Influence of Supply Chain Integration, IT Practices and Visibility on Modular Design and Supply Chain Agility, Supported Maritime and Tourism Business in Indonesia

I Nyoman Sudapet [#1], Agus Sukoco[#2], Muhammad Ikhsan Setiawan[#3]

1,2 Department of Management, Narotama University, Surabaya, Indonesia
3 Department of Civil Engineering, Narotama University, Surabaya, Indonesia
1nyoman.sudapet@narotama.ac.id
2agus.sukoco@narotama.ac.id
3ikhsan.setiawan@narotama.ac.id

Abstract- Present study aims to examine the relationship between supply chain integration, and IT capability on the supply chain agility in the banking sector of Indonesia, support Maritime and Tourism Business. Moreover, impact of supply chain visibility is examined on supply chain modular design and supply chain agility. The current research aims to analyse the nature of relationships among latent variables; therefore, this study chose the latent analysis technique for investigating these relationships. Statistical Package for Social Sciences (SPSS) and Partial Least Squares Structural Equation Modelling (PLS-SEM) were employed to describe the data and the relationship among variables, respectively. The p-values in the result show that all the under-study variables show significant results while the result of relationship between IT practices and supply chain agility is insignificant. The study provides a comprehensive framework in context of supply chain agility and supplier's modular design. The literature fills the theoretical gap in existing literature and join the supply chain integration and IT practices with supply chain agility and connects supply chain visibility with supplier's modular design. This study is helpful for the policy makers of the banking sector of Indonesia in strategizing the ways to impact the agility in their supply chain process.
Keywords: Supply chain integration, Supply chain agility, IT Practices, Supply chain visibility, Supplier's modular designs

1.   Introduction

The present environment of the business is very unpredictable where the demands of the customers are always increasing and changing. Due to this reason, a number of different products are required by the customers. For the organizations, these changes are big risks. Due to these fast changes, the competition among the environment is increased. It is need of time that organizations produce high quality services and products despite [1]. It is need of time that organizations build the products that are competitive in the market. In order to produce such products, organizations need to develop the capability. Moreover, As the current market is very competitive, organizations must have the capability to

synchronize, reshape and rethink. Due to agility of the supply chain organizations have the capacity to survive in the market. The costing of the firm is affected in the short- and long-term basis due to agility [2].

In order to enhance the benefits to the customers, supply chain agility plays very critical role. This is done by the organizations by getting the IT related information. There exists media among receiver and the sender. There are a number of organizations and products in which more than one supply chains are involved due to which alteration and changes are required by the organization so they can compete in the market. Organizations can sense the changes in the market through agile supply chain and get the benefit through the IT capabilities [3].

Banking sector of Indonesia is very important and dynamic because of the tourists who visits the Indonesia. According to the available statistics, there are more than 1600 rural banks in Indonesia and 115 commercial banks as well. More than 45% of the assents of the banking sector are captured by 4 largest banks. In Indonesia, more than 160 units are of Islamic banks in rural area, under than financial units there are operating 21 banks and 13 Islamic banks are offering full services. Around 4% of the banking assets are held by the Islamic banks of Indonesia [4]. In the lights of such intense competition, there is need that banking sector of Indonesia should focus on their integration with local banks, develop and improve their IT sector and develop visibility in their supply chain.

Therefore, the main objective of the present study is to examine the relationship between SCI, and IT capability on the SCA. Moreover, impact of SCV is examined on supply chain modular design and supply chain agility.

2. Literature Review

2.1 Supply chain agility (SCA)

The important element of success in current era for the organizations is their ability to handle the challenges and they capability respond the challenges. By the proper handling and responding, the organisations can develop

421

Int. J Sup. Chain. Mgt   Vol. 8, No. 6, December 2019

and sustain competitive advantage [5]. As the market is vibrant and dynamic, there need of agility is rising in order for the firms to be successful. by this way, organizations can survive in the market for the longer period of time. one of the most important issue of organizations in current era is the supply chain because the demands and needs of the customers are increasing. Therefore, among these significant issues, agility of supply chain is also the important one because it is very important that organizations need to be responsive and flexible [6].

