

2019 ICBLP 5 Orang

by Dihin Muriyatmoko

Submission date: 18-Oct-2019 06:23AM (UTC+0900)

Submission ID: 1195013297

File name: Full_Paper_ICBLP_Tian.docx (330.63K)

Word count: 3053

Character count: 17808

ASEAN's Regional Business Innovation Through Digitization of Supply Chain

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Abstract. ASEAN Economic Community (AEC) was established in 2015 as a prominent milestone agenda for integration of regional economy in ASEAN. Varied development stages of its member countries and geographical condition which is a grouping of archipelago nations, are some issues headed by ASEAN to implement AEC. The purpose of this paper is to synthesize information from previous journals, publishers, and data analyst related with trade policy of ASEAN and how ASEAN boost their economic competitiveness by innovation on supply chain. This paper applies literature review on the most recent studies about economic sector of ASEAN and innovation of supply chain toward industry 4.0. This study recommend analysis on several categories : general characteristics of ASEAN and related sector of that region, solution methodology to emphasize economic competitiveness through supply chain and implementation strategy for digitization of supply chain on regional and industry level.

Keywords: Supply Chain, Digitization, ASEAN, Business

1 Introduction

The Association of Southeast Asian Nations (ASEAN) is a political and economic organization aimed at promoting economic growth and regional stability among its members. ASEAN is essential focal point of manufacturing as well as trade in the world. The growth for consumer market in this region also is one of the fastest. For boosting economic aspect of ASEAN, At the Ninth ASEAN Summit on 7 October 2003, the ASEAN leaders made agreement to establish ASEAN Economic Community (AEC) by 2020.

ASEAN is a diverse group consist of different markets, varying economic development stages, diverse cultures, and geographical condition making it one of the most competitive regions in the world today. Diversity of those characteristics which are :

- **Geographic Area**
ASEAN countries vary in sizes. The largest is Indonesia which at 1.86 million square kilometers is 2,605 times the size of Singapore . Geographically, ASEAN is a region consist of archipelago nations, continental lowland, plateau and mountains. This conditions emphasize the additional coverage cost to enlarge business strategies among ASEAN member countries.
- **Population**
Highly populated nations among ASEAN members are Indonesia in the highest position and Philippines as the second. Viet Nam is also highly populated with 87.8 million people. By those elevating number of inhabitants, ASEAN become potential market.
- **Urbanization**
Due to globalization, the economy has shifted from an agriculture-based to an industry-based. Singapore is most urbanized with 100 percent urban population. In contrast, Cambodia is primarily rural with less than a quarter of its population (21%) found in urban areas in 2010 [1]. Urbanization stimulate economic growth because the size, density and diversity of urban population lead to competitive labor cost and economies of scale business.
- **GDP (Gross Domestic Product)**
Indonesia and Vietnam are nations with higher value of GDP than other ASEAN members in 2017. On contrary, Singapore state in the lowest GDP, since it has limited area to production activities. GDP growth in a region indicates potential economic strength which can be affected from domestic demand, economic policy, and production capability in those area.

Based on the challenge facing ASEAN above, this paper focus on synthesizing factors affecting business performance in this region and elaborating trade policy related with digitization of supply chain as regional business innovation. Because the limited number of publication that discussed specifically about innovation of supply chain in regional scope, this paper presented a review of main idea about digitization of supply chain in ASEAN's regional policy. Previous research related with supply chain in regional scope [2] discussed about research in logistics and supply chain management in Africa. Those paper described issues mapping in developing countries such as Africa without discussed more about regional policy. Other paper discussed about regional business innovation which focused on complex adaptive system gofermance in supply chain to respond the need of mining industry [3]. It did not recommend notably about digitization of supply chain.

The aim of this paper are to synthesize information from previous publications related with supply chain policy of ASEAN and recommend ASEAN's trade policy about digitization of supply chain to elevete regional business innovation. The questions for this paper are as follows :

RQ₁. How can digitization of supply chain influence ASEAN's business innovation ?

RQ₂. What is the reccomendation for applying digitization of supply chain in ASEAN ?

