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The Mediating Role of Open Book Accounting and Value Chain Costing in the Relationship between Supply Chain Integration and Operational Performance of Indonesian Manufacturing Firms

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The main objective of the current study is to examine the relationship among the supply chain of manufacturing firms. In addition to that the study argues that managerial accounting techniques such as the open book accounting and value chain accounting mediates the relationship between supply chain integration and operational performance. It has been argued that there is positive relation between supply chain integration and firm's optimum performance. This research has taken a single latent factor for SCI, and this does not go in contradiction with the research preferring individual sub-level components of supply chain integration. The study has used the SEM-PLS as a statistical tool to answer the research questions. This study adopted a structural equation model with the purpose of analyzing the structural association between the observed and the latent variables, as well as to estimate the structural model. Estimating the appropriate sample size is one of the important aspects of SEM-PLS. The sample size for this study was selected as 322 based on the population size. The findings of the study are in line with the proposed hypothesis of the study.

Key words: *Open Book Accounting, value chain accounting, supply chain integration, operational performance.*

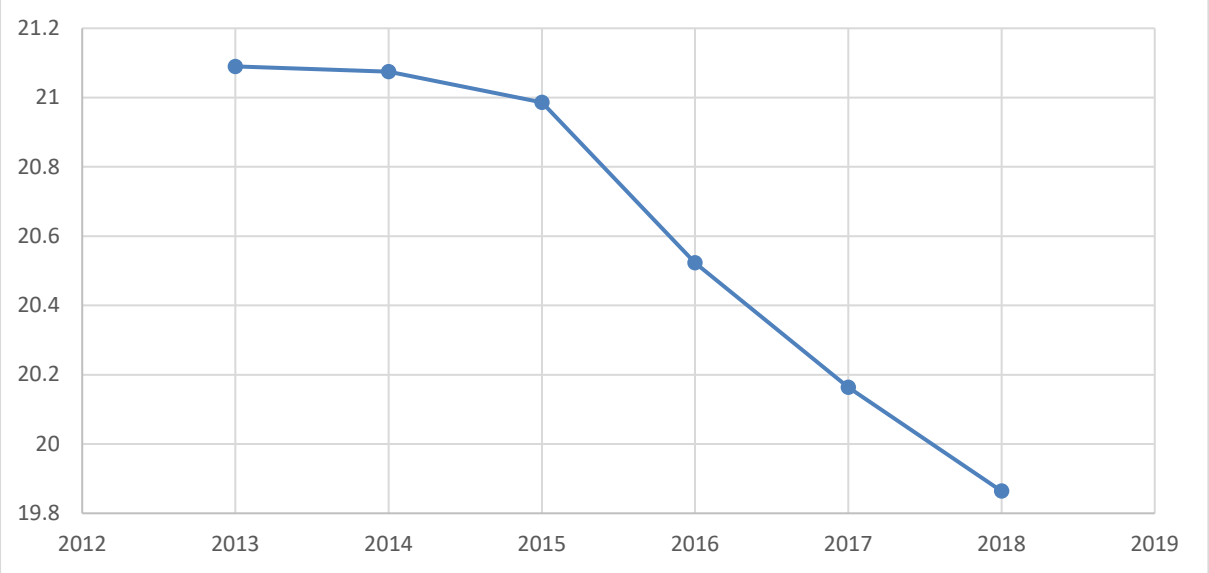
Background

There is need for a close integration between manufacturers, suppliers, and customers in order to improve the supply chain performance (Flynn, Huo, & Zhao, 2010; Turkulainen & Ketokivi, 2012; Zhao, Barber, Cistulli, Sutherland, & Rosengarten, 2013). The supporting factors in the success of supply chain include the level of relation among the supply chain members. The undisputable factors for supply chain success include the high level of partnership and collaboration with the buyer and suppliers in supply chain integration and its processes (Droge, Vickery, & Jacobs, 2012; Jermsittiparsert, Sutduean, & Sutduean, 2019; Sriyakul, Umam, & Jermsittiparsert, 2019a, 2019b). The increase in globalization and supply chain complexity over the last decade has called for reconsidering the validity of supply chain integration on theoretical grounds. The competitive performance in supply chain can be achieved through supply chain integration(D. Prajogo, Oke, & Olhager, 2016; Mee-ngoen, Thongrawd, & Jermsittiparsert, 2019; Sutduean, Joemsittiprasert, & Jermsittiparsert, 2019; Sutduean, Prianto, & Jermsittiparsert, 2019).

