and SCR3 (0.909) are higher with its own latent variable rather than with other latent variables. The cross-loading scores of SCV1 (0.714), SCV2 (0.717), and SCV3 (0.775) are higher with its own latent variable rather than with other latent variables. The cross-loading scores of CLD1 (0.600), CLD2 (0.808), and CLD3 (0.640) are higher with its own latent variable rather than with other latent variables.

Table 4.21 Cross Loading Result

	SCE (X1)	SCI (X2)	SCR (X3)	SCV (Y)	CLD (Z)
SCE1	0.697	0.179	0.388	0.336	0.397
SCE2	0.890	0.550	0.569	0.545	0.467
SCE3	0.746	0.331	0.363	0.265	0.502
SCI1	0.179	0.802	0.518	0.479	0.253
SCI2	0.565	0.914	0.754	0.713	0.698
SCI3	0.415	0.768	0.684	0.415	0.520
SCR1	0.414	0.613	0.785	0.410	0.514
SCR2	0.587	0.682	0.880	0.513	0.536
SCR3	0.506	0.731	0.909	0.692	0.672
SCV1	0.181	0.402	0.349	0.714	0.367
SCV2	0.615	0.442	0.632	0.717	0.551
SCV3	0.292	0.615	0.410	0.775	0.499
CLD1	0.137	0.425	0.477	0.430	0.600
CLD2	0.634	0.469	0.589	0.559	0.808
CLD3	0.334	0.371	0.274	0.329	0.640

Source: Data Processing SEM-PLS 2026

4.3.4 Composite Reliability

Composite reliability is a measure of the internal consistency of a composite score or scale; it assesses the degree to which the items in the scale are measuring the same construct or concept consistently. In other words, composite reliability indicates how well a set of items or measures on a scale work together to measure a single concept, and how reliably they do so. Hair et al. (2014) mentioned that there are three classifications of composite reliability value; 0.60 until 0.70 is considered as acceptable, 0.70 until 0.95 is considered as good, meanwhile above 0.95 is considered as too identical. According to the table below, we can see that the composite reliability of all latent variables is between 0.727 and 0.894. The

composite reliability value of Supply Chain Empowerment (SCE) is 0.824; Supply Chain Innovation (SCI) is 0.869; Supply Chain Resilience (SCR) is 0.894; Supply Chain Velocity (SCV) is 0.780; Covid Lock Down (CLD) is 0.727. Thus, the researcher can conclude that all composite reliability values in this study are good.

Table 4.22 Composite Reliability

Variable	Composite Reliability (rho_c)
Supply Chain Empowerment (SCE)	0.824
Supply Chain Innovation (SCI)	0.869
Supply Chain Resilience (SCR)	0.894
Supply Chain Velocity (SCV)	0.780
Covid Lock Down (CLD)	0.727

Source: Data Processing SEM-PLS 2026

4.3.5 Cronbach's Alpha

Another metric to measure internal consistency is Cronbach's Alpha. Cronbach's alpha ranges from 0 to 1, with values closer to 1 indicating greater reliability.

Based on Dahlan et al. (2014), Cronbach's Alpha can be interpreted and categorized into five reliability levels according to the following scale.

Table 4.23 Cronbach's Alpha parameter

Cronbach Alpha Value	Reliability Description
0.81 – 1.00	Very Reliable
0.61 – 0.80	Reliable
0.42 – 0.60	Fairly Reliable
0.21 – 0.41	Not Reliable
0.00 – 0.20	Very Unreliable

Cronbach's Alpha value of Supply Chain Empowerment (SCE) is 0.693, Supply Chain Innovation (SCI) is 0.778, Supply Chain Resilience (SCR) is 0.827, Supply Chain Velocity (SCV) is 0.585, and Covid Lock Down (CLD) is 0.449. Therefore, the researcher can conclude that Cronbach's Alpha result shows reliable and acceptable for Supply Chain Innovation (SCI), Supply Chain Resilience (SCR) and Supply Chain Empowerment (SCE) and Supply Chain Velocity (SCV) and Covid Lock Down (CLD) are fairly reliable and acceptable in this study.

Table 4.24 Cronbach's Alpha Result

Variable	Cronbach's Alpha
Supply Chain Empowerment (SCE)	0.693
Supply Chain Innovation (SCI)	0.778
Supply Chain Resilience (SCR)	0.827
Supply Chain Velocity (SCV)	0.585
Covid Lock Down (CLD)	0.449

Source: Data Processing SEM-PLS 2026

4.4. Inner Model SEM-PLS Results

The validity and reliability of each indicator used in this study have been examined and evaluated in the preceding section, which was written by the researcher. The researcher will discuss the inner model of SEM-PLS in this section. The inner model is the component of the overall structural model that depicts the relationships between latent variables, and it will be the topic of discussion in this section. In SEM-PLS, the inner model's function is to test hypotheses about the theoretical connections between latent variables and to estimate the model's parameters, such as the coefficient of determination (R^2), predictive relevance (Q^2), and hypothesis testing.

4.4.1 Coefficient of Determination (R^2)

Result The coefficient of determination (R^2) is a statistical measure that indicates the amount of variance in a dependent variable that can be explained by the

independent variables in the model. The coefficient of determination ranges R² from 0 to 1, where 0 indicates that none of the variance in the dependent variable is explained by the independent variables, and 1 indicates that all of the variance is explained. Generally, a higher value of the coefficient of determination indicates a better fit of the model. Hair et al. (2014) suggested that the R² value should be between 0 and 1 with classification; 0.75 (75%) indicates substantial, 0.50 (50%) indicates moderate, and 0.25 (25%) indicates weak. As displayed in the table below, the coefficient of determination of each dependent variable after we convert to percentage are as follows; the R² value of Supply Chain Velocity is 56.7%.

Table 4.25 R- Square

	R-square
SCV (Y)	0.567

Source: Data Processing SEM-PLS 2026

According to the coefficient of determination value classification by Hair et al. (2013), The R² value of Supply Chain Velocity (56.7%) is considered as moderate which shows that 43.3% of the variation in SCV can be explained by other variables outside this study.

4.4.2 Effect Size (f^2)

Effect size was assessed to determine the relative impact of each predictor on supply chain velocity.

Table 4.26 F Square

	SCV (Y)
SCE (X1)	0.015
SCI (X2)	0.106

SCR (X3)	0.004
----------	-------

Source: Data Processing SEM-PLS 2026

Evaluation Conclusion on Effect Size (f^2)

The effect size (f^2) was examined to evaluate the relative contribution of each predictor variable to Supply Chain Velocity (SCV). Effect size analysis goes beyond statistical significance by assessing the practical relevance of each construct in explaining the endogenous variable (Hair et al., 2017).

Based on the guidelines proposed by Cohen (1988), where f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects respectively, the findings reveal Supply Chain Innovation (SCI) shows an f^2 value of 0.106, which also reflects a small but practically relevant effect on SCV.

In contrast, Supply Chain Empowerment (SCE) records a very low effect size ($f^2 = 0.015$), which falls below the threshold for a small effect, indicating a weak contribution to SCV. Supply Chain Resilience (SCR) demonstrates the lowest effect size ($f^2 = 0.004$), signifying a negligible impact on Supply Chain Velocity (SCV).

Overall, the effect size results indicate that SCI are the most influential predictors of supply chain velocity in the structural model, while SCE and SCR contribute minimally. These findings emphasize the importance of innovation mechanisms in enhancing supply chain velocity, supporting prior research that highlights innovation as key drivers of supply chain performance (Hair et al., 2021).

4.4.3 Predictive Relevance (Q2) Result

The degree to which the observed values and the parameter estimations are produced by the model is one of the things that the Predictive Relevance (Q2) metric may evaluate. The presence of a predictive relevance value in the model is indicated by a Q2 value that is greater than 0 (zero). However, if the model has a Q-Square value that is less than 0 (zero), then the predictive relevance of the model is low or nonexistent (Ghozali, 2016).

The following formula, developed by Hair (2014), can be used to calculate predictive value and relevance:

$$Q^2 = 1 - (1 - R^2)$$

$$Q^2 = 1 - (1 - 0.567)$$

$$Q^2 = 1 - 0.433$$

$$Q^2 = 0.567$$

As we can see from the calculations above, the Q^2 value is 0.567 or 56.7% which shows that the research model in this study is globally accepted as the value is far above 0 (Ghozali, 2014).

