

# Determinants for a Successful Interstate Ro-Ro Operations in Indonesia-Malaysia-Thailand: A Review

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**Abstract**— In accelerating the integration of the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) and realising more equivalent modal splitting, short sea shipping (SSS) has become a progressively important component in IMT-GT transport planning. Over the years, numerous studies have attempted to look into the SSS requirements and to classify the SSS routes which are economically practicable. Interestingly, Ro-Ro services have become one of the interest areas under the SSS operations that have been extensively researched particularly in Europe. Notwithstanding the efforts made to develop successful Ro-Ro operations, there still exists a great potential which has yet to be exploited enough for various reasons. This paper aims to review the key factors which may contribute to successful Ro-Ro SSS operations. Although a myriad of important factors identified by means of empirical studies, a counter argument is that the important determining factors which are required for a particular route or region may not be applicable to another. In Europe and North America, SSS was introduced to divert road freight transportation away from the congested roads as its main purpose, whereas in Southeast Asian countries, SSS has been part of the initiative to ensure the attainment of a well-connected Association of Southeast Asian Nations (ASEAN) community. However, earlier Ro-Ro operations along some of the routes were not able to sustain and ceased operations after several years. Hence, although important lessons can be learned from the experience of other regions, a more comprehensive study need to be conducted before any Ro-Ro SSS endeavour could be initiated to ensure the important determinants for its success that may be peculiar to a particular region or corridor are identified and addressed.

**Keywords**— Short Sea Shipping (SSS), Ro-Ro, Association of Southeast Asian Nations (ASEAN), Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT)

## 1. Introduction

Short sea shipping (SSS) has presently begun to draw global attention from governments around the world. This could be mainly because many governments now attempt to find ways and means to reduce both greenhouse gases and traffic congestion. In July 2003, Canada and the United States signed a Memorandum of Cooperation (MOC) on sharing SSS experience and information. Subsequently, the federal government of the USA was engaged in an assessment of SSS through a series of workshops [6]. On the other hand, over the past years, a significant attention has been paid for the expansion of SSS services in both Europe and North America. Besides, some recent studies by scholars have also looked into the potential for SSS activities on the east coast of Canada and the USA [7]. Notwithstanding the significant number of studies on SSS carried out in Europe, North America and other parts of the world, a recent review of such published works on SSS by [2] revealed that it was still limited in numbers.

This paper aims to identify important determinants which may facilitate the introduction of a feasible SSS operation by means of a comprehensive review of related recent literature, mainly from the contexts of Europe and North America along with other parts of the world. It is hoped that such a review may significantly contribute to a better understanding of the density of the variables involved and ensuring the efforts in relation to SSS could be translated into reality, particularly among the member countries of IMT-GT Sub-Region that are embarking on their own interstate SSS to ensure the accomplishment of a well-connected ASEAN Economic Community

## 2. Research Problem

Although SSS is by and large, considered as low cost, environmentally friendly and a safe means of

transportation [3], in the case of IMT-GT sub-region, it has yet to achieve a significant level of recognition in terms of its market share [21]. In this regard, if SSS were to be an efficient alternative to road transport, it is required to achieve a significant level of recognition from both the public and private sectors. It is along these lines that the researcher intends to investigate the key determinants that must be addressed first by the IMT-GT interstate Ro-Ro SSS stakeholders and potential investors to ensure the success of their SSS endeavors. While quite a number of determinants have been reported in the previous studies, particularly in the contexts of Europe and North America, it can be argued that each area or corridor may require separate studies owing to the key determinants between these corridors may not be similar [34].

### 3. Literature Review

#### 3.1 Definition of Short Sea Shipping

In a comprehensive review of literature, it can be discovered that there is neither a clear definition of SSS within the academic literature nor a common understanding among the professional maritime institutions. As in the case of academic literature, the term Short Sea Shipping (SSS) has often been operationalized without any reference being made to its previous use. Nevertheless, by means of a focused research, it is possible to identify various definitions. The European Commission defines SSS as ‘the carriage of goods by ships among the ports located within the geographical region of Europe or among these ports which are located in non-European countries with a coastline on the enclosed seas around Europe [8]. Besides, [35] argued SSS can be considered as the shipping of cargo or for relatively shorter distances or even to nearby coastal ports. Another definition provided by [33] is, SSS is considered as a distribution service from regional main cargo ports to other ports.