Supply chain agility is the organization's ability to provide advantage on the basis of strategy by responding proactively to the uncertainty of the marketplace. Organizations can achieve competitive advantage by a number of different ways, the same way organizations can achieve agility through a number of different ways as ways. Dexterity, quickness and numbness are related to agility whereas versatility and adaptabilities are related to flexibility [7]. Whereas, the reaction time in order to bring change is the agility. Overall abilities of the organizations are associated with agility. One of the key elements of the organization by which they can develop competitive advantage is the supply chain agility. Organizations can develop supply chain agility through the capability acquisition systematically, by responding to the changes of competitor and changes of the environment [8].

2.2 Supply Chain Visibility (SCV)

Supply chain visibility is described by authors in different ways. Exchange process of the information was focus of a few authors therefore they defined visibility as the organization's ability to share and access information throughout the supply chain [9]. Some researchers kept their focus on the properties of the information which is exchanged and conceptualized in the visibility of the supply chain. Moreover, they further conceptualized it as the speed of information, readiness of information, and information accuracy [34].

Therefore, visibility is referred as the degree to which there exists share understanding among the all actors of the supply chain. This understanding is related to the information of the product, access to the product without distortion, delay, noise and loss. Researchers have also referred visibility as the amount of on hand information which is possessed by the partners. The information possessed is related to supply and demand of planning and control management. On the other hand, it is also referred as the resources of the organization such as inventory [10].

Most of the times the tasks of the organizations are complex which required a lot of coordination, due to which it must be important part of every organization's supply chain. Researchers have defined coordination as the systematic policy usage so the assistance can be

provided to the organizations like humanitarian organizations which are dealing with environmental matters [11].

Under the supply chain, visibility provides very deep insight regarding the processes of humanitarian organizations like disaster relief, that impact the coordination efforts of the organization [12].

Visibility of the organization is also considered as the IT tools of the organization that increase the integration of the organization at the inter-organization level. Moreover, coordination via information is also the integral part of it [13]. The practices of collaborative supply chain are also promoted through visibility of the supply chain. A real time exchange of information is provided by the platform that is collaborative. Organizations can have good control of operations through tracing and tracking of the products. Through visibility, organizations can monitor the performance of supply chain as well. Researchers have mentioned that ERP which is the tracking and logistic capability system can be an effective tool of the supply chain management [14].

The supply chain visibility of the organization is the antecedent of the operational capabilities of the organization. these organizational capabilities also include supply chain agility [15]. Boundary spanning technologies related to visibility must be used by the organizations for the purpose of supply chain along with the link among buyers and suppliers. Such link is called value added networks. Moreover, it should include, routines, processes and procedures due to which distinct organization can work together so they can achieve a single goal. Intellectual capital will also be increased by the visibility capability of the organization [16].

2.3 IT practices

In order to sense the changes of the market, the practices of the information technology play very important role. It Is done by managing big data which are leveraged and processed by the supply chain. The processing and flow of information is facilitated by the practices of the Information technology throughout the supply chain [17,37]. Due to these IT practices, the adequacy, accuracy and accessibility of the information is improved by the practices of IT. Because of the development of Information Technology, all information related to supply chain and information quality can be achieved. Within the supply chain the main driver ITP are the improvement information quality. In past empirical research also support these assumptions according to which there is higher quality of information among those organizations having IT capabilities. It is also considered as the important element of the coordination as well which can improve the operations of the supply chain [18].

The organizations having IT capability can share the information to adapt according to the changes of the

422

Int. J Sup. Chain. Mgt   Vol. 8, No. 6, December 2019

market. There can be reduction in cost and time due to IT capabilities of the organization. Moreover, effectiveness of the organization can be improved due to IT capability. Researchers have revealed empirically that agility of the organization is impacted by the IT practices of the organization including supply chain factors, firm and market. Especially, IT is very effective in enhancing the supply chain agility [7,38].

