

# Determining the Influence of Technology, Logistic Integration and Operational Performance on Supply Chain with Moderating Role of Information Sharing

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**Abstract**—The basic objective of the ongoing article is to investigate the impact of technology integration, logistic integration and operational performance on the supply chain activities of the services sector in Indonesia. The goals also include the examination of the moderating role of supply chain management information sharing among the links of technology integration, logistic integration, operational performance and supply chain activities of the services sector in Indonesia. The data has been obtained by using the questionnaires from the employees that are associated with the supply chain activities while analysis was made with the help of smart-PLS. The results indicated that technology integration, logistic integration and operational performance have positive linkage with supply chain activities of the services sector in Indonesia. The findings also exposed that supply chain information sharing system has positively moderated among the links of technology integration, and supply chain activities of the services sector in Indonesia. These findings have provided help to the upcoming studies to examine this topic in future along with regulation-making authorities who want to develop the policies for effective supply chain activities that enhance the firm performance.

**Keywords;** *Technology integration, Logistic integration, Operational performance, Supply chain activities, supply chain management*

## 1. Background

Supply chain management has gained much importance in the late 60s when the term was not properly emerged. The dominance of supply chain management has also earned much attention after the 80s for the increasing of performance at various levels to successful organizations. The numerous technological advancements in the environments of the business changed the levels of performance [24]. Therefore, operational performance usually adapted for various means to emerge in the earning of benefits for the supply chain activities. Development of technologies in the operational management inserted rapid changes over the businesses due to its eminent usage and varying benefits [26]. Various factors were involved in the terms of business where handling of various procedures is done through the effective usage of supply chain activities [1]. Therefore,

handling of raw material to the conversion of finished goods is properly managed through the use of SCM. Importance of supply chain has eminently resulted in various departmental measures where the mean of using goods to the other elements could provide the competence of the supply chain. The eminent use of technology inserts a dominant role in the effectiveness of utilizing the supply chain and the association of advancements in the development of technologies. The ultimate operational performance is dependent on the effectiveness of the supply chain where the effective management of logistics contributes towards the cost reduction [17]. The gap of communication is induced over the activities of the supply chain where the effective measures of supply chain help in achieving the advantages of coordination techniques and eminent communications [22]. The determination of operational performance is based on a variety of factors where the element of the supply chain is one of them. The variety of supply chain and other activities are involved in a business that contributes to better performance in the organizations.

There is a variation of techniques that are used to measure the supply chain activities by the numerous operational measures [19]. The element of operational performance is term as a systematic measure that is used in various business terms to enable the needs of businesses. Through the use of operational performance of supply chain businesses usually develops quick and strategic coordination's among various business operations whether are outside or inside the entities [18]. The involvement of operational performance over the supply chain helps a business to process the levels of productions from the stage of raw material to the end goods. There are various measures of obtaining the performance of a supply chain where the costs, reliability, agility, and responsiveness are significant for measuring the overall supply chain performance scenario [35]. There are different levels of ascertaining performances whereas the operational performance act differently rather than the regular performance of financials and competitive advantages. Due to significant concerns of operational performance, the variation differentiates and doesn't focus on the aspects that are linked with financials [32]. The

variation of reliability prevails among the levels of productions and sales. Although, orders fulfilment and quality are also dominated as eminent factors that positively contribute toward the supply chain activities the dominance of operation performance through significant means of the study ascertains the aimed level of activities [3]. Despite having the parameters of ascertaining various objectives, the operational performance usually involves all frameworks that significantly endorse impact over the supply chain activities.

Companies usually determine the operational performance by the responsive measures adopted by opposite sides; therefore effective strategies that are adopted helps operational management to induce influence over the supply chain activities [34]. The proper adaptations of strategies in time require efficient measures by the operational works where the services and information to the departments could better enumerate the significance of supply chain activities in markets [10]. The significant integration of technologies in various allocated area of operations dominate with significant importance over the supply chain activities which results in better performance of organizations [25]. Although, advancements have significant impacts over the companies the dominant allocation of technological resources could enumerate better results over the markets [11]. The integration of logistics involves various parameters which are designed by the operational management to achieve a sustainable environment in supply chain activities [5]. Every company requires the logistic need for the enhancement of performance; therefore, effective integration of logistics with technology measures could result in the supply chain activities [7]. The factors of technology and logistics are eminent in the companies with dominating impacts on the supply chain whereas information sharing wide supply chain management positive insert role between them. The association of operational performance is different from the aspects of financial performance while it prevails on the supply chain side with dominating measures [31]. Significantly, the delivery of services and goods are pertinent to be elaborated by the use of effective supply chain measures where operational performance positively helps to eliminate the issues. There is no existence of financial matters within the discussion of operational performance which influences the supply chain activities.