Generally, SSS has been known under an assortment of names. For exploration purposes, this study operationalized the definition of SSS as propagated by the European Commission i.e., the movement of cargo and passengers by sea among ports which are situated within the geographical region of Europe or among those ports which are situated in non-European countries with a coastline on the enclosed seas bordering Europe.

Short-range maritime transport usually covers both national and international maritime transports, as well as feeder services, along the coast and the islands, rivers and lakes [14].

#### 3.2 The strengths of Short Sea Shipping

The geographical environment of the EU which can be considered as the simplistic accessibility of ports [22] along with the longest EU coastline, exceeding 67,000 km [28] may serve as a strategic situation for SSS, hence a major strength of it too. Additionally, [28] revealed that between an estimated 60 % to 70 % of all industrial and production centres of the EU are located within 150 to 200 km of the coastline.

Another big strength of SSS is the capacity of it to carry relatively higher volumes of goods than that of other modes which may culminate in a better use of economies of scale [22]. These economies of scale may in turn allow SSS to offer services at lower freight rates and exploit the capacity which is underused without incurring high capacity-related investment costs. [30] Described SSS as the only transport mode, making it possible to carry goods and raw materials at an affordable price range. This may have implications for door-to-door transportation of certain cargo types, namely the dry and wet bulk by coastal sea and river vessels [28]. Based on its geographical advantage and its capacity to carry high volumes of goods, SSS is able to foster the integration, cohesion and economic development of remote areas within the EU or even beyond.

Considering the fact that SSS is an extremely capital-intensive industry, the market has relatively higher entry barriers than for example, the road transport. This may serve as an added advantage for the key players who have already been on the market as they can develop transport systems in which, the most capital intensive mode is already present [28]. While there can be congestion and space limitations in land modes, the capacity of the sea on the other hand is virtually unlimited and the demands of infrastructural maintenance or extension is by far lower, too. SSS does not require sea lanes, but only a superstructure along the coast that may ensure the safety of navigation [22]. They also opined that the investment in infrastructure can also be seen as an investment in SSS, for example, a vessel traffic management information system may help mitigate the effects of the broken transport chain. [28] also echoed a similar view in relation to this by stating

that the cost incurred for port maintenance and port investments is considered lower compared to all the other land transport modes, especially due to the external costs involved; congestion and pollution.

The only external cost incurred in the business of SSS and this may be brought by the participants who are not directly involved in an adequate port infrastructure, which is necessary to control the entry and exit of goods to avoid congestion. This, however, has to be organised on a mutual basis along with the involvement of different stakeholders to prevent the existence of bottlenecks in transport chains. According to [28], this situation implies that SSS does not require innovation in the form of new investments in infrastructure, but the performance can be easily increased by the cooperation of SSS and business related players. The implementation of a new philosophy may increase the flexibility, creativity, integrity, leadership and openness to learning, which may help handle the market uncertainties and new logistical challenges like Just-in-Time (JIT). In relation to capital intensity, which may give the SSS players' business a competitive advantage, there is also the level of skills and knowledge of players that may equally act as entrance barriers [28].

As another external cost, [28] referred to the average daily congestion of 4,000 km within the road networks in the heart of Europe. This congestion, which is associated with social cost, can only be removed or reduced by investing in new infrastructure which in turn, may need to be made for the expenses of another social cost.

Additionally, [22] enlisted much lower Carbon dioxide emission per ton-km as one of the big strengths of SSS. Thus the external cost can also be added to the smallest emission of Carbon dioxide, which SSS reportedly have on all transport modes. [28] Went on to say that there is now an increasing environmental regulatory pressure imposed on industries such as SSS which is fostering businesses to be innovative.

In addition to bearing the cost of these regulations, such pressures may also help increase the number of quality businesses, which will in the long run may offset costs incurred. Lastly, by conserving the environmental friendliness of SSS, the number of fatalities related to SSS may become relatively

lower in comparison with the other modes, in particular, the road.

The advantages of SSS can also be seen from the economic point of view [28]. The intra-European ship industry can actively contribute to their knowledge and skills and to the success of SSS in relation to the adaptation of the ship design in SSS business. Presently, an estimated 50 % of all ships manufactured in Europe are set for this particular market [14]. This means that the comprehensive knowledge is not lost, despite the pressure to reduce the cost arising from the Far East. The value of Knowledge, Information, and Skills are actually seen as the most valuable asset of companies based on the fact that it is not easy to be imitated and can be acquired only over time [15].