2.4 Modular Design

Researchers have defined modular design of the organization as the practice of the organization in which standardized modules are used. These modules can later easily be rearranged or re-assembled intro different forms and functions. Moreover, these modules can be later shared throughout the product lines. The product life cycle concept is linked with recycling of the product, usage of the product, assembly manufacturing and usage of the material as well. For the assessment of the lifecycle, modular design is used [35]. Academicians and organizations have given attention to the modular design in order to influence the sustainable characteristics and PLC. Modular design is also the part of focus as solution that is sustainable. Maximize the quality of the product, features of the product and minimize the delivery time is enabled by the modular design [19].

As the markets in the current era are very dynamic, therefore it is very important for the organizations to develop integrated supply chain in which all partners work together and form a new kind of organization of working capability. In such dynamic environment, IT capability of the organization also plays important role in order to adapt the changes of the organization [20].

The capabilities of the firms are increased due to modular design for the reconfiguration of the production process which allow effectiveness in usage of the capacity of the product. Profit of the organization is increased due to modular design as the cost of the organization is reduced in terms of sustainability of the organizational performance. Researchers suggested that manufacturing agility is allowed by the modular design due to which firms are allowed to adapt according to the changes demanded by customers and potential market. Moreover, human diversity is enhanced because if modular design because a number of products are brought to fulfil the requirements. In order to increase the variety of the product modular design is the central of the consideration for the academicians and organizations [21].

The risks and uncertainty of the organization are reduced because of agility which contribute towards the organizational sustainability. Moreover, firms are also enabled to act quickly and effectively according to the changing environment of the organization. As a result, firms are allowed to take sustainable competitive advantage. Researchers have mentioned that modular designs have positive and direct impact on the agility if the supply chain because it contributes to the sustainable values. The extent to which there is requirement of the change is controlled by the modular design of the organization which impacts the product. Therefore, agility to fulfil the changes are provided by it [36].

In the supply chain of the organization, visibility is the critical and main issue because the performance of the partners has the capability to impact it. Therefore, the relationships among the partners can break or make because of visibility of the supply chain. The time when information is urgently required by the members of the supply chain, at that point visibility is the key. The limit to which information is shared among the members of the supply chain is called the visibility. In other words, access to the information which is related to the product is called visibility. It's been revealed that organizations most of the time has to face the overstocking due to lack of visibility [22].

2.5 Supply Chain Integration (SCI)

In Past supply chain integration is used by a number of researches extensively in past decades. Still this topic is the apple of eye for a number if researchers. The network of the SC is dynamic. The value of supply chain is increased in which most of the firms are integrated. Researchers have defined supply chain integration as the process in which parts are connected and redefined in order to formula a new one [23].

Networked supply chain is need of time due to rapid changes of the supply chain. It is also needed in order to increase the supply chain value. Researchers and academicians have mentioned that integration is the important facet of the supply chain. Therefore, high level of information, commitment and trust among the partners of the supply. Efficient work force is demanded by the attributes of the organization that are supposed to right at both external and internal levels [24].

A number of studies are conducted in terms of relationship among supply chain integration with the agility of the supply chain. A broader perspective of supply chain is presented by a number of researchers in relation with information sharing, visibility and integration of supply chain [25].

Following hypotheses are drawn from the above studied literature

H1: SCV significantly impacts the supplier modular design.

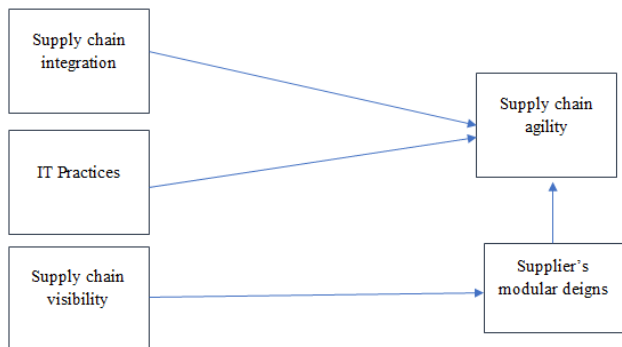H2: SCV significantly impacts the supplier agility.