4.5 Hypothesis Testing Results

The final step in the SEM-PLS analysis process is called "Hypothesis Testing," and its purpose is to determine whether the hypothesis being tested may be accepted. The path coefficient value or Original Sample (O), which can show the nature of the relationship between variables (whether it is positive or negative), T-Statistics, which can measure the significance, and P-Values, which can tell whether the hypothesis is supported or not. These are the measurement items. If the value is between 0 and 1, the Original Sample displays a positive result, but the number between -1 and 0 displays a negative result. If the T-statistics are higher than 1.96, the result is significant; nevertheless, if they are lower than 1.96, the result is not significant. If the P-Value is less than 0.05, this indicates that the hypothesis is supported, but a value greater than 0.05 indicates that the hypothesis is not supported (Ghozali, 2014). The outcomes of this study's attempt to test the hypothesis are presented in the table that follows.

Table 4.27 Hypothesis Result

Hypothesis	Original Sample (O)	T-Statistics (O/STDEV)	P Values	Result	Hypothesis Result

H1 (+) Supply Chain Empowerment (SCE) positively affects Supply Chain Velocity (SCV)	0.117	0.666	0.253	Positive Not Significant	Not Supported
H2 (+) Supply Chain Innovation (SCI) positively affects Supply Chain Velocity (SCV)	0.357	1.681	0.046	Positive Not significant	Supported
H3 (+) Supply Chain Resilience (SCR) positively affects Supply Chain Velocity (SCV)	0.078	0.307	0.380	Positive Not significant	Not Supported
H4 (-) COVID-19 lock down (CLD) negatively affects Supply Chain Velocity (SCV)	0.339	1.844	0.033	Positive Not significant	Supported

Source: Data Processing SEM-PLS 2026

4.5.1 The Effect of Supply Chain Empowerment on Supply Chain Velocity

The results show that Supply Chain Empowerment has a positive but statistically insignificant effect on Supply Chain Velocity ($\beta = 0.117$, $t = 0.666$, $p = 0.253$). Although the direction of the relationship is consistent with theoretical expectations, the low t-statistics and p-value above the 0.05 threshold indicate that the effect is positive and not statistically significant but not supported.

4.5.2 The Effect of Supply Chain Innovation on Supply Chain Velocity

Supply Chain Innovation exhibits a positive and moderate significant effect on Supply Chain Velocity ($\beta = 0.357$, $t = 1.681$, $p = 0.046$). Although the direction of the relationship is consistent with theoretical expectations, the low t-statistics and p-value below the 0.05 threshold indicate that the effect is positive with moderate statistically significant and supported.

4.5.3 The Effect of Supply Chain Resilience on Supply Chain Velocity

The relationship between Supply Chain Resilience and Supply Chain Velocity is positive but not statistically significant ($\beta = 0.078$, $t = 0.306$, $p = 0.380$). Although the direction of the relationship is consistent with theoretical expectations, the low t-statistics and p-value above the 0.05 threshold indicate that the effect is positive and not statistically significant but not supported.

4.5.4 The Moderating Effect of COVID-19 Lock Down on Supply Chain Velocity

The moderating effect of COVID-19 lockdown policies on the relationship between Supply Chain Empowerment and Supply Chain Velocity shows a positive interaction coefficient ($\beta = 0.339$). However, the effect is statistically moderate significant based on the t-statistic ($t = 1.844$). Although the reported p-value ($p = 0.033$) suggests supported, the moderate t-value indicates that this interaction effect is strong and stable.

4.6 Analysis and Discussion

The Analysis identifies Supply Chain Innovation (SCI) as the most significant internal driver of velocity, with a positive path coefficient of 0.357. Although empowerment (SCE) and resilience (SCR) show positive direction, they did not reach statistically significant in the quantitative model. This suggests that while all factors were present, it was the structural innovations (digital tools and redesigned workflows) that most directly translated into measurable speed during the crisis. Nour, S., & Arbussà, A. (2025).

The moderating effect of Covid Lock Down (CLD) was supported ($p = 0.033$), with moderate significant T-Statistic (1.844) indicates that the strength of this moderation was strong. COVID-19 Lock Down did perform well as a latent construct, due to its exogeneous and heterogenous nature. Qualitatively, this

suggests that the Lock Down acted as a constant pressure that the Company's innovation efforts had to perpetually overcome, rather than a factor that completely blocked operational effectiveness. Bhattacharyya, S. S., & Thakre, S. (2021).

4.7 Analytic Hierarchy Process (AHP) Analysis and Expert Judgement

To deepen the qualitative understanding of these factors and to prioritize strategy, the Analytic Hierarchy Process was conducted based on expert judgement.

4.7.1 Synthesis of Interview

The two Managers provided nuanced views on the prioritization of the research variables:

Criteria; SCE (Supply Chain Empowerment), SCI (Supply Chain Innovation) and SCR (Supply Chain Resilience).

Expert 1: Mr. Adi Yulianto (Country Indonesia Supply Chain Managers PT XYZ Indonesia with 20 years of services at Company).

Expert 2: Mr. Saul Tinambunan (Regional OPEX Logistic Supply Chain PT XYZ Indonesia with 15 years of services at Company).

Goals: Improve Supply Chain Velocity (CFR)

Criteria; SCE (Supply Chain Empowerment), SCI (Supply Chain Innovation) and SCR (Supply Chain Resilience).

Judgment extracted Expert 1:

SCI > SCE (Strong Importance → 5)

SCR > SCE (Strong importance → 5)

SCI > SCR (Moderate-strong importance → 7)

Table 4.28 Pairwise Matrix (A1)

Criteria	SCE	SCI	SCR
SCE	1	0.20	0.20

SCI	5	1	7
SCR	5	0.14	1
Total	11	1.34	8.20

Criteria	SCE	SCI	SCR	Sum value	Priority Weight
SCE	0.091	0.149	0.024	0.26	0.088
SCI	0.455	0.745	0.854	2.05	0.684
SCR	0.455	0.106	0.122	0.68	0.228
Total	1.00	1.00	1.00	3.00	1.00

$$\lambda_{\max} = 3.17$$

$$CI = (3.17 - 3) / (3 - 1) = 0.085$$

$$CR = 0.085 / 0.58 = 0.1 \text{ (Consistent)}$$

Priority factor Expert 1 are SCI (68.4%), SCR (22.8%), and SCE (8.8%)

Judgment extracted Expert 2:

SCE > SCI (Importance → 4)

SCE > SCR (Strong importance → 5)

SCI > SCR (Strong importance → 5)

Table 4.29 Pairwise Matrix (A2)

Criteria	SCE	SCI	SCR
SCE	1	4	5
SCI	0.25	1	5
SCR	0.2	0.2	1
Total	1	5	11

Criteria	SCE	SCI	SCR	Sum value	Priority Weight
SCE	0.690	0.769	0.455	1.91	0.638

SCI	0.172	0.192	0.455	0.82	0.273
SCR	0.138	0.038	0.091	0.27	0.089
Total	1.00	1.00	1.00	3.00	1.00

Priority factor Expert 2 are SCE (63.8%), SCI (27.3%), and SCR (8.9%).

Table 4.30 Final Weight (Average)

Criteria	Expert 1	Expert 2	Final Weight
SCE	0.088	0.638	0.363
SCI	0.684	0.273	0.479
SCR	0.228	0.089	0.159

Final AHP Rank are SCI (47.9%), SCE (36.3%) and SCR (15.9%).

The AHP result indicates that Supply Chain Innovation is the most critical qualitative driver of Supply Chain Velocity, confirming the quantitative SEM-PLS findings.

“Innovation enabled rapid reconfiguration of Sourcing of Truck, Distribution, and digital coordination during the COVID-19 disruption,” Mr. Saul and Mr. Yulianto Adi said.

Empowerment ranks second, highlighting the importance of decision autonomy and workforce enablement during crisis operations. “Supply chain resilience, while still important, plays a supporting role by sustaining performance after innovative responses are implemented” Mr. Yulianto Adi has informed.

4.7.2 Analysis and Result Hybrid

Finally, with the prioritization results obtained from the AHP analysis are consistent with the magnitude of standardized path coefficient obtained from SEM-PLS, indicating robustness and triangulation across quantitative and expert judgment-based methods. Even though resilience contributes to stability, innovation and empowerment are more critical drivers of supply chain velocity during extreme disruption. The negative moderating effect of COVID-19 lockdown indicates that

government mobility restrictions weakened the otherwise positive influence of innovation and empowerment on supply chain velocity. Zou, Q., Wang, Y., & Modi, S. (2024). This suggests that policy-induced constrained limited firms' ability to translate internal capabilities into operational speed.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusions

This study examined supply chain velocity, supply chain innovation, and supply chain resilience in relation to supply chain progress in FMCG companies, where the COVID-19 lockdown served as a driving force. By combining SEM-PLS analysis with the Analytical Hierarchy Process (AHP), this study provided a comprehensive understanding of how organizational efforts interact with external disruptions to maintain chain performance during a systemic crisis. Empirical results indicate that Supply Chain Innovation is the most influential factor in improving Supply Chain Progress. SEM-PLS findings indicate that innovation-related practices such as the use of digital processes, innovative workflow design, and collaboration across functions play a crucial role in accelerating information flow and order delivery.