Additionally, the advantages of SSS are the highest safety levels of dangerous goods, based on the long distance of this cargo to humans, which may not be the case when using road transports. Furthermore, SSS is capable of carrying large indivisible heavy unit loads which may turn out to be a problem for other transport modes. Finally, SSS is one of two transport modes which leave space for a higher and intense capacity usage behind the rail mode [16].

### 3.3 Ro-Ro Shipping Operations

Basically, Ro-Ro or Roll on-Roll off vessels are defined as ships that can transfer trailers, truck and wheeled cargo comprising passengers without the obligation of using a cargo handling gear [3]. Ro-Ro shipping is exclusive in providing continuous services of transporting vehicles, passengers, containers, and general cargoes on trucks [18]. In general, [18] argue Ro-Ro ships are greatly smaller than the common container ships, though, Ro-Ro ships fit for numerous point-to-point operations. In terms of benefit, Ro-Ro shipping operations are extensively used crosswise the globe for many routes between islands and by-pass routes escaping detour transport [23]. Consequently, Ro-Ro shipping operations between islands can afford smooth connectivity particularly for IMT-Growth Triangle [18].

## 4. Methodology

This paper presents an evaluation of the related literature in relation to the focus of the study by closely referring to various studies carried out elsewhere. This study also presents a theoretical

review on SSS and its important determinants, and discusses the relationship between both SSS and these determinants. Lastly, a systematic summary of the theory, empirical substantiation and the gap that this study intends to fill are presented.

## 5 Results and Discussion

### 5.1 Determinants for a Successful SSS Endeavour

From the European experience, [27] analysed the service attributes that SSS must deliver in order to be integrated into multimodal logistic chains in a more competitive way. Following are the factors in descending order of importance: (i) carrier logistic network design and speed (ii) cost of service (freight rates), reliability and quality (iii) carriers, representatives, sales and after-sales behaviour (iv) involvement in the forwarding industry (v) service guarantee (vi) corporate image (vii) commercial and operational and (viii) carrier shippers relationship policies and investment policies. As [27] suggested, the results point to the need to focus on the efficiency of the transport network and the adoption of a relationship management approach in which, partnerships or strategic alliances are the foundations of such relations.

[27] Also revealed that the right mix of logistics strategies may certainly improve customer service and, at the same time strengthen the marketing and logistics relationship. They have also provided SSS with the ability to develop dedicated multimodal transport services that may fit within the logistics needs of SSS end users. Moreover, they also contributed towards the development of internal capacities and the ability to adapt to changing market needs and values. They also revealed the concentration on core competencies may help this change and more often than not, the short sea-operator (SSOs) may be forced into developing strategic alliances or partnerships with the different players in an attempt to minimize the cost. Coordination, visibility and synchronisation may contribute to streamlining operational procedures and the lean port network ideas can be implemented and even more, SSS may by then, be considered a reliable transport mode [27].

In a similar vein, [26] reported that the factors for SSS can be more complicated since they include more than one mode which comprises two attributes, namely monetary cost and time requirement, these

attributes can be further divided into three other categories, namely maritime, road and port. In the same study, drawing on the simulated results, it was discovered that SSS became more competitive when the use of vessels occupied relatively a higher proportion of the multimodal transportation route and serving coastal regions, whereas the road haulage continued its dominance within the inland regions.

[19] In their study indicated that variables such as how accessible port infrastructure is, the overland distance covered by the shipment, the relative value added for the freight, the size of the shipment and the type of company are equally as important as determinants of modal choice for the traditional cost and transit time variables. Two years on [12] demonstrated that a poorly defined object of intervention may result in implementing ineffective public policies in which, the tools may not be in line with the objectives. They also argued that the lack of a standard definition had been a subject of discussion in the academic world for the last 25 years and worse still, although some criteria were already set and compared, but no clear consensus has been reported yet. They also indicated that though the EU's geographical definition may be accepted, but it does not aptly correspond to the purposes of its programs which aim to promote a shift from roads to the sea. Without avoiding the 1999's definition, the EU may need to clarify its position by means of any relevant policy [12]. This implies that improved evaluation for each segment of the SSS market is necessary. The EU may need to devote more attention to this matter than at present. They also revealed a perceived misconception about the trucking corridors patterns, i.e., France reportedly stated that shorter transit time and distance always favour truck transport and efforts to transform cargos into ports may not be achieved [12].