H3: SCI significantly impacts supply chain agility.

H4: IT Practices significantly impacts supply chain agility.

H5: Supplier modular design significantly impacts SCA.

423

Int. J Sup. Chain. Mgt   Vol. 8, No. 6, December 2019

2.6 Research Framework

Following framework is developed from the above proposed hypotheses

3. Methodology

The current research aims to analyse the nature of relationships among latent variables; therefore, this study chose the latent analysis technique for investigating these relationships. The researcher may choose covariance-based SEM technique for data analysis, but it requires normally distributed dataset [27]. In present research, Partial Least Square Structural Equation Modelling (PLS-SEM), a distribution-free statistical technique was employed. According to [26], a partial least square (PLS) is a well-recognized and a powerful alternative method to the SEM methods, such as AMOS and LISREL. However, it is appropriate to choose PLS path-modelling in case of complex models, for instance, models which involve moderating and mediating effects, and hierarchical constructs having complete disaggregation method [28].

The PLS-modelling is recommended to apply at the initial stage, i.e. during the stage of theoretical development, which thereby allows the researcher to examine as well as confirm the exploratory models. Furthermore, another powerful feature of PLS-modelling is the suitability of this technique to analyse prediction-oriented research, in which the researcher obtains help from the methodology to focus on explaining the endogenous constructs. Besides, the PLS is also vulnerable to multicollinearity, since PLS use multiple regression to estimate the structural and measurement models, therefore, the obtained estimates from both the models may seem to be vulnerable to multicollinearity issues. Finally, [29] suggested that PLS path-modelling can be applied on both formative and reflective measurement models. Thus, before selecting any statistical technique for analysis, the following assumptions were tested. In general research and particularly in social research, there are three main steps of data analysis; the first step involves data cleaning and data organizing; the second step involves description of the data; and third step involves hypotheses testing and models estimation, and is referred as the inferential statistics.

4. Results

Therefore, a partial least square structural equation modelling (PLS-SEM) was used to determine the outer or the measurement model. For the goodness of model fit, the following steps were taken, firstly, ascertaining the construct validity, that
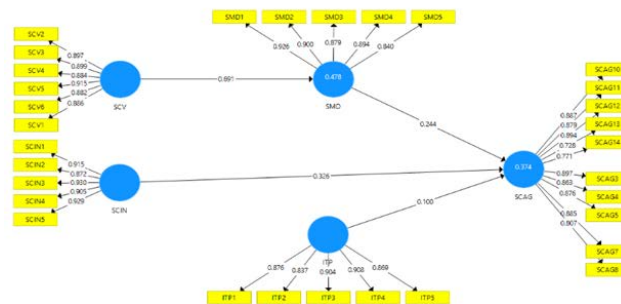

Figure 1. Measurement Model

In addition, the data preparation phase also includes keying or checking the data, as well as checking for data accuracy.

On the contrary, the descriptive statistics are also used for explaining basic characteristics of the data, thereby allowing to provide explanation regarding the sample and variables involved in the study. The present study has employed two data analysis techniques, i.e. descriptive analysis and inferential analysis, to describe the nature of study variables as well the existing relationships among these variables. Statistical Package for Social Sciences (SPSS) and Partial Least Squares Structural Equation Modelling (PLS-SEM) were employed to describe the data and the relationship among variables, respectively. involves composite reliability, factor loadings, convergent validity, and Cronbach alpha; and secondly, assessing the discriminant validity for this study through the [30] criterion. The measurement model dimensions are shown in Figure 1.