It has been argued that there is a positive relation between supply chain integration and a firm's optimum performance. Several previous researchers are in contradiction with the findings of other researchers. However, the positive relation among the variables is referred to with some specific conditions (Cao et al., 2015). Some researchers have focused on the generalization of their findings (Bowersox, Closs, & Stank, 1999). The inter-play of supply chain integration, operational performance and other exogenous control variables has not been depicted through any form of analytical model. When the research does not incorporate analytical model, this results in inconsistence in relation between SCI and other variables (Flynn et al., 2010; Turkulainen & Ketokivi, 2012). A detailed explanation to the issue can be provided with a proper analytical model as compared with a formative evaluation.

The previous literature works have reflected that several exogenous and endogenous variables influence the relation between SCI and manufacturer's performance. Specifically, with the advancement of open source information system, the influence of SCI on supply chain performance is based on several exogenous variables (Boehmke & Hazen, 2017). The exogenous variable affecting the relation between SCI and supply chain performance may include competitiveness of products in supply chain, market uncertainty, cultural and technological factors, and organizational attributes. The manufacturing sector in Indonesia is not performing well as is evident from the figures that show the contribution of manufacturing sector in the GDP of Indonesia is decreasing, see Figure 1 below.

Figure 1. Manufacturing sector as a percentage of GDP



Source: World Bank

It is agreed that there is a need for a theoretical rationale for generalizing the relation between Supply chain performance and operational performance. Moreover, disagreement exists about the factors influencing the relation between supply chain integration and operational performance (Van der Vaart & van Donk, 2008). Therefore, a research gap exists in the literature about Supply Chain Integration. The focus of this research is on addressing the identified research gap. A manageable scope has been defined based on three key constructs including Supply Chain Integration, Operational Performance and Market Uncertainty (MU). The research has developed a model based on the relation among these variables.

The next section discusses the validity of the constructs. The objective of the research is to analyze the relationship between SCI (supply chain integration) and operational performance of manufacturer. Through an analytical mode, the interplay of the three constructs will be depicted. The act of manufacturer as an original equipment manufacturer (OEM) in supply chain has been regarded as the unit of analysis. The research focuses on the changing relation between OP and SCI.

In supply chain control, management accounting in supply chains is a related concept. There is a need for planning, evaluating, monitoring and management of information regarding manufacturing processes and logistic across the value chain. These processes are being optimized by management accounting in supply chains. The focus of the strategy is on aligning processes and activities with management. With the increase in complexity in the value chain, the concept of supply chain management has become greatly relevant in theoretical and practical terms. A wide range of management control tasks is included in Supply Chain

Management. By defining the concept of controlling supply chain, the range of subjects is summarized. There is insufficient transfer of current MCM (management control systems) to Supply Chain Management due to the focus on internal needs of company. There is a need for future oriented measurement in research studies. However, a number of previous studies include the past-oriented financial figures.

Literature Review

Supply chain integration (SCI)

Today, supply chain integration has become a highly recognized topic for research in the field of supply chain management. Most researchers agree that SCI is an important element for the performance of manufacturer (D. Prajogo & Olhager, 2012; Turkulainen & Ketokivi, 2012; Sutduean, Harakan, & Jermsittiparsert, 2019a, 2019b). The concept of Supply Chain Integration has been defined by most researchers as positively linked with sustainable growth and competitive strength. It has been evidenced through literature that some conflicts exist related to the basic definitions of the concept. SCI has been defined as the process of integration between the suppliers and manufacturers. However, some have defined the concept as the external integration of manufacturer including customer and supplier. The concept has been defined as the three dimensions of supplier integration: internal, supplier and customer integration (Flynn et al., 2010). The focus of some research is on the individual dimensions of the Supply Chain and Integration (Bankert & Nelson, 2018). Alternatively, some focus has been on the SCI as a single construct. All of these definitions of SCI have their own merits and demerits. This research has taken the concept given by Flynn et al. (2010) in which the internal, supplier and customer integration is involved in SCI. Similarly, the collection of empirical data regarding the measurement of SCI variables will be based on the three dimensions.

