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Enhancing Indonesia's Supply Chain Competitiveness: Analysis of Key Horizontal Issues and Policy Recommendations in the Digital Transformation Era

1st Florentinus Pambudi Widiatmaka
Politeknik Ilmu Pelayaran Semarang
Semarang, Indonesia

2nd Suherman
Politeknik Ilmu Pelayaran Semarang
Semarang, Indonesia

3rd Pranyoto
Politeknik Ilmu Pelayaran Semarang
Semarang, Indonesia

4th Heri Sularno
Politeknik Ilmu Pelayaran Semarang
Semarang, Indonesia

5th Kundori
Universitas Maritim AMNI
Semarang, Indonesia
kundori.jaken@gmail.com

6th Sukrisno
Sekolah Tinggi Ilmu Ekonomi Parwisata
Semarang, Indonesia

***Abstract*— This research examines the challenges and opportunities in supply chain management in Indonesia, focusing on identifying Key Horizontal Issues (KHIs) and developing policy recommendations. Through analysis of primary and secondary sources, seven main KHIs were identified: standardization, regulatory framework, training and education, international agreements, incentives and funding schemes, reference bodies, and infrastructure. The research methodology involved expert consultations, workshops, and literature reviews to develop comprehensive policy recommendations. Results indicate the need for harmonization of standards and regulations, enhancement of workforce skills, supply chain-focused international agreements, incentive schemes for innovation, establishment of a national reference body, and development of infrastructure supporting future supply chains. Policy recommendations are grouped into six macro areas, encompassing regulatory, educational, international cooperation, funding, information, and infrastructure aspects. Implementation of these recommendations is expected to enhance the competitiveness and sustainability of Indonesia's supply chains in facing global challenges and digital transformation.**

Keywords*— *Indonesian Supply Chain, Key Horizontal Issues, Policy Recommendations, Global Competitiveness, Digital Transformation

I. INTRODUCTION

The field of supply chain management in Indonesia is beset with a multitude of intricate challenges, many of which have arisen in the context of the ongoing processes of globalization and digital transformation. Indonesia, the largest archipelago with a population of over 270 million, is confronted with significant transformations in social and consumer behavior, rapid technological advancement, environmental degradation, the depletion of natural resources and the consequences of climate change (Widiatmaka et al, 2024). This complexity is reflected in a range of economic sectors, including the palm oil industry and the food sector, particularly with regards to rice production. The palm oil industry, the largest contributor to Indonesia's exports, is confronted with challenges pertaining to the sustainability of its practices and the efficiency of its supply chain. Despite reaching a volume of 34 million tons by 2020, the palm oil industry continues to confront challenges related to land conflicts, deforestation, and fluctuations in global prices. Similarly, rice production in the country reached 54.65 million tons in 2020. However, disparities in distribution and infrastructure have resulted in significant regional price discrepancies. To identify horizontal issues (KHI) and develop relevant policy recommendations, a comprehensive approach is necessary, involving a variety of stakeholders.

Leading researchers from technology institutes and public universities in Indonesia have made significant contributions to the field of supply chain management. Prof. Dr. I Nyoman Pujawan (2017) from ITS has conducted significant research into supply chain collaboration, particularly the utilization of information technology in this context. While Dr. Togar M. Simatupang (2019) of ITB concentrated on sustainable supply chains, While Dr. Togar M. Simatupang (2019) of ITB concentrated on sustainable supply chains. Prof. Dr. Arief Daryanto (2018), from IPB, elucidated the challenges encountered by smallholders in the agribusiness supply chain. Furthermore, Prof. Dr. Mahendrawathi ER (2020) from ITS investigated the integration of technology in the supply chain of SMEs. Dr. Titi Candra Sunarti (2021) of UI made a contribution to the field of supply chain policy research.

The complexity of Indonesia's supply chains is exemplified by those associated with the palm oil industry and the food sector, with particular relevance to the latter's focus on rice. In the year 2020, exports of palm oil reached a volume of 34 million tons. However, this growth in exports has occurred in the context of ongoing challenges related to sustainability. Rice production reached 54.65 million tons in 2020, yet the distribution of this rice was not uniform. As a result of unequal distribution, disparities emerged in pricing.