Table 1. Outer Loading

	ITP	SCAG	SCIN	SCV	SMD
ITP1	0.876				
ITP2	0.837				
ITP3	0.904				
ITP4	0.908				
ITP5	0.869				
SCAG10		0.887			
SCAG11		0.879			
SCAG12		0.894			
SCAG13		0.728			
SCAG14		0.771			
SCAG3		0.897			
SCAG4		0.863			

SCAG5	0.876				
SCAG7	0.885				
SCAG8	0.807				
SCIN1		0.915			
SCIN2		0.872			
SCIN3		0.93			
SCIN4		0.905			
SCIN5		0.929			
SCV2			0.897		
SCV3			0.899		
SCV4			0.884		
SCV5			0.915		
SCV6			0.882		
SMD1				0.926	
SMD2				0.9	
SMD3				0.879	
SMD4				0.894	
SMD5				0.84	
SCV1			0.886		

In data analysis, the reliability of a construct explains the measure's level of consistency.

A technique for the measure's reliability can be chosen by controlling other variables, which can be done by providing the supporting evidence that similar or same score is provided by the respondents on a questionnaire. Thus, reliability of a measure is assumed to be achieved, when a measure's individual items or sets are consistent with the questionnaire. Hair et al. (2010) define construct validity as the extent to which the set of generated items can appropriately measure a concept, which they are intended to measure.

Table 2. Reliability

	Cronbach's Alpha	rho_A	CR	(AVE)
ITP	0.926	0.928	0.944	0.773
SCAG	0.957	0.961	0.963	0.723
SCIN	0.948	0.952	0.96	0.829
SCV	0.95	0.951	0.96	0.799
SMD	0.933	0.935	0.949	0.789

According to [30] and [31] the values for composite reliability must exceed the recommended value i.e. 0.70, as shown in Table. In addition, the results also indicate that the Average variance extracted (AVE) values were found to be greater than the recommended range, which represents the adequate construct validity. The convergent

validity for the outer model is also confirmed from the results.

Table 3. Validity

	ITP	SCAG	SCIN	SCV	SMD
ITP	0.879				
SCAG	0.569	0.85			
SCIN	0.815	0.777	0.901		
SCV	0.81	0.718	0.891	0.894	
SMD	0.696	0.526	0.649	0.691	0.888

In order to measure a particular construct, all the generated items must exhibit higher loadings on its respective construct, as compared to other constructs. The detailed literature review has confirmed that those items must be generated or incorporated which been tested or established in prior researches.

Afterwards, the [30] criterion was employed to confirm the discriminant validity. Table shows that for all the constructs, the AVE's square roots were positioned diagonally in the correlation matrix. If the diagonal elements show higher values as compared to other row and column elements, then the discriminant validity is achieved. Therefore, summarising that if the construct validity for the outer model is established, then the results obtained for hypotheses testing can also presumed to be reliable and valid.

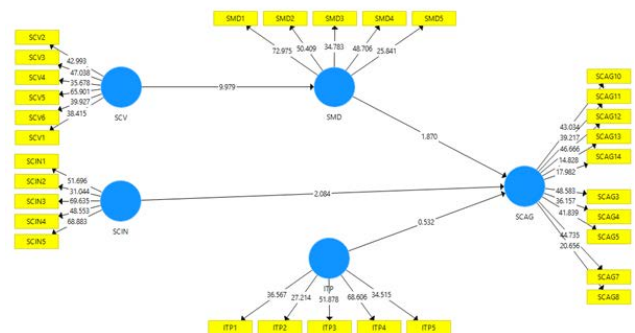The next step in the SEM-PLS is the assessment of the structural model, the

Figure 2. Structural Model

The direct relationship between the variables of the study are explained in the

Table 4. Direct Relationship

	(O)	(M)	(STDEV)	T Statistics	P Values
ITP -> SCAG	0.1	0.098	0.189	0.532	**0.297**
SCIN -> SCAG	0.326	0.334	0.157	2.084	**0.019**
SCV -> SCAG	0.169	0.167	0.091	1.86	**0.031**
SCV -> SMD	0.691	0.692	0.069	9.979	**0**
SMD -> SCAG	0.244	0.243	0.131	1.87	**0.031**