## 2. Hypotheses development

Literature enumerated variety of factors that dominate in studies influencing the costs and effectiveness of supply chain activities. Companies usually face the situation of failures due to the lack of awareness with the eminent factors which help in operational performance to lower the costs in the supply chain [27]. In the activities of the supply chain, the costs are referred as lower and the

reliable qualities are countered as higher which are certain at some stage, while the operational measures help by incorporation of flexible measures for the responsiveness of addressing issues in time. Studies established the measures of a time frame for the achievement of operational performance while other factors also exist that help to measure the supply chain activities [21]. The main objective of SCM is considered as enhancement inefficiency in operations and the performance of financials to each participant which collaborated between the supply chains globally. The internal performance is measured through the effectiveness of work which is assigned with various measures, although, effectiveness and efficiency tend to be an important measure the standards in operational performance are designed by the use of supply chain [4]. Many companies adopted various strategies as enumerated in literature where the level of variable elected to ascertain the activities of the supply chain [24]. The performance in wide literature was used to be measure through the use of cost and profits which renders the financial situation of companies while the operational performance denotes the competitive performance in global markets.

Technology is considered a significant need of every business where the advancements have made many things more changed. The global changes induce some changes which significantly have elaborated the operational performance of supply chain activities. The integration of technology is concerned with the latest availability in the markets which were required to attain the competitive advantage and gain excellence [37]. Change in business environments rapidly impacts the operations of the business for efficiency and innovation in operational techniques. The business performance is linked with the integration of technologies and innovations which are introduced with the changing needs of markets [30]. Products are sold and purchased with the usage of technological advancements but the ultimate operational performance involves the significance of technology integration. Usually, in various departments, technological integrations help companies to develop various products and maintain flexible measures in improving the qualities of standards internationally [29]. Integration of technology positively induces the decisive and crucial role in the performance of operations while utilizing the technology. For the improvement of functions and practices through the effective and efficient measures employed by companies that insert the role of coordination and communication among the supply chain participants [34] [8]. Companies usually adopt various measures to enhance the operational performance of the supply chain where the levels of exports tend to be more important which are performed through the means of technological integrations.

**H1:** Technology integration significantly influences supply chain activities.

Companies producing goods after the purchasing of raw material needs operational activities to provide them in local and international markets. Therefore, effective use of supply chain helps companies to attain various objectives of operational management. Management of logistics is dominated as an important element and the backbone for the effectiveness of the supply chain [7]. The efficient and effective supply chain logistics integration especially insert vital role among the operational performance of firms where the dominance of operational and logistics required to be maintained. The inclusion of logistic integration involves the relation of customers and suppliers where the role of supply chain insert various measures that result in operational performance of the supply chain [12]. The dominating role of the supply chain is enumerated in the literature with dominating effects where the various levels are ascertained. Various materials are handled through the employment of logistic integration whereas the linkage between logistic approach and operation performance is significantly elaborated in wide literature with significant importance [9]. The integration of logistic management positively enumerates the dominance of time frame which is required by most of the companies and end customers. The speedy delivery was unable in past decades due to the unavailability of the supply chain; therefore, logistic integration has helped to attain the timely delivery of goods to consumers of various countries [2]. Studies referred to logistic integration as an important factor which enumerates the elements of cost reductions and efficient outputs from business with the operational performance of the supply chain.

**H2:** Logistics integration significantly influences supply chain activities.

Studies mentioned the measurement element of performance where financials were required for the accomplishment of the company's growth. The aspects of ascertaining the level of performances were later on established by the aspects of services rendered to the consumers and other companies [23]. The existence of operational performance was not inclusive of the calculation of costs and profits; therefore, the value of services and operational aspects were added to measure the performance of supply chain activities. The expansions of businesses globally and locally enhanced the participants in the supply chain which are required to evaluated and integrated accordingly to their skills and functions [16]. Mostly, the firms involve various skills for the measurement of performances but the literature enumerated some firms which rely on the efficient skills in the activities of the supply chain to the reduction of costs and enhancing the qualities and benefits in a global environment. The literature further described the

performance as an important element where the existence of operational performance, financial performance and environmental performance underpinned in some studies [31]. In the context of previous performance analyzing studies, the operational performance was dominating to be influential for the overall performance of firms since characterization. Many studies stated the significance of operational performance with the involvement of finished goods, manufacturing goods and raw material transformations where the links of the supply chain were positively jointed [13]. The study established the link of operational performance as a dominating factor which influences the supply chain activities or elaborates the operational performance of supply chain activities.