To identify the key horizontal issues (KHI) and to develop policy recommendations, a comprehensive approach involving a range of stakeholders was undertaken. The

process entailed the collection of data, the organization of workshops and consultations with experts and relevant agencies. The principal obstacles include disparities in infrastructure and logistics costs reaching 24% of GDP by 2020, the integration of SMEs in global supply chains, resilience to disasters, limited technology adoption, and sustainability issues in the palm oil industry.

The development of evidence-based and comprehensive policy recommendations is essential to enhance Indonesia's competitiveness and ensure the sustainability of its supply chains. The formation of collaborative partnerships between government, academic, and industry entities is a crucial strategy for effectively addressing present challenges and capitalizing on prospective opportunities, with the aim of establishing a supply chain that is resilient, efficient, and sustainable in the long term.

II. METODHOLOGY

The objective of this research is to identify horizontal issues (KHI), and subsequently develop policy recommendations for supply chain management in Indonesia. To this end, we employ a qualitative methodology. The research employed a combination of primary and secondary source data collection methods.

The research team conducted a series of consultations and interviews with over 100 experts in the fields of industry, research institutions, and government agencies across three Indonesian cities (Jakarta, Surabaya, and Makassar) during the first semester of 2023. Secondary sources included documentation from a range of relevant organizations.

The data was analyzed in two stages. The initial stage of this research identified KHI as a cross-cutting issue that necessitates a stakeholder-based approach, engaging with stakeholders at the regional, national, and international levels. KHI is defined as a phenomenon that cannot be directly influenced by a single company or supply chain. The second phase of the research process involved formulating policy recommendations for each identified KHI.

The research methodology employed was expert elicitation, in accordance with the guidelines set forth by Morgan (2017) and the structure for formulating recommendations derived from the works of Morgan (2017), Doyle (2017), Copeland (2017), and the Organization for Economic Co-operation and Development (OECD, 2019). This approach was adapted to the context of Indonesia, the largest archipelago with a population of more than 270 million.

This study identifies KHI relevant to supply chain challenges in Indonesia, including disparities in infrastructure, integration of SMEs in global supply chains, resilience to natural disasters, technological adoption, and sustainability issues in strategic industries. The final outcome is a comprehensive set of policy recommendations based on a robust evidence base. These aim to enhance Indonesia's competitiveness and ensure the sustainability of its supply chains in the face of growing global competition.

III. DISCUSSION

A. Key Horizontal Issues

In the Indonesian context, seven key horizontal issues (KHI) that have the potential to impact upon the supply chain have been identified through an analysis of primary and secondary sources. The aforementioned KHIs comprise the following: standardization, the regulatory framework, training and educational initiatives, international agreements, incentives, and funding schemes, reference bodies, and infrastructure.

Standardization presents significant challenges in harmonizing process management standards and the regulatory framework between different regions. To enhance efficiency and competitiveness, it is essential to align these standards at the regional, national and international levels. The training and education sector should priorities the identification of novel competencies that facilitate the utilization of contemporary technological solutions and supply chain strategies.

It is imperative that Indonesia adopts a systemic approach to international agreements pertaining to the field of supply chain management, with a view to reducing the number of barriers currently impeding trade. The objective is to optimize operational processes and foster international collaboration. In order to facilitate the demonstration and trial of digital technologies within the context of the supply chain, incentive programmes and sources of funding must be established.

The creation of a specialized reference body which has been acknowledged internationally would facilitate the addressing of standards in the supply chain and the promotion of a standardized performance model.

Infrastructure development Integrated communications, energy, and logistics are the primary focus of efforts to facilitate the movement of goods across Indonesia.

The effective management of this KHI necessitates the involvement of multiple stakeholders, including the government, industry, academia, and other relevant parties. By addressing KHI holistically, Indonesia can enhance its competitiveness and resilience in an increasingly competitive global era.

B. *Guaranteed Standards and Legislation*

Such circumstances act as an obstacle to the integration and interoperability of both industry and digital logistics (Zimmermann et al., 2019). In order to overcome this issue, it is necessary for Indonesia to develop standards which facilitate the digital transformation of industry and market harmonization, while still taking the interests of the national government into consideration.