The mediation of the SMD is shown in the table 5 below. structural model is shown in the figure 2 below table 4 below all the hypothesis other than ITP -> SCAG are accepted significantly

Table 5. Mediation

	(O)	(M)	(STDEV)	T Statistics	P Values
SCV -> SMD -> SCAG	0.169	0.167	0.091	1.86	**0.031**

The coefficient of determination represents the model's reflective accuracy which is estimated by squaring the values of correlation among actual endogenous constructs and the predicted endogenous constructs. The coefficient shows the joint effect of the set of exogenous constructs on the endogenous latent constructs of the model (Hair et al., 2014). R-square ranges between 0-1, i.e. the higher the value the greater the predictive accuracy.

Table 6. R-square

	R Square
SCAG	0.374
SMD	0.478

Although, there is no rule of thumb suggested for the R^2, but $R^2=0.25$ represents weak prediction, $R^2=0.50$ represents moderate prediction, and $R^2=0.70$ represents substantial prediction as suggested by [32] and [33]. Hence, for each targeted construct, the greater the number of paths the higher the tendency of obtaining greater R-square. While conducting a research, majority researchers tend to achieve parsimonious models, which could explicate the data and provide understandable outcomes by employing only a few independent variables.

5. Conclusion

Banking sector is the backbone of any economy. The banking sector of Indonesia is very dynamic and important as well because of large number of international tourists visit Indonesia and use this channel. In this scenario, organizations must adopt IT practices, integrate SC process and keep the visibility in their supply chain process so they can achieve agility in their processes.

The current research aims to analyse the nature of relationships among latent variables; therefore, this study chose the latent analysis technique for investigating these relationships. The result of the study show that all the under-study variables show significant results while the result of relationship between IT practices and SCA is insignificant. It means that SCV and SCI are critical. The study provides a comprehensive framework in context of SCA and supplier's modular design. In order to keep communication with all of the stakeholders, it is very important for the organizations to implement the IT practices in their supply chain practices. Moreover, they are critical for sharing the critical information with the partners of the supply chain. IT practices of the organization are important as well to keep record of the inventory. By this way organizations can provide services or produce goods in time according to the need of the customers. Such practices are required to perform better than the competitors and develop competitive advantage.

The literature fills the theoretical gap in existing literature and join the supply chain integration and IT practices with supply chain agility and connects supply chain visibility with supplier's modular design.

This study is helpful for the policy makers of the banking sector of Indonesia in strategizing the ways to impact the agility in their supply chain process.

6. Acknowledgement

References

[1] M. Christopher, *"The agile supply chain: competing in volatile markets,"* Industrial Marketing Management, Vol. 29, No. 1, pp. 37-44, 2000.

[2] A. O. Somuyiwa, I. T. Adebayo and T. A. Akanbi, *"Supply chain performance: an agile supply chain driven by information system (IS) capabilities,''* British Journal of Arts and Social Sciences, Vol. 1, No. 2, pp. 125-135, 2011.

[3] Y. Wu and J. Angelis, *Achieving agility of supply chain management through information technology*

applications, In Advances in production management systems (pp. 245-253). Springer, Boston, MA, 2007.

[4] M. C. Basri and S. Rahardja, *''The Indonesian economy amidst the global crisis: good policy and good luck,''* ASEAN Economic Bulletin, pp. 77-97. 2010.

[5] K. O. Wonyra, *Industrialization and Economic Growth in Sub-Saharan Africa: The Role of Human Capital in Structural Transformation,"* Journal of Empirical Studies, Vol. 5, No. 1, pp. 45-54, 2015.

[6] M. J. Braunscheidel, N. C. Suresh, and A. D. Boisnier, *''Investigating the impact of organizational culture on supply chain integration,''* Human Resource Management, Vol. 49, No. 5, pp. 883-911, 2010.