These results support the Resource-Based View, which asserts that strategically valuable and difficult-to-imitate capabilities enable firms to achieve superior operational results, especially in uncertain environments. Supply Chain Empowerment also has a positive effect on Supply Chain Velocity. The findings suggest that decentralized decision-making, open information sharing, and managerial trust allow operational time to respond quickly to disruptions without excessive legacy and hierarchy. Although its impact is weaker than that of innovation, empowerment remains an important driver of responsiveness, especially during periods of high volatility.

Supply Chain Resilience showed a positive but relatively smaller effect on Supply Chain Velocity. The results indicate resilience mechanisms such as alternative sourcing strategies, flexible production scheduling, and close coordination with logistics partners function primarily as stabilizing elements. Rather than directly accelerating speed, resilience ensures continuity and supports recovery, thereby indirectly sustaining supply chain velocity under disruption.

The moderating analysis reveals that COVID-19 lockdown policies significantly influenced the relationships between internal supply chain capabilities and velocity. While lockdown measures constrained transportation capacity and labor mobility, they also intensified the need for rapid adaptation. In this context, regulatory pressure acted as a catalyst that strengthened the role of innovation and empowered decision-making, rather than merely inhibiting operational performance.

From a performance perspective, PT XYZ's ability to maintain an average Case Fill Rate of approximately 99%, exceeding the internal target of 97.8%, provides strong practical validation of the model. The convergence between SEM-PLS results and AHP expert judgments—where innovation emerged as the top priority factor—strengthens the robustness of the conclusions. Overall, this study confirms that supply chain velocity during systemic crises is primarily driven by innovation, supported by empowerment and resilience, within the contextual constraints of government policy.

5.2 Managerial Implications

The findings of this study offer several important managerial implications for FMCG companies operating in volatile and highly regulated environments.

First, managers should institutionalize supply chain innovation as a core strategic capability rather than treating it as an ad hoc response to crises. Investments in digital visibility tools, real-time analytics, and cross-functional integration should be embedded into standard operating procedures. As demonstrated by PT XYZ, such innovations significantly enhance responsiveness and enable organizations to maintain high service levels even under severe mobility and labor constraints.

Second, empowerment should be formally designed into supply chain governance structures. Clear decision-right frameworks, escalation protocols, and transparency mechanisms allow supervisors and frontline staff to act swiftly without waiting for hierarchical approval. This approach aligns with stakeholder theory (Freeman, 1984), emphasizing the role of internal stakeholders in value creation during uncertainty.

Third, resilience strategies should be balanced between efficiency and flexibility. While redundancy in suppliers, inventory buffers, and logistics partners may increase short-term costs, these mechanisms provide the foundation for rapid recovery and sustained velocity. Managers should therefore view resilience not as a cost burden but as a strategic insurance mechanism that complements innovation-driven speed.

Finally, the study suggests that firms should proactively align their supply chain strategies with government policy scenarios. Scenario planning for lockdown intensity and duration, combined with flexible work arrangements and digital coordination, can transform regulatory constraints into catalysts for operational improvement rather than sources of disruption.

5.3 Recommendations

Based on the empirical findings and theoretical grounding of this study, several recommendations are proposed:

For Practitioners

FMCG companies should prioritize continuous digital innovation in supply chain processes, including end-to-end visibility systems and agile network design.

Establishing a formal crisis decision framework that empowers middle management and operational teams will further enhance supply chain velocity during future disruptions.

For Academicians

Future research is encouraged to extend this model by incorporating additional variables such as supply chain collaboration, risk management capability, or sustainability orientation. Comparative studies across multiple FMCG firms or industries would also enhance the generalizability of the findings.

For Policymakers

Government authorities should consider the operational realities of essential FMCG supply chains when designing lockdown policies. Clear, consistent, and predictable regulations can reduce uncertainty and support firms in maintaining service levels while safeguarding public health.

5.4 Limitations and Future Research Directions

Despite its contributions, this study has several limitations. The sample size is limited to a single FMCG company, which may constrain external validity. The reliance on self-reported survey data also introduces potential response bias. Future studies may employ longitudinal designs, objective performance metrics, or broader cross-industry samples to deepen understanding of supply chain velocity under crisis conditions.

In conclusion, this research demonstrates that innovation-driven agility, supported by empowerment and resilience, is the key determinant of supply chain velocity during systemic disruptions such as the COVID-19 pandemic. These insights provide both theoretical enrichment and practical guidance for building robust and responsive supply chains in an increasingly uncertain global environment.

REFERENCES

- Ahimbisibwe, A., Ssebulime, R., Tumuhairwe, R., & Tusiime, W. (2016). Supply chain visibility, supply chain velocity, supply chain alignment and humanitarian supply chain relief agility. *European Journal of Logistics, Purchasing and Supply Chain Management*, 4(2), 34- 64.
- Andrean, R., & Marwan, M. (2025). Pengukuran Kinerja Supply Chain Management Di Toko Aki Menggunakan Metode SCOR. *Jurnal Teknologi Dan Sistem Informasi Bisnis*, 7(2), 245-252.
- Barney, J. B. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, 17(1), pp. 99-121.
- Bhattacharyya, S. S., & Thakre, S. (2021). Coronavirus pandemic and economic lockdown; study of strategic initiatives and tactical responses of firms. *International Journal of Organizational Analysis*, 29(5), 1240-1268.
- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). Survey design methodology. *Journal of Survey Methodology*, 15(3), 102-117.
- Guan, D., Wang, D., Hallegatte, S., Davis, S. J., Huo, J., Li, S., ... & Gong, P. (2020). Global supply-chain effects of COVID-19 control measures. *Nature human behavior*, 4(6), 577-587.

Jakhar, S. K., & Barua, M. K. (2014). An integrated model of supply chain performance evaluation and decision-making using structural equation modelling and fuzzy AHP. *Production planning & control*, 25(11), 938-957.

Juan, S. J., Li, E. Y., & Hung, W. H. (2022). An integrated model of supply chain resilience and its impact on supply chain performance under disruption. *The International Journal of Logistics Management*, 33(1), 339-364.

Kanike, U. K. (2023). Factors disrupting supply chain management in manufacturing industries. *Journal of Supply Chain Management Science*, 4(1-2), 1-24.

Kline, R. (2016). Structural equation modeling for testing causation relationships between latent variables using observed variables. *Journal of Statistical Analysis*, 32(2), 78-89.

Kwak, D. W., Seo, Y. J., & Mason, R. (2018). Investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains. *International Journal of Operations & Production Management*, 38(1), 2-21

Nguyen, P. H. (2022). Two-Stage PLS-SEM and Fuzzy AHP Approach to Investigate Vietnamese SMEs' Export Competitiveness. *Computers, Materials & Continua*, 72(2).

Nour, S., & Arbussà, A. (2025). Driving innovation through organizational restructuring and integration of advanced digital technologies: a case study of a

world-leading manufacturing company. *European Journal of Innovation Management*, 28(8), 3262-3283.

Nurlaila, I., Hidayat, A. A., & Pardamean, B. (2021, April). Lockdown strategy worth lives: The SEIRD modelling in COVID-19 outbreak in Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 729, No. 1, p. 012002). IOP Publishing.

Purnawidya, Y. C., & Raharjo, S. T. (2023). Building competitive advantage through implementing total quality management in fast-moving consumer goods manufacturing companies in Indonesia. *SIBATIK JOURNAL: Jurnal Ilmiah Bidang Sosial, Ekonomi, Budaya, Teknologi, Dan Pendidikan*, 2(12), 3953-3970.

Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair Jr, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of family business strategy*, 5(1), 105-115.

Sugiyono. (2012). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Zou, Q., Wang, Y., & Modi, S. (2024). Linking government interventions to firm performance: the influence of stringency and support during the COVID-19 pandemic. *International Journal of Operations & Production Management*, 44(2), 393-423.