In the transportation sector, which constitutes a significant contributor to energy consumption and greenhouse gas emissions, the implementation of integrated policies that encourage the utilization of alternative modes of transportation, with a particular emphasis on multimodal transportation strategies (Lu, et al. 2016), is essential. Presently, disparities in equipment, infrastructure, administration, and regulations serve as considerable impediments. The establishment of incentives that encourage a balanced distribution of investment across all transportation

modalities is imperative. This should encompass the development of sea transportation, short-distance sea transportation, and railways. It is of the utmost importance to provide education and training to those who will constitute the future supply chains of tomorrow, given the pivotal role that supply chain managers play in the global economy. Supply chain management professionals are responsible for the entirety of the supply network, from the procurement of raw materials through to the delivery of finished products and services to end consumers (Kristiyanti et al, 2024, Min et al., 2019).

It is essential that those responsible for supply chains possess multidisciplinary skills in order to ensure the effective management of these networks and to guarantee the competitiveness of the companies in question. The importance of identifying the competencies required by supply chain professionals cannot be understated, particularly given the ever-changing technological and economic landscape that is constantly evolving. To guarantee the mapping of competencies, it is essential to establish a collaborative relationship with industry. (Raustiala, 2005).

The ongoing transformation of supply chain management, which encompasses a multitude of factors including sustainability, emerging technologies and digitalization, necessitates a constant process of realigning employee skills and competencies with the evolving requirements of the field (Ben-Ner and Siemsen 2017). This encompasses the development of skills, including creativity, the ability to think critically, and the capacity for sound decision-making. It also necessitates the cultivation of abilities to navigate structural alterations within the supply chain and to respond effectively to the growing intricacy of customer expectations.

Table 1: An Analysis of the Required Skills, Competencies and Policies for the Future Supply Chains in Indonesia. The following table sets out a number of skills, competencies and policies that will be required for future Indonesian supply chains.

Table 1: Skills, Competencies, and Policies for the Future Supply Chains in Indonesia of the Future in Indonesia

Category	Skills/Competencies	Policies to be Taken
Skills Personal	Decision making, analytical skills, leadership, teamwork, creativity, learning ability, critical thinking, change management change, conflict resolution, communication skills, cultural awareness/global citizenship, holistic supply chain thinking, consulting skills, diversified KPI management, corporate governance, cost management, evaluation bidding & supplier selection, demand forecasting, intellectual property, quality management, risk management	The objective is to develop an educational curriculum which is integrated with the needs of industry. This should include training programmes, professional certification programmes and the supply chain. It should also facilitate cooperation between industry and educational institutions for internship programmes and job training programmes.
Technology	The following areas of expertise are available: data analytics, human-machine interaction, automation, planning resources, company/material requirements, procurement IT systems, e-procurement technology, remote working, virtual technology planning, openness to new technologies, and new technology	Incentivising Technology Adoption in the Supply Chain Industry The provision of incentives for the adoption of technology in the supply chain industry is an effective means of facilitating the development of digital innovation centres and the training of supply chain technology personnel. International cooperation in this area is also beneficial The transfer of technology and knowledge is a process which requires careful consideration
Environment	The principles of the circular economy and the concept of the closed-loop supply chain, which encompasses knowledge of the carbon footprint and environmentally green production, green logistics, green procurement, green packaging and exposure to green accounting	It is recommended that regulations be established which encourage the practice of green supply chain management. Fiscal incentives should be provided for companies that implement

Category	Skills/Competencies	Policies to be Taken
		environmentally friendly practices in their supply chains. Furthermore, national standards for measurement and sustainability reporting in the supply chain should be developed
Configuration Supply Chain	The coexistence of two distinct supply chain features, namely lean (or efficient) and agile (or responsive), represents a novel approach to the formation of partnerships and contracts within this field. Additionally, there is a growing tendency to adopt global sourcing/acquisition strategies and to engage with suppliers at an earlier stage. This is occurring concurrently with the development of innovative sourcing approaches and procurement techniques, as well as collaborative innovation processes. Furthermore, new business models have emerged as a consequence of technological advancement. The coexistence of supply chain structures has also been observed. For instance, there is the emergence of structures designed for mass customisation, as well as small-scale home-based supply chains that facilitate mass customisation	It is recommended that encouragement be given to the formation of industry clusters in order to facilitate collaboration and innovation. In order to support business models, partnerships and the supply chain, a supportive legal framework should be developed. Support should be provided for SMEs in integrating themselves into global supply chains. Finally, a mentoring programme between large companies and SMEs should be facilitated for the transfer of knowledge and best practices

The source is as follows: a study conducted by researcher in 2024

The implementation of these policies by the Indonesian government will facilitate the development of the skills and competencies required for the Future supply chain improvements will enhance the competitiveness of the national industry, while also equipping the workforce with the requisite digital skills and global mindset to navigate the challenges of the digital era and the increasing globalization of trade.