[7] I. Sukati, A. B. Hamid, R. Baharun and N. M. Jamal, *The moderating role of market, firm and supply chain factors on the relationship between information technology practices and supply chain agility,''* American Journal of Industrial and Business Management, Vol. 4, No. 5, pp. 258, 2014.

[8] V. Yaron, *"Learning is fun, you can really hear it: Teacher training and Chopin's Etudes,"* International Journal of Innovation, Creativity and Change, Vol. 3, No. 2, pp. 140-156, 2017.

[9] W. B. Zhang, *"Growth, residential distribution, and land price in an integrated solow's growth and alonso's residential model*," Asian Themes in Social Sciences Research, Vol. 2, No. 1, pp. 23-31, 2018.

[10] K. J. Petersen, G. L. Ragatz and R. M. Monczka, *''An examination of collaborative planning effectiveness and supply chain performance,''* Journal of Supply Chain Management, Vol. 41, No. 2, pp. 14-25, 2005.

[11] H. L. Wei and E. T. Wang, *''The strategic value of supply chain visibility: increasing the ability to reconfigure,''* European Journal of Information Systems, Vol. 19, No. 2, pp. 238-249, 2010.

[12] R. M. Tomasini and L. N. Van Wassenhove, *''From preparedness to partnerships: case study research on humanitarian logistics,''* International Transactions in Operational Research, Vol. 16, No. 5, pp. 549-559, 2009.

[13] R. Rajaguru and M. J. Matanda, *''Effects of inter-organizational compatibility on supply chain capabilities: Exploring the mediating role of inter-organizational information systems (IOIS) integration,''* Industrial Marketing Management, Vol. 42, No. 4, pp. 620-632, 2013.

[14] M. Themistocleous, Z. Irani, and P. E. Love, *''Evaluating the integration of supply chain information systems: A case study,''* European Journal of Operational Research, Vol. 159, No. 2, pp. 393-405, 2004.

[15] E. Overby, A. Bharadwaj, and V. Sambamurthy, *''Enterprise agility and the enabling role of information technology,''* European Journal of Information Systems, Vol. 15, No. 2, pp. 120-131, 2006.

[16] U., Yildirim, A. K. I. N. Soner, Z. Gül, and Y. Çiçek, *"A Review on EU Transportation Projects within the Case of Turkey for European Union Regional Development Policy,"* International Journal of Sustainable Development and World Policy, Vol. 5, No. 1, pp. 12-25, 2016.

[17] H. S. Moharana, J. S. Murty, S. K. Senapati, and K. Khuntia, *''Importance of information technology for effective supply chain management,''* International Journal of Modern Engineering Research (IJMER), Vol. 1, No. 2, pp. 747-751. 2011.

[18] J. T. Kariuki, and M. K. Mwangi, *''Information Communication Technology Adoption and Supply Chain Performance of Parastatals in Kenya's Energy Sector,''*

[19] C. Suh and I. Lee. *An empirical study on the manufacturing firm's strategic choice for sustainability in SMEs,''* Sustainability, Vol. 10, No. 2, pp. 572, 2018.

[20] M. Sonego, M. E. S. Echeveste, and H. G. Debarba, *''The role of modularity in sustainable design: A systematic review,''* Journal of Cleaner Production, Vol. 176, No. 196-209, 2018.

[21] J. Ma and G. E. O. Kremer, *''A systematic literature review of modular product design (MPD) from the perspective of sustainability,''* The International Journal of Advanced Manufacturing Technology, Vol. 86, No. 5-8, pp. 1509-1539, 2016.

[22] R. Klueber and R. M. O'Keefe, *''Defining and assessing requisite supply chain visibility in regulated industries,''* Journal of Enterprise Information Management, Vol. 26, No. 3, pp. 295-315, 2013.

[23] F. B. Georgise, K. D. Thoben, and M. Seifert, *''Supply chain integration in the manufacturing firms in developing country: An Ethiopian case study,''* Journal of Industrial Engineering, 2014.