2 Concept of Digital Supply Chain

2.1 Supply Chain

We started to discuss about the definition of supply chain. The supply chain, which is also defined as logistics network, is a network between parties that change basic commodity (upstream) into finished good product (downstream) which adds value for customers [1]. Based on Christopher from his book, the definition of supply chain could more accurate as a network which mutually and cooperatively working together as well as connected and interdependent organisations Those involved in the supply chain are responsible for the process to the product [2]. Waters [3] added, each party of supply chain contributes to the process of transforming raw materials into finished materials. Figure 1. shows supply chain activities by linking upstream activities and downstream activities.

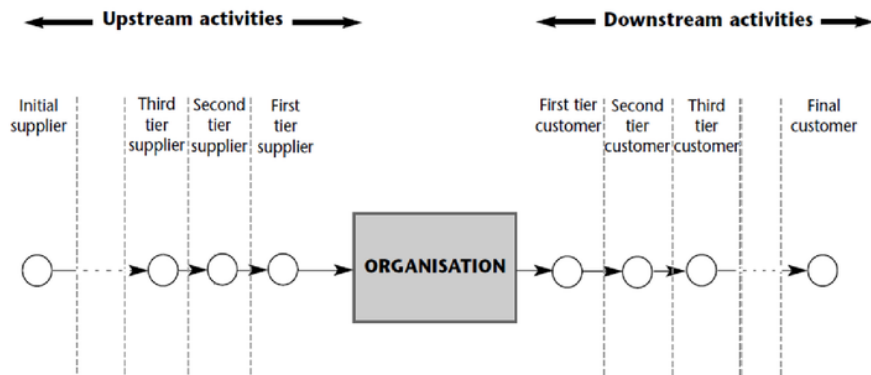


Figure 1. Supply Chain Activity [3]

More detailed explanation from Waters [3] that upstream activity is a buy side activity carried out by a manufacturing organization in obtaining material to be processed in the manufacture. While downstream activities are activities carried out by companies to distribute their finished products (sell side) [3].

2.2 Digital Supply Chain

Business interaction among regional area nowadays is more tight and competitive. Every business innovation used in industry related with utilizing of smart technologies. This trend sometimes is called Industry 4.0 which using Internet as trigger, that makes communication between humans and machines in Cyber-Physical-Systems (CPS) throughout large networks [4]. Those changing condition brings business and manufacturing environment into Industry 4.0 which has many impacts on the whole supply chain. Interconnectivity and transparency between suppliers, manufacturers and customers is essential to be accelerated from when the order is sent until the end-of-life of the product. According to IBM, supply chain in the future consists of the three technology-based drivers which are instrumented, interconnected, and use intelligent [5]. First, "instrumented" means supply chain data would be equipped with sensors, RFID, GPS, and other devices [5]. Second, "interconnected" in other literature means whole supply chain parties, are all connected in a smart supply chain, including assets, IT systems, and products [6]. Using "Intelligent" factor was defined as utilizing smart system which assist decision maker to make simulation for various constraint and solution [5], while the other author was explained about application of intelligent system is needed for demand forecasting in retail industry [7].

3 Methodology

There are many approaches or methods to make a literature review with purpose to discuss a topic. First method in writing literature review is narrative literature review which form a bridge among empirical articles and research publications within a related topic [8]. This method give reader conclusion of a scope and theoretical level that empirical research paper cannot normally reach [8]. The gap of narrative literature review is inexistence of empirical studies

discussed in this method which could strengthen a line of conclusion in paper. Other method is meta-analysis which summerizing, combining and statistically analyzing empirical studies on the subject [9]. Meta-analysis could be used to design new research from the findings of prior studies and also to support evidence-based policy [10]. According to paper reviewed about supply chain management, content analysis is a method that can be used in a quantitative as well as a qualitative way [11]. The method used in this paper was content analysis because it provided broader discussion with flexibility to researcher for synthesizing complex information related with a topic and also allowed for using qualitative and unstructured data such as interviews or webbased documentary research [11]. Since it was used in previous publication, content analysis consist of three steps : analysis of articles, definition of content within each category, and identify research gaps in the literature [9].