In the context of community policies aiming to achieve sustainable mobility, European institutions have of late been promoting SSS as an alternative and at the same time, it may serve as a complement to land transport. Indeed, the European Commission has classified it as the only mode of transport which is capable of sustaining the rapid growth of the European Union and offering real possibilities of achieving a transfer of freight from road, improving competitiveness, reducing environmental costs

incurred and favouring the cohesion of the European Union [25].

In the same study, they also argued that SSS must be developed with a clear intermodal vocation, forging bilateral ties among the shipping companies that operate lines of this nature and their customers, as well as the international road transport firms. They also indicated that the use of SSS implies a major readjustment in their traditional way of operating, making it difficult for them to decide on the use of this mode of transport and therefore, a matter of confrontation between road transport and sea transport. However, it provides encouraging cooperation between the two modes, so that competition may take place within multimodal transport chains. They also argued that the success of SSS is based on the cooperation and trust established between road and sea transports, and the best results can be shown when both compliment each other in a coordinated way. In fact, the literature points out that cooperation and long-term partnership in the channel may lead to improved performance [25].

In terms of infrastructure, [11] argued the modal-related infrastructure plays a crucial role in relation to the design of transport corridors. They also argued the spatial implementation (or availability) and the capacitive design of routes as well as their intermediate network, the logistics facilities are essential. Therefore, there is a need to cover different transportation modes which demonstrate differentiated case-related benefits due to the general framework employed.

In the same study, it was stated that with regards to the efficient organisation of operational processes, the field of partly mode-specific ICT (information and communication technologies) systems may have to be considered as another significant factor. This requires the use of high-performance ICT-based systems for planning as well as for monitoring and control [11].

[24] Reported that ships spend approximately 40% of their time in ports and approximately half of that time in waiting for various processes to initiate. Reasons for the waiting were divided into five categories. These were, ranked in order of importance, waiting due to: (i) ports open hours, (ii) early arrival, (iii) congestion and clearance procedures, (iv) unspecific reasons and (v) waiting

for the pilot [24]. On the other hand, they also indicated that there is a need for a different approach which may help increase the efficiency of a port call, for instance, longer opening hours, and more time and better tools for planning the sea voyage.

Recently, [32] presented a model for the evaluation of SSS transportation demand, considering both transit time and costs for unimodal (road) and intermodal transportation solutions. They also revealed that cargo amounts carried by road or SSS may vary significantly in terms of sailing speeds, as these two parameters are the most important in comparison with the relative time and cost. They argued that the parameter which may impact time (tolerance for extra transit time in SSS and sailing speed) was found to be more important than those affecting costs. For ease of reference, a summary of significant factors in ensuring the success of an SSS endeavor through studies conducted on European SSS operations is presented in Table 1:

Table 1. Determinants of a successful SSS operation for European

Determinants	1	2	3	4	5	6	7	8	9
Monetary cost and time requirement	*		*			*		*	*
Sea-leg distances	*		*						
Market size and transportation demand									
Transport Policy				*	*				
Logistics chains and intermodal transportation		*		*	*	*	*		*
ICT (information and communication technologies) systems							*		
Network Structures							*		

Design Framework							*		
Port infrastructure and efficiency			*					*	

Legend:

1. Ng (2009)[2]
2. Paixao-Casaca & Marlow(2005, 2009) [27,28]
3. Menéndez & FeoValero (2009) [19]
4. Gouvernal et al. (2010) [20]
5. Sánchez et al., (2011) [25]
6. Douet & cappuccilli (2011) [12]
7. Daduna et al., (2012) [11]
8. Johnson & Styhre (2015) [24]
9. Tiago et al., (2016) [32]

From the experiences of the American, the Department of Transportation (DOT) has made SSS a high priority in its National Freight Action Agenda. The first SSS initiative was launched in November 2002. United States Maritime Administration (MARAD) currently leads the way in promoting the idea of the SSS with its Marine Highway initiative [29]. MARAD has organised four conferences on SSS in the time span of 2002 to 2006. The main purpose was to raise awareness among stakeholders on SSS and further boost short sea operations [29]. In their study, they indicated that the Short Sea Shipping Cooperative Program (SCOOP) had funded three studies looking into SSS and the first study by the US Merchant Marine Academy, presented an economic analysis of a proposed short sea service with a Ro-Ro vessel designed to carry 80 tractor trailers. The estimation of the required freight rate revealed that this was lower than the truck freight rate for distance which was beyond 200 miles. This analysis, however, did not include the terminal costs and the port fees, which in the case of SSS can be a major part of the total transportation cost. The study also presented the findings of a survey that was sent to various industry stakeholders, such as port authorities, shippers, and ship owners. The results showed that

the market size and transportation demand for short sea services are the most critical factors for them [29].

