

World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

World Maritime University Dissertations

Dissertations

10-31-2022

Relationship between hinterland connectivity with logistics performance: a case of Sarawak, Malaysia

Nur Haziqah Binti Japar

Follow this and additional works at: https://commons.wmu.se/all_dissertations



Part of the [International Trade Law Commons](#), and the [Transportation Commons](#)

Recommended Citation

Nur Haziqah Binti Japar, "Relationship between hinterland connectivity with logistics performance: a case of Sarawak, Malaysia" (2022). *World Maritime University Dissertations*. 2114.
https://commons.wmu.se/all_dissertations/2114

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.

WORLD MARITIME UNIVERSITY

Malmö, Sweden

**Relationship between Hinterland Connectivity with Logistics
Performance: A Case of Sarawak, Malaysia.**

By

NUR HAZIQAH BINTI JAPAR

A dissertation submitted to the World Maritime University in partial
fulfilment of the requirements for the reward of the degree of.

MASTER OF SCIENCE

in

MARITIME AFFAIRS

(SHIPPING MANAGEMENT AND LOGISTICS)

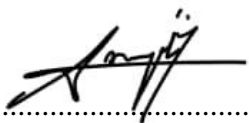
2022

Copyright Nur Haziqah Binti Japar, 2022

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): 

(Date): 19th September 2022

Supervised by: Prof. Dong-Wook Song

Supervisor's affiliation: Head, Shipping and Port Management

Acknowledgement

الرَّحِيمِ الرَّحْمَنِ اللَّهُ بِسْمِ

In the name of Allah S.W.T, the Most Gracious, Most Merciful

Alhamdulillah, praises to Allah S.W.T for giving me this *rizq*, patience and strength in completing this dissertation.

I would like to express my deepest appreciation to Yayasan Sarawak for granting me this opportunity and trust to pursue my MSc at the prestige World Maritime University.

I am deeply indebted to my parents, Japar Bin Hashim and Zuraini Binti Seruji who have sacrificed their comfort for raising me and my cousins from a low-class family and ensuring that we received the best level of education. My parents have been giving me full trust, along with their endless prayers and hope. You are my support, inspiration, and love that helps me pass the challenges and obstacles during my studies.

To my beloved, one and only little brother, Muhammad Haziq Al Harith Japar Bin Abdullah, throughout your growth, I have always been away either working or studying, but you are always in my mind and heart. I hope to portray the best example that you could look up to everyday.

To my friends and chosen family in WMU, I never thought that I could create such comradery and kinship with you. Coming from different countries, cultures and backgrounds, the friendship we built has been based on acceptance, tolerance and compassion for one another. I truly appreciate your friendship. What a fond memory to carry home and along with me, forever.

Last but definitely not least, the completion of this study could not be possible without the consistent guidance from my Supervisor, Prof. Dong-Wook Song. I am truly honored to be selected as his student and supervisee.

Abstract

Title of Dissertation: **Relationship between Hinterland Connectivity with Logistics Performance: A Case of Sarawak, Malaysia**

Degree: **Master of Science**

The dissertation focused on the relationship between Hinterland Connectivity with the Logistics Performance in the general overview in Malaysia and later use Sarawak as a specific case study. In the process, the dissertation highlighted the economic condition, future outlook of the state as well as the limitation that took place during the logistical operations. Sarawak, Malaysia which is the other half island of Malaysia is located in Borneo Island shares the land with two other countries which are Indonesia and Brunei Darussalam. The export and import activities in Sarawak with the neighbouring countries and the Peninsular Malaysia is relatively consistent mainly due to dependability on commodity supplies and the strong relationship.

The dissertation believed that there are more sub-aspects to hinterland connectivity is which it is not solely on developing road for connection but also on how well does other infrastructure along the hinterland contributes to logistics performance. It incorporates the complements of key players of logistics to better understand the complexity of logistics in general.

In completion of achieving the objectives of this dissertation, strategies are suggested that would enable the state and stakeholders to enhance the logistics performance from various perspective such as investment, and regulatory framework by inclusiveness with local and international stakeholders and delivering added-value services. These strategies could bring benefits not just to Sarawak as a state but also to Malaysia and its neighbouring countries.

KEYWORDS: Hinterland Connectivity, Infrastructure, Logistics Performance

Table of Contents

Declaration.....	i
Acknowledgement	ii
Abstract.....	iii
List of Tables	vi
List of Figures	vii
List of Abbreviations	viii
Chapter 1: Introduction.....	1
1.1 Background	1
1.2 Problem Identification.....	2
1.3 Objective	3
1.4 Dissertation Structure.....	4
Chapter 2: Literature Review- Overview of Malaysia Logistics Performance and Hinterland Connectivity.....	7
2.1 Introduction	7
2.2 Description of Logistics Performance Index (LPI)	8
2.3 Overview on Malaysia Logistics.....	11
2.4 Description of Hinterland Connectivity	13
2.5 Overview on Sarawak Hinterland Connectivity.....	14
2.5.1 Sarawak- West Kalimantan’s Economic Transformation	16
2.5.2 Sarawak- Brunei Darussalam’s Economic Transformation	16
2.6 Sarawak Future Outlook.....	17
2.7 Hinterland Connectivity Challenges	19
2.7.1 Geographical Location	19
2.7.2 Dependence on International Import outside of Borneo.	20
2.7.3 Lack of IT Infrastructure	20
2.7.4 Limited Infrastructure for Cross-Bordering	21
2.7.5 Poor Coordination.....	21
2.7.6 Overlapping Regulation.....	22
2.7.7 Illegal Transportation or Activities.....	23
2.8 Summary	23
Chapter 3: Introduction of Concepts.....	25

3.1 Introduction	25
3.2 Concept of Logistics Performance Index (LPI)	28
3.3 Concept of Hinterland Connectivity: The Functional & Geographical Integration of Value Chains	30
3.4 Summary	33
Chapter 4: Application of Conceptual Framework	34
4.1 Introduction	34
4.2 Functions of Hinterland in Logistics Performance	34
4.3 Regulation as the Pillar of Hinterland-Logistics Performance.....	36
4.4 Conceptual Framework- Hinterland Analysis.....	37
4.5 Summary	38
Chapter 5: Research Methodology.....	39
5.1 Case Study Design	40
5.2 Developing Conceptual Framework.....	41
5.3 Data Collection.....	42
5.4 Procedure and Design of the Research.....	42
5.5 Limitation of Data Collection and Methodology	42
Chapter 6: Discussion and Suggestion.....	44
6.1 Introduction	44
6.2 Suggestion	45
6.2.1 Attract and Gain Investment.....	45
6.2.2 Strengthening the Common Ground: Institutional and Regulatory Framework	46
6.2.3 Inclusiveness of Stakeholders.....	47
6.2.4 Value-Added Services in Logistics.....	48
6.2.5 Allocation of resources on IT and Infrastructure.....	49
6.3 Integrated Framework	49
6.4 Summary	50
Chapter 7: Conclusion.....	52
References.....	53

List of Tables

Table 1: Fundamental Strategic Objective in Trade Infrastructure	35
Table 2: Break down of methods and sources	40

List of Figures

Figure 1: Research Structure.....	6
Figure 2: Malaysia 2018 LPI Index	9
Figure 3:Pan Borneo Highway.....	18
Figure 4:Key Components in Logistics	26
Figure 5:LPI Concept- Infrastructure Component	29
Figure 6:Integration of Hinterland in Logistics Process	31
Figure 7:Conceptual Framework of Hinterland Connectivity Analysis	37
Figure 8:Research Design and Process	39
Figure 9:Integrated Framework	50

List of Abbreviations

AEC	ASEAN Economic Community
ASEAN	Association of Southeast Asian Nations
CEIC	Census and Economic Information Center
EPU	Economic Planning Unit
GDP	Gross Domestic Product
IMT-GT	Indonesia-Thailand-Malaysia Growth Triangle
LPI	Logistics Performance Index
MCO	Movement Control Order
MFA	Ministry of Foreign Affairs
MIDA	Malaysian Investment Development Authority
MITI	Ministry of International Trade and Trade
MOT	Malaysia Ministry of Transport
OECD	Organization for Economic Cooperation and Development
SCORE	Sarawak Corridor of Renewable Energy

Chapter 1: Introduction

1.1 Background

Malaysia has shown to acquire significant achievement whereby its services sectors projected as the major contributors to the country's growth with approximately 36.5% (Ministry of Finance Malaysia, 2022). In reference to the World Bank in year 2018, Malaysia ranked 41 out of 166 countries. Logistics is the basis of the supply chain globally. In Malaysia, the logistics has been acknowledged as the main contributor to the country's gross domestic product (GDP), thus making the performance of the logistics a critical criterion. Along with, in year 2020, Sarawak came third as the main economic contributor in Malaysia among 13 states.

Sarawak is viewed as part of Borneo Island which shares geographical land with three different countries which are Malaysia, Indonesia and Brunei Darussalam. Sarawak is a land area covering approximately 124,451 km² or around 1.7 times bigger compared to the size of West Kalimantan. The wide strength of Sarawak makes up to 37.5% of whole Malaysia's land area. Subsequent to that, Bloomberg (2021) states that Indonesia will move its capital Jakarta to the Kalimantan, Borneo by the year 2024. Hence, the capital of Indonesia will be in the same land of Sarawak, Malaysia.

With that being said, there is a high potential of increase in international supply and demand, transaction of goods and services taken place across the two or more national borders. Henceforward, putting Sarawak as the focused topic, as Sarawak is connected with Indonesia (Kalimantan) and Brunei Darussalam by land, the quality of cross-border or hinterland transaction would bring a significant implication in international trade.

This paper will essentially discuss the relationship of hinterland connectivity with logistics performance in Sarawak with the direct and indirect benefits that these aspects will bring to the economy of Sarawak as a state in Malaysia.

Hinterland and logistics which evolve around the ports industry, manufacturing industry and transportation industry in general are in favor of how effective the hinterland is and how it can facilitate the logistics processes. In other words, the process and provided facilities are the value added to increase the logistics performance and hinterland connectivity that will attract more users to undergo more trading activities with Sarawak. Hence, this research will cover the element of hinterland connectivity (infrastructure) in order to achieve the objectives.

Malaysia having two ports which are Port Klang and Port Tanjung Pelepas that rank top 20 ports in the world, but there is still little emphasis directed to the development of ports in East Malaysia although the ports in East Malaysia are secondary ports (Rahman et al., 2018). It is important to acknowledge that East Malaysia also plays crucial role in facilitating the trade and generating economic growth to the country. This limited emphasis has created a gap in various aspects such as hinterland conditions due to lack of integrated policy imposed by government to promote the trade competitiveness in East Malaysia.

1.2 Problem Identification

Challenges arise on how to achieve the highest potential of efficiency in logistical operations. This is because challenges from a logistics perspective do not only come from one source or factor, rather, it is interlinked between different factors (Bakar et al., 2016). In other word, one challenges would create a bullwhip effect in the whole supply chain.

To elaborate, granted that Sarawak has optimum efficiency in port operation but the hinterland condition is not adequate, the movement of cargo to its final destination will still be disrupted. Furthermore, international cross-border constitutes to different procedures (specifically Malaysia, Indonesia and Brunei) has its own

regulation and practices for crossing the borders in which the operational structure would adhere to own standards (Jeevan et al.,2021).

It proves that configuration, adaptation and resilience are needed to survive before being able to thrive towards operational improvement and productivity. Nevertheless, in-depth research in the area of logistics is still lacking. The challenges of achieving the highest potential of logistical operations and hinterland through crossing borders have no robust research. Hence, this research topic is chosen to close the gap to achieve key success factors for a better development in Sarawak are worth highlighting.

1.3 Objective

For the purpose of fulfilling the aim of this research, we will be analyzing the hinterland connectivity and other factors associate with logistics operation as well as to assess its impact on the logistics performances. The objective is to review the hinterland connectivity in Sarawak, Malaysia which will eventually lead to the identification of challenges or gaps that are found along the logistical process and recognizing how it also brings impact on the overall logistics performance.

Ultimately, the research will propose some key suggestions to improve the logistics performance through minimizing or acting upon the challenges. This research quantifies on general improvement which are connected to the logistic performance enhancement whereby it includes the aspects of financial, regulation and operation to increase better flow of logistics operation specifically on cross-bordering activities through hinterland.

1.4 Dissertation Structure

The structure of this dissertation will consist of six (6) chapters. Chapter 1 presents the introduction and purpose of this research which includes the background, problem statement, objectives and the significant impact of the findings.

Chapter 2 is the literature reviews of this research that will begins with introducing the background and condition of trade activities and future economic plans in Sarawak as the largest state in Malaysia. This chapter will focus on the logistics performance and the condition of hinterland connectivity in Malaysia as general and will the narrowed down to the state of Sarawak. As the result of the overview, challenges or gaps presence will be identified especially during logistics activities that occurs along the hinterland.

Chapter 3 will then introduce the general theories and concepts applicable for the subjects of discussion. It begins with introducing three general key components in logistics which are Economic structure, Governance structure and Infrastructure. After introducing the key component, the scope is narrowed by only focusing on the infrastructures component as it is one out of six (6) components in logistics performance. Following, breaking down the sub-categories under infrastructure is the road or hinterland and Chapter 3 will end with explaining what, where and how does hinterland play its role in the supply chain or logistics process.

Chapter 4 is the next stage by integrating Chapter 2 with Chapter 3 by applying Sarawak into the selected theories and concepts. A conceptual framework will be created to illustrate the interconnection between identified variables.