C. Drafting of International Agreements

It is frequently observed that international trade agreements are deficient in terms of their comprehensive approach. Consequently, it is imperative that such agreements be updated to address the impact of digitalization and urban production. It is imperative that Indonesia priorities the advancement of agreements that holistically encompass the supply chain, encompassing trade concerns, infrastructure, and environmental considerations.

It is incumbent upon the government to assume an active role within the negotiating process, with a view to advancing the interests of the nation and of the industry in question. It is necessary to conclude bilateral and multilateral agreements with the objective of promoting research, dissemination and education on supply chains. Indonesia has the potential to establish locally-driven initiatives, drawing upon existing global networks as a point of reference. The agreement should encompass the following domains: scientific, managerial, industrial, and policy-related areas pertinent to the supply chain.

Table 2: Policy Recommendations for International Supply Chain Agreements a Case Study of Indonesia's Supply Chain

Recommendation Policy	Key Issues	Action to be Taken
It is recommended that bilateral and multilateral agreements be promoted with a supply chain perspective. A supply chain perspective is a comprehensive approach to analysing and improving the flow of goods and services from raw material to final	a lack of perspective at the systemic level with regard to the supply chain as a whole, as well as an absence of a systemic perspective on existing agreements in this area, has resulted in companies continuing to experience difficulties in the course of their operations	A comprehensive analysis must be undertaken to identify the discrepancies between existing supply chain agreements and the requirements of those involved in the chain. In order to achieve this, a panel of experts representing

Recommendation Policy	Key Issues	Action to be Taken
customer in a supply chain		various sectors, including industry, science and the law, should be established. This panel would be overseen by the Indonesian government. Following this, the priority interventions for international agreements must be determined, focusing on those that address dimensions, actors and strategies relevant to the supply chain. Initiatives must be identified and implemented to facilitate collaboration between countries, including bilateral and multilateral collaboration between Indonesia and other countries on priorities that have been identified
It is recommended that a research and development (R&D) network be established to advance and disseminate knowledge related to supply chain management.	In light of the increasingly globalised supply chain, it is imperative that international agreements are forged in order to facilitate enhanced collaboration with research and education institutions outside Indonesia.	The formulation of international agreements is a crucial step in the establishment of a network. These agreements must have the objective of fostering collaboration between research and education institutions within Indonesia and abroad. This will enable the creation of networks that address pertinent issues, such as those related to supply chains. The Indonesian government should allocate financial resources and explore opportunities for innovation or the utilisation of existing facilities and initiatives. It is essential to involve the higher education sector, the government, and the private sector in the creation of these networks and institutions. They should be tasked with delivering targeted activities within the supply chain. It is vital to monitor and evaluate the impact of these collaborative efforts.

source: Researcher's Study 2024

By implementing the aforementioned policy recommendations, Indonesia can strengthen its position in global supply chains while also encouraging innovation and international collaboration with regard to the development of efficient and sustainable supply chains.

D. Support and Incentive Schemes and Funding

Incentive and funding schemes are of great importance in encouraging the demonstration and implementation of technology in Indonesia. Presently, a paucity of consensus persists regarding the delineation of optimal supply chain practices. Additionally, the prevailing scarcity of knowledge-sharing among enterprises contributes to a continued deficiency in this domain. It is essential to allocate the necessary financial resources to facilitate the integration of public and private sector initiatives accelerate the improvement of national supply chains (Haon et al. 2015). It is imperative that Indonesia develops a research and technology development framework that is tailored to the local context, in a manner analogous to that of Horizon Europe.

The objective of the programme is to facilitate enhanced collaboration between academia and industry with a view to the development of strategic technologies and technology in general. The primary challenges are the lack of follow-up on strategic projects, which results in the underutilization of their outcomes. A systematic mechanism is necessary to guarantee the comprehensive utilization of project outcomes (Savelsbergh and van Woensel, 2016).

The adoption of best practices in supply chain management should be encouraged through the implementation of a unified framework that can be applied across various sectors. The determination of KPIs for the supply chain is of significant importance in order to recognise best practices and priorities aspects such as sustainability.