4 Findings

4.1 ASEAN's Business Inovation through Supply Chain Integration

ASEAN consist of varied development stages of its member countries and geographical condition wich is a grouping of archipelago nations. Based on data from Mc Kinsey in 2014, the number of ASEAN countries which have low midle income more than the middle upper[12]. The nation members which is included in high-saving economies are such as Brunei, Malaysia, and Singapore, and low-saving economies, such as Cambodia, Laos, and the Philippines. There are various production facilities and networks that are dispersed throughout the entire region. Because of different levels of development among ASEAN Members, an efficient and sophisticated flow of inputs to production could be assured [12].

For answering RQ₁ "How can digitization of supply chain influence ASEAN's business inovation?", this paper synthesized points and findings from previous journals and also web-based publications related with trade policy of ASEAN. The analysist started with the point about how important business inovation todays in regional scope. Business inovation is notable step for facing the changing global economy because the higher demands of computing technology and more dynamic transparent global trading [13]. Regional business inovation stated in previous publication can carry out global competition for the members of collective economic community [14]. Furthermore, it proposed a model for regional enterprise support system which consist of governance policy, technology agency, inovation research and support system for evaluating business performance (Figure 2) [14].

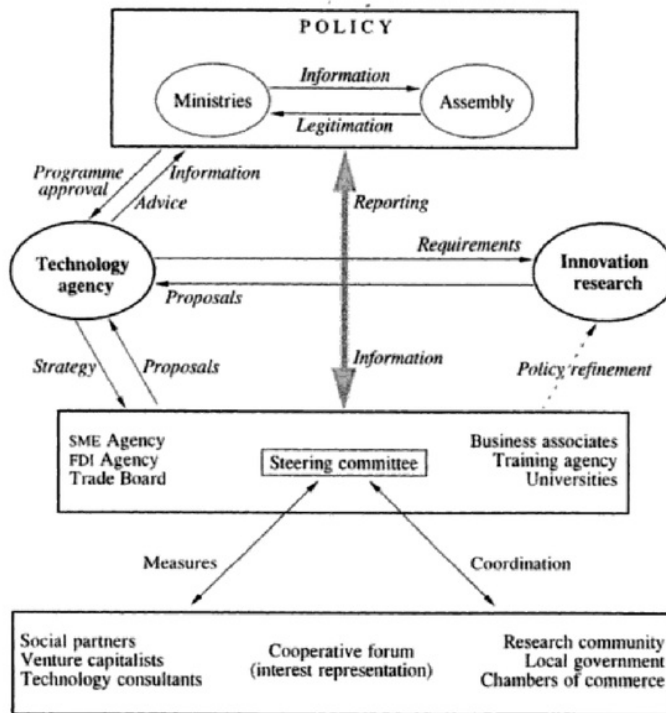


Figure 2. A Regional Enterprise Support System Model[14]

After discussing the definition of regional business, this paper focused on ASEAN policy related with supply chain innovation. The starting point for elevating ASEAN's regional business potential is from the establishment of AEC by 2020. The implementation of single market through AEC allows free flow of trade as well as free mobility of labour and capitals [15]. Megafactory countries in Asia such as Japan, China and Korea also have signed economic integration with ASEAN which resulting the signature of the ASEAN-China Free Trade Area framework in 2002. The China-ASEAN FTA started to operate in 2010. Impact of free trade area policy is the domestic value added gross manufacturing exports fell in all countries, as firms started to relocate production abroad [16]. The policy of China, Japan and Korea to shift their product into assemblage type and spread the location of their intermediates raw material production to ASEAN countries because of lower production cost. This phenomenon also has led multi-national companies in ASEAN are adopting production strategies that involve horizontal and vertical multi-plant operations in two or more ASEAN countries for strategic and economic reasons. Cope with those condition, supply chain integration is needed.

4.2 Policy for Implementation of Supply Chain Digitization in ASEAN

To formulate the recommendation for applying digitization of supply chain in ASEAN (RQ₂), two side approaches have to be done from governance side as top-down approach and also industry side as bottom-up approach.