Different approaches exist for structuring SCI. In this research, a single latent factor has been taken for SC, and is not in contradiction with the researchers preferring individual sub-level components of supply chain integration. The choice is based on the preferences of research shown in the literature. Both these approaches have respective advantages and shortcomings. It has been argued in this research that a latent factor can represent SCI and this is an easier way to conduct research analysis. Several past research studies have proved the dimensional reduction approach to be effective (Brown, 2015).

Operational performance (OP)

The overall supply chain performance is based on operational performance (OP) that is a result of different supportive factors in the organizational system. It has been suggested by Van Hoek (1998) and Beamon (1999) that indicators such as operational responsiveness to demand changes and customer satisfaction should be incorporated in performance measures of supply

chain. In a similar way, time, cost, delivery, quality, and flexibility have been regarded as basic measures for determining operational performance. A green supply chain framework for operational performance was developed by Jakhar (2015) as a response to the supply chain need to focus on environmental concerns. Operational Performance (OP) has been chosen in this research as a construct for two reasons (Liu, Huang, Wei, & Huang, 2015). The first is evidence through literature that OP is a supportive factor for supply chain performance. The second reason is that it can be measured and is dependent on level of supply chain integration. Moreover there is some doubt that it is the most indispensable and critical part of several frameworks of performance measurement. However, the findings in literature are not consistent.

The question may arise as to the use of business performance or supply chain performance in the place of operational performance. However, these have not been chosen because environmental influences are included in business performance such as infrastructure and competitors (Khan & Qianli, 2017). On the other hand, operational performance is an internal concept and it can be individually linked with the SCI effects. Supply chain performance does not go fit with the definition of unit of analysis used in this study, that the concept of supply chain performance can become unclear. It is proposed that the future research could incorporate more constructs.

The literature review reveals that several previous researchers have worked on the relation between supply chain integration and performance (D. I. Prajogo, 2016). Moreover, the findings of this research lack consistency regarding the association between SCI and operational performance. Some of the related articles have been listed with their findings in relation to the association between OP and SCI. It has been suggested by Configuration theory that the success of SCI is based on the operational performance in different circumstances (Cao et al., 2015). This states that with better interconnected configured elements, the organization performs better (Tamayo-Torres, Gutiérrez-Gutiérrez, Llorens-Montes, & Martínez-López, 2016). It is therefore claimed that with a highly integrated supply chain, the organization can outperform in the market. As indicated by configuration theory, there is need for supply chain integration to achieve high performance. It is posed then that a theoretical support is provided by configuration theory for the relationship of SCI and OP.

It has been suggested by structural contingency theory that the performance of supply chain is based on the level with the strategy is linked with the structural design (Fernandez & Rainey, 2017). The theory has been defined as the dependence of supply chain performance on supply chain structures. It has not been specified by the theory whether there is need for alignment between SCI and performance. It has been revealed through literature review that there are great inconsistencies. The research in the field of internal integration, customer integration and supplier integration has been reviewed based on the SCI definition. The findings of the

literature related to customer integration are consistent. Manufacturers can be supported to reduce their cost and respond to changes in demand through customer integration. In this way, customer integration is an integral factor for customer satisfaction, which can result in the achievement of product innovation (La Rocca, Perna, Snehota, & Ciabuschi, 2017). Alternatively, some research has found that supply chain performance is not improved through customer integration (Turkulainen & Ketokivi, 2012).

There are some discrepancies in the literature related to internal integration. It has been found by some researchers that there is direct relation between operational performance and internal integration of the manufacturer (Michalski, Montes-Botella, & Narasimhan, 2018). Some have found a positive relation between operational performance and internal integration including performance of process efficiency and logistics service (Alfalla-Luque, Marin-Garcia, & Medina-Lopez, 2015). The review of literature on supplier integration reveals that there are non-trivial inconsistencies. Some studies have found the relation between introduction processes for new product and product development performance, supplier development and measures of visibility. Several studies have not found a significant relation between operational performance and supply chain integration and some have found negative relation between the variables.