The establishment of networks is required in order to encourage the development of innovative financing mechanisms and the advancement of inclusive market development. The establishment of venture capital, led by a public-private partnership, will facilitate the generation of the next revolutionary innovation by sharing the financial risk between government and industry

Table 3: Policy Recommendations for Incentive and Funding Schemes Indonesian Supply Chain

Recommendation Policy	Key Issues	Action to be Taken
Increase collaboration based on the results of national projects	A lack of visibility has been identified with regard to the project results and the collaboration between the various segments. It is necessary to obtain additional financial resources to enable the implementation of large-scale projects	It is recommended that the existing collaboration mechanisms be identified and evaluated in order to ascertain their efficacy and potential for enhancement. The allocation of funding for trials and large-scale applications of the results of previous projects should also be encouraged. Furthermore, the visibility, communication, and transfer of project results should be increased in order to facilitate the benefit of new initiatives in the supply chain sector
Establish award to support and spread best practices in the supply chain	There is no universally accepted definition of supply chain best practices. The lack of a standardised definition is a challenge for all stakeholders. The distribution and implementation of optimal methodologies remains an area of deficiency	The creation of incentives for the advancement and dissemination of optimal methodologies is a crucial aspect of this process. Furthermore, the establishment of precise key performance indicators (KPIs) at the national level is essential for benchmarking and monitoring progress. The definition of best practices is also a fundamental element in this endeavour In the context of the Indonesian supply chain, it is of paramount importance to guarantee the availability of effective communication tools that facilitate the dissemination of knowledge and the

Recommendation Policy	Key Issues	Action to be Taken
		implementation of optimal practices in other sectors
The formation of collaborative relationships between public and private entities is a crucial step towards achieving optimal resource utilisation. The involvement of the private sector in providing financial backing represents a significant aspect of this endeavour	In the majority of instances, supply chain partners do not participate in the prioritisation process undertaken by original equipment manufacturers (OEMs). Such prioritisation may be conducted by entities operating in either the public or private sector	In order to establish structures of engagement and partnerships with stakeholders, it is essential to put together a consortium. This will facilitate the allocation of national catalyst funding, which can be used to support intensive micro, small and medium-sized enterprises (MSMEs). These businesses often face difficulties in accessing suitable financing instruments and innovation financing instruments, which can be developed in a transparent and fair manner. In addition, the evaluation process itself should be clear and transparent, involving expert juries and reporting structures

source: Researcher's Study 2024

The implementation of these policy recommendations will facilitate the improvement of the effectiveness of incentive schemes and funding schemes, which in turn will serve to encourage innovation and the development of stronger, more sustainable supply chains

E. Promotion of Agencies

Reference Bodies for Supply Chain. To address this, it is proposed that a national supply chain observatory should be established as a knowledge center with the objective of facilitating data access and encouraging information exchange (Agatz et al., 2012). The infrastructure is a crucial area of focus due to the rise in traffic volume, growth in e-commerce, and the rapid expansion of delivery services, which have collectively resulted in congestion and pollution (Haon et al., 2015, Dian et al, 2022). Proposed solutions include infrastructure development, the introduction of charging infrastructure for electric vehicles, the integration of low-emission zones, and the transformation of open space into centralised hubs for package delivery (Standing et al., 2019).

The development of 5G infrastructure has the potential to improve system integration and facilitate the sharing of information (Clausen et al., 2016). The collation and analysis of real-time data can facilitate enhanced route and traffic flow planning (Bagloee et al. 2016). The integration of autonomous vehicles (AVs) represents an essential element in this regard. The advent of autonomous vehicles (AVs) has the potential to reduce the number of cars on the road and the congestion and parking demand that they generate (Beirigo et al., 2018). Multi-purpose autonomous vehicle (AV) fleets with the ability to transport both goods and passengers concurrently have been identified as a potential means of enhancing the sustainability of urban logistics (Joerss et al., 2016).