APENDIX

APENDIX A. Result of Survey

Name	Mean	Standard deviation
CLD1	3.920	0.997
CLD2	4.040	0.979
CLD3	4.020	0.990
SCE1	3.880	0.886
SCE2	4.180	0.841
SCE3	4.160	0.857
SCI1	3.920	0.868
SCI2	4.280	0.665
SCI3	4.220	0.878
SCR1	4.140	0.849
SCR2	4.300	0.671
SCR3	4.300	0.671
SCV1	3.340	1.032
SCV2	4.360	0.656
SCV3	3.760	0.991

APENDIX B: Results of SmartPLS 4 data processing

PLS-SEM Algorithm R-Square & R-Square Adjusted

PLS-SEM algorithm

- Outer weights
- Latent variables
- Residuals
- Simple slope analysis
 - Conditional direct effects
 - Conditional indirect effects
- Quality criteria
 - R-square
 - ☒ Overview
 - ☐ R-square - Bar chart
 - ☐ R-square adjusted - Bar chart

R-square - Overview

	R-square	R-square adjusted
SCV_(Y)	0.567	0.494

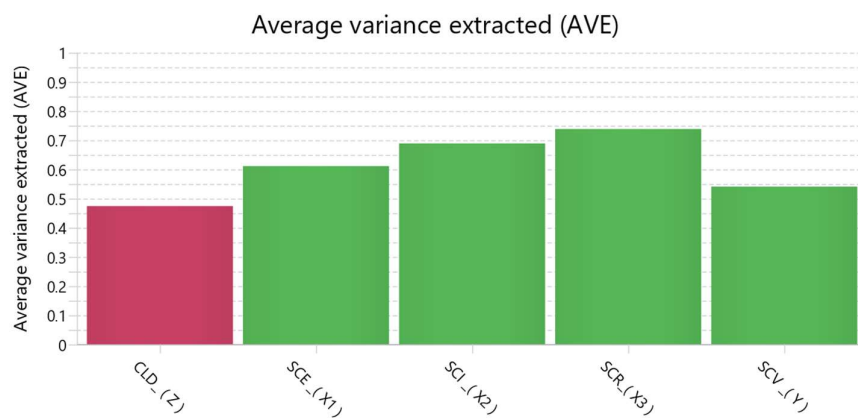
Reliability and Validity

PLS-SEM algorithm

- Construct reliability and validity
 - ☒ Overview
 - ☐ Cronbach's alpha - Bar chart
 - ☐ Composite reliability (rho_a) - Bar chart
 - ☐ Composite reliability (rho_c) - Bar chart
 - ☐ Average variance extracted (AVE) - Bar chart
- Discriminant validity
- Collinearity statistics (VIF)
- Model fit
- Model selection criteria

Construct reliability and validity - Overview

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CLD_(Z)	0.449	0.469	0.727	0.474
SCE_(X1)	0.693	0.794	0.824	0.611
SCI_(X2)	0.778	0.856	0.869	0.689
SCR_(X3)	0.827	0.887	0.894	0.739
SCV_(Y)	0.585	0.582	0.780	0.541



Discriminate Validity

PLS-SEM algorithm

▼ Discriminant validity

○ Heterotrait-monotrait ratio (HTMT) - Matrix

○ Heterotrait-monotrait ratio (HTMT) - List

○ Heterotrait-monotrait ratio (HTMT) - Bar chart

○ Fornell-Larcker criterion

○ Cross loadings

Discriminant validity - Fornell-Larcker criterion

	CLD_ (Z)	SCE_ (X1)	SCI_ (X2)	SCR_ (X3)	SCV_ (Y)
CLD_ (Z)	0.689				
SCE_ (X1)	0.568	0.782			
SCI_ (X2)	0.616	0.488	0.830		
SCR_ (X3)	0.678	0.586	0.790	0.860	
SCV_ (Y)	0.658	0.524	0.672	0.649	0.736

DATA Survey	Indicators	Copy to Excel/Word								
Indicators 15	Name	No.	Type	Missings	Mean	Median	Scale min	Scale max	Observed min	Observed max
Samples 50	SCE1	1	MET	0	3.880	4.000	2.000	5.000	2.000	5.000
Missing values 0	SCE2	2	MET	0	4.180	4.000	2.000	5.000	2.000	5.000
☒ Indicators	SCE3	3	MET	0	4.160	4.000	2.000	5.000	2.000	5.000
☐ Correlations	SCI1	4	MET	0	3.920	4.000	2.000	5.000	2.000	5.000
☐ Data groups	SCI2	5	MET	0	4.280	4.000	3.000	5.000	3.000	5.000
☐ Raw data	SCI3	6	MET	0	4.220	4.000	1.000	5.000	1.000	5.000
	SCR1	7	MET	0	4.140	4.000	2.000	5.000	2.000	5.000
	SCR2	8	MET	0	4.300	4.000	3.000	5.000	3.000	5.000
	SCR3	9	MET	0	4.300	4.000	3.000	5.000	3.000	5.000
	SCV1	10	MET	0	3.340	3.000	1.000	5.000	1.000	5.000
	SCV2	11	MET	0	4.360	4.000	3.000	5.000	3.000	5.000
	SCV3	12	MET	0	3.760	4.000	1.000	5.000	1.000	5.000
	CLD1	13	MET	0	3.920	4.000	1.000	5.000	1.000	5.000

Collinearity statistics (VIF) - Outer model - List	
	VIF
CLD1	1.028
CLD2	1.173
CLD3	1.166
SCE2	1.495
SCE3	1.482
SCI1	1.580
SCI2	1.913
SCI3	1.541
SCR1	1.653
SCR2	2.164
SCR3	2.037
SCV1	1.329
SCV2	1.089
SCV3	1.304
SCE1	1.220
CLD_ (Z) x SCE_ (X1)	1.000
CLD_ (Z) x SCI_ (X2)	1.000
CLD_ (Z) x SCR_ (X3)	1.000

DATA Survey		Indicators							Copy to Excel/Word
Indicators	15	Name	α max	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness	Cramér-von Mises p value
Samples	50	SCE1	5.000	2.000	5.000	0.886	-0.755	-0.289	0.000
Missing values	0	SCE2	5.000	2.000	5.000	0.841	-0.087	-0.776	0.000
		SCE3	5.000	2.000	5.000	0.857	0.345	-0.912	0.000
● Indicators		SCI1	5.000	2.000	5.000	0.868	-0.917	-0.219	0.000
○ Correlations		SCI2	5.000	3.000	5.000	0.665	-0.736	-0.397	0.000
○ Data groups		SCI3	5.000	1.000	5.000	0.878	2.511	-1.369	0.000
○ Raw data		SCR1	5.000	2.000	5.000	0.849	-0.942	-0.481	0.000
		SCR2	5.000	3.000	5.000	0.671	-0.746	-0.451	0.000
		SCR3	5.000	3.000	5.000	0.671	-0.746	-0.451	0.000
		SCV1	5.000	1.000	5.000	1.032	-0.416	-0.174	0.000
		SCV2	5.000	3.000	5.000	0.656	-0.641	-0.553	0.000
		SCV3	5.000	1.000	5.000	0.991	-0.166	-0.507	0.000
		CLD1	5.000	1.000	5.000	0.997	1.283	-1.084	0.000

Path coefficients - Mean, STDEV, T values, p values

Copy to Excel

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
CLD_ (Z) -> SCV_ (Y)	0.339	0.355	0.184	1.844	0.033
CLD_ (Z) x SCE_ (X1) -> SCV_ (Y)	0.043	0.097	0.226	0.192	0.424
CLD_ (Z) x SCI_ (X2) -> SCV_ (Y)	-0.082	-0.071	0.291	0.281	0.389
CLD_ (Z) x SCR_ (X3) -> SCV_ (Y)	0.109	0.069	0.361	0.303	0.381
SCE_ (X1) -> SCV_ (Y)	0.117	0.133	0.176	0.666	0.253
SCI_ (X2) -> SCV_ (Y)	0.357	0.363	0.212	1.681	0.046
SCR_ (X3) -> SCV_ (Y)	0.078	0.071	0.254	0.307	0.380

APENDIX C.

Interview AHP with Expert:

With Mr Saul Tinambunan

Interviewer (Widi): Good afternoon, Mr. Saul.

Saul: Good afternoon, Mr. Widi.

Interviewer (Widi): So, for my research this time, the topic is "The Influence of Empowerment, Innovation, and Supply Chain Resilience Factor on Supply Chain Velocity with COVID Lockdown as the Moderating Factor: A Case Study at PT XYZ Indonesia."

Saul: Okay.

Interviewer (Widi): This is just the table of contents... Okay. Now, we already have the executive summary, Mr. Saul.

Saul: Uh-huh.

Interviewer (Widi): This research uses a quantitative method—Structural Equation Modeling, Partial Least Squares (SEM-PLS)—and will be supported by a qualitative Analytic Hierarchy Process (AHP). This expert judgment is to continue the qualitative AHP part. I need some help with that.

Saul: Okay.

Interviewer (Widi): From my quantitative research, it was found that out of the three variables—Supply Chain Empowerment, Innovation, and Resilience—Supply Chain Innovation is the most significant internal driver of velocity.