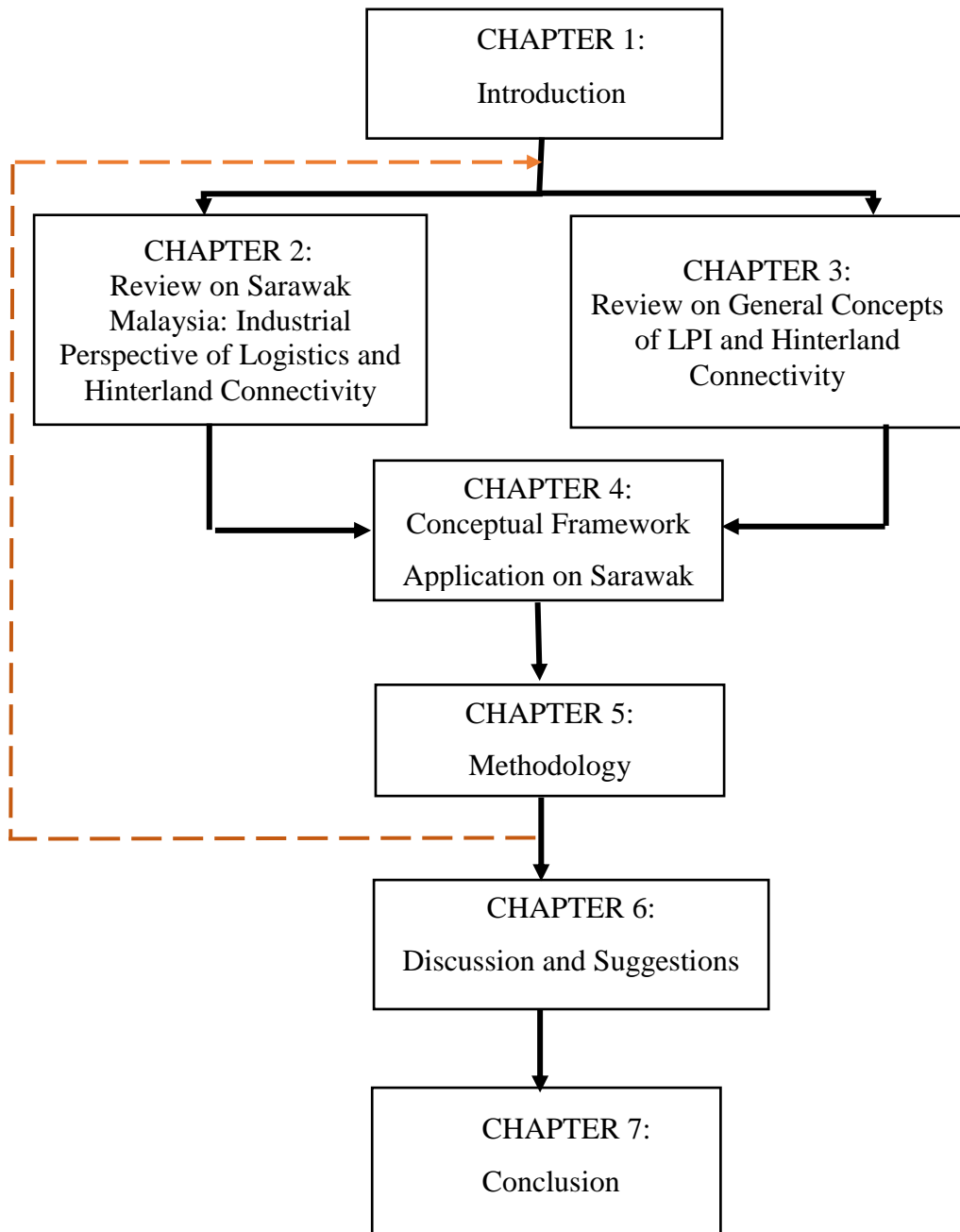
Chapter 5 is the methodology chapter that will explain the selected methods being applied to carry out and accomplish this research. This research will mainly rely on qualitative analysis using secondary data. This chapter will elaborate ways methods are applied depending on chapter and how the secondary data is gathered and further analyzed in the context of Sarawak, Malaysia.

Chapter 6 is will discuss the results whether hinterland really contributes to the performance of logistics operation. It is then followed by strategies or

recommendations that can be adapted by Sarawak in order to encounter the identified short-comings.

Lastly, Chapter 7 will end by recapping the summary of the research, the limitation of the methodology, the contribution and the conclusion.

Figure 1.
Research Structure



Note: Developed by Author

Chapter 2: Literature Review- Overview of Malaysia Logistics Performance and Hinterland Connectivity

2.1 Introduction

Recapitulate on the history of logistics, it begins from the needs in military sector during the World War II whereby the military forces required provisions on foods, medicines and machineries from their own countries to be transported across the borders (Makmor, Mohamad Saludin and Saad, 2019).

Since then, logistics has become the primary in the era of competitive trade activities which not only covers the act of planning, implementing, controlling and transporting goods and services from one point to another but also harmonization or simplification of the movement activities locally and internationally (Szymonik, 2012).

Over the time, logistics are becoming more complicated and sophisticated than before, however, it remains to be an essential role in micro-economic and macro-economic perspectives. This transportation was also time sensitive hence require it to be transported at the correct time, location, quantity and cost. To elaborate, customers' satisfaction can be achieved by focusing on the micro-economic perspective in the logistics services while the country's economic development can be achieved mainly by focusing on the macro-economic perspectives (Pengman, Melan and Abdul Hanan, 2022).

The monitoring of logistics performance is crucial because it assist to define not only the achievement of the logistic but also the potential for the logistics to be

better by adapting changes. Nonetheless, in order to ensure that the logistics processes are being executed in an optimum level, the flows or procedures of the logistics process need to be at its highest.

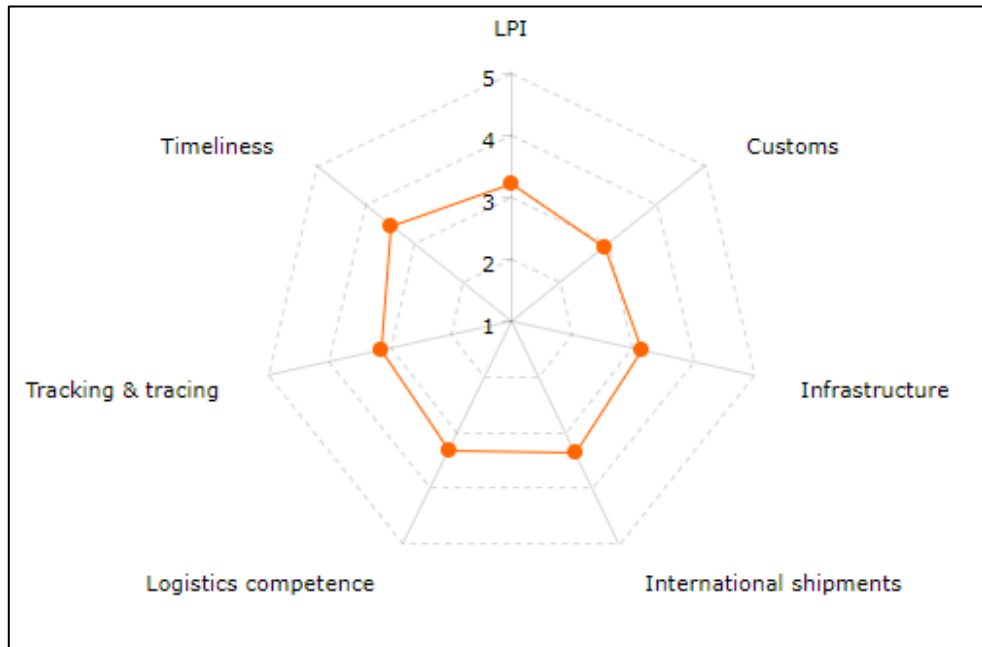
2.2 Description of Logistics Performance Index (LPI)

Logistics performance (LP) has various definition as each definition are elaborated based on the objectives in specific subjects with different goals intended but, the most common definition cited defined that LP is the effectiveness and efficiency demonstrated in performing transportation activities (Aini,2021). In different studies by Widayat, Subiyantoro and Sidik (2022), the definition is further extended by inserting the term multi-dimensional activities that are carried out by different associations in order to accomplish the same set of goal.

In order to measure the logistics performance, an indicator called Logistics Performance Index (LPI) act as a tool that assist countries in determining the level of “friendliness” of the countries in term of trading internationally specifically across 160 countries (The World Bank, 2018). Notwithstanding, in a more academic term, LPI assist countries in analzing the opportunity as well as challenges that the country is facing in terms of logistics performance (Sharapiyeva, Atoni and Yessenzhigitova,2019).

Figure 2.

Malaysia 2018 LPI Index



Note: From “Malaysia LPI Score World Bank”, 2018, <https://lpi.worldbank.org/international/global>

Referring to Figure 2, LPI is made up from the combination of six (6) components which are:

- A. Customs: The level of efficiency during clearance at border.
- B. Infrastructure: The availability and quality of transport infrastructure for trade.
- C. Timeliness: The level of frequency between shipment and the time it takes for a shipment to arrive at the final destination especially within the agreed time delivery.
- D. Number of international shipments: The proficiency and level of easiness in arranging shipment internationally.
- E. Logistics competence: The ability to provide quality logistics services to users.

F. Tracing and tracking: The availability to track and trace shipment on actual time.

The LPI's score is weighted using average index from 1 to 5 whereby 1 is the lowest and 5 is the highest. In reference to the World Bank (2018), Malaysia is ranked 41 in the world. However, beyond a shadow of doubt, the prominent rank of Malaysia logistics is contributed by the strategy location of the ports in Malaysia which are located between the South China Sea, Pacific Ocean and the Indian Ocean. In addition to that, the movement from globalization also helps Malaysia to improve the logistics performance. For instance, between the year 1993 to 2013, ASEAN recorded a significant growth in trade with an average of 9.2%. This growth jointly increases trade and logistics within the region, with container or commodities being transported using different nodes of hinterlands to meet the demand (The ASEAN Secretariat, 2014).

Discussing further, Malaysia is performing relatively well in term of international shipments as it is indicated as one of the highest measures among other components. Based on the LPI above, holistically the satisfactory is slight above average. This index reflects the level of utilization of resources that has been used which also aligned with the economical aspect of the logistics operation. Besides that, the results of LPI indicates the ability for the logistics operation or activities to create value for the targeted market or customers by practicing own set of uniqueness in services that enable the specific logistics organization to distinguish itself from other competitors which are other countries around the world (Shahrin,2014).

Although LPI is the most common tool as a benchmark for the country to refer in the logistics performance internationally, the results displayed are still arguable in term of the way the data has been analyzed and, on the method, used to make a comparison between country that will then indicates the country's rank in the world (Ong, Zailani and Kanapathy,2020). Because of this reason, LPI should not be the only tool used as reference for the studies, but the elements contained in LPI is applicable to be taken out for further analysis or studies.

2.3 Overview on Malaysia Logistics

Malaysia was not an exception with the hard-hitting from COVID-19 pandemic. In fact, according to Bloomberg (2021), it has resulted in an astonishing reduction of 5.6% of Malaysia's economy in year 2020 which is the lowest state after the Asian Financial Crisis in 1998. The cost incurred in transport activities in the ASEAN countries accounted for an average of 60 percent. However, nearly 80 percent is contributed from Malaysia. Since the hit of Covid-19, the flow of freight transport in ASEAN countries have shown growth of 20 percent due to increasing activities of production, distribution and consumption. This difference indicates changes that has taken place whereby the localization or regionalization are detected (Malaymail, 2021).

Conjunction to that, freight and logistics industry had been profoundly impacted as well. Malaysia imposed Movement Control Order (MCO) in response to the pandemic. MCO is a strict procedure that prohibited any transport movement across state and in some extend, between cities (MIDA, 2021). Hence, not only international import and export had been purposely reduced but also the transportation by land being reduced significantly that caused harm for supply network throughout Malaysia.

Over the time, pressure from declining source of economy activities, the logistics and business environment shifted from e-commerce and the government slowly opening back the borders between states and countries, allowing essential transportation to resume back as normal but with certain official permissions such as the Ministry of International Trade and Trade (MITI) letter. The by-product of both e-commerce and re-open of borders, the demand has positively emerged for transportation services.

For Malaysia, this shift is a significant potential for logistics industry in order to improve the capability of logistics activities. Corresponding to this aim, Logistics Master Plan is developed. According to the plan, it has been identified that in pursuant of developing logistics activities, there is a need to emphasize on the law and regulation on the ground that these aspects are the component that able to give more

priorities for the development and enable implementation of transport and trade facilitation (MOT Malaysia Ministry of Transport, 2015). The transition of transporting cargo from one point of collection to point of delivery that require cross-border commonly go through difficulties due to administrative difference. With that being said, it is important to look at both procedural measures and infrastructure to make Malaysia more competitive.

On the consequence of globalization, the ASEAN Economic Community (AEC) members, Malaysia and other countries are encouraged to improve their global competition by first improving its national economic competitiveness (Onwuegbuchunam et al., 2018). Malaysia, which is a country of Southeast Asia that composed of two regions which are the Peninsular Malaysia or West Malaysia and the East Malaysia which is located in Borneo Island. The geographical location of Malaysia is very strategic as it is located in one of the busiest and important straits, which is the Strait of Malacca bring tremendous advantage for Malaysia as a country in the maritime sector. With that being said, countries that managed to display high competitiveness in taking the geographical advantage to the fullest will be able to become superior in attracting the market (Bakar and Jaafar, 2016).

Narrowing down to the largest state in Malaysia, Sarawak's primary trading has remained to be laboriously depending on export activities. This is due to the richness of natural resources that this state possessed and are heavily used in industrial manufacturing and productions such as forestry and mining. In the matter of fact, this type of commodity made up to over 32.8% of Sarawak's GDP (MARC, 2015). As of manufacturing, it includes the production of wood-based products, metals, petrochemicals, foods and beverages. Furthermore, the state government is currently under consideration to diversify Sarawak's manufacturing-based economic activities with an aim to add more values gained from the raw materials from the resources.

2.4 Description of Hinterland Connectivity

Hinterland connectivity is considered as the second most crucial factor in determining the level of competitiveness in a country in term of logistics activity (Chen, Jeevan and Cahoon, 2016). Hinterland in the context of seaport can be defined as an area where the trading activities and operation are mainly taking place. Hinterlands are not limited to specific characteristics rather it is differ based on the type of commodity, mode of transportation used to move the commodity, time and distance (Keizer,2017).

Based on Muliama, Jinca and Sitepu (2016), in the aspect of macro-economic, the hinterland is used to facilitate demands of transportation that focus more towards the supply of networks between ports, production plants and consumptions sites which are connecting between the sea and the land areas. However, Zainuddin (2019) explained that in term of logistics perspectives, hinterland is being more emphasized on how the trading activities are being coordinated while taking into account the condition of the country's macro-economic and the availability of physical setting simultaneously.

Unlimited to that, connectivity can be measured from the physical dimension of the countries or state's properties involved in the transport connection and create linkage with the inland freight infrastructure such as the road and rail. Connectivity can be defined as the ability for the logistics process to easily link the nodes of networks from one point to another (Arip et. al, 2012). In reference to Cheon, Peng and Xu (2021), it is discussed that the network quality is depending on the combination of infrastructure features and how the links are being connected specifically the procedure involved.

Hinterland connectivity can be defined as a form of connection that usually involved a long-distance transportation and involved corridors whereby inland functions as physical connectors between other inland systems includes the maritime trade gateways and river services within regional economic system and outside of regional economic system. Supported by Mentzer, Myers and Cheung, (2004) the focus should be compensated from the prospect of cost incurred in the network and

the procedural quality. Another paper by Guan et al. (2020) indicates that the hinterland connectivity is the attribution of networks that entails the level of possibilities in reaching and linking all the nodes of networks.

It is a major challenge for the government to build or upgrade the infrastructure in order to cater the increasing pressure on cargo transportation and space. One of the reasons is because it is a capital-intensive by nature as comprehensive energy supplies and warehouses are needed in complementary to the infrastructure (Bashar, 2015). It is important to narrow the gap of development between East Malaysia and West Malaysia.