Another issue arises in literature related to the modelling of SCI with operational performance without any constraint. It was discussed by Bowersox et al. (1999) that SCI is a critical factor. The results of the research claimed that the center of the overall performance is supply chain integration. There is a positive relation between supply chain integration and overall performance. The opposing studies have revealed negative relation of SCI with overall supply chain performance (Swink & Song, 2007). Most previous research, such as Bowersox, has agreed on the positive association between supply chain integration and overall performance. Some researchers have shown an insignificant or negative correlation between the SCI and overall performance. The articles with conflicting opinions are shown in Appendix-A related to SCI and performance. There is great inconsistency in the literature that results in the problems of research validity.

Management accounting in supply chain

There is need for cooperation among the companies and focus on mutual targets and tools in the supply chain. Considering this, the understanding of processes in the partner companies is crucial. Exchange of information including sensitive data across the supply chain must be controlled through increased coordination between the in-house information systems. Management accounting in supply chains is important and significantly greater than the provision of important figures. The controlling tasks can be transferred to management accounting across supply chain. These are supported by cross-company approach. Moreover,

the past oriented aspects of previous concept are not suitable. Supply chain management has great strategic important and this must be taken into account.

Due to supply chain complexity, there is need to focus on interface management. Several functions and tasks have been defined in literature. Performance measurement is the primary task of management accounting across supply chain. The measurement of resources, flexibility, and output are the key elements of strategic goals. To gain profitability, there is need for efficient management of resources. When products are not valued by customers, they may switch to other supply chains. There is need for agility in the supply chains because of the changing business environment and customer demands. Total costs, distribution, and manufacturing costs along with inventory measures and rate of return are included in the measures for resource performance. Some of the examples of performance measures include the number of products manufactured, product quality and customer satisfaction that cannot be expressed in numerical terms. Increase in customer satisfaction, reduction in back orders, ability to respond the changes in demand are the advantages of improved agility or flexibility.

Open Book Accounting

The sharing of cost information is involved in open book accounting and it is effected within and across the organization. The basic aim of open book accounting is to identify the processes, which are unable to add value to the final product or service so that these are eliminated without any influence on the customer. The quality, delivery and cost of the product improve with the elimination of non-value adding processes. Sharing such information with the supply chain partners has been recognized with the development of lean thinking in management. The idea is to incur expenditure to add value for the customers rather than waste. Most of the companies do not feel comfortable to share their information with the supply chain partners because of increased concern with competitive position and trust issues. Some technical issues may arise such as accounting conventions within organizations. Open book accounting reduces cost and improves the sharing among the partner organizations. There is need to share cost information between the customer and supplier because it can result in success through identifying and eliminating process which are non-value adding.

Several issues need to be resolved in order to get benefit from open book accounting. A number of issues have been identified by Kajüter and Kulmala (2005) in their research on German and Finnish companies. These issues or problems include that no extra benefits are received by the suppliers from openness. Moreover, accounting information must be kept private, cost information cannot be accurately produced by network members and this may lead to sharing of poor cost data. Sharing cost structure may exploit the suppliers and lack of capable resources from the main contractors lead to failure to implement accounting systems. Supply chain members may not agree on the way to execute open book practice. There is need for

considering these factors in the process of implementing open book agreement to support success. An interesting study was conducted on the level of trust between suppliers and supermarkets in UK. Some big retailing companies were studied and their websites were used to access the relevant information. The leading supermarkets include Tesco, Marks and Spencer, Safeway, Sainsbury, Waitrose and the Co-Op. it was found that these companies have maintained effective relation with their suppliers across the supply chain. Moreover, the research warns about the indiscriminate demand and heavy-handed forms of accountability from open book accounting. When things are not handled with care, this can result in lack of trust and problems for manipulating management accounting information.