Interviewer (Widi): For velocity, I'm using the Cash Fill Rate as the benchmark, Mr. Saul.

Saul: Cash Fill Rate? Okay.

Interviewer (Widi): Yes, as the measure of velocity—the speed. From Supply Chain Innovation, we got 56.7%, which is quite high for driving Supply Chain Velocity.

Saul: Okay.

Interviewer (Widi): The next step is to measure the qualitative side.

Saul: Okay, I see.

Interviewer (Widi): Based on the available data, I've taken data from the last five years. For the Cash Fill Rate in Indonesia—specifically PT XYZ Indonesia—it's consistently around 99%.

Saul: Oh, I see.

Interviewer (Widi): It's consistent for us at XYZ in JHP. The average target is around 97.8%.

Saul: So that was during the 2019 to 2020 period?

Interviewer (Widi): This is the average, Mr. Saul... from the last five years. I have the data here.

Saul: Okay, okay. Yeah, that's fine.

Interviewer (Widi): This is the easiest way to see it.

Saul: Okay.

Interviewer (Widi): Yesterday, you also filled out the survey. Thank you for that, Mr. Saul.

Saul: You're welcome.

Interviewer (Widi): Now, here's the data. If we look at why this became my research gap... from previous research in 2019-2020, the global situation with the COVID lockdown had a huge impact.

Saul: Right.

Interviewer (Widi): But for Indonesia, if we look at the 2019 fiscal year, there was an impact at 96%—which is significant—but from 2020 onwards, we were able to hit the targets again.

Saul: Yeah, we adapted.

Interviewer (Widi): That's what we need to find out: what factors actually allowed PT XYZ Indonesia to recover? Especially when compared to other ASEAN countries like Thailand and the Philippines, where recovery was slower—they were below 98%.

Saul: Right.

Interviewer (Widi): This is what's interesting about Indonesia. Now, based on your experience, I've prepared a few questions.

Saul: Okay.

Interviewer (Widi): First, generally speaking, from an operational standpoint, which of the three factors—Empowerment, Innovation, or Resilience—is the most critical for increasing Velocity or the Cash Fill Rate?

Saul: Out of those three? Innovation, Empowerment, and what was the last one?

Interviewer (Widi): Resilience.

Saul: Should I pick one or how do you want me to answer, Mr. Widi?

Interviewer (Widi): Well, in the AHP method, we rank them. We determine which factor is the top priority down to the lowest.

Saul: Okay, okay. Before I answer, is the scope just for Indonesia or the whole of APAC?

Interviewer (Widi): Just for Indonesia, Mr. Saul.

Saul: Just Indonesia. Okay. If I look back to early 2020, when COVID first hit Indonesia—around March, if I recall—the thing I remember most is the supply chain disruption.

Interviewer (Widi): It was severe.

Saul: Yes, supply chain disruption started happening. First, from the demand side, customer patterns changed drastically and unexpectedly. For our business, the biggest highlight was our NCP (Nutrition & Consumer Product) category.

Interviewer (Widi): So, the volume spiked?

Saul: Exactly. Volume spiked so much that our warehouses were empty. Not a single carton was left to meet that sudden, massive shift in customer demand.

Speaker 1 (Saul): Yes, so demand suddenly spiked because of COVID. They were in need of an agent or a product to help prevent the spread of the COVID virus. In our line—I mean in our products—that was the disinfectant type, which is Bayclin. For Baygon and others, I think the impact was secondary; as a "family" brand, those are always around, and their fluctuations weren't that significant. But I want to highlight that our biggest business was Bayclin; based on the table, our S-20 demand would likely drop.

Interviewer (Widi): I see. So, to answer the first question regarding velocity, it means demand really did increase, right?

Speaker 1: Demand increased because customer habits suddenly changed. What was previously used only for bleaching clothes or cleaning the kitchen suddenly became a primary need. Wherever they were active, there had to be Bayclin, for example. As a result, everything on the demand side became a mess.

Interviewer (Widi): Oh... so our case fill rate was "bleeding" (struggling) back then, Sir?

Speaker 1: It was bleeding. We couldn't supply. It was a sudden demand, and at that time we didn't expect it—we didn't know when COVID would happen; only God knows. We all reacted; the trigger was the drastic change in demand due to COVID. The demand for Bayclin had to be adjusted. Let's say the average requirement for one year was only one million cartons; suddenly with COVID, we needed two million—a 100% increase, double. To supply that need, it's impossible to do in just one or two days or even two weeks. Why? Because in the supply chain, many factors support that, especially the production line capacity, manpower, and the capacity of the packaging material suppliers. That made our response a real challenge.

Interviewer (Widi): Okay. Speaking of the response, let's dive deeper. Regarding my variables, I want to check on "empowerment." At that time, you were the supervisor, right, Mr. Saul?

Speaker 1: Correct, I was in charge of logistics.

Interviewer (Widi): So, regarding empowerment to mobilize that manpower, what were the decisions made at the supervisor or manager level?

Speaker 1: Well, for empowerment, our first focus was that we had to align with the procedures from our Safety Department.

Interviewer (Widi): Oh, Safety.

Speaker 1: Safety first. We also saw that during COVID, there were many government regulations that changed day-by-day or month-by-month based on the situation. For example, first there was a full lockdown, then partial lockdown, or PSBB—I forget all the names.

Interviewer (Widi): Yes, right, PPKM.

Speaker 1: There was PPKM and so on; essentially, it was layered and based on the conditions in Indonesia. After vaccines were available, for instance, a certain percentage was allowed to enter. But what I want to convey is that we were hesitant

at the time. So, we aligned with our stakeholder, which was Safety. We looked at what procedures were necessary if we wanted to operate at 100%.

Interviewer (Widi): Okay. Was that information provided transparently from your superiors down to the shop floor team?

Speaker 1: It was transparent. There was communication via email, and a Task Force in the form of a WhatsApp Group or formal meetings to ensure our Pulo Gadung site or factory didn't violate government rules for preventing the spread of COVID-19. I remember the simplest thing was that all employees had to use specific COVID PPE, like masks, and we segregated work areas. If a space usually held 10 people, we reduced it to maintain distance and avoid contact. We mapped out the people and had to provide them with understanding.

Speaker 1 (Continued): Regarding empowerment, we first aligned with the Safety Team. Secondly, within internal logistics, we ensured that the health of our team members was maintained. There were temperature checks, random checks, and tracking for close contacts. At that time, we could segregate them, put them on leave, or have them work from home; we did manpower mapping like that. Regarding nutrition, I recall logistics and manufacturing provided vitamins. So, we really helped empower them there—through clarity of procedures, providing the necessary facilities and PPE, and even providing extra milk and vitamins. We also assisted with checks through the clinic if anyone was suspected of being a close contact. I even remember we had independent testing with the clinic to check for exposure.

Interviewer (Widi): Oh, so during the COVID period regarding empowerment—because my hypothesis is that empowerment is...

Let's start again. So, that's it. Final question. Earlier, we mentioned that the Covid lockdown policy had a negative influence, right? It added a negative impact on supply chain velocity. Do you agree?

Saul: Yes, it definitely added another step or effort that we had to make just to stay operational.

Interviewer: Okay. Now, for the final part—the synthesis and conclusion. We were successful in the fiscal year; during Covid, it did drop by 1%, but after Covid, we were successful again. From the factors we discussed—Empowerment, Innovation, and Resilience—is there one that you think is the most important?

Saul: If I had to choose one, it would be Innovation.

Interviewer: Innovation. Okay. And the second?

Saul: The second would be Resilience. It's about how we can adapt and survive. Finally, Empowerment.

Interviewer: Why that order?

Saul: Innovation comes first because when a crisis hits, everyone is panicked. So We need to came out with solution. We need to see the alternative way them first—provide PPE, ensure food is available, and maintain clear communication. Once they are have solution, resilience follows, allowing them to adapt. Only then can we think about empowerment.

Interviewer: I see. Now, let's talk about the weighting for these criteria. Totaling 100%, how would you distribute the weight among these four factors? I'll use the "SCE" (Supply Chain Empowerment), "SCI" (Supply Chain Innovation),and "SCR" (Supply Chain Resilience), for the analysis.

Saul: I'm not sure I fully understand the axis here.

Interviewer: This is for the matrix analysis. For example, SCE against SCE will be 1. I need your professional weighting for the final analysis.

Saul: I see. If it's out of 100%:

Innovation: 40%

Resilience: 35%

Empowerment: 25%

Interviewer: Perfect. Now for the last question , if I have a matrix scale of relative importance between 3 factor the number is 1 until 9 , can you get the value from each correlation factor .