In order to increase the trading activities for the state, it is essential to improve the trade corridors that incorporated the multi-modal transportation network which allows better market accessibility, trade networking and industrial movement fluidity (Amran, 2011). With that being said, ports that are linked to a well-developed hinterland give an indication that the hinterland are well equipped with an efficient infrastructure that is not only efficient but offers range of routes, and operates under a convenience procedure (Lundan, 2005).

However, research from Kumagai (2013) indicates that the captive hinterland can impact the competitiveness of the port. This statement is argued by Cheon, Song and Park (2018) countering that an extended hinterland connectivity generally created profit and competition. To elaborate, ports and logistics activities will be able to enhance competitiveness between one another without being restricted to one particular route, rather have an option of routes and corridors.

This not only expresses that the state has multiple corridors for cross-border accessibility but also indicates that it enables logistics players to explore more options on costs and services to create values for the customers (Ghemawat, 2007).

2.5 Overview on Sarawak Hinterland Connectivity

The borders between Sarawak-Indonesia and Sarawak-Brunei are the economic corridors that are already existing and yet have gaps to be assessed on the

potential investment, open for both private and public sector to enhance the trade flows and the transport infrastructure, trade and logistics. As discussed in previous chapter, the focused corridor is a well-defined geographical area in which there are economic nodes available as a point of connections for production and market functions for the use of Sarawak as well as for the export purpose to neighboring countries.

However, Sarawak does not have complete resources for the completion of the final products in manufacturing and processing (Hausman, Lee and Subramanian, 2013). Therefore, the manufacturing or industrial activities still depending on the raw supplies deriving out of the upstream supplies and in this particular case, the sources from neighboring countries which are Indonesia and Brunei. The geographical location in the West Borneo Economic Corridor could make these required resources available to Sarawak of West Kalimantan, and would drive for the competitiveness of the industry especially when there is additional transportation cost added as part of the total production cost component (Sloan, 2019).

The geographical location of a state is prominent and cannot be underestimated in the completion of the final product (Kuncoro,2013). To briefly elaborate, the distance between each stage in supply chain can provide an essential factor towards losing or gaining competitiveness making distance a more critical factors and any delays occurred in one stage could make the whole supply chain become more expensive (Alamgir et. al, 2019).

Linking it to the importance of the cross-border trade, almost 40% of the Malaysia export are represented by the foreign inputs (Central Bank of Malaysia, 2017). In addition to that, Malaysia has become one of the top 10 country in the world that depends on the global value chain in term of production activities. Regardless of this fact, in Sarawak specifically, the level of cross-border opportunities and level of information-sharing are shown to be intensively low (Sloan et,al, 2019). This makes Sarawak lose the opportunity to gain the cost-saving benefits in the production and need to relay on the transportation of raw materials from West Malaysia.

2.5.1 Sarawak- West Kalimantan's Economic Transformation

The cross-bordering activities can only be performed when one country is crossing toward a different country with the transition of way of operation, procedure and regulation (Zainuddin et al., 2018).

In order to do an in-dept research on the cross-bordering activities in Sarawak, it is also important to first have an overview of the neighbouring country that involved in the cross-bordering activities. The West Kalimantan is the nearest to the border of Sarawak in the point of fact that it shares a similar production activity with Sarawak. For example, Sintete Port Indonesia located in West Kalimantan mainly depending on the agricultural produce, and still depending on the Malaysia to get the daily consumer products.

The process of integration between Indonesia-Malaysia incurred for this commodity is through the Sambas provinces as it is bounded with north of Sarawak. With the shares of the apprehensive view in production activities, the West Kalimantan leaders start to focus on the network in dynamic aspects of the supply chain operation, and it is mainly focused on the neighbouring countries because of the awareness that there is an extend of "cost-sharing" between the neighbouring countries (Herliana and Parsons, 2011).

Not to mention (Anggoro, 2015) added that the cross-border adds value by enabling the transfer of commodities, technologies as well as expertise. Interpreted by Kristina (2021), this positive by-product gained by cross-border activities has become the motivation for West Kalimantan to better integrate its border area and development of the hinterland condition especially the connection areas that are bounded to Sarawak by land.

2.5.2 Sarawak- Brunei Darussalam's Economic Transformation

Brunei's economy has transitioned to a more diversified and dynamic economy with now providing manufacturing and industrial services. Previously, Brunei's main economic strength was as an oil-rich and dependent country. The wealth of natural oil

resources is the core that has turned Brunei to diversified and become one of the richest countries in the ASEAN. To support, according to the IMF (2016), Brunei is ranked number 5 wealthiest country in the world below Singapore based on the Gross Domestic Product (GDP).

Based on the Ministry of Foreign Affairs Brunei Darussalam, the country has been tying diplomatic relations with Malaysia since early 1984 (MFA, 2022). As for the state of Sarawak, in year 2015, Brunei and Sarawak launched the ASEAN Economic Community (AEC) with an aim to strengthen the investment and trade between both countries as Sarawak started to penetrate its exports to Brunei such as machinery and timber products (The Brunei Time, 2016). Moving forward in the year 2022, Sarawak government continues to strengthen the plan by opening Trade and Tourism Office in Brunei Darussalam (The Star, 2022).

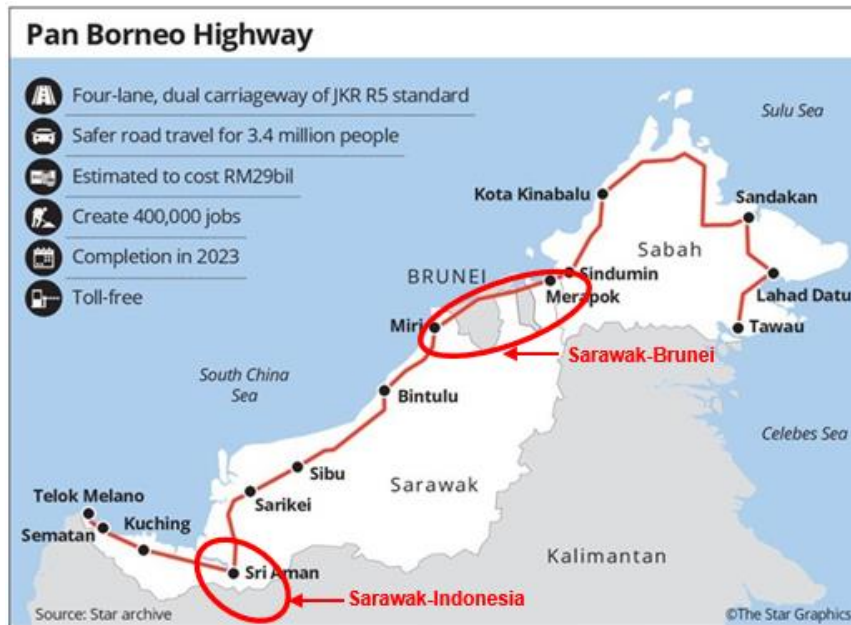
This shows that the relationship between Brunei Darussalam and Sarawak, Malaysia has been positive along the years.

2.6 Sarawak Future Outlook

Generally, there are road connections that link Sarawak-Brunei and Sarawak-Indonesia but somewhat limited. Several projects have been announced to develop the infrastructure in East Malaysia with the aim to improve the country's connectivity. One of the major projects is the Pan Borneo. As Sarawak is committed in developing the borderland, the quality of hinterland connectivity is not only related to the accessibility point on Sarawak alone, but also related to the neighbouring country's transportation infrastructure. The condition and availability of cross-border outlets from neighbouring countries need to be in line with the development point with Sarawak. The location of development activities needs to be linked to achieve its function because without the ability to serve the purpose, the Pan Borneo project's aim could be gone to waste.

Figure 3.

Pan Borneo Highway



Note: From The Star Graphic, 2022, <https://www.thestar.com.my/business/business-news/2019/04/09/pdp-model-ideal-for-pan-borneo/>

In reference to The New Straits Times (2022), in relation to the logistics and transportation aspects, there are several factors that are undertaken in Sarawak which push for future development and the state's economy and boost the confidence of the logistics industry. That includes:

- A. Construction of the Pan Borneo: Pan Borneo has been constructed since year 1986 that stretches out between two states in East Malaysia (Sarawak and Sabah). This construction is by extending the road lane from 2 to 4 lanes, the construction of all the 115 bridges that would elevate the interchanges and check points with service area. The reason for using Pan Borneo as part of the discussion is because this major project was undertaken by the Sarawak state government and according to TheStar (2018), Pan Borneo project claimed to serve its purpose of improvising the economic activities especially for

infrastructure development, logistics and tourism. Referring to the above image of the Pan Borneo Highway, there is one direct connection between Sarawak-Brunei covering the Brunei by-pass and one potential connection between Sarawak-Indonesia.

- B. Development of rural area: Developing the suburban areas by launching the industrial sectors such as manufacturing and providing infrastructures. The government also aims to undergo expansion of the main industrial zone in Sarawak called the Samajaya Free Industrial Zone. This is aim to distribute and enhance more economical activities that does not only compacted the main city of Sarawak but also the other provinces in Sarawak.

2.7 Hinterland Connectivity Challenges

The challenges for logistics operation starts to prevail at the very beginning of the process until the commodity arrives at the final destination. The level of challenges might be concentrated at a specific process compare to others depending on the task incurred and the environment setting.

2.7.1 Geographical Location

The geographical location of the hinterland is an important factor that will determine the success of the hinterland development. In order to generate more demand for the cross-border transportation, the difference between the connecting road from the port or final destination should be short (Ismail, Othman and Zen, 2015).

Generally, Zainuddin et al. (2019) discussed that most port in Malaysia provide coverage for hinterland which has helped to intensified the competition, but Sarawak hinterland transport system still have a lot of lacks in providing high-capacity corridors.

Not to mention, the infrastructure has to be sufficient enough and can be efficiently used at all times. Ladin et al., (2020) elaborated that a good hinterland access does not only mean that the state has road connection but also have the

important components in logistical activities such as temporary storage, communicating facilities, repair points and security system that is reachable within a certain distance.

2.7.2 Dependence on International Import outside of Borneo.

The larger the population of people living and doing economical activities such as shopping and working, the higher the concentration of movement flow and the greater the need to use larger space (Kobayashi and Sugihara, 2019). This drives for demands and fulfilled by supplies.

However, in common cases especially goods related to sophisticated technology such as devices, the raw materials can hardly be provided by a single source. In other word, one product may depend on two or more countries to supply the materials and spare parts. Commodities such as manufactured goods and crude materials that mostly imported from China, Japan and Australia.

In accordance to Census and Economic Information Center (CEIC, 2022), Brunei's main import is also manufacturing goods from Malaysia, Singapore and China.

2.7.3 Lack of IT Infrastructure

The adjacency of Sarawak's in enhancing logistical activities to and from West Kalimantan and Brunei Darussalam could bring much-needed savings to enterprises. However, Othman et. al (2016) indicated that there is still an acute lack of IT infrastructure leads to limited information sharing especially on enterprise-level in regards to the hinterland accessibility point. This has led many companies to ops with a more distanced suppliers and travel through a longer route. These distant relationships, as per discussed by Gani (2017), have resulted to poor competitive advantage and slow momentum for company to grow.

2.7.4 Limited Infrastructure for Cross-Bordering

For logistics, the infrastructure for transportation includes air, sea and land transportation. Focusing on the land by specifying on the hinterland aspect, this feature comes with its own limitation in Sarawak particularly in terms of the condition of the infrastructure. As stated by Karim (2015), any deficiency in condition and limitation in hinterland accessibility will affect the whole logistics performance within the state.

Make detailed, the accessibility between neighbouring countries is indicated by the existence of the road networks and how many alternatives there are to transport the commodity to its end point of supply chain (Aziz, Ibrahim and Yaacob, 2013).

The movement of commodities is still facing difficulties in term of the distribution outlet such as warehouse facilities along the route. In logistics, the efficiency of transportation services relies upon the combination of quality and quantity of the accessibility point and the level of mobility on the commodity movement.

2.7.5 Poor Coordination

The uncoordinated application in procedures is an issue that is not only involving one sector. This issue needs to be observed in an integrated way; it is an issue that affect other sectors as well (Runting et al., 2016). Malik, Omar and Moon (2020) make detailed that when there is poor coordination of procedure happens, it will restrict information sharing by the parties involved in the logistics industry.

This could be the unawareness of the importance of corridors functions in Sarawak. It is shown that the logistic industry has rapidly grown (MIDA,2021). This simultaneously should trigger the need to emphasis the excellence of procedure.

The parties who involved in operating these infrastructures also need to be well coordinated to assist the users such as the truck drivers. Unlimited to the government's effort, the private companies who provide transportation services also need to be as attractive and accommodating toward the demand and utilizing the infrastructure provided by the government (Ruslan, Ghani and Khalid, 2019).

Furthermore, having these components will attract and capture more traffic to use this hinterland infrastructure. With that being said, Elias et al. (2021) explained that the hinterland connectivity and condition facilitates over 80% of the freight transportation through a single mode of transportation which is road. As there is no other mode of transportation available that connects Sarawak-Kalimantan and Sarawak-Brunei, the overutilizing of road could cost the infrastructure to be congested and difficult to maintain.

Withal, the institutional can also be the mean to solve these difficulties to a certain level (Idris and Idris, 2017). However, Kaur (2017), commented that it depends on coordination settings, it could also cause the process of cross-bordering to be slowed down instead of achieving the target. This is because cross-border activities involve the government institutions such as customs, as well as the public or private trucking companies (Goi, 2022).

This interrelation between entities are the agents of confusion and causes ineffectiveness in relation to the coordination in cross-bordering activities (Suttishe et al., 2019). The complexity of logistics services and the strictness in permitting convenient accessibility from local and international government has not fully been accommodating for the need of logistics development.

2.7.6 Overlapping Regulation

The trades that take place between Sarawak-Indonesia is not just covering the cross-border commerce of trading international goods for consignee, but also covers transit trade activities. The regulatory guidelines to be practiced by the officers from both sides of Sarawak and Indonesia are still unclear making the shippers and consignee to be uncertain on the transportation times caused by the vague clarification by both governments during the facilitation of the trades occurred between Sarawak-Indonesia borders (Lord and Chang, 2019).

In cross-bordering, there are certain overlapping regulations related to the movement such as the level of strictness during inspection and documentation (Klem, 2021). For instance, in order to develop the logistics operation in the cross-border area

such as Sri Aman which is the closest connection to the Kalimantan, Indonesia border, an agreement between region or country is required to ensure a smooth process of cross bordering such as procedure that would avoid double documentations.