Value Chain Costing

Value chain costing is based on the value chain analysis of Porter. An argument was made by Porter in which it was claimed that organizations offering better customer value for price through differentiation strategy are able to achieve competitive advantage. Moreover, providing equivalent customer value for low cost through cost leadership strategy also leads to the achievement of competitive advantage. A set of activities exist in the designing, production, and distribution of a product. The areas in which customer value can be improved are identified through value chain analysis. Further, areas where cost can be reduced, or differentiation can be achieved are also highlighted. With the aspect of lean thinking, the points in the flow of information and material are identified, where customer value can be enhanced and lead-time can be improved.

Therefore, value chain analysis involves the identification of sections where opportunities can be explored for making improvements in product manufacturing, designing, or delivery. A useful extension is value chain costing, which takes into account the cost savings and benefits in the relation of firm with customers and suppliers. Value chain costing is the extension of traditional costing and it involves the costing to the product designing, procurement, production, manufacturing, distributing to the end customers. While conducting value chain costing, data problems may arise and the solutions may not be precise. However, there are significant benefits such as improved quantitative awareness about the external competition and internal systems of the firm. There exist close relation between open book accounting and value chain costing and the benefits of open book accounting are improved with value chain costing.

Hypotheses

H1: the supply chain integration has significant impact on the operational performance.
H2: the supply chain integration has significant impact on the open book accounting.
H3: The supply chain integration has significant impact on the value chain costing.

H4: The open book accounting has significant impact on the operational performance.
H5: The value chain costing has significant impact on the operational performance.
H6: The open book account mediates the relationship between supply chain integration and operational performance.
H7: The value chain costing mediates the relationship between supply chain integration and operational performance.

Methodology

This section presents the data analysis, hypotheses testing, and discussion regarding the research findings. Data analysis is used to carry out statistical analysis on the collected data, in addition, it also involves testing of hypotheses, and revision of theories. The statistical technique adopted in this study is the Partial Least Square Structural Equation Modelling (PLS-SEM) which is a most frequently and widely used data analysis methodology (Becker, Ringle, & Sarstedt, 2018).The present study is correlational in nature i.e. it is carried out at a certain period of time. Therefore, data is collected using a primary research method. For this purpose, a questionnaire is developed to generalize the responses for a certain situation. The questionnaires were sent through email to the targeted respondents. The study chose this method as it is less costly and time consuming and allows to collect responses from far geographical boundaries. For data collection, cluster sampling technique is employed. These collected responses are then used to carry out statistical testing of the proposed set of hypotheses.

This study adopted structural equation model with the purpose of analyzing the structural association between the observed and the latent variables, as well as to estimate the structural model. Estimating the appropriate sample size is one of the important aspect of SEM-PLS. The sample size for given study is selected to be 322 based on the population size, following the Krejcie and Morgan (1970) table for sample size determination. However, to avoid data abnormality and response bias, the sample size has been increased to 675. The study received 470 properly filled questionnaires, with a 70% response rate. Keeping in view the capabilities and objectives of the research, PLS-SEM was employed to achieve the research goals and objectives. PLS-SEM, an expression of composite Structural equation modelling has gained enough attention by academicians and researchers in various disciplines. It is a multivariate technique having the ability to combine different aspects of factor and regression analysis and therefore allows the simultaneous examination of measurement and the structural theory, i.e. determining the relation between measured variables and their latent constructs and also the relation among these constructs.