Saul : Ok

Interviewer : Ok first between SCE and SCI what is the most importance

Saul: Between them I choose SCI is strong importance

Interviewer: Ok so I put 5, and how about SCE and SCR what is the level of importance

Saul: Ok I choose SCR .

Interviewer: Ok, I put 5 also ya.

Saul: Ok

Interviewer: Ok lastly how about SCI and SCR

Saul: I choose SCI is moderate importance

Interviewer: Ok, how many value?

Saul: put 7 on them

Interviewer: Ok I put 7, so for last question before we closed .What is regarding the post-Covid era: How has this experience informed future strategies to handle similar systematic crises? If, heaven forbid, another crisis happens, what is the strategy?

Saul: First, we must create a Task Force for Crisis Management. That is vital. You need a single point of authority to provide clear directions on what to do and what not to do.

Interviewer: Like a "Crisis Decision Framework"?

Saul: Exactly. A crisis management team consisting of the Plant Manager, HR Director, Supply Chain Director, etc. Decisions must be made quickly, information must be clear, and the team executing it must understand their roles perfectly—who can come to the factory, who can't, and what the protocols are.

Interviewer: So, whether it's a war, another pandemic, or any systematic crisis, the strategy is to establish that management team immediately.

Saul: Yes, that is the core strategy.

Interviewer: Okay, Mr. Saul. Thank you so much for the interview today. Thank you for helping with my research. I hope PT XYZ's supply chain velocity continues to improve in the future. I'll close this now. Good afternoon.

Saul: You're welcome. Good afternoon.

With Mr. Yulianto Adi

Interviewer: Good afternoon, Mr. Yulianto Adi. Thank you for joining me. I would like to present my thesis: "The Influence of Empowerment, Innovation, and Supply Chain Resilience Factors on Supply Chain Velocity with COVID-19 Lockdown as a Moderating Factor: A Case Study of PT XYZ Indonesia (SC Johnson)."

Mr. Anto: Understood.

Interviewer: The background of this study is Supply Chain Velocity, which I measured using the Case Fill Rate (CFR). Looking back at the pandemic, previous studies showed significant impacts on supply chain performance. I want to see if this holds true for PT XYZ. I am analyzing how empowerment, innovation, and resilience influenced velocity, specifically during the COVID-19 period.

Research Methodology

Interviewer: I am using a hybrid process for this research:

Quantitative: Using statistical methods and data collected from questionnaires.

Qualitative: To provide a deeper "deep dive," I am using the Analytic Hierarchy Process (AHP) method.

Interviewer: To ensure the qualitative results are unbiased, I won't show the quantitative statistical results yet. Let's jump straight into the qualitative interview questions.

Interview: Impact of COVID-19 on Supply Chain Velocity

Interviewer: First, regarding Supply Chain Velocity. In your opinion, did COVID-19 affect the team's ability to maintain the Case Fill Rate in Indonesia?

Interviewer: Looking at the data from the last five years:

In 2019, we missed our target (96% vs. a target of 96.7%).

In 2020 and onwards, we managed to maintain an average of 99%.

Given this, did the pandemic actually have a negative impact on our speed and fill rate?

Mr. Anto: From a logistics perspective, the Case Fill Rate shouldn't be viewed solely as a logistics issue; it is heavily influenced by production.

Mr. Anto: During the pandemic, volume fluctuated, and we had to see how much we could fulfill. Interestingly, our loading process (logistics) wasn't heavily impacted. While there might have been slight changes in speed or productivity within a single shift, the overall ability to fulfill orders remained stable.

Interviewer: Good afternoon, Mr. Yulianto Adi. Thank you for joining me. I would like to present my thesis: "The Influence of Empowerment, Innovation, and Supply Chain Resilience Factors on Supply Chain Velocity with COVID-19 Lockdown as a Moderating Factor: A Case Study of PT XYZ Indonesia (SC Johnson)."

Mr. Anto: Understood.

Interviewer: The background of this study is Supply Chain Velocity, which I measured using the Case Fill Rate (CFR). Looking back at the pandemic, previous studies showed significant impacts on supply chain performance. I want to see if this holds true for PT XYZ. I am analyzing how empowerment, innovation, and resilience influenced velocity, specifically during the COVID-19 period.

Research Methodology

Interviewer: I am using a hybrid process for this research:

Quantitative: Using statistical methods and data collected from questionnaires.

Qualitative: To provide a deeper "deep dive," I am using the Analytic Hierarchy Process (AHP) method.

Interviewer: To ensure the qualitative results are unbiased, I won't show the quantitative statistical results yet. Let's jump straight into the qualitative interview questions.

Interview: Impact of COVID-19 on Supply Chain Velocity

Interviewer: First, regarding Supply Chain Velocity. In your opinion, did COVID-19 affect the team's ability to maintain the Case Fill Rate in Indonesia?

Interviewer: Looking at the data from the last five years:

In 2019, we missed our target (96% vs. a target of 96.7%).

In 2020 and onwards, we managed to maintain an average of 99%.

Given this, did the pandemic actually have a negative impact on our speed and fill rate?

Mr. Anto: From a logistics perspective, the Case Fill Rate shouldn't be viewed solely as a logistics issue; it is heavily influenced by production.

Mr. Anto: During the pandemic, volume fluctuated, and we had to see how much we could fulfill. Interestingly, our loading process (logistics) wasn't heavily impacted. While there might have been slight changes in speed or productivity within a single shift, the overall ability to fulfill orders remained stable.

Host: Alright, Pak Anto, let's move on to the innovation factor. During those restrictions, did you implement any digitalization? For instance, if you were short-staffed, were there any specific innovations or improvements made?

Mr. Anto: Regarding digitalization, there weren't major leaps at that time. However, we did innovate in how we distributed workload between teams. I was managing both the Surabaya and Pulo Gadung locations. Tragically, we lost a team member—a Finished Goods Supervisor in Surabaya—to COVID-19. To manage this, we monitored everything remotely from Pulo Gadung. While the physical work was

done by the floor team in Surabaya, the documentation and oversight were handled remotely by the Pulo Gadung team as a backup.

Host: So it was a remote backup system? And back then, you were still using SAP, right?

Mr. Anto: Exactly. That is what we did.

Host: What about logistical routes? Did you have to change routes if certain roads were blocked?

Mr. Anto : Here is the thing regarding "Route to Customer Delivery": when we faced issues with productivity or team availability, we would adjust our Distribution Center (DC) sourcing strategy. For example, if Customer A was normally serviced by the Surabaya DC, we might shift that fulfillment to Pulo Gadung.

Host: Even though shipping costs would be higher because of the distance?

Mr. Anto: Yes, but we could modify the source. In critical cases, that's what we did. It wasn't for every order, only when urgent. If we don't fulfill orders for "Modern Trade" (large retailers), we can face penalties for low "case fill rates". If they order 100 cartons and we only send 50, we get penalized.

Host: So you just had to calculate which cost was greater—the shipping or the penalty?

Mr. Anto: Precisely.

Host: Now for the third point: Resilience. If a tracking supplier had an issue, did you have a backup plan? Did you use dual sourcing for transporters?

Mr. Anto: Yes, we had a ranking and backup system for transporters for every "Ship-To" location. Because we had two sources (Surabaya and Pulo Gadung), each DC had its own backup transporters for every destination. For example, for shipments from Pulo Gadung to Palembang, we didn't rely on just one transporter. We had three to four backup transporters. If the first couldn't do it, we moved to the second, and so on. We could even switch modes—moving from land transport to sea freight if necessary.

Host: That's a solid backup plan. Lastly, regarding Lockdown Moderation. Did the restrictions limit your manpower or transportation capacity?

Mr. Anto: Definitely. In the beginning, we struggled to manage and adjust to the procedures. We had to follow two sets of rules: Government regulations and internal directions from SC Johnson. It was a struggle at first, but through encouragement, assistance, and collaboration between teams, we eventually stabilized and adapted. Beyond just adapting, we were constantly brainstorming new ideas to work within those limitations.

Pak Widi: ...There was a loss of productivity, output, and working hours, and so on. Right, Mas Anto?

Mr. Anto: Correct.

Pak Widi: So, in other words, during those times, as things progressed, there were innovations to maintain the Supply Chain Velocity, right? Innovations were continuously being made?

Mr. Anto: Exactly. Correct.

Pak Widi: Okay. Now, for the final part, Mas—regarding maintaining the CFR (Customer Fulfillment Rate). I'm going to do a weighted analysis here. So, the weights are like this... I'd like to get your perspective, Mas Anto. I need the weighting for these three factors: Empowerment, Innovation, and Resilience (SC-R)

Pak Widi: Out of a total of 100%, which one do you think is the most influential for maintaining the CFR? What should we prioritize the most? For context, SCI is Innovation, E is Empowerment, R is Resilience.