2.7.7 Illegal Transportation or Activities

On the contrary side, Jalili and Sualman, (2020) interpreted in the perspective of LPI (Custom Clearance), it also means a higher chance of illegal activities to be carried out along this route such as items and services due to a better road access between neighbouring countries. Therefore, the dark side of this infrastructure development, the security activities involving local authorities such as Custom and Immigration Department need to be deployed to monitor the routes and specific areas (Liu et al., 2020).

Simultaneously, the customs clearance process would be more meticulous due to this security precautions. This challenge is difficult to be overcome as it is a necessity for a state or country to priorities safety and security especially when it is easily breached by the medium of transportation.

2. 8 Summary

This chapter has elaborated the overview of Malaysia logistics regarding the position of Malaysia in overall logistics performance (LPI) and how the logistics performance is being calculated. This chapter also includes an argument by author especially on how the outcome of LPI is not completely comprehensive to be solely used as an analysis. Apart from that, this chapter stated the future as well as ongoing plans of the main subject of research that constitute to the future potential as a continuous response for Chapter 1.2 which specify the Problem Statement. Meaning that once the condition is clarified and gap (challenges) is found, the research can then proceed to the scope of improvement for Sarawak to be a hub for higher logistics activities.

For a comprehensive and clear overview, this chapter is yet to test the relationship between industrial condition with the conceptual framework; hence, the next chapter which is Chapter 3 will introduce the concepts of logistics performance and the concept of hinterland which will enable the research to analysed the corresponding relationship between logistics performance and hinterland in Sarawak in Chapter 4: Conceptual Framework.

Chapter 3: Introduction of Concepts

3.1 Introduction

This chapter introduces the common concepts, definitions as well as the application of the concepts in logistics and hinterland connectivity.

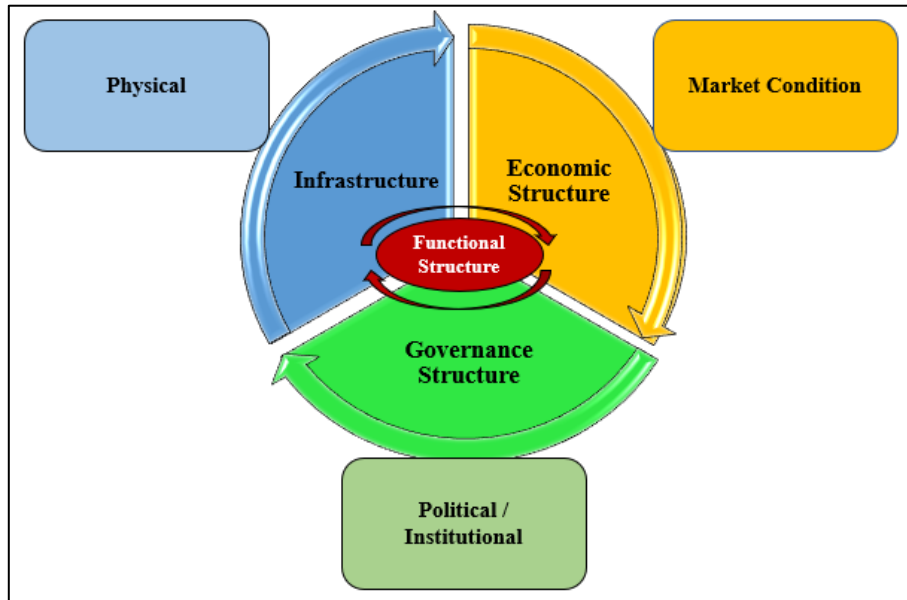
“The logistics related to the hinterland involves many actors and activities, and requires intense collaboration and coordination to work effectively and efficiently”

– Song and Panayides. (2015). Maritime Logistics: A guide to Contemporary Shipping and Port Management 2nd Edition. pg 67

First and foremost, it is important to begin with the general concept to demonstrate the relationship concurrence between key players in logistics. Figure 4 introduces all the three main key players which are economic, governance and infrastructure shows to be highly interrelated, hence leading to the cumulative of inefficiency when there is a negative shift incurred in any part of players and vice versa (Zhang and Okoroafa, 2015).

Figure 4.

Key Components in Logistics



Note: Developed by the Author, based on Witte and Wiegmans (2013)

To further elaborate, from Figure 4, it indicated how complex the logistics are and it can be noted that logistics also have a high ambiguity due to the lying lines for the region itself as well as for the external region that logistics activities are associated with in any one transportation (Kumar and Rahman, 2015). The three components are considered as a separated areas of development and each one is driven by different factors. According to Witte and Wiegmans (2013), the economic structure is defined as the quality and availability of the spatial distribution in relation to the market factors and financial factors.

Indicated by Parikesit, Basalim and Wibowo (2019), market factors are pertaining to the agglomeration of externalities such as the fluctuation of the supply and demand which influence the commercial performance. As for financial factor, Kordnejad (2016) defines it as availability of resources and the allocation of resources. The factor is heavily influenced by the commercial performance. To explain, the outcome of commercial performance will enable the acquisition of the infrastructures

and the access to these infrastructures. On the other hand, added by Kano, Tsang and Yeung (2020), that the economic downturn is also regarded to the management of fund carried out by the government that will obstruct the effectiveness of positive economic condition.

Discussed by Taghikhah, Voinov and Shukla (2019), the government structure is more abstract driven such as the leadership exertion and political system since it differs between countries. It is influenced by the regulation of the neighbouring country, the condition of infrastructure and the commitment established by neighbouring country to improvise own infrastructure. For instance, any improvement in term of governance structure in a country such as liberalization imposed to open the market for trading with other country, it would likely boost the market condition as demands start coming in and the supplies are also being widen from the entrance of other foreign suppliers and competitors (Shi and Li, 2016).

To get a clearer rationale of this, Ghomi, Karimi, Behnamian, and Firoozbakht (2021) mentioned that when there is a huge investment gained, then further development of the infrastructures can be achieved. In addition to that, the government also responsible in achieving the transportation investment. This process is rather abstract as it can be carried out under straight objective to improve nation's development or under a defensive attitude by the government to only achieve short-term objectives such as for public impression (Mangan and Lalwani, 2016).

For institutional structure, referring to Beysenbaev and Dus (2020), it is more towards the hard structure such as the facilities and the formal structure such as the organizational management that associate with people such as the firms and non-governmental organization. Stated by Bensassi et al. (2015), the infrastructure is a physical-related components, driven by the ability and priorities of the country to enhance its infrastructure.

Allegedly, infrastructure is frequently associated with the need of standardization mainly from the policy maker to ensure a standardized flow for the supply chain operation (Monios, 2014). Argued by Jia et.al (2020), mentioned that the harmonization is related to the concept of integrated supply chain management in

which it is also connected to the cooperation from practitioner such as the logistics companies. Due to this, Irannezhad, Prato and Hickman (2020) elaborated that it is difficult to achieve efficiency when standardization created by policymakers does not serve full function when there is low adaptation by the practitioners.

Enveloping the three components, the functional structure implies that there is a strong interface between each component to each other. For this figure, economic structure relates to the market condition, in which, it is unable to be controlled by the nation. However, Bouchery, Woxenius and Fransoo (2020) argued that changes in economic structures are the one that able to propel or trigger the emergence of governance structure from a country as well as the infrastructure changes intended by the country and exercised by the industry players.

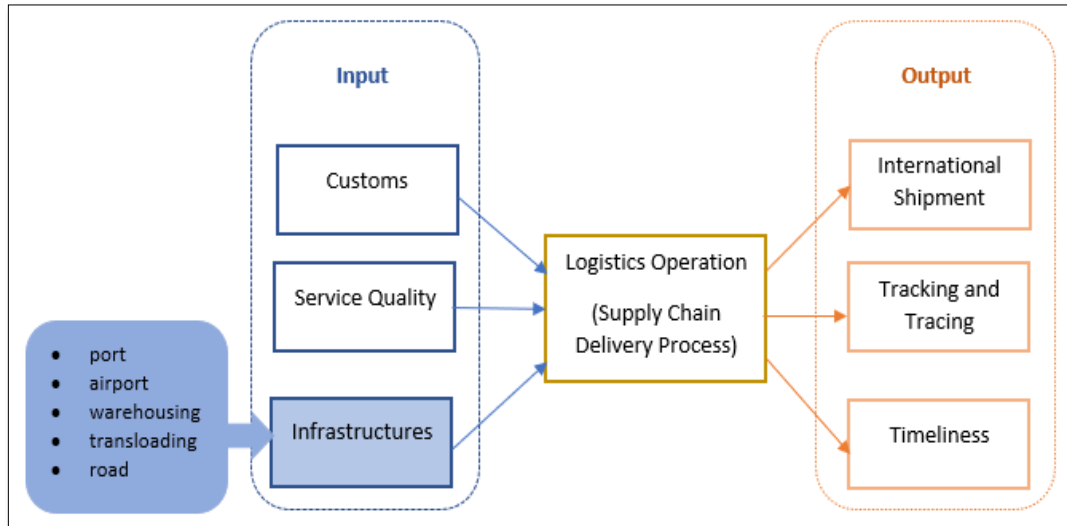
3.2 Concept of Logistics Performance Index (LPI)

After introducing the general concept, next is to narrow down to the Infrastructure perspective which is one (1) out of six (6) components in LPI. Below is the general illustrating the LPI and then focusing on one of the indices which is Infrastructure as it is the subject of research discussion. This concept demonstrates the indicators of calculating the logistics performance. As illustrated, referring from Su and Ke (2017), among the six indicators, it can be further categorized into two categories which are input and output.

Based on Neagoe et al (2017), three indicators in the input categories are Customs, Infrastructure and Service Quality. These indicators fall in the regulation of policy by the government. Remaining three indicators in input categories are Timeliness, International Shipment and Tracking and Tracing falls in the service delivery performance.

Figure 5.

LPI Concept- Infrastructure Component



Note: Developed by the Author, based on Su and Ke (2017)

Concerning on the infrastructure, it consists of few sub-categories such as port infrastructure, airport infrastructure, warehousing infrastructure, transloading infrastructure, and road infrastructures (Indriastiwi, Hadwardoyo and Nahry, 2020). Paper by Munim and Schramm (2018) indicates that the reason behind each segregation is because infrastructure as pertaining to the condition of facilities that helps boost the quality of trade which differs depending on the uniqueness and differentiation of facilities needed to handle and transport the commodity.

In order to determine the quality of infrastructure, it is important to review the effectiveness of the sub-index of the factor such as the quality of transportation (OECD,2015). To further explain on the transportation, a review of the road condition and efficiency will be primary in the assessment. For instance, an elaborative on the existing network that are stimulated from the existence of the road. Furthermore, existence of road is not the only determinant to the quality of the road (Behdani et al, 2019). The quality encompasses the length of the road, the number of options or divided road network.

Sdoukopoulos and Boile (2020) considered that logistics is multivariate by nature and the measurement of efficiency differs between countries. To put a light on

this, each cost incurred during each logistics processes such as custom clearance fees and transportation are different. Similarly, the density and capacity of the road network and the condition on road infrastructure also differs (Chen, Cullinane and Liu, 2017).

Due to these reasons, the results of LPI are bias depending on the condition of the country. Hence, conclusion from Angelopoulos et al (2018) stated the determinant of logistics performance by assessing the LPI for countries is not comprehensive enough to be taken as the only measurement tool.

3.3 Concept of Hinterland Connectivity: The Functional & Geographical Integration of Value Chains

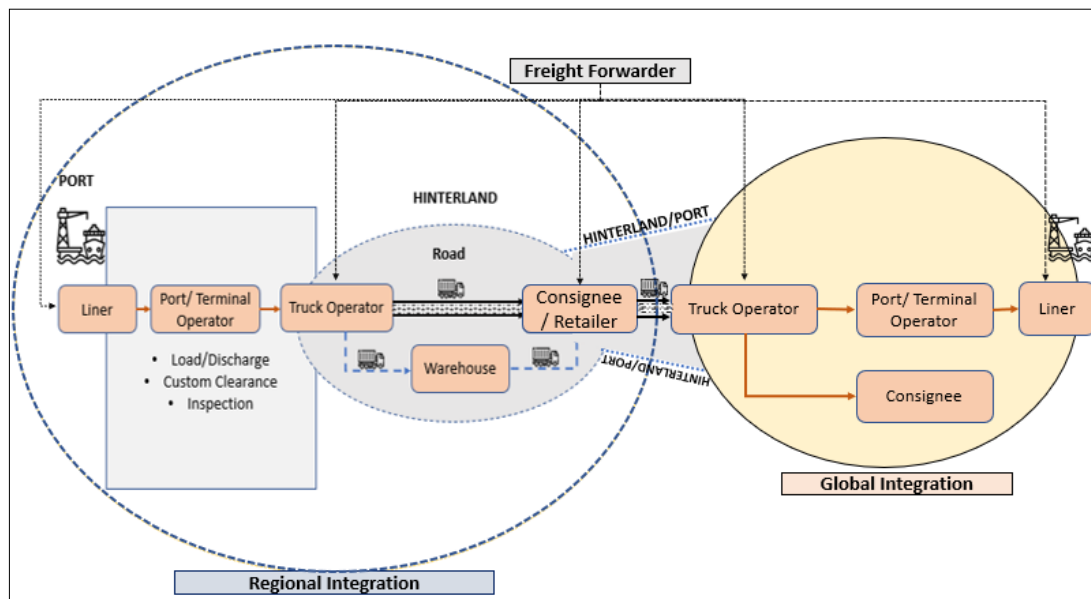
Based on Frazzon et al (2019), the term hinterland is derived from the economic perspective of geographical transport. This is set through the principle of location established from the point of origin to the point of final destination. According to Gosling et al (2016), hinterland is a part of the geographical integration that aims to utilize the comparative advantage available in term of resources that include space, labour and better land access. Following research by Behbahani et al (2019), the term hinterland also can be referred as an inland area in which ports are used to complete the export and import operation. Another discussion carried out by Mahadevan (2019) explains that hinterland generally associated with the continental or rural areas in the nation.

Debated from Monios and Bergqvist (2020), with the geographical integration especially international transaction through land or cross-bordering, there is a change in conventional situation in the logistical condition where it depends on the physical situation of the road and locational choice that is chosen with the aim to maximize the efficiency of the transportation. Hazen et al, (2020) added with the growing complexity of the logistical demand such as the configuration of cargo, the demanded time prescribed by the shipper and consignee that needed to be obliged by the freight forwarder become the additional forces of efficient logistics.

Not to mention, the level of convention in completing a single supply chain tends to depend on at least two or more regional oriented components as the cargo is being transported from one country to another country (Guo, 2019). The figure below illustrates the relationship between the role of hinterland within in logistics process. The relationship between the port and the hinterland has become obvious over time as ports are the means of accommodating exports and imports by sea from different sectors while hinterland is the main means of connecting in transporting the exports and imports within the region and outside of the region (Rudskaia and Eremenko, 2020).

Figure 6.