Industry Side Approach Policy

Utilization of digital supply chain in industry level according to previous literature are determined by some key areas of technologies, such as : integrated planning and execution, logistics visibility, Procurement 4.0, and smart warehousing.

- **Integrated Planning and Execution**
By utilization of Integrated Planning and Execution, signals that sent from supply chain network and alert all to issues affecting supply or demand [18]. Models were proposed for integrated planning such as Distributed Generation integrated with load response [21], advance planning optimization [22], and static scheduling method [22].
- **Logistics Visibility**
Chain visibility is majorly influenced by effective “track and trace” system that allows players to determine the status of any given shipment of goods at any point in its travels [18]. Logistic visibility has been implemented in China for building agri-food supply chain traceability system by using Blockchain technology and RFID [23].
- **Procurement 4.0**
Digitization of procurement will impact on supply chain cost efficiency and faster delivery. Company need to connect more closely with suppliers by using big data tools for supporting the planning process, and supplier risk [18]. Procurement 4.0 contributes to improve the organizational supply chain for satisfy customized and innovative demands [24].
- **Smart Warehousing**
In further warehousing system, transportation will be integrated with intelligent warehouse management system, for optimizing just-in-time and just-in-sequence delivery [18]. Smart warehouse management will utilize Internet of Things (IoT), supported with hardware, such as handheld electronic label, barcode readers and fixed readers and also software, such as a host management system and shelf electronic tags [25]. For more expert implication, smart warehousing can use Web of Things (WoT) to deliver a real-time depiction on the Web [26].

Governance Side Approach Policy

³⁸ Revolution of supply chain in industry level give main impact for regional policy as the fourth industrial revolution does not recognize national borders. That condition push regional cooperation, and ASEAN through AEC need to upgrade its approach to regional governance policy. For implementation of digital supply chain in regional area, trade policy among ASEAN members have to set under the vision of AEC. Recommendation of regional policy retrieved from journals, year of publication, publishers, and data analyst which support the implementation of supply chain digitization, as seen in Table 1.

Table 1. Regional Policy for Implementation of Supply Chain Digitization

Author	Publication Year	Policy	Implementatin for Supply Chain Integration
Wattanapruttipaisan [17]	2007	Appointment of ICT Equipment and Logistics as Priority Integration Sectors (PIS)	<ul style="list-style-type: none"> - Nontrade Costs - Exacting tariff packages, Rules of Origin, and technical standards for PIS commodities <p>Research and empowerment of local firm to upgrade process creativity in electronic-related sector.</p>
Asian Development Bank [18]	2017	ASEAN through AEC encourage Asian Government to implement blockchain technology	<ul style="list-style-type: none"> - Digitised transaction among SME's for providing sophisticated and efficient microfinance - Block-chain based platform for aquitable energy supply - developing policies and programmes to fuel entrepreneurship by using block-chain based marketplace
ASEAN Secretariat [19], Bhattacharyay [20]	2014, 2010	ASEAN established cooperative programmes in ICT through e-ASEAN Agreement	<ul style="list-style-type: none"> - Develop information infrastructure - Promote and facilitate investments in the production of ICT products and services - Facilitate the growth of electronic commerce

5 Conclusions and Recommendations

This paper presented literature review which discuss about regional policy in ASEAN. This paper also constructed recommendation for implementaion of digital supply chain in ASEAN. Digitization of Supply Chain improves regional business performance for more efficient by governance support system. Implementation strategy for digitization of supply chain should be carried out from regional governance policy and also industry policy.

There is also still a lack of empirical study about how far digitization of supply chain implemented in ASEAN governance practices and how industry responses for those. Recommendations for future research are listed below.

- Empirical study for implementaion of supply chain digitization in ASEAN.
- Empirical study about ASEAN governance performance for digitization of Supply Chain.
- Study about environmental and social impact from digitization of supply chain in ASEAN.

Acknowledgments

This paper was presented in International Conference on Business, Law, and Pedagogy 2019. We thank University of Darussalam Gontor for fully funding of paper presentation in those conference.

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