[24] A. Gunasekaran and E. W. Ngai, *''Information systems in supply chain integration and management,''* European Journal of Operational Research, Vol. 159, No. 2, pp. 269-295, 2004.

[25] D. Prajogo and J. Olhager, *''Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration,''* International Journal of Production Economics, Vol. 135, No. 1, pp. 514-522, 2012.

[26] M. Sarstedt, C. M. Ringle, D. Smith, R., Reams, and J. F. Hair Jr, *''Partial least squares structural equation modeling (PLS-SEM): A useful tool for*

family business researchers,'' Journal of Family Business Strategy, Vol. 5, No, 1, pp. 105-115, 2014.

[27] B. M. Byrne, *Multivariate applications series. Structural equation modeling with AMOS: Basic concepts, applications, and programming (2nd ed.),* New York, NY, US: Routledge/Taylor & Francis Group, 2010.

[28] W. W. Chin, B. L. Marcolin, and P. R. Newsted, *''A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study,''* Information Systems Research, Vol. 14, No. 2, pp. 189-217, 2003.

[29] W. W. Chin and P. R. Newsted, *''Structural equation modeling analysis with small samples using partial least squares,''* Statistical Strategies for Small Sample Research, Vol. 1, No. 1, pp. 307-341, 1999.

[30] C. Fornell and D. F. Larcker, *''Structural equation models with unobservable variables and measurement error: Algebra and statistics,"* 1981.

[31] J. F. Hair Jr, W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate data analysis. vectors, 7th Edition*, 2010.

[32] J. F. Hair Jr, M. Sarstedt, L. Hopkins, and G. V. Kuppelwieser, *"Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research,''* European Business Review, Vol. 26, No. 2, pp. 106-121, 2014.

[33] J. Henseler, C. M. Ringle, and M. Sarstedt, *''Using partial least squares path modeling in advertising research: Basic concepts and recent issues,''* Handbook of research on international advertising, Vol. 252, 2012.

[34] X. Li, K. S. Chang, J. J. Dooley, A. A. Greene T. A. Deshpande, and D. J. Hakeman, *U.S. Patent No. 7,136,832.* Washington, DC: U.S. Patent and Trademark Office, 2006, 1997.

[35] P. Gu, M. Hashemian, S. Sosale, and E. Rivin, *''An integrated modular design methodology for life-cycle engineering,''* CIRP Annals, Vol. 46, No. 1, pp. 71-74.

[36] R. I. Van Hoek and H. A. Weken, *''The impact of modular production on the dynamics of supply chains,,''* The International Journal of Logistics Management, Vol. 9, No. 2, pp. 35-50, 1998.

[37] C. Marinagi, P. Trivellas, and D. P. Sakas, *''The impact of information technology on the development of supply chain competitive advantage,''* Procedia-Social and Behavioral Sciences, Vol. 147, pp. 586-591, 2014.

[38] J. Jayaram, S. K. Vickery, and C. Droge, *''The effects of information system infrastructure and process improvements on supply-chain time*

performance,'' International Journal of Physical Distribution & Logistics Management, Vol. 30, No. 3/4, pp. 314-330, 2000.

[39] J. Sutduean, W. Joemsittiprasert, and K. Jermsittiparsert, *"Supply Chain Management and Organizational Performance: Exploring Green Marketing as Mediator,"* International Journal of Innovation, Creativity and Change, Vol. 5, No. 2, pp. 266-283, 2019.

[40] K. Jermsittiparsert and L. Pithuk, *"Exploring the Link between Adaptability, Information Technology, Agility, Mutual Trust, and Flexibility of a Humanitarian Supply Chain,"* International Journal of Innovation, Creativity and Change, Vol. 5, No. 2, pp. 432-447, 2019.

[41] K. Jermsittiparsert and S. Rungsrisawat, *"The Supply Chain Management and Information Sharing As Antecedents of Operational Performance: A Case of SMEs.,"* Humanities and Social Sciences Reviews, Vol. 7, No. 2, pp. 495-502, 2019.