Integration of Hinterland in Logistics Process



Note: Developed by the Author

Illustrate from the figure above, there are three apparent activities involved along the transportation which are First-mile, Middle-mile and Last-mile. Port's activities particularly the cargo transportation by sea with the transportation carried out via hinterland for both incoming cargo and outgoing cargo. Port acting as an "interchange" in the chain of supply chain is as paramount as the role of hinterland as the interface in order to support the economic activities between regions and countries.

Both port and hinterland are complementary whereby it connects the geographical nodes and facilitate different modes of transportation such as vessel, truck and rail.

Along these activities, different actors are involved which are the port authority, shipper and freight forwarder or transporter. When cross-border transportation is taking place, there is a broader transition incurred with policy and security requirements yet synchronized with the logistics distribution (Borba et al, 2020).

- A. First Mile: When cargo or commodity arrives as the ‘first mile’ of the logistics process, the operation of terminal handling is taken inside the port. By Brick (2019), here is where the process of consolidating freight or assembling process. Freight loads commonly coordinated by the freight forwarder will arrive at the assemble station or warehouse as the dominant mode of transportation to begin the door-to-door delivery services.
- B. Middle Mile: Middle Mile or transfer of cargo is defined when there is a connection between at least two or more checkpoint, usually between states or between international distribution systems (Ozkanlisoy, 2021). Elaborated by Paksoy et al, 2020), the efficiency of the transfer is derived from the checkpoint’s adequacy in providing and performing services during connection such as the facilities coupled with the strictness of the regulation from the receiving points. The main intermodal function generally take place at the terminal in order to provide continuity within the supply chain. With ports being the primary example allowing for shipping services via deep sea, hinterland has also become the notable example that connects the regional integration to the international integration (Melo, 2022).
- C. Last Mile: When the cargo has closely reached the destination within the region, it is usually referred to as the ‘last mile’ of the logistics (Bernon et al, 2018). Commonly, the transportation ends here, however, also in most cases, it ‘last mile’ within the region is only the intermediate of the logistics process whereby the cargo is required to be further transported and exported to another country (Gossler, WWakolbinger and Burkart, 2020).

Paper by Stojanovic and Ivetic (2020) stated that ports are generally the busiest space yet stand to be the most significant impact on the transportation. To example, the transition of truck from the port area to hinterland is then heavily impacted by the corridors from the different areas. With that being said, due to high level of reliance, an efficient supply chain refers to the positive emergence of the joint connection appealing between two or more governance, investors and main industry players (Jayathilaka et al, 2022).

To further elaborate, Garver and Williams (2017) identified the present of difference in relationship between ports and hinterland development. First is the Inside-Out which is when the development of hinterland is derived by the inland industry players such as trucking providers. Conversely, the Outside-In is the derived from the players related to ports such as the port authorities and the shipping liners.

Furthermore, ports also have to be located in strategic location by which ports are able to have the benefit of balanced and high demand for both outbound and inbound traffic, whilst attracting continuous investment for the port (Nguyen, 2021). However, as argued by Rezaei et al (2018), the efficiency can be gained through the presence of integration between companies that are doing business through hinterland activities and port activities. Hence, the success of logistics performance is the ability to approach exploit full synergies between transportation nodes and players in the logistics network.

3.4 Summary

The concept is formulated by illustrating the general relationship by combining both maritime sector and other logistics sectors. The principle of this chapter is to explain the concept of logistics performance and hinterland connectivity and relation between logistics operation and where does the hinterland fall under, along the logistics process. Once the concept is introduced and deliberately explained, the next chapter (Chapter 4) is a forward course by applying the case study into the concepts by developing conceptual framework.

Chapter 4: Application of Conceptual Framework

4.1 Introduction

The larger the population of people living and doing economical activities, the higher the concentration of movement flow and the greater the need to use larger space. Due to the limited reliable power supplies from the domestics' industrial plants, the development project to enhance the infrastructure needs to have a harmonious strategic plan that are not just consistent but able to capture support from the industry players especially players that are within the development areas.

4.2 Functions of Hinterland in Logistics Performance

The Industrial Trade and Industry Ministry in Malaysia along with the Economic Planning Unit (EPU) from the Prime Minister's Department is promoting the country's development in bordering areas in Indonesia and Thailand (Nasir and Hussim, 2019). However, this development is only being enforced under the sub-regional programs, for instance, the Indonesia-Thailand-Malaysia Growth Triangle (IMT-GT) and the program's focus is not only limited to the networking activities (Pacudan,2016).

Research done by Subramaniam, Devadason and Sundararaja (2008) indicated that Sarawak's state border covers the distribution operation that is based on cluster depending on the degrees of collaboration, productivity activities and future development projects that are happening nearby the regions. To put a light on this, Sarawak Corridor of Renewable Energy (SCORE) plan that was launched by the Sarawak Government back in year 2008 is a specific strategy for the state's development that only focus on making Sarawak a "smart city".

This goal is to make Sarawak a hub for industrial areas and become a port city within the industrial areas called Tanjung Manis. Linking this to the main research topic, regardless of the aim to develop the area in Sarawak, the goal of becoming a “smart city” could be achieved but becoming the hub and port city is fairly more complicated. This is because in order to be a hub, there is a need to have an integrated approach and development coverage.

This means that the state should also focus on the whole connectivity process and procedure, for this research, is the hinterland aspect. Adding to that, it is observed by Yean and Das (2017) that the main capital and towns in the bordering countries have displayed growth and this is driven by the differences in the economic development of each nation.

Referring to the table below, in term of infrastructure, there are 5 functions of hinterland in the trade and transport context which are enabling or accelerating speed, dependability, flexibility, quality and cost (Belekoukias, Garza-Reyes and Kumar 2014).

Table 1: Fundamental Strategic Objective in Trade Infrastructure

Functions	Trade and Transport facilitation context
Speed	Ability of infrastructure to enable Just-in-Time delivery
Dependability	Presence of infrastructure along journey. Ex: warehouses
Flexibility	Ability to change direction and presence of options
Quality	Lean and ability to reduce shortcoming during operation mainly through automated facilities
Cost	Potential to contribute for lower cost in operation

Note: Developed by the Author, based on Belekoukias, Garza-Reyes and Kumar (2014)

Harun and Remali, (2018) discussed that developing the national logistics performance regardless both industrial or capitalized states within the country are seen as a collective key strategy that will increase the level of international competitiveness for the country. Moreover, higher accessibility will attract more markets to trade with

the state as connectivity is one of the selection criteria for shippers and charterers. Not to mention Jeevan et al. (2020), added that the port competitiveness is closely dependent on how accessibility the freight distribution is around the provinces in the state and to go across the neighbouring countries.

Also, Cho and Lee (2020) discussed that for the earlier stage, a greater deal of the work incurred in the development of hinterland connectivity, will demand the need to involve promoting contacts with businesses in West Kalimantan and Brunei Darussalam in order to make Sarawak's enterprises aware of all the large potential cost-saving opportunities around and in the supply chain business industries. Plus, Dlakantoni, Escalth, Roberts and Verbeet (2017) mentioned, that the internal elements within the countries such as the level of competition, financing (micro-economic) and custom procedure (LPI) also play significant roles.

Developing these functions aims to accelerate the cross-border activities by promoting better access to the markets as well as able to provide lower transportation cost simultaneously. When all five intended functions are satisfied, the growth of trade and consumptions accomplished through optimum infrastructure will activate the neighbouring productions and consumptions.

4.3 Regulation as the Pillar of Hinterland-Logistics Performance

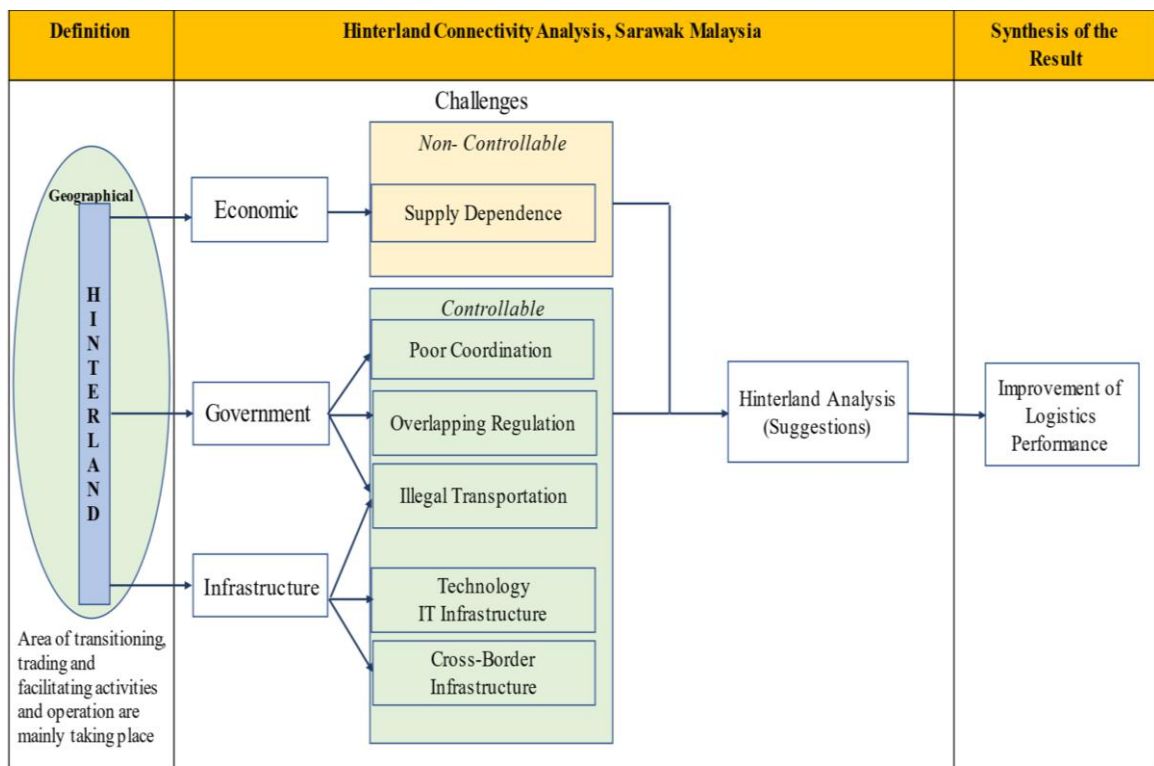
As discussed in Chapter 3, in the spectrum of infrastructure specifically hinterland, unique attention needs to be designated along the Sarawak Economic Corridor as it is an input as well as the connecting agent in the logistics. However, applying the concept with the case of Malaysia, the challenges faced by the government integrates between different sectors of the economic industries (Hadi, Muhamad and Othman, 2017).

It is impractical not to take into account the regulatory aspect because the nature of logistics itself which flows from one place to another will meet and act in accordance with the application of regulation (Behdani et al.,2020). Even though the state government is initiating the cross-border cooperation with the neighbouring countries, the greater role remains to be vested within the initiative of the state itself within the state area as that falls under the government's responsibility (Hanaoka et.

al, 2022). Nevertheless, the government’s plan to develop the area will directly promote the cross-border trading activities, indirectly will encourage for social development and diversity economic activities alongside the borders (Runting et. al, 2015). The trade that takes place in Sarawak-Indonesia borders has remained to be modest mainly due to the regulations in the trade that is has been applied. To explain, at the border of Sarawak-Indonesia, the Indonesian transporters will need to present and prove a genuine certification of the products or cargoes to the Indonesia authorities to ensure standardized documentation is obtained during the transportation of cargoes from Sarawak’s local authorities (Lord and Pawat, 2016).

4.4 Conceptual Framework- Hinterland Analysis

Figure 7.
Conceptual Framework of Hinterland Connectivity Analysis



Note: Developed by the Author

The conceptual framework above incorporating Chapter 2 and Chapter 3 by applying Sarawak as the general case study and the concept of hinterland connectivity in logistics

As illustrated in Figure 7.

Conceptual Framework of Hinterland Connectivity Analysis, the geographical location is the natural setting for the state. From there, hinterland is developed over the time as more trading is taken place through both globalization and regionalization. As discussed in Chapter 3, this research takes three components which are economic structure, governance structure and infrastructure. Hinterland analysis of the case study is undergone in Chapter 4 and the outcome identified six challenges, categories under non-controllable and controllable.

Assuredly, the procedure in the cross-border operations has increasingly become the most important in the trade activities in Sarawak, bordering with Indonesia and Brunei Darussalam.

4.5 Summary

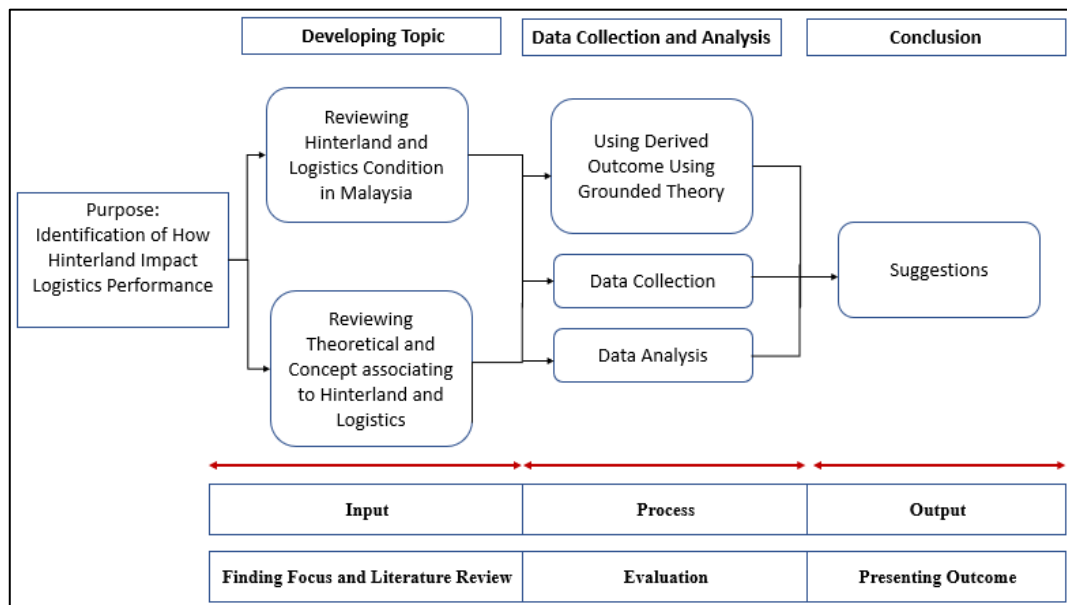
There is potential for this hinterland connectivity to be the pillar for generating the state's economic condition, not just providing a better journey experience, but also efficient logistics performance. Having Pan Borneo would prosper the growth of the logistics for all three countries, these challenges are the factors that could be taken as a focused baseline for the state to take action upon. The breaking down of the challenges make it more reachable to improvise logistics.