Mr. Anto: In my opinion, it's the Covid Lockdown that contributes the most to any limitations or activity restrictions within an industry.

Pak Widi: Oh, wait, not like that, Mas. What I mean is: Which factor is the most influential in maintaining our CFR so that it stays performant?

Mr. Anto: Oh, okay. To keep it maintained... In my opinion, first, we must Empower the people/resources. Second is Innovation.

Pak Widi: Okay. So, what percentage for Empowerment, Mas? From 100% total

Mr. Anto : I choose 40%

Pak Widi: Okay.

Mr. Anto: Once people are empowered and there is innovation, I believe Resilience will naturally follow.

Pak Widi: Right. So, what percentage for Innovation?

Mr. Anto: Around 35%.

Pak Widi: Ok, how about Resilience how many percent?

Mr. Anto: Yes, 25%.

Pak Widi: Okay, thank you, Mas Anto. I think that covers it. Now we come to the last question, if I have a matrix scale of relative importance between 3 factor the number is 1 until 9, can you get the value from each correlation factor.

Mr. Anto: Ok

Pak Widi : Ok first between SCE and SCI what is the most importance

Mr. Anto: Between them I choose SCE is importance with 4

Pak Widi: Ok so I put 4, and how about SCE and SCR what is the level of importance

Mr. Anto: Ok I choose SCE.

Pak Widi: Ok, I put 5 also ya.

Mr. Anto: Ok

Pak Widi: Ok lastly how about SCI and SCR

Mr. Anto: I choose SCI is importance

Pak Widi: Ok, how many value of priority?

Mr. Anto: put 5 on them

Pak Widi: Ok I put 5

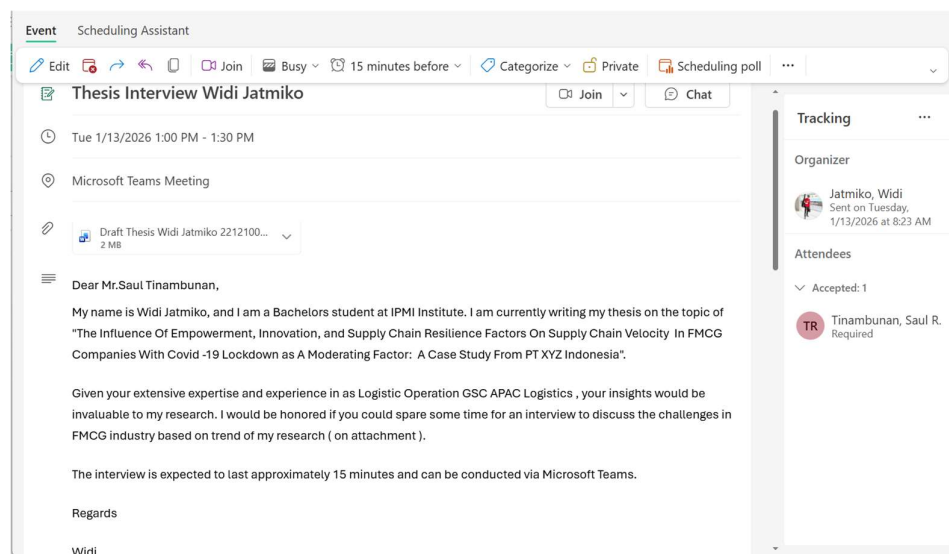
Oh, sorry, one last thing: How has this experience informed future strategy for handling similar situations in the future?

Mr. Anto: I feel we already have a very good procedure in place now for how to face a lockdown if it happens again. We have procedures from the perspective of the Indonesian Government and from the perspective of SC Johnson as a private company. We will use those. We've "learned by doing." We've gone through one cycle; if it happens again, we shouldn't struggle as much because the guidance is clear.

Pak Widi: Clear guidance. Alright, Mas Anto, thank you for this interview. It was very clear and much appreciated. See you later.

Mr. Anto: You're welcome, Pak Widi. Good afternoon.

APENDIX D. Invitation email for Expert Judgement:



Thesis Interview Widi jatmiko

Tue 1/13/2026 3:00 PM - 3:30 PM

Draft: Thesis Widi Jatmiko 2212100...
2 MB

Dear Mr. Adi Yulianto,

My name is Widi Jatmiko, and I am a Bachelors student at IPMI Institute. I am currently writing my thesis on the topic of "The Influence Of Empowerment, Innovation, and Supply Chain Resilience Factors On Supply Chain Velocity In FMCG Companies With Covid -19 Lockdown as A Moderating Factor: A Case Study From PT XYZ Indonesia".

Given your extensive expertise and experience in as Logistic Operation GSC APAC Logistics , your insights would be invaluable to my research. I would be honored if you could spare some time for an interview to discuss the challenges in FMCG industry based on trend of my research (on attachment).

The interview is expected to last approximately 15 minutes and can be conducted via Microsoft Teams.

Regards

Widi

Tracking

Organizer

Jatmiko, Widi

Sent on Tuesday,
1/13/2026 at 8:31 AM

Attendees

Accepted: 1

AY

Adi, Yulianto

Required

89

APENDIX E. Survey Google Form

THE INFLUENCE OF EMPOWERMENT, INNOVATION, AND SUPPLY CHAIN RESILIENCE FACTORS ON SUPPLY CHAIN VELOCITY IN FMCG COMPANIES WITH COVID-19 LOCKDOWN AS MODERATING FACTOR : A CASE STUDY PT XYZ INDONESIA

Kepada Yth.
Ibu, Bapak Pemangku Kepentingan
Di PT JOHNSON HOME HYGIENE PRODUCTS
Jakarta

Perkenalkan saya, Widi Jatmiko, mahasiswa program studi Administrasi Bisnis Program Sarjana, Kelas BBA Pro tahun 2022, sebagai peneliti.
Dalam rangka penyelesaian studi Program Sarjana, dalam konteks penyusunan skripsi Program Administrasi Bisnis Institut IPMI, peneliti saat ini melakukan penelitian skripsi yang berjudul "Pengaruh Faktor Pemberdayaan, Inovasi, dan Ketahanan Rantai Pasok Terhadap Kecepatan Rantai Pasok Pada Perusahaan FMCG Dengan Lockdown COVID-19 Sebagai Faktor Pemoderasi: Studi Kasus PT XYZ Indonesia" [The Influence of Empowerment, Innovation, and Supply Chain Resilience Factors on Supply Chain Speed in FMCG Companies with COVID-19 Lockdown as a Moderating Factor: A Case Study of PT XYZ Indonesia]. Penelitian ini merupakan syarat untuk mendapatkan gelar Sarjana Administrasi Bisnis Institut IPMI.
Seluruh jawaban akan dijaga kerahasiaannya dan hanya digunakan untuk kepentingan penelitian akademik.

Silakan memberikan tanggapan Anda sesuai dengan kondisi yang sebenarnya. Jawaban diberikan menggunakan skala Likert 1 sampai 5, dengan ketentuan berikut:
1 = Sangat Tidak Setuju / Strongly Disagree
2 = Tidak Setuju / Disagree
3 = Netral / Neutral
4 = Setuju / Agree
5 = Sangat Setuju / Strongly Agree

Atas partisipasi Ibu, Bapak dalam mengisi kuesioner ini, kami ucapkan banyak terima kasih. Semoga hasil penelitian ini dapat memberikan manfaat bagi kemajuan ilmu pengetahuan dan praktek manajemen.

* Menunjukkan pertanyaan yang wajib diisi

1. **Nama** [Name] *

2. **1. Apakah Anda seorang yang bekerja di level Manajerial di industri FMCG PT JHHP di Indonesia?** *

[Are you a Managerial level of supply chain FMCG Industries PT JHHP in Indonesia?]

Tandai satu oval saja.

☐ Yes / Ya

☐ No / Tidak

3. **2. Apakah Jurusan di Pendidikan Anda terkait dengan bisnis atau pekerjaan berhubungan di rantai pasokan?** [Is your Major related to bussiness or enrolled job on supply chain?]

Tandai satu oval saja.

☐ Yes / Ya

☐ No / Tidak

FMCG Industri definisi [Definition of FMCG] :

Adalah singkatan dari Fast Moving Consumer Goods, yaitu produk yang dibutuhkan sehari-hari, memiliki harga terjangkau, dan sangat cepat terjual karena sering dibeli oleh konsumen. [It is an abbreviation for Fast Moving Consumer Goods, namely products that are needed every day, have affordable prices, and sell very quickly because they are frequently purchased by consumers].