Table 4: Policy Recommendations for Reference Agencies and Infrastructure Indonesia's Supply Chain

Recommendation Policy	Key Issues	Action to be Taken
National Supply Chain Observatory created	The retrieval of information and knowledge pertaining to the intricacies of the supply chain is a challenging endeavour. The absence of effective communication and application of best practices is also evident	The objective is to develop and establish an observatory that will facilitate the collection, analysis and dissemination of data related to the supply chains that underpin national economies. The focus of the observatory will be on a holistic, integrated perspective that encompasses not only the technological infrastructure that underlies supply chains, but also the networks of

Recommendation Policy	Key Issues	Action to be Taken
		businesses and other entities that contribute to and depend upon those chains. In-depth analysis of the trends that shape national supply chain networks will enable a greater understanding of the potential for benchmarking and the sharing of knowledge across different sectors. The identification of future trends and the definition of roadmaps and research priorities will inform the development of strategies to enhance the resilience and efficiency of national economies.
Developing infrastructure for the supply chain of the future	The growth in traffic volume and the expansion of e-commerce have contributed to an increase in demand for quick delivery, which has in turn led to congestion and pollution	The development of infrastructure for electric vehicles includes the charging infrastructure necessary to support their use. Additionally, standards and regulations for low emission zones must be harmonised, as must the transformation of open storage facilities into package centres or micro depots. Furthermore, the development of robust infrastructure in rural and small town areas must be facilitated, as must the encouragement of data sharing between local businesses and government through secure IT infrastructure. Finally, the preparation of infrastructure must also be considered to support vehicle development autonomous

`Source: A study conducted by researchers in 2024

The implementation of this policy recommendation would enable Indonesia to enhance the efficiency and sustainability of its supply chain, thereby preparing it for the challenges of urban logistics in the future

CONCLUSION

The competitiveness of Indonesia's supply chain is contingent upon a multitude of factors and the involvement of numerous stakeholders. The following key horizontal issues (KHI) affect both the supply side and the demand side of policy-making, which in turn shapes the framework for the adoption and implementation of new measures designed to improve supply chain competitiveness.

The recommendations that can be made in this area can be grouped in several macro areas:

a. Ensuring appropriate standards and legislation
b. Educating and training professionals for the supply chain of the future
c. Establishing international agreements
d. Supporting and encouraging incentive and funding schemes
e. Promoting an international reference
f. Building infrastructure to drive the future supply chain

The recommendations are designed to provide a balanced, comprehensive and achievable framework, which can be implemented through collaborative action between

public and private bodies. Formulation Furthermore, these recommendations have been developed in accordance with the fundamental principles of Indonesia's national research and innovation programme.

The new work programme should be aligned with the vision of attaining a sustainable, equitable and prosperous future for humanity and the planet, in accordance with the values espoused by Indonesia. This vision should be consistent with the seventeen Sustainable Development Goals (SDGs) put forth by the United Nations. The principal objectives of the programme can be enumerated as follows:

a. The strengthening of Indonesia's scientific and technological base
b. The improvement of innovation capacity, competitiveness, and Indonesia's employment
c. The fulfilment of citizen priorities and the maintenance of socioeconomic models and value systems

It is evident that policy recommendations can make a substantial contribution to three main pillars.

a. The first of these is Pillar 1, which pertains to the excellence of scientific endeavours. The objective is to reinforce and extend the quality of the scientific foundation in Indonesia.
b. Pillar 2 - Addressing global challenges and enhancing Indonesia's industrial competitiveness: The promotion of key technologies and solutions that support Indonesia's policies and Sustainable Development Goals is a further objective.
c. Pillar 3 - An Innovative Indonesia: The stimulation of breakthroughs that create markets and ecosystems conducive to innovation

REFERENCES

[1] Agatz N, Erera A, Savelsbergh M, Wang X (2012)

[2] Optimization for dynamic ride- sharing: a review. Eur J Oper Res 223(2):295–303

[3] Bagloee SA, Tavana M, Asadi M, Oliver T (2016) Autonomous vehicles: challenges, opportunities, and future implications for transportation policies. J Mod Transp 24(4):284–303

[4] Beirigo BA, Schulte F, Negenborn RR (2018) Integrating people and freight transportation using shared autonomous vehicles with compartments. IFAC- PapersOnLine 51(9):392–397

[5] Ben-Ner A, Siemsen E (2017) Decentralization and localization of production: the organizational and economic consequences of additive manufacturing (3D printing). Calif Manag Rev 59(2):5–23.https://doi.org/10.1177/0008125 617695284

[6] Clausen U, Stütz S, Bernsmann A, Heinrichmeyer H (2016) ZF-Zukunftsstudie. Die letzte Meile. Hg. v. ZF Friedrichshain AG. Fraunhofer IML Copeland E (2017) How to write policy recommendations that influence government. Available at: http://eddiecopeland.me/how- to-write-recommendations-that-change-government- policy/

[7] Dian, W., Pambudi, W., Leonardus, S., Sukrisno, S., & Kundori, K. (2022). The mediating role of environmental sustainability between green human resources management, green supply chain, and green business: A conceptual model. Uncertain Supply Chain Management, 10(3), 933-946.