Chapter 5: Research Methodology

The research will be applying a qualitative approach and a conceptual framework is developed about how hinterland connectivity impacted the logistics performance. An extensive descriptive literature review has been chosen and used to illustrate the connection of roles, factors of challenges in the perspectives of different key players in logistics.

Figure 8.

Research Design and Process



Note: Developed by the Author

Referring to the above figure, empirical analysis is carried out and separated primarily into two spectrums which are the hinterland connectivity and the logistics performance. Each chapter intensively explores both spectrums that work on gaining deep understanding of underlying reason, opinion and motivation. This method is the

most suitable because it provides information about procedures that often rendering around contradictory routine norms in particular regions (Merriam et al., 2019). Adjacently, research is constructively evolved into discussions and analysis from input and output.

Besides that, this method is picked because the outcome of this research will be gained through analysing the “why” and “how” focusing on controllable practicalities from logistical issues to create an optimum framework that helps trade activities and logistics operation in Sarawak to stand out among states rather than the “what” (Bloomberg and Volpe, 2018).

Table 2: Break down of methods and sources

Methods	
Research Type	<ul style="list-style-type: none"> ➤ Qualitative Approach ➤ Secondary Sources
Sources	<ul style="list-style-type: none"> ➤ Case Studies ➤ Publications (Articles, scholarly books, published statistics) ➤ Websites (Industry Reports, Corporate Reports, Government Report) ➤ Prior academic studies
Tools	<ul style="list-style-type: none"> ➤ Conceptual Framework

Note: Developed by the Author

5.1 Case Study Design

Sources that will be used in this research are case studies and publications. The sources will choose depending on the chapters and discussion topics in the research. For this research, two common case study used in research are single case study and multiple case study which are the development of Pan-Borneo road connectivity with the Sarawak logistics. Case studies and publications pertaining to specific countries such as Brunei, Malaysia or Indonesia are used to obtain a deep understanding of the characteristics of each country in regards to logistics and hinterland connectivity, as

well as to made it possible to identify the similarities and differences between then countries that are directly connected by land with the main focus, Sarawak.

In addition, case studies involving Southeast Asia cases and other international cases will be used because there will be analysis on comparison depending on the scenario used for elaboration. This is because, different scenarios lead to different main factors or focus hence using only a single case study will not be comprehensive to produce quality research (Alase, 2017). Apart from that Kivunja (2018) states that by applying multiple case studies, enables the research to get various sources of information and will then come up with a concept framework. Another secondary data is gained from websites and reports to explain the different phases of the hinterland development as well as its current functionality for transportation, the condition and other connection nodes from neighbouring countries.

Nonetheless, publications such as media, articles, books and news are used. The reason why this research select case studies is because case studies in an invaluable record to illustrate operational practices and the evolution of industrialisation that had happened in the past (Tracy, 2019). Heale and Twycross (2022) elaborated that while case studies are unable to provide specific guidance due to the background differences in different organizations, publications will be able to further interpret the occurrence.

5.2 Developing Conceptual Framework

The research has been designed in order to explore and to resolve two research objectives. The first one is to identify the key challenges or limitations of logistics operation and hinterland connectivity in Sarawak, Malaysia.

To find the answer to the first question, conceptual framework has been created and used to identify the interrelationship between hinterland with logistics performance and identify the shortcoming points along this interrelationship. Second objective is to investigate the factors to enhance logistics performance and hinterland connectivity in Sarawak, Malaysia. For this second objective, an analysis of the

derived outcome of objective 1 is analysed. The conceptual framework comprises of the holistic analysis is developed.

5.3 Data Collection

Data collection is defined as a process of gathering the information and measuring the variables based on the interest using a systematic technique that can lead the researcher to achieve an answer that is stated earlier in the research questions (Farquhar, Michels and Robson, 2020). Plus, comparative research is also put into act by comparing multiple analysis or discoveries between the factors (Ruggiano and Perry,2019).

With that being said, the majority of the researchers come into agreement that there is no singular methodology in applying comparative research due to the reason that it includes descriptive phenomena that involve different status of particular regions and operations. Nonetheless, this careful procedure in collecting data is adopted with the intention to attain the standard and achieve robustness of the dissertation.

5.4 Procedure and Design of the Research

Subsequent to analysing the data deliberately, the outcome of this analysis would able to help other researchers, the state authority and logistics companies to understand the challenges, improve the directly relatable factors, and considering all the issues, able to assist between key players and maintained an effective logistical flow in the country.

5.5 Limitation of Data Collection and Methodology

There were numbers of limitation faced in the collection of data. Some related variables were not available in undergoing this research such as the capacity that the Pan-Borneo is facilitating as it is a new and partially undergoing development, as well

as the data from the authority websites. Moreover, there is no previous research that fully analyse this topic to help prepare this dissertation.

Chapter 6: Discussion and Suggestions

6.1 Introduction

Hinterland undeniably impacted the logistics performance. The integration of the networks along the supply chain is achieved when the interconnectivity between different modes of transport can be carried out seamlessly without any obstruction. When the connections across the sea, air and land continues to become easier in term of the flow of commodities and people within Sarawak and outside of Sarawak, hence, the infrastructure in transportation will be transitioned from a weakness point to the strength point of the state.

The efficient in logistics is the catalyst towards logistics performance as it contributes to lower cost and less time it takes for the commodity to reach the final destination. Apart from that, it also subsequently helps to increase the comparative advantages among the domestics' players in Sarawak. Even though Pan Borneo is the primary artery of the transportation road in Sarawak and much of the existing road is already in place, extensive improvements are still needed along the supply chain of the state in order to be more representative in the national logistics operation.

Not limited to that, the development of such assets mainly the road, physical infrastructure and digital infrastructure need to be improvised to enhance the connectivity along all regions, giving more options and more efficient movements. As discussed previously on a number of addressed issues, each issue has been emphasized in a way by the state but it needs to be strengthened in conjunction with integrated planning by regulatory bodies, practitioner, and institutional oversight of the logistics industry.

Reflecting on the overview of Sarawak, Malaysia in term of trade facilitation, there is still plenty room for improvement especially in addressing the inland handling and transportation.

6.2 Suggestion

From the literature reviews, analysis and case study that have been incorporated, it gives a view for how intensive the hinterland is toward the state's logistics performance. Below are the suggestions that are found feasible to be adopted and implemented by Sarawak.

6.2.1 Attract and Gain Investment

In order to kick-start development and projects, the flow of investment is crucially required and investment is highly favourable mainly for countries with a high position in the international trade movement combined with a strong existing infrastructure and trade environment. Because of this strict preference from investors, in order to attract the capital sources from the investor, it is important for nation to first accelerate the infrastructure to drive the improvement of socio-economic especially in the rural areas.

The prominence of an accelerated in infrastructure development will spur the economic growth, creating confidence for investors to devote to the states or country's trade. The hinterland is the arteries of freight transportation and the spur lines that provide the mobility of the community. To support this, world-class ports are built around a continuously upgraded transportation network. For example, one federal port in Sarawak which is Bintulu Port and three state operated port which are Kuching Port, Rajang Port and Miri Port could attain a better global position and market by boosting the hinterland network enabling more capacity handling.

Investment in infrastructure lays down a strong foundation for logistical and economic growth in the long-term. Based on the discussion in previous chapters, it is seen that historically, Sarawak, Malaysia has been investing in infrastructure. For this

reason, the citizen especially in rural areas has access to basic daily staples and services such as electricity, communication, transportation and clean water.

When major investment is gained, the state will be able to provide a significant leap in capability that drive for stronger base for growth in the upcoming years. Port area is the primary growth nodes that should be given attention to attract more investment.

6.2.2 Strengthening the Common Ground: Institutional and Regulatory Framework

Lowering the trade barriers will maximise the trade movement. It suits with Sarawak as a developing and growing state in logistics sectors. More players and market are required to utilize the assets provided. It depends on the credibility to come down with comprehensive agreement between neighbouring countries.

Essentially, it is important to understand that the logistics industry consists of various agencies with vague lead from a specific agency that is accountable for the holistic planning and development of logistical process. To elaborate, each agency only covers part of the logistics movement and involvement, which then be transitioned to a different agency such as the trucking only responsible for the transportation, which is then commonly transferred to the warehouse that only responsible for the storage and consolidation.

Improving the last mile connectivity is achieved by upgrading the critical road connecting the logistics zone or commonly known as the industrial zone without losing the focus on the traffic management system to reduce the congestion and optimize asset utilization.

Along the line, the state is responsible for providing a good connection for the use of both trucking company to the warehouse location. Regardless, there are still several agencies or companies that are poorly managed and it will hinder the targeted development. Because of this, it is important to strengthen all company and agencies, and it starts with strengthening the government's structure and regulatory framework as it is the common ground for all logistics players in the state. With strong, considerate

and clear common ground, it will unlock trade potentials and making logistics activities on part is other developed countries.

6.2.3 Inclusiveness of Stakeholders

A. Nation's Stakeholders

The inclusiveness of the nation's stakeholders should include both private and government in order to enhance the domestic connectivity. Stakeholders of the logistics industry are the main source of information and actual reflection of practicality in supply chain of the nation. These are the personnel who has direct operational experience and facing the challenges in the logistics operations.

To put it in another way, stakeholders present from the point of receiving physical cargo, to the performing documentation, clearing the tariff rates or charges to planning for best possible route to the consignee and experiencing the road condition. Stakeholders are directly impacted by any short-coming in each process.

Subsequently after getting the inputs from the stakeholders, it can be started by improving the connectivity between key trading cities and expanding to the rural areas because key trading cities are mainly the most congested with the cargo's turnaround, import and export.

Not only limited to the stakeholder, the shareholder or key investors need to be included to discuss on any future initiative as it is equally important to retains the confidence and transparency with the shareholder.

B. Cooperation with International stakeholders: Private and Government

Along with the two common borders whereby the intended plan for Indonesia to move its capital to East Kalimantan, and the neighbouring for Brunei Darussalam, the industry is now managing as a cross-functional role in taking advantage of the linkages with various sectors from two different countries. All the three countries are depending on each other by any smallest mean as when the country is outsourcing the raw materials, the country could attain economy of scale.

In another scope, creating trade between different countries is important to create a relationship and support better competitiveness for a wider market. In addition, development needs to be undertaken in an even effort between neighbouring countries to attract demands of cross-bordering and easing the logistic process. With this dependability, the state or country needs to increase its level of compliance in term of agreement and regulations to ensure it benefits one another.

Besides that, the regional supply chain linkages are also important in attaining new investments. In Malaysia, there are numbers of major multinational companies' offices and manufacturing plant such as BMW, Samsung and Schlumberger. These companies are also the major stakeholders in the supply chain. If the government is undergoing proactive efforts to create relationship with these companies through either bilateral or even multilateral initiative, there is high potential for new investment to be obtained.

6.2.4 Value-Added Services in Logistics

Hinterland is not only about constructing the road but also to ensure there are sufficient number or supplies of infrastructure presents along the road. In other words, developing the road alone does not serve the complete purpose of enhancing the logistics activities in the state.

With the current weakness, using the privilege of geographical location via sea and air, Sarawak logistics can likely be improved with comprehensive infrastructure of hinterland that enables logistics industry to benefits with the infrastructure such as the traffic systems, the facilities of warehouse, pitstops for cargo handling especially in the case of any emergencies for truck assistance. In addition, developing the hub and spoke model that would support efficient distribution as well as ability for heavy consolidation. This is achievable by first promoting the availability of modal shift from the seaport to the road connection.

6.2.5 Allocation of resources on IT and Infrastructure

The recovery of the global trade after the pandemic is an indication of logistics ramp-up. The allocation of gained resources is important to ensure that the resources are distributed in the right scope of the nation's development. The states need to determine the priorities of development plan encompassing the construction of road and the necessities that come with it such as the electricity, the water supplies, bridges and the socio-economics programmes as part of the state's Master Plan.

Moreover, post pandemic has increased the number of digital users in spending. This accelerates the pressures for logistics players to accommodate those habits on an already complex logistics sector. The beginning of Industry 4.0 has supplemented to the trust in using digital services. Therefore, the priorities of the state are expending from physical infrastructure to the soft infrastructures.

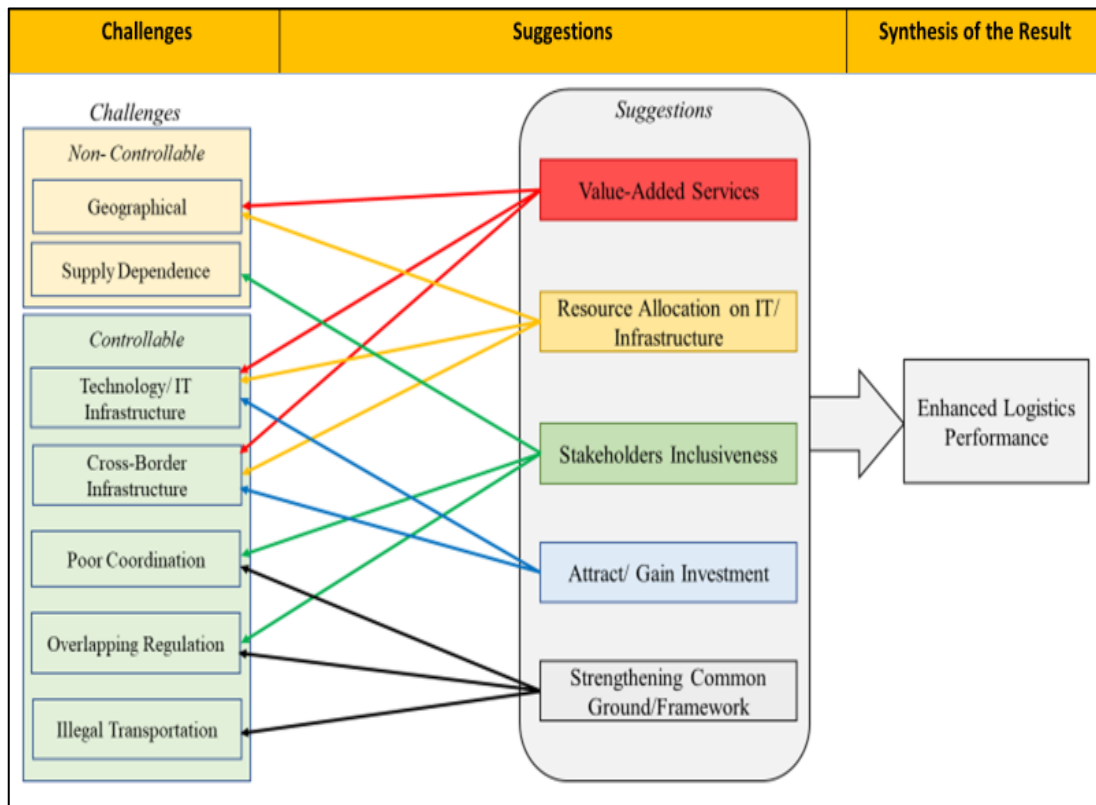
The practices of users are very dynamic whereby the preferences change over time. Hence, the priorities of resources allocation also would shift over time. As each executing of development project takes time to be completed, it is important to start the project development as swift as possible by taking into account all-inclusive risk calculation and management. Moreover, the outcome of each project needs to stay aligned with the competitive aspects which are cost, speed and time.