**H3:** Operational performance significantly impacts the supply chain activities.

The major concern of this study is to enumerate the significance of operational performance in various industries. The study enumerated the factors that influence the operational performance of supply chain activities whereas the dominating factor of information sharing positively exists between them [33]. Literature mentioned information sharing an important element that significantly contributes to the performance of the supply chain in various aspects of businesses. The overall supply chain mentioned the element of information sharing that insert a vital role among the elected factors of this study [28]. Although, many factors have dominating relationships but the significance of information sharing wide supply chain management positive inserts relation between the approaches of integration and performance. Information sharing widely influences the performance of operation through various measures although, the eminence of information sharing results in positively but the internal measures are dependent on the base of information sharing wide supply chain management [15]. Information sharing wide supply chain management is primarily focused by various studies that eminently impacts the relation among various technological and logistic integrations of businesses. Variety of studies examined the role of information sharing and quality among various operational procedures; therefore, study enumerated the significance of information sharing wide supply chain management that significantly inserts the moderating effects upon the integration of technology, logistics and operational performance of supply chain activities [6].

**H4:** Information sharing wide supply chain management significantly and positively moderates among the relationship between technology integration, and supply chain activities.

**H5:** Information sharing wide supply chain management significantly and positively moderates among the relationship between logistic integration, and supply chain activities.

**H6:** Information sharing wide supply chain management significantly and positively moderates among the relationship between operational performance and supply chain activities.

### 3. Methodology

The basic objective of the ongoing article is to investigate the impact of technology integration, logistic integration and operational performance on the supply chain activities of the services sector in Indonesia. The goals also include the examination of the moderating role of supply chain management information sharing among the links of technology integration, logistic integration, operational performance and supply chain activities of the services sector in Indonesia. The data has been obtained by using the questionnaires from the employees that are associated with the supply chain activities. The simple random sampling techniques have been adopted while selection the respondents and personal visit was conducted for the distribution of questionnaires. A total of 420 questionnaires has been forwarded to the respondents but only 290 were returned that represents about 69.05 percent response rate. The analysis was made with the help of smart-PLS due to the complexity of the framework. Three predictors have been taken by the present study include technology integration (TI) that has three items, logistic integration (LI) that has six items and operational performance (OP) that has four items. In addition, supply chain activities (SCA) has used as a dependent variable that has five items while supply chain management information sharing (SCMIS) has used as a moderator that has four items [36]. These links along with variables are shown in Figure 1.

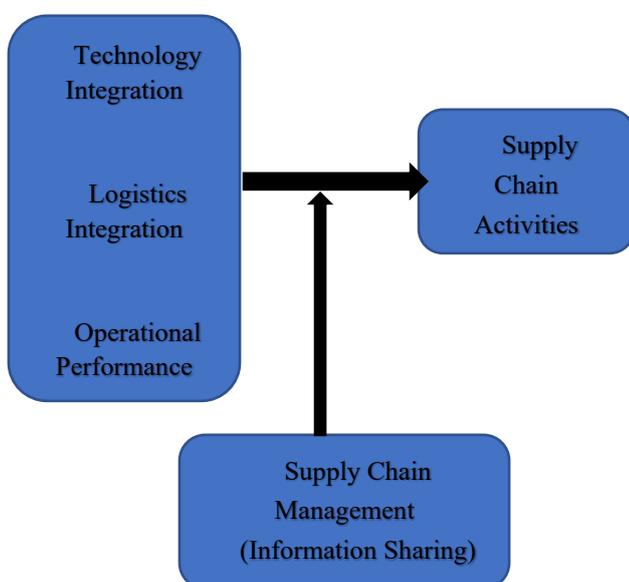


Figure 1. Theoretical framework

### 4. Results

The results of the present study exposed that the convergent validity has valid and high linkage among items because the Alpha and CR values are more than 0.70 while loadings and AVE values are higher than 0.50. These values are mentioned in Table 1.

Table 1. Convergent validity

Items	Loadings	Alpha	CR	AVE
LI1	0.827	0.926	0.942	0.729
LI2	0.863			
LI3	0.852			
LI4	0.821			
LI5	0.885			
LI6	0.872			
OP1	0.904	0.922	0.945	0.811
OP2	0.898			
OP3	0.902			
OP4	0.898			
SCA1	0.823	0.852	0.9	0.693
SCA3	0.832			
SCA4	0.855			
SCA5	0.819			
SCMIS1	0.433	0.83	0.892	0.689
SCMIS2	0.932			
SCMIS3	0.932			
SCMIS4	0.912			
TI1	0.716	0.743	0.851	0.658
TI2	0.903			
TI3	0.804			

The results also exposed that the discriminant validity has valid and no high linkage among variables because the values of Fornell Larcker along with cross-loading exposed that the links among the variable itself stronger than the links with other variables. These values are mentioned in Table 2 and Table 3.