[8] Doyle S (2017) Writing for government and the public sector. Available at: https://web.uvic.ca/~sdoyle/E302/index.html

[9] ER, M., & Wardati, N. K. (2020).The Impact of Social Media Functionality and Strategy Alignment to Small and Medium Enterprises (SMEs) Performance: A Case Study in Garment SME in East Java. Asia Pacific Journal of Information Systems, 30(3), 568–589. https://doi.org/10.14329/apjis. 2020.30.3.568

[10] Haon S, Monzon A, Berger A, Caux D, Liesa F, Lu M et al (2015) Urban freight. Research & innovation roadmap. Hg. v. alice und Ertrac. Available at: http://www.etp- logistics.eu/wp-con tent/uploads/2015/08/W56mayokopie.pdf

[11] Indrawan, D., Rich, K. M., van Horne, P., Daryanto, A., & Hogeveen, H. (2018). Linking supply chain governance and biosecurity in the context of HPAI control in western java: A value chain perspective. Frontiers in Veterinary Science, 5(MAY), 1–12. https://doi.org/10.3389/fvets.2018.00094

[12] Joerss M, Schröder J, Neuhaus F, Klink C, Mann F (2016) Parcel delivery. The future of last mile. Hg. v. McKinsey&Company. Available at: https://www.mckinsey.com/de/~/media/McKinsey/Locations/Europe%20and%20Middle%20East/Deutschland/News/Presse/2016/2016- 09-09/2016_the_future_of_last_m ile.ashx

[13] Komoditi, P., Andanu, O., & Udin, F. (2021). Strategi Peningkatan Kualitas Produk Dalam Rantai Pasok Komoditi Pisang Di Provinsi Bengkulu. Jurnal Teknologi Industri Pertanian, 31(2), 220–231. https://doi.org/10.24961/j.tek.ind.pert.2021.31.2.220

[14] Lu Y, Morris KC, Frechette S (2016) Current standards landscape for smart manufacturing systems. Natl Inst Stand Technol NISTIR 8107:39

[15] Kristiyanti, M., Rosita, N., Hermawati, R., Khamdilah, A., Kundori, K., & Mawardi, K. (2024). Logistics digitalization on import document activities: Electronic delivery orders and service quality in maritime ports. International Journal of Data and Network Science, 8(1), 227-234.

[16] Min S, Zacharia ZG, Smith CD (2019) Defining supply chain management: in the past, present, and future. J Bus Logist 40:44–55

[17] Morgan G (2017) Theory and practice in policy analysis— including applications in science and technology. https://doi.org/10.1017/97813 16882665

[18] Organisation for Economic Co- operation and Development (OECD) (2019) Policy briefs by topic. Available at: https://www.oecd.org/policy-briefs/bytopic/

[19] Pujawan, I. N., & Er, M. (2017). Supply Chain Management Edisi 3. Penerbit Andi. https://books.google.co.id/boo ks?id=V-wNEQAAQBAJ

[20] Raustiala K (2005) Form and substance in international agreements. Am J Int Law 99(3):581–614 Savelsbergh M, van Woensel T (2016) City logistics: challenges and opportunities. Transp Sci 50(2):579–590

[21] Simatupang, T. M. (2013). Logistics and Supply Emerging Practices. School of Business & Management Institut Teknologi Bandung.

[22] Savelsbergh M, van Woensel T (2016) City logistics: challenges and opportunities. Transp Sci 50(2):579–590

[23] Standing C, Standing S, Biermann S (2019) The implications of the sharing economy for transport. Transp Rev 39(2):226–242

[24] Widiatmaka, F. P., Prasetyo, A. N., Suherman, S., Sularno, H., Cahyadi, T., Pranyoto, P., ... & Sukrisno, S. (2024). Quality of Transportation Infrastructure and Trade Facilities: Opportunities and Challenges in Increasing Trade and Economic Productivity. TransNav, International Journal on Marine Navigation and Safety od Sea Transportation, 18(3), 521-528.

[25] Zimmermann R, Ferreira LMD, Moreira AC (2019) Strategic fit between innovation strategies and supply chain strategies: a conceptual study. Int J Value Chain Manag 10(3):258–2