6.3 Integrated Framework

Below is the summary of integrated framework incorporating the challenges that are discussed in Chapter 2 with the proposed suggestions as a response that can be considered to encounter the challenges.

Figure 9.

Integrated Framework



Note: Developed by the Author

As developed above, it shows that the strategies are closely interrelated with one another whether directly or indirectly. In addition to that, challenges that fall under non-controllable also have the ways to be encountered when strategies are observed at the right angles. With that being said, holistic approach is crucial because it proves that there is no “one size fits all” by which one challenge can be fully resolve by executing one strategy.

6.4 Summary

When there is strong forward and backward linkages in the logistics, the industry becomes nationally and internationally competitive. Accordingly, it becomes the tool to accelerate the merging internationally by connecting with global markets.

The logistics industry in Sarawak, Malaysia has so much potentials as well as room for improvement. The anticipated outcome from these strategies is to achieve more efficiency in logistics and integration between different interrelated scopes that will improvise the overall logistics performance in Sarawak.

Chapter 7: Conclusion

The research provides an overview of the hinterland and logistics performance. It has further elaborated on how hinterland falls into place in the completion of supply chain and determining the level of efficiency in the logistics performances. It is found that logistics as an overall is complex by nature. The flow and process are highly dynamic by which one single operation of step is interlinked and dependent to the efficiency of another step before it.

This research has evaluated the influence of hinterland as one of the most important angles that should be focused on as it is the medium that links the transportation regardless if the cargo is moved by air, sea or land. In other words, in order for cargo to reach the final destination, it will use the land (hinterland) to achieve the objectives.

From the findings and discussion, it has been intensive elaborated that hinterland does not limit to solely the existence of land as infrastructure, but also how well conditioned, maintained and well-equipped other facilities are along the hinterland. The findings have recommended some feasible strategies in order to stimulate the effective usage of hinterland connectivity in enhancing the logistics performance.

In addition, as each strategy requires capital, corporation and time, it could be implemented in stages. It is also important to disclose that the strategies recommended could not make the whole logistics process flawless or perfect, rather, it is to improve the initial performance of logistics and minimize the existing 'red tape'.

The objectives of this research are achieved and contribution of this research is to provide an additional overview regarding the research subject for future improvement to the government and stakeholders by diverting the view towards the hinterland perspectives and requirements for a better logistics in Sarawak.

References

- Aini,2021. Malaysia Construction Logistics Performance Through A Lens Of Communication And Supply Base Strategy. Malaysia: MITRAN.
- Alamgir, M., Campbell, M. J., Sloan, S., Suhardiman, A., Supriatna, J., & Laurance, W. F. (2019). High-risk infrastructure projects pose imminent threats to forests in Indonesian Borneo. *Scientific Reports*, 9(1), 1-10. <https://doi.org/10.1038/s41598-018-36594-8>
- Alase.(2017). The Interpretative Phenomenological Analysis (IPA): A Guide to a Good Qualitative Research Approach. USA: *International Journal of Education & Literacy Studies*.
- Amran. (2011). Innovation Adoption Among Logistics Service Providers in Malaysia: An Exploratory Study on the Managers' Perceptions. Malaysia: Medwell Journals.
- Angelopoulos et al., (2018). Effect of Global Supply Chain Developments on the Governance of Port Regulation. Greece: Department of Maritime Study.
- Anggoro. (2015). Automotive and logistics clusters to drive economic competitiveness in Java, Indonesia. Retrieved from: <https://www.proquest.com/openview/f566d34b82f445e7721270fef1a08791/1?pq-origsite=gscholar&cbl=18750>
- Arip et, al., (2012). A framework of logistics village in reducing the problem regarding goods transportation in peninsular Malaysia. Retrieved from: <https://ieeexplore.ieee.org/abstract/document/6226066>
- Aziz, Ibrahim and Yaacob. (2021). Logistics Development in Malaysia East Coast Region: Infrastructure, Constraints and Challenges. Malaysia: International Journal of Trade Economics and Finance.
- Bakar and Jaafar. (2016). Malaysian Logistics Performance: A Manufacturer's Perspective. *Procedia - Social and Behavioral Sciences*, 224, 571–578. <https://doi.org/10.1016/j.sbspro.2016.05.442>
- Banomyong and Fernandez.(2021). Evaluating Trade Corridor Performance: A Myanmar Case Study. Thailand: Journal of International Logistics and Trade.
- Bashar. (2015). ASEAN Economic Community 2015: Enhancing Competitiveness and Employability through Skill Development. Thailand: International Labour Organization.

- Behdani et al., (2019). Port-hinterland transport and logistics: emerging trends and frontier research. Germany: Springer Nature Limited.
- Behbahani et al., (2019). A conceptual framework to formulate transportation network design problem considering social equity criteria. Netherlands: Elsevier.
- Behdani et al. (2020). Port-hinterland transport and logistics: emerging trends and frontier research. United Kingdom: Springer Nature Limited.
- Belekoukias, Garza-Reyes and Kumar.(2014). The impact of lean methods and tools on the operational performance of manufacturing organisations. Derby: International Journal of Production Research.
- Bensassi et.al., (2015). Relationship between logistics infrastructure and trade: Evidence from Spanish regional exports. Netherlands: Elsevier.
- Bernon et al., (2018). Aligning retail reverse logistics practice with circular economy values: An exploratory framework. Retrieved from: <https://www.tandfonline.com/doi/full/10.1080/09537287.2018.1449266>
- Beysenbaev and Dus. (2020). Proposals for improving the Logistics Performance Index. Netherlands: Elsevier
- Bloomberg. (2021). Malaysia's Economy Sees Worst Year Since 1998 Asian Crisis. Retrieved from: <https://www.bloomberg.com/news/articles/2021-02-11/malaysia-s-economy-suffers-worst-year-since-1998-asian-crisis#xj4y7vzkg>
- Bloomberg.2021. Indonesia Sets 2024 Deadline to Move Its New Capital to Borneo. Retrieved from: <https://www.bloomberg.com/news/articles/2021-11-01/indonesia-sets-2024-deadline-to-move-its-new-capital-to-borneo>
- Bloomberg and Volpe. (2018). Completing Your Qualitative Dissertation: A Road Map From Beginning to End. USA: SAGE Publications.
- Borba et al., (2020). Barriers in omnichannel retailing returns: a conceptual framework. Austria: Emerald Insight.
- Borneo Post. (2022). Sarawak to set up trade, tourism offices in Brunei, Kalimantan. Retrieved from: <https://www.theborneopost.com/2022/01/22/sarawak-to-set-up-trade-tourism-offices-in-brunei-kalimantan/>
- Bouchery, Woxenius and Fransoo. (2020). Identifying the market areas of port-centric logistics and hinterland intermodal transportation. Netherlands: Elsevier.
- Brick. (2019). A conceptual framework for defense logistics. Retrieved from: <https://www.scielo.br/j/gp/a/4vV3znbxT6dhkFGzNffDp4q/?format=pdf&lang=en>

- CEIC.(2022). Brunei Imports: Malaysia: Sarawak: Manufactured Goods Classified by Material. Retrieved from: <https://www.ceicdata.com/en/brunei/trade-statistics-imports-by-country-and-sitc/imports-malaysia-sarawak-manufactured-goods-classified-by-materia>
- Central Bank of Malaysia. (2017). Global Value Chains and the Drivers of Exports in Malaysia. Malaysia: BNM.
- Chen, Cullinane and Liu. (2017). Developing a model for measuring the resilience of a port-hinterland container transportation network. Netherlands: Elsevier.
- Chen, Jeevan and Cahoon. (2016). Malaysian Container Seaport-Hinterland Connectivity: Status, Challenges and Strategies. Amsterdam: Elsevier.
- Cheon, Song and Park. (2018). Does More Competition Result in Better Port Performance? Retrieved from: <https://link.springer.com/content/pdf/10.1057/s41278-017-0066-8.pdf>
- Cho and Lee. (2020). Does transportation size matter for competitiveness in the logistics industry? The cases of maritime and air transportation. Netherlands: Elsevier.
- Dlakantoni, Escalthe, Roberts and Verbeet. (2017). Accumulating Trade Costs And Competitiveness In Global Value Chains. Retrieved from: https://www.wto.org/english/res_e/reser_e/ersd201702_e.pdf
- Elias. (2021). Service Excellence for Sustainability: Lessons from Malaysia, Japan, and Taiwan. United Kingdom: Springer Nature.
- Farquhar, Michels and Robson. (2020). Triangulation in industrial qualitative case study research: Widening the scope. Retrieved from: <file:///C:/Users/User/Downloads/1-s2.0-S0019850118306916-main.pdf>
- Frazzon et al,. (2019). Smart port-hinterland integration: Conceptual proposal and simulation-based analysis in Brazilian ports. Switzerland: Inderscience Enterprises Ltd.
- Gani.(2017). The Logistics Performance Effect in International Trade. The Netherlands: Elsevier.
- Garver and Williams. (2017). Improving the validity of theory testing in logistics research using correlated components regression. United Kingdom: Taylor & Francis Group.
- Ghemawat. (2007). Redefining Global Strategy: Crossing Borders in A World Where Differences Still Matter. United Kingdom: Harvard Business Press.
- Ghomi, Karimi, Behnamian, and Firoozbakht. (2021). A Multi-objective Particle Swarm Optimization Based on Pareto Archive for Integrated Production and

- Distribution Planning in A Green Supply Chain. Retrieved from: <https://www.tandfonline.com/doi/full/10.1080/08839514.2020.1840197>
- Goi. (2022). *The Next Frontier Towards Digital Sarawak Advancing into the Future*. United Kingdom: Routledge.
- Gosling et al., (2016). *The role of supply chain leadership in the learning of sustainable practice: toward an integrated framework*. Netherlands: Elsevier.
- Gossler, WWakolbinger and Burkart. (2020). Outsourcing in humanitarian logistics – status quo and future directions. Retrieved from: <https://www.emerald.com/insight/content/doi/10.1108/IJPDLM-12-2018-0400/full/pdf?title=outsourcing-in-humanitarian-logistics-status-quo-and-future-directions>
- Guan et al. (2020). Global supply-chain effects of COVID-19 control measures. Retrieved from: <https://www.nature.com/articles/s41562-020-0896-8.pdf>
- Guo. (2019). *Supply Chain Management for Circular Economy: Conceptual Framework And Research Agenda*. Netherlands: Elsevier.
- Hadi, Muhamad and Othman. (2006). Critical factors of implementing Industrialised Building System in Sarawak: A research on SMEs. Retrieved from: <https://iopscience.iop.org/article/10.1088/1755-1315/67/1/012006/meta>
- Hanaoka. (2022). *Identifying Factors for Selecting Land over Maritime in Inter-Regional Cross-Border Transport*. Switzerland: MDPI.
- Harun and Remali. (2018). *Malaysia National Single Window: The Enforcement Royal Malaysia Custom and Miti Liabilities on Trade System and Logistic Sector*. Retrieved from: <https://proceedings.itltrisakti.ac.id/index.php/ATLR/article/view/85/89>
- Hausman, Lee and Subramanian. (2013). The Impact of Logistics Performance on Trade. Retrieved from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1937-5956.2011.01312.x>
- Hazen et al., (2020). *Supply chain management for circular economy: conceptual framework and research agenda*. Austria: Emerald.
- Heale and Twycross. (2022). What is a case study?. Retrieved from: <https://ebn.bmj.com/content/ebnurs/21/1/7.full.pdf>
- Herliana and Parsons. (2011). Chapter 2: Logistics in Indonesia. Retrieved from: <https://www.apec.org/docs/default-source/Publications/2011/1/The-Impacts-and-Benefits-of-Structural-Reforms-in-Transport-Energy-and-Telecommunications-Sectors/TOC/Logistics-in-Indonesia.pdf>

- Idris and Idris. (2017). *The Silver Lining In Cabotage Policy: Issues And Policy Recommendations*. Cambridge: IACLEF.
- Indriastiwi, Hadwardoyo and Nahry. (2020). *Port Connectivity Model in The Perspective of Multimodal Transport: A Conceptual Framework*. Indonesia: IOP Publishing.
- Irannezhad, Prato and Hickman. (2020). *An intelligent decision support system prototype for hinterland port logistics*. Netherlands: Elsevier.
- Ismail, Othman and Zen. (2015). *An Economic Evaluation of Electromechanical Components for Microhydro in Borneo –Case Study*. Retrieved from: <https://i-proclaim.my/journals/index.php/apjee/article/view/220/210>
- Jalili and Sualman. (2020). *Exploring Contemporary Security Issues Near Sarawak-Kalimantan Border*. Malaysia: University Teknologi MARA.
- Jayathilaka et al.,(2022). *Gross domestic product and logistics performance index drive the world trade: A study based on all continents*. San Francisco: PLOS ONE.
- Jeevan et al. (2020). *Application of geoeconomics in seaport operations: a theoretical proposal for post Covid-19 recovery strategy*. United Kingdom: Taylor & Francis Group.
- Jeevan et al. (2021). *Cross-border freight movement between Thailand-Malaysia-Singapore: Utilising border based dry ports for effective inland transaction*. Croatia: Faculty of Maritime Studies.
- Jia et.al,. (2020). *Towards an integrated conceptual framework of supply chain finance: An information processing perspective*. Netherlands: Elsevier.
- Kano, Tsang and Yeung. (2020). *Global value chains: A review of the multidisciplinary literature*. Canada: Journal of International Business Studies.
- Karim. (2015). *Chapter Three Local-Central Dynamics and Limitations of Micro-Regionalism:Understanding West Kalimantan and Sarawak Cross-Border Cooperation*. Singapore: ASEAN-Canada Research Partnership.
- Kaur. (2017). *3rdAcademic International Conference on Law, Economics and Finance AICLEF 2017 (CAMBRIDGE) Conference Proceedings*. United Kingdom: FLE Learning Ltd.
- Keizer. (2017). *Logistics Network Design for Perishable Products with Heterogeneous Quality Decay*. Netherlands: Elsevier.
- Kivunja. (2018). *Distinguishing between Theory, Theoretical Framework, and Conceptual Framework: A Systematic Review of Lessons from the Field*. Australia: International Journal of Higher Education.