4. **3. Apakah Anda bekerja di industri FMCG?** [Are you work on FMCG Industry ?] *

Tandai satu oval saja.

☐ Yes / Ya

☐ No / Tidak

5. **4.Apa jenis kelaminmu?** [Whats your Gender]

Tandai satu oval saja.

- ☐ Laki laki [Man]
☐ Perempuan [Woman]

6. **5.Berapa lama Anda bekerja di peran Supply Chain?** [How long you are working *
in Supply chain role ?]

Tandai satu oval saja.

- ☐ Kurang dari 1 tahun [Less than 1 Year]
☐ Lebih dari 1 tahun [more than 1 year]

7. **6.Industri FMCG apa yang Anda bekerja sekarang?** [What Industri of FMCG do *
you work now?]

Centang semua yang sesuai.

- ☐ Pembasmi serangga [insecticide]
☐ Pemutih [bleach]
☐ Semir Sepatu [Shoe Polish]

8. **7.Tingkat pekerjaan apa yang Anda jalani sekarang di tingkat Manajerial rantai *
pasokan?** [What level of work do you work now at the Managerial level of supply
chain?]

Tandai satu oval saja.

- ☐ Staff / Operator
☐ Leader lini [Line Leaders]
☐ Supervisi [Supervisor]
☐ Manajer [Manager]
☐ Direktur [Director]

Pemberdayaan Rantai Pasok [Supply Chain Empowerment]

Memberdayakan karyawan dan mitra di seluruh rantai pasokan dapat menghasilkan pergerakan barang dan informasi yang lebih cepat dan efisien. [Empowering employees and partners across the supply chain can lead to faster and more efficient movement of goods and information]

9. A. Saya didorong untuk mengambil keputusan operasional tanpa menunggu persetujuan dari tingkat yang lebih tinggi. [I was encouraged to make operational decisions without waiting for higher-level approval] *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly agree

10. B. Informasi tentang gangguan pasokan dibagikan secara terbuka di seluruh departemen. [Information about supply disruptions was shared openly across departments] *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly Agree

11. C. Atasan saya mempercayai saya untuk mengambil tindakan korektif segera ketika menghadapi masalah logistik. [My supervisor trusted me to take immediate corrective actions when facing logistics problems]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly Agree

Inovasi Rantai Pasok [Supply Chain Innovation].

Menyederhanakan proses, meningkatkan efisiensi, dan meningkatkan kinerja secara keseluruhan.[Streamlining processes, improving efficiency, and enhancing overall performance].

12. A. Perusahaan saya menerapkan alat pelacakan digital atau analitik data untuk meningkatkan pengambilan keputusan secara real-time. [My company implemented digital tracking or data analytics tools to improve real-time decisions] *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly Agree

13. B. Kami mendesain ulang alur kerja atau rute untuk beradaptasi dengan pembatasan pengiriman baru. [We redesigned workflows or routes to adapt to new delivery restrictions]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly Agree

14. C. Kolaborasi lintas fungsi (misalnya, pemasaran-logistik) meningkat selama masa gangguan untuk menemukan solusi kreatif.[Cross-functional collaboration (e.g., marketing-logistics) increased during the disruption to find creative solutions]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly Agree

Ketahanan Rantai Pasok [Supply Chain Resilience].

Rantai pasokan yang tangguh lebih fleksibel dan gesit, artinya dapat dengan cepat beradaptasi dengan perubahan kondisi pasar dan permintaan pelanggan. Hal ini memungkinkan respons yang lebih cepat terhadap gangguan dan waktu penyelesaian yang lebih singkat dapat menghasilkan pergerakan barang dan informasi yang lebih cepat dan efisien. [Resilient supply chains are more flexible and agile, meaning they can quickly adapt to changing market conditions and customer demands. This allows for quicker responses to disruptions and a faster turnaround time can lead to faster and more efficient movement of goods and information].

15. A. Kami memiliki pemasok alternatif atau rencana cadangan untuk material-material penting. [We had alternative suppliers or backup plans for critical materials]. *

Tandai satu oval saja.

1 2 3 4 5
Sangat Tidak Setuju / Strongly Disagree Sangat Setuju / Strongly Agree

16. B. Tim kami dapat dengan cepat memprioritaskan ulang jadwal produksi atau pengiriman ketika terjadi gangguan. [Our teams could re-prioritize production or delivery schedules quickly when disruptions occurred]. *

Tandai satu oval saja.

1 2 3 4 5
Sangat Tidak Setuju / Strongly Disagree Sangat Setuju / Strongly Agree

17. C. Kami berkoordinasi erat dengan mitra logistik untuk memulihkan operasional setelah penghentian yang tidak terduga. [We coordinated closely with logistics partners to recover operations after unexpected shutdowns]. *

Tandai satu oval saja.

1 2 3 4 5
Sangat Tidak Setuju / Strongly Disagree Sangat Setuju / Strongly agree

Kecepatan Rantai Pasok [Supply Chain Velocity]

Ukuran seberapa cepat perusahaan dapat bereaksi terhadap permintaan, mengurangi biaya, dan meningkatkan kepuasan pelanggan. Rantai pasokan berkecepatan tinggi ditandai dengan proses yang efisien, pengurangan waktu tunggu, dan peningkatan daya tanggap. [a measure of how quickly a company can react to demand, reduce costs, and enhance customer satisfaction. A high-velocity supply chain is characterized by streamlined processes, reduced lead times, and increased responsiveness].

18. A. Waktu pemrosesan pesanan hingga pengiriman kami menurun dibandingkan sebelum gangguan. [Our order-to-delivery time decreased compared to before the disruptions]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly agree

19. B. Pesanan pelanggan dipenuhi dalam jangka waktu pengiriman yang dijanjikan. [Customer orders were fulfilled within promised delivery windows]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly agree

20. C. Alur informasi dari penjualan ke produksi menjadi lebih cepat selama masa gangguan. [Information flow from sales to production became faster during the disruptions]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree Sangat Setuju / Strongly Agree

Kebijakan Karantina Wilayah Covid-19 [Lock Down Covid-19 Policy].

Terlepas dari keterbatasan dan konsekuensi yang saling bertentangan, langkah-langkah tersebut, jika diterapkan sebagai strategi nasional, dianggap sebagai langkah yang tepat untuk mengatasi wabah Penyakit Coronavirus 19 (COVID-19) dengan cepat. [Despite their conflicting restrictions and consequences, they might offer when enforced as a national strategy, are deemed to be suggestive for a prompt conquer to the Coronavirus Disease-19 (COVID-19) outbreak].

21. A. **Kebijakan lockdown pemerintah mengurangi kapasitas transportasi dan ketersediaan pengemudi.** [Government lockdown policies reduce transportation capacity and driver availability]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree

22. B. **Selama lockdown Covid-19, saya masih bisa bekerja dari rumah.** [During Covid 19 lockdown I still can work from home.]. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree

23. C. **Perubahan peraturan karantina wilayah yang sering terjadi menciptakan ketidakpastian dalam perencanaan operasi pasokan.** Frequent changes to regional quarantine regulations create uncertainty in planning supply operations. *

Tandai satu oval saja.

1 2 3 4 5

Sangat Tidak Setuju / Strongly disagree

APENDIX F. Company Profile PT XYZ



PT XYZ

Pulogadung



Located at Jakarta Industrial Estate Pulogadung (JIEP national vital Object)



Built in 1981 (Bayer Agrochemicals), took over from PT Bayer Indonesia in Jan 2003



Technologies : Aerosol, Sachet, Tube, Liquid Electric, Gel, Liquid Bottle, Liquid Pouch, Tablet, Tube, Mat

SKUs : 102 SKUs

WH Capacity : 7,000 pallet position, average utilization 77%



Headcount : Permanent : 201, Contract : 150 (depend on volume)



Certified : ISO 9001: 2015, Halal , CPPKRTB, Gold flag SMK3, Proper Blue, The Best Sustainability Award by JIEP 2023, Zero GHG with REC, GPTW

People Demographic

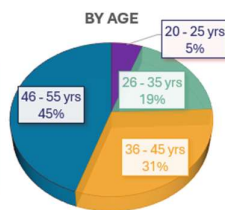
BY GENDER



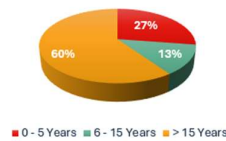
Male : 88%
Female : 12%

Great Place To Work®

BY AGE

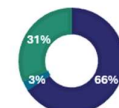


BY LENGTH OF SERVICE



0 - 5 Years 6 - 15 Years > 15 Years

BY EDUCATION LEVEL



High School Diploma University & Master



No matter the gender, LOS, education, or age, Pulogadung team are all **Superheroes** 😊