[29] Demonstrated that the potential for short-sea shipping within Central America (CA) may depend to a great extent on tackling the physical geographical situation and regional trade pattern. They also revealed that the integration of SSS in regional transport policies and infrastructure development plans seems very important. In order to strengthen the potential of SSS in CA, it is important to initiate a process for the involved actors to create awareness for the need of combining transport policy measures with regional economic development initiatives [31].

In the same study, they also indicated that transport policy-makers have to create guidelines for the development of SSS transport corridors, focusing on corridors along the Caribbean and the Pacific coast. Moreover, a re-planning of the current road network is necessary to solve the prevalent substandard conditions of the road network and further to develop an appropriate network under an innovative multimodal transport development framework. On the other hand, they also revealed politicians from different political levels have to be aware of this process as that would culminate in creating political will. The cost of sharing between private and public sources may require a systemic view and it is of importance to treat different modes of transport equally with regards to the evaluation of new investment projects [31].

The characteristics of SSS services and its system's internal advantages with regards to environmental performance, or investment needs in comparison with the other modes, making this transport mode highly attractive in the prevailing situation of terrestrial transport infrastructure deficits and high overland transport costs [31].

From the experiences of Canada, [7] identified a number of challenges to the development of short sea shipping in the country, including port interfaces, transit time, demand, seasonality, the extra cargo handling costs, and institutional rules. Specifically, they also revealed that workshop participants wanted the government levels to work toward addressing the regulatory irritants, including fees and restrictions, to assist with port infrastructure, to invest in maritime technology, and

to promote North American economic development. They also opined that the next steps may need to include the government's support for studies to identify broad opportunities for Canadian participation, and to assess commodities with market potential and technologies that could be commercially made successful [7].

In another study, [6] indicated that with respect to the service characteristics of transit time and price, there was convincing evidence that these factors were significant. They also concluded that the more reliable the service, the more likely the mode will be chosen. They also found that to the question of what factors may influence the respondents to consider switching to SSS also revealed that the majority of them cited that price, reliability, and transit times are key service characteristics of any service provider. For ease of reference, a summary of the significant factors in ensuring the success of an SSS endeavour through studies conducted on North American SSS operations is presented in Table 2 below:

Table 2. Determinants of a successful SSS operation for the American

Determinants	[31]	[6, 7]	[29]
Monetary cost and time requirement	*	*	
Market size and transportation demand		*	*
Transport Policy	*		*
Logistics chains and intermodal transportation	*	*	*
ICT (information and communication technologies) systems	*		*
Port efficiency	*		
Port pricing policy	*	*	
Awareness of SSS	*		
Political support	*		

Finally, from the experiences in the East Asian region, the SSS is considered essential elements of available transport services, due to the geographical conditions and the industrial location structures [13]. Thus, the SSS for Japan is deemed as a cornerstone of the operational processes in relation to its national traffic, in which, there is predominantly Ro-Ro transport [5].

However, the improvement of the performance of the SSS due to shorter travel times also may cause a disproportionate rise in energy demand, which cannot only counteract the cost targets but also may have a negative impact on the environmental situation. In addition, SSS services to connect Korea and the Japanese industry as well as the Chinese mainland can turn out to be significant over the coming years [17]. Nevertheless, there are limited studies of the key success factors for the SSS operations in the ASEAN region [2]. A recent study, carried out by [2] employed a Delphi technique revealed that there were several key success factors for the SSS which were adequate port facilities and equipment, harmonization of administrative procedures among port, suitable ship type in relation to payload, distance and speed and lastly, good intermodal links and government assistance at initial period. For ease of reference, a summary of the significant factors in ensuring the success of an SSS endeavour through studies conducted on ASEAN SSS operations is presented in Table 3 below:

Table 3. Determinants of a successful SSS operation for BIMP-EAGA Sub-Region

Determinants	[2]
Adequate port facilities & equipment	*
Harmonisation of administrative procedures among ports	*
Suitable ship's type in relation to payload, distance & speed	*
Good intermodal links	*
Government assistance at initial period	*

### 5.2 Implication for ASEAN Countries

Referring to Table 1 above, the `\*` specifies the researchers observed that the determinants that have frequently been reported in European SSS studies are (i) Monetary cost and time requirement, (ii) logistic chains and intermodal transportation, (iii) Sea-leg distances, and (iv) Port infrastructure and efficiency. On the hand, from Table 2 above, the `\*` specifies the researchers observed that the determinants that have frequently been reported in the North American SSS studies are: (i) logistic chains and intermodal transportation, (ii) Monetary cost and time requirement, (iii) Sea-leg distances, (iv) Transport Policy, (v) market size and transportation demand, and (vi) ICT (information and communication technologies) systems. In this regard, from Table 3 above, the `\*` specifies the researcher observed that the determinants that were listed in BIMP-EAGA Sub-Region SSS studies are: (i) Adequate port facilities & equipment, (ii) Harmonization of administrative procedures among ports, (iii) Suitable ship's type in relation to payload, distance & speed, (iv) Good intermodal links, and (v) Government assistance at initial period.

In discussion, even though quite recent studies concerning the key success factors for a feasible SSS were conducted within the ASEAN region, it is still considered limited in number. As can be observed from Table 1, which is more comprehensive, those factors could also be applicable to the ASEAN environment to guarantee the operation of a feasible SSS in the sub-region. Yet, since separate areas or routes may have their own uniqueness, a detailed study may however be required to ensure the main determinants which could influence the success of their SSS endeavour would be identified [2].

In addition to the earlier argument, due to the coastal nature and archipelagic of the ASEAN region, most of the routes recognised would involve networks between the island and mainland or involving an inter-island link for which, no other suitable alternative mode of transportation, especially for freight movement is available [1]. Definitely, lengthy and inefficient cross-border procedures which may increase pointless frictions and costs to transport operators and consumers, have been documented by some of the governments in the ASEAN region as an important challenge that need to be recognised in order to achieve the aspired ASEAN community [4].

## 6 Conclusion

In conclusion, the arguments by several scholars through their studies focusing on SSS in the European context, the SSS operation for each route or area reportedly may have its own distinctiveness. This has been found to be clearly supported by the views posited by other scholars upon a comprehensive review of literature of studies that have been focused on European SSS itself [2].

Based on the discussion in the foregoing sections, the present challenge being faced by SSS is to determine the appropriate determinants in order to achieve the goal of successful SSS operation as well as reliable SSS services. Indeed, it seems highly unlikely that significant use of any alternative determinants of feasible SSS may occur unless clear determinants are identified. By means of determining the appropriate determinants, SSS may therefore, be considered as an alternative to road transport if it were to show some comparative advantage and if it were able to adapt to the needs of the demand for transport by making door-to-door maritime services available to users, thereby providing a real competitive alternative to road transport especially for the IMT-GT Sub-Region. Intermodal transportation and logistics chains as the main activity of SSS may require some special attention to the modes for which, there is an exchange from one mode to another.

In achieving a paradigm shift from roads to SSS, various interventions may have to be undertaken. For this policy to work effectively and efficiently, it would have to redress some of the major failures in the sector first. Numerous studies have shown how the inclusion of external costs can effectively change the financial and social positions of SSS in relation to road freight transport, and in so doing, the profile of SSS as a feasible freight movement alternative could be raised. Given the limited degree of internalisation of external costs, road transport still retains its competitive advantage. However, the correct dimension of appropriate determinants of SSS for promoting environmentally friendly transportation alternatives may ensure successful implementation of SSS, thus highlighting the welfare gain for society as a whole.

## 7 Recommendations



It is the researcher's view that, notwithstanding the limitations associated with the present review study, it may still serve as a guide for future research. Future research of this kind may broaden the scope of study concerning SSS operation, i.e., detailed observations on the practices and awareness of SSS especially within the ASEAN region. In other words, a more rigorous and comprehensive review of literature in this regard, is therefore absolutely necessary. Moreover, comprehensive observations including gathering data from huge samples, as well as proper interviews to gain accurate perspectives without distortion and dilution concerning this area of research are deemed significant in future studies.

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