- Klem. (2021). 'A Garuda in my Heart, a Tiger in my Stomach': Brokering an Informal Economic Border Enclave in the Borneo Highlands. Retrieved from: <https://www.tandfonline.com/doi/full/10.1080/14442213.2021.1948096>
- Kobayashi and Sugihara. (2019). Changing Patterns of Sarawak's Exports, c.1870-2013. Retrieved from: https://link.springer.com/chapter/10.1007/978-981-13-7513-2_27
- Kordnejad. (2016). Evaluation and Modelling of Short Haul Intermodal Transport Systems. Sweden: Royal Institute of Technology.
- Kristina. (2021). Human-Environment Relations and Politics in Indonesia: Conflicting Ecologies. United Kingdom: Routledge.
- Kumagai. (2013). Geographical simulation analysis for logistics enhancement in Asia. Amsterdam: Elsevier.
- Kumar and Rahman. (2015). Sustainability adoption through buyer supplier relationship across supply chain: A literature review and conceptual framework. Netherlands: Elsevier.
- Kuncoro. (2014). Economic Geography Of Indonesia: Can Mp3ei Reduce Inter-Regional Inequality?. Retrieved from: <http://seajbel.com/wp-content/uploads/2014/07/Economic-Geography-Of-Indonesia-%E2%80%93-Can-Mp3ei-Reduce-Inter-Regional-Inequality-Mudrajad-Kuncoro.pdf>
- Ladin et al. (2020). Feasibility Study on the Transportation Network in the East Coast of Sabah. Malaysia: International Journal of Innovative Technology and Exploring Engineering (IJITEE).
- Liu et al. (2020). Transboundary Frontiers: An Emerging Priority for Biodiversity Conservation. Netherlands: Elsevier Ltd.
- Lord and Chang. (2019). Pre-Feasibility Study of Sarawak-West Kalimantan Cross-Border Value Chains. Retrieved from: <https://mpra.ub.uni-muenchen.de/94732/>
- Lord and Pawat. (2016). BIMP-EAGA Investment Opportunities in Corridor Value Chains. Retrieved from: https://mpra.ub.uni-muenchen.de/76457/3/MPRA_paper_76457.pdf
- Lundan. (2014). Transnational Corporations and Transnational Governance: The Cost of Crossing borders in the Global Economy. Germany: Springer.
- Mahadevan. (2019). Collaboration in Reverse: A Conceptual Framework for Reverse Logistics Operations. West Yorkshire: Emerald Insight

- Makmor, Mohamad Saludin and Saad. (2019). Best Practices Among 3rd Party Logistics (3PL) Firms in Malaysia towards Logistics Performance. Malaysia: Creative Commons Attribution.
- Malaymail.2021. Malaysia drops to 41 in World Bank's Logistics Performance Index. Retrieved from: <https://www.malaymail.com/news/money/2021/09/29/malaysia-drops-to-41-in-world-banks-logistics-performance-index/2009348>
- Malaysia Investment Development Authority MIDA. (2021). Malaysia, Well-Positioned As A Regional Logistics Hub And Gateway To Asean. Retrieved from: <https://www.mida.gov.my/malaysia-well-positioned-as-a-regional-logistics-hub-and-gateway-to-asean/>
- Malaysian Rating Corporation MARC. (2015). Economic Research: The State of Sarawak. Retrieved from: <https://www.marc.com.my/index.php/economic-research/country-reports/country-reports-2015/757-the-state-of-sarawak-18-august-2015/file>
- Malik, Omar and Moon. (2020). Humanitarian Logistics: A Disaster Relief Operations Framework During Pandemic Covid-19 in Achieving Healthy Communities. Malaysia: Advances in Business Research International Journal.
- Mangan and Lalwani. (2016). Global Logistics and Supply Chain Management. USA: John Wiley & Sons.
- Mentzer, Myers and Cheung, (2004). Global market segmentation for logistics services. Amsterdam: Elsevier.
- Melo. (2022). Analysis of activities that make up reverse logistics processes: proposition of a conceptual framework. Brazil: Brazilian Journal of Operations and Production Management.
- Merriam et.al. (2019). Qualitative research in practice: Examples for discussion and analysis (2nd ed.). Newark, NJ: Jossey-Bass.
- MIDA. (2021). Current CIMS approval letter valid through extended MCO 3.0 period. Retrieved from: <https://www.mida.gov.my/mida-news/current-cims-approval-letter-valid-through-extended-mco-3-0-period/>
- Ministry of Finance. (2022). Economic Outlook 2022. Retrieved from: <https://budget.mof.gov.my/2022/economic-outlook/>
- Ministry of Foreign Affairs Brunei Darussalam. (2022). The Brunei Darussalam, Indonesia, Malaysia and the Philippines – East ASEAN Growth Area (BIMP-EAGA). Retrieved from: <https://www.mfa.gov.bn/SitePages/The%20Brunei%20Darussalam,%20Indo>

[nesia,%20Malaysia%20and%20the%20Philippines%20%E2%80%93%20East%20ASEAN%20Growth%20Area%20\(BIMP-EAGA\).aspx](#)

MOT Malaysia Ministry of Transport. (2015). Logistics And Trade Facilitation Masterplan (2015-2020). Retrieved from: <https://www.mot.gov.my/en/Penerbitan%20Rasmi/Executive%20Summary%20Logistics%20and%20Trade%20Facilitation%20Masterplan.pdf>

Monios. (2014). Institutional Challenges to Intermodal Transport and Logistics. Governance in Port Regionalisation and Hinterland Integration. Netherlands: Routledge.

Monios and Bergqvist. (2020). Logistics and the Networked Society: A Conceptual Framework for Smart Network Business Models Using Electric Autonomous Vehicles (EAVs). Netherlands: Elsevier.

Munim and Schramm. (2018). The impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade. Norway: Journal of Shipping and Trade.

Muliama, Jinca and Sitepu. (2016). Port Nodes of Nunukan In Support Of Logistic Transport.

Nasir and Hussim. (2019). Factors Influencing The Competitiveness Of Malaysia Container Hauliers Company In Cross Broder Movements. Case Study: Bukit Kayu Hitam, Malaysia-Sadao, Thailand. Retrieved from: <https://proceedings.itltrisakti.ac.id/index.php/ATLR/article/view/201>

Neagoe et. al,. (2017). Port terminal congestion management. An integrated information systems approach for improving supply chain value. Australia: AISeL.

New Straits Times. (2022). Sarawak-Stable and Growing in 2022. Retrieved from: <https://www.nst.com.my/property/2022/04/790024/sarawak-stable-and-growing-2022>

Nguyen. (2021). The role of logistics industry in the sustainable economic development of Southeast Asian countries. Retrieved from: http://www.growingscience.com/ac/Vol7/ac_2021_115.pdf

OECD. (2015). Port Investment and Container Shipping Markets. France:

International Transport Forum. Onwuegbuchunam et al. (2018). Structural changes in the global transport chain: Implications for ports. Retrieved from: <https://jsdtl.sciview.net/index.php/jsdtl>

Ong, Zailani and Kanapathy. (2020). Overview-Issues and Challenges for Freight Logistics Industry in Malaysia. Malaysia: Journal of Techonology and Operations Management.

- Othman et. al. (2016). The Relationship between Supply Chain Integration, Just-In-Time and Logistics Performance: A Supplier's Perspective on the Automotive Industry in Malaysia. Malaysia: International Journal of Supply Chain Management.
- Ozkanlisoy. (2021). The Covid-19 Outbreak's Effects and New Inclinations in Terms of Logistics And Supply Chain Activities: A Conceptual Framework. Retrieved from: <https://dergipark.org.tr/en/download/article-file/1859743>
- Pacudan, R. (2016), 'Road Map for Power Market Integration in the Brunei-Indonesia-Malaysia-Philippines (BIMP) Region', in Li, Y. and S. Kimura (eds.), Achieving an Integrated Electricity Market in Southeast Asia: Addressing the Economic, Technical, Institutional, and Geo-political Barriers. ERIA Research Project Report 2015-16, Available at: http://www.eria.org/RPR_FY2015_No.16_Chapter_2.pdf , pp.41-58
- Paksoy et al.,(2020). Logistics 4.0: Digital Transformation of Supply Chain Management. Florida: CRC Press.
- Parikesit, Basalim and Wibowo. (2019). The Critical Importance of Land Transport when Considering Port Development. Cambridge: Open Book Publishers.
- Pengman, Melan and Abdul Hanan, 2022. Logistics Service Providers' Capabilities And Roles Of Government Towards Cross Border Logistics Performance Between Thailand And Malaysia. Retrieved from: <http://www.assumptionjournal.au.edu/index.php/abacjournal/article/view/6083>
- Rahman et al. (2018). Decision making techniques for analysing performance of Malaysia Secondary Ports. Malaysia: International Journal of Shipping and Transport Logistics.
- Remali and Harun. (2018). Malaysia National Single Window: The Enforcement Royal Malaysia Custom and Miti Liabilities on Trade System and Logistic Sector. Malaysia: GROSTLOG
- Rezaei et al.,(2018). Measuring the relative importance of the logistics performance index indicators using Best Worst Method. Netherlands: Elsevier.
- Rudskaia and Eremenko.(2020). Conceptual framework for solving problems of commercial transportation of goods in the city logistics system. USA: IOP Publishing.
- Ruggiano and Perry. (2019). Conducting secondary analysis of qualitative data: Should we, can we, and how?. <https://journals.sagepub.com/doi/pdf/10.1177/1473325017700701>
- Runting et.l.,(2015). Alternative futures for Borneo show the value of integrating economic and conservation targets across borders. Retrieved from: <https://www.nature.com/articles/ncomms7819?report=reader#Sec2>

- Runting et al. (2016). *Alternative futures for Borneo show the value of integrating economic and conservation targets across borders*. USA: Macmillan Publishers Limited.
- Ruslan, Ghani and Khalid. (2019). *The Influence of Cabotage Policy on Price Disparity between Peninsular Malaysia and Sabah*. Retrieved from: <https://ijie.um.edu.my/index.php/ijie/article/view/18615/10154>
- Sdoukopoulos and Boile. (2020). *Port-hinterland concept evolution: A critical review*. Netherlands: Elsevier.
- Shahrin (2014). *Intermodal container transport logistics to and from Malaysian ports: Evaluation of Customer requirements and environmental effects*. Doctoral thesis, Stockholm: KTH Royal Institute of Technology.
- Sharapiyeva, Atoni and Yessenzhigitova. (2019). *The Impact of Port Transport-logistics Infrastructure and LPI for Economic Growth: on the Example of Landlocked Countries*. Croatia: Faculty of Maritime Studies.
- Shi and Li. (2016). *Developing the port hinterland: Different perspectives and their application to Shenzhen Port, China*. Netherlands: Elsevier
- Song and Panayides. (2015). *Maritime Logistics: A guide to Contemporary Shipping and Port Management 2nd Edition*. United Kingdom: Kogan Page Limited.
- Sloan. (2019). *Hidden challenges for conservation and development along the Trans-Papuan economic corridor*. Amsterdam: Elsevier.
- Sloan et. al., (2019). *Trans-national conservation and infrastructure development in the Heart of Borneo*. Retrieved from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0221947>
- Stojanovic and Ivetic. (2020). *Possibilities of using Incoterms clauses in a country logistics performance assessment and benchmarking*. Netherlands: Elsevier.
- Subramaniam, Devadason and Sundararaja. (2022). *Cross-Border Shopping Behaviour of Bruneians*. Retrieved from: <https://borneojournal.um.edu.my/index.php/BRJ/article/view/9791>
- Su and Ke (2017). *National Logistics Performance Benchmarking a Process-based Approach Using World Bank Logistics Performance Index Database*. Retrieved from: https://www.researchgate.net/publication/313349490_National_Logistics_Performance_Benchmarking_A_Processbased_Approach_Using_World_Bank_Logistics_Performance_Index_Database
- Suttishe et al. (2019). *Integrating Activity-Based Costing and Computer Simulation to Investigate Thailand-Malaysia Cross Border: A Case Study of Sadao Customs House*. United Kingdom: IOP Conference Series: Materials Science and Engineering.

- Szymonik, A. (2012). Logistics and Supply Chain Management Security and safety engineering of logistic systems in supply chains View project Logistically Efficiency of Product as a element Design for Logistics and Total Logistics Management View project. <https://www.researchgate.net/publication/297369572>
- Taghikhah, Voinov and Shukla. (2019). Extending the supply chain to address sustainability. Netherlands: Elsevier.
- The ASEAN Secretariat. (2014). ASEAN Community in Figures Special Edition 2014. Retrieved from: https://asean.org/wp-content/uploads/2021/08/ACIF-Special-Edition-2014_web.pdf
- The Nation Thailand. (2016). AEC to enhance Brunei-Sarawak trade. Retrieved from: <https://www.nationthailand.com/international/30278070>
- TheStar. (2018). Pan Borneo Highway to bring growth. Retrieved from: <https://www.thestar.com.my/news/nation/2018/04/17/pan-borneo-highway-to-bring-growth>
- The Star. (2022). Sarawak to continue with plans to open trade and tourism offices in Brunei and Kalimantan. Retrieved from: <https://www.thestar.com.my/aseanplus/aseanplus-news/2022/01/25/sarawak-to-continue-with-plans-to-open-trade-and-tourism-offices-in-brunei-and-kalimantan>
- The World Bank. (2018). International LPI. Retrieved from: <https://lpi.worldbank.org/international/global>
- Tracy. (2019). Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact. USA: John Wiley & Sons.
- Wang, Peng and Xu. (2021). Emergency Logistics Network Design Based on Space-Time Resource Configuration. Netherlands: Elsevier.
- Widayat, Subiyantoro and Sidik. (2022). Influence of Logistic Performance on Global Competitiveness. Retrieved from: https://books.google.se/books?hl=en&lr=&id=y8ZyEAAAQBAJ&oi=fnd&pg=PA156&dq=Influence+of+Logistic+Performance+on+Global+Competitiveness&ots=ARYDmJCVTo&sig=nQN57Grr3d9okzKIqDLHVB5L7GY&redir_esc=y#v=onepage&q=Influence%20of%20Logistic%20Performance%20on%20Global%20Competitiveness&f=false
- Witte and Wiegmans. (2013). Corridors for Customers: Analysing Bottlenecks: Analysing Bottlenecks in Intermodal Freight Transport. Dublin: AESOP-ACS P Joint Congress
- World Bank. (2018). International Score Card. Retrieved from: <https://lpi.worldbank.org/international/scorecard/radar/254/C/MYS/2018>

Yean and Das.(2017). Services Liberalization in ASEAN : Foreign Direct Investment in Logistics. Singapore: ISEAS-Yusof Ishak Institute.

Zainuddin et al. (2019). Inland Port Logistical Issues In Northern Region Of Peninsular Malaysia. Malaysia: Journal of Humanities, Language, Culture and Business (HLCB).

Zhang and Okoroafa. (2015). Third-Party Logistics (3PL) and Supply Chain Performance in the Chinese Market: A Conceptual Framework. USA: Canadian Centre of Science and Education