Table 2. Fornell Larcker

	LI	OP	SCA	SCMIS	TI
LI	0.854				
OP	0.411	0.900			
SCA	0.417	0.513	0.832		
SCMIS	0.489	0.505	0.445	0.830	
TI	0.344	0.405	0.701	0.420	0.811

Table 3. Cross-loadings

	LI	OP	SCA	SCMIS	TI
LI1	0.827	0.308	0.330	0.402	0.306
LI2	0.863	0.352	0.353	0.415	0.260

LI3	0.852	0.319	0.321	0.393	0.267
LI4	0.821	0.365	0.302	0.433	0.218
LI5	0.885	0.370	0.389	0.430	0.315
LI6	0.872	0.383	0.417	0.434	0.369
OP1	0.342	0.904	0.465	0.460	0.352
OP2	0.396	0.898	0.459	0.448	0.380
OP3	0.344	0.902	0.468	0.463	0.352
OP4	0.398	0.898	0.453	0.450	0.374
SCA1	0.318	0.386	0.823	0.304	0.585
SCA3	0.341	0.489	0.832	0.399	0.615
SCA4	0.373	0.453	0.855	0.436	0.585
SCA5	0.355	0.369	0.819	0.333	0.546
SCMIS1	0.662	0.199	0.162	0.433	0.121
SCMIS2	0.418	0.468	0.418	0.932	0.393
SCMIS3	0.374	0.473	0.421	0.932	0.428
SCMIS4	0.392	0.471	0.407	0.912	0.369
TI1	0.194	0.292	0.423	0.349	0.716
TI2	0.363	0.415	0.723	0.350	0.903
TI3	0.244	0.251	0.501	0.340	0.804

The results also exposed that the discriminant validity has valid and no high linkage among variables because the values of Heterotrait Monotrait (HTMT) ratios are lower than 0.90. These values are mentioned in Table 4.

Table 4. Heterotrait Monotrait ratio

	LI	OP	SCA	SCMIS	TI
LI					
OP	0.443				
SCA	0.464	0.575			
SCMIS	0.647	0.565	0.512		
TI	0.391	0.475	0.848	0.517	

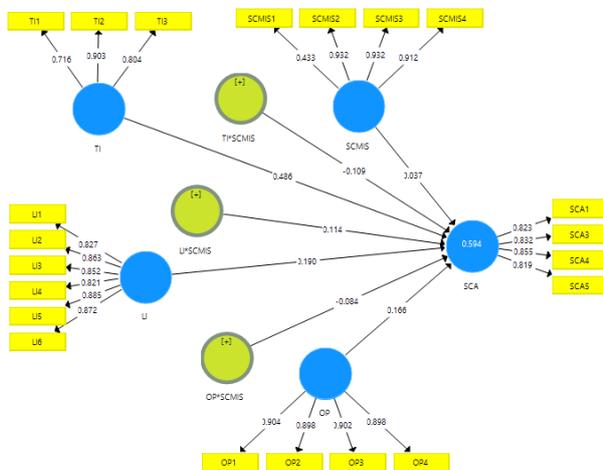


Figure 2. Measurement model assessment

The path analysis shows that technology integration, logistic integration and operational performance have positive linkage with supply chain activities of the services sector in Indonesia and accept H1, H2 and H3. In

addition supply chain management positive moderated among the links of technology integration and supply chain activities and accept H4. However, supply chain management insignificantly or negatively moderated among the links of logistic integration operational performance and supply chain activities and reject H5 and H6. These links are mentioned in Table 5.

Table 5. Path analysis

Relationships	Beta	S.D.	t-statistics	p-values
LI -> SCA	0.190	0.055	3.485	0.001
LI*SCMIS -> SCA	0.114	0.046	2.479	0.014
OP -> SCA	0.166	0.050	3.307	0.001
OP*SCMIS -> SCA	-0.084	0.045	1.870	0.062
TI -> SCA	0.486	0.045	10.692	0.000
TI*SCMIS -> SCA	-0.109	0.051	2.133	0.033

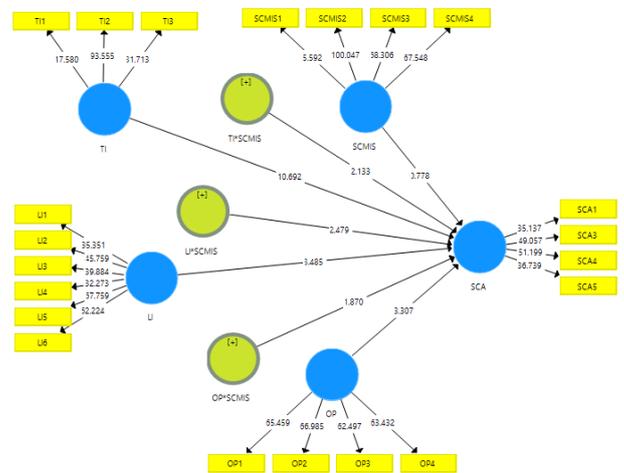


Figure 3. Structural model assessment

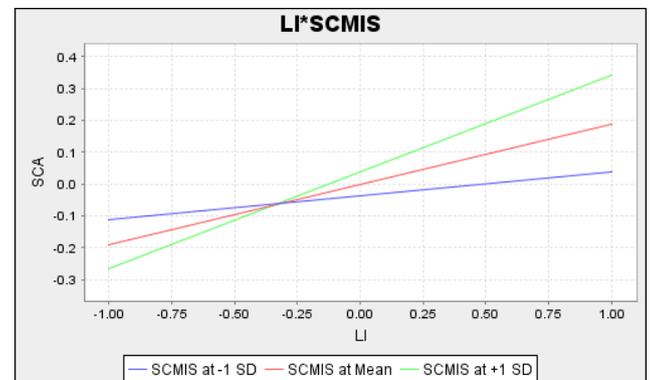


Figure 4. LI\*SCMIS

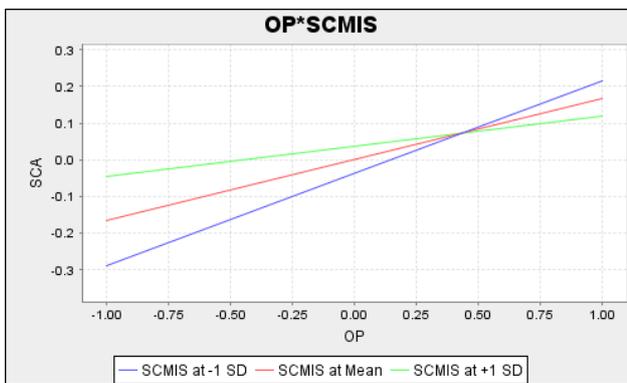


Figure 5. OP\*SCMIS

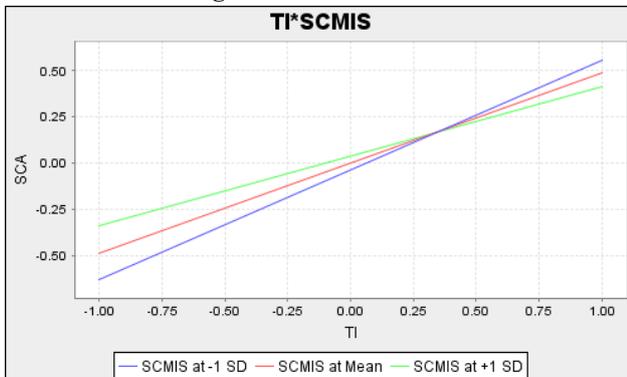


Figure 6. TI\*SCMIS

## 5. Discussion and conclusion

The results indicated that technology integration, logistic integration and operational performance have positive linkage with supply chain activities of the services sector in Indonesia. These findings are the same as the output of the Naway and Rahmat [24] who also examined that technology integration has positively associated with the supply chain activities of the firm. In addition, a study by Jaradat, Adams [14] examined that supply chain activities are dependent on the logistic integration and these findings are similar to the outcome of the present study. The findings also exposed that supply chain information sharing system has positively moderated among the links of technology integration, and supply chain activities of the services sector in Indonesia. These outcomes are also the same as the findings of the Matani [20] who also exposed that supply chain management has improved the technology integration that affects the supply chain activities of the organization. These findings have provided help to the upcoming studies to examine this topic in future along with regulation-making authorities who want to develop the policies for effective supply chain activities that enhance the firm performance. Thus, the current study concluded that the services organizations in Indonesia have effective technology along with logistic integration that enhances the supply chain activities with the help of a strong SCM information sharing system. This study has suggested that future study should include other sectors such as the manufacturing sector in the analysis to expand the scope

that is ignored by the present study. The current study also ignored the mediating impact on the framework and suggested that future studies should incorporate this aspect in their studies.

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