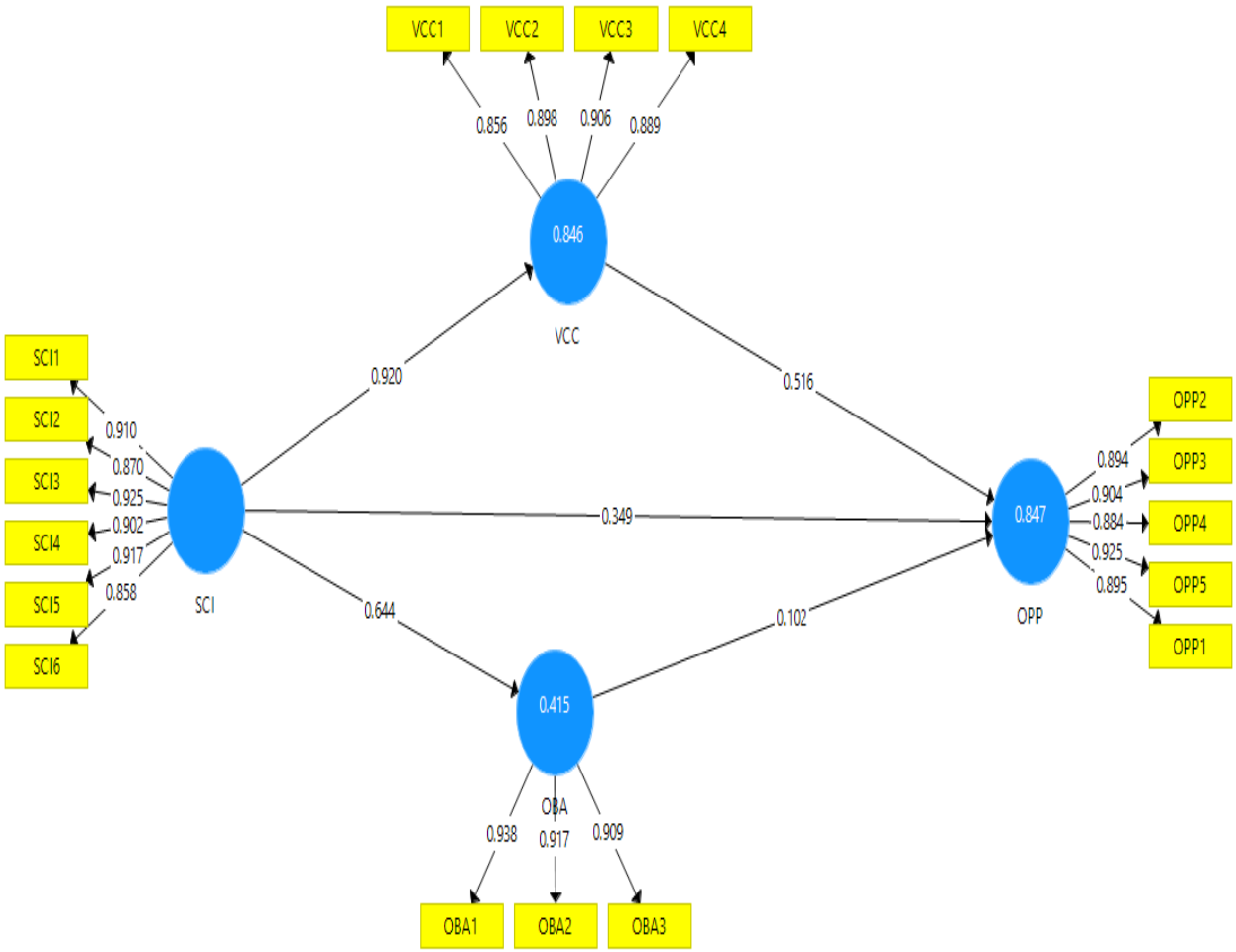
Previously, CB-SEM has been the most widely used covariance-based method. It was introduced and suggested by Jöreskog (1973) and captured the attention of several empirical

researchers in the field of social science. Due to predominance of other techniques such as AMOS, LISREL, and EQS, PLS-SEM has been somehow neglected, since it is a most powerful and suitable alternative to CB-SEM approach. PLS-SEM is better than CB-SEM in many ways, such as it is a best suitable approach in many social science situations, i.e. during model complexity involving several indicators, small sample sizes, and when there are several model relationships are involved in the study.

Analysis

PLS-SEM is equally stringent having complementary modelling approach with the structural equation modelling. In different research, it has been proven to be a silver bullet, if applied correctly. PLS-path modelling has a unique suitability to the predictive analytics. It goes beyond the linear estimation of association between the latent and manifest variables (Hair, Risher, Sarstedt, & Ringle, 2019). Since PLS-SEM estimates the model parameters grounded in causal and well-developed explanations, it also bridges the seeming division among prediction and explanation (Hair et al., 2019; Shmueli et al., 2019). Figure 2 model below.

Figure 2. Measurement Model



After the selection of methodology and data gathering, the next step is to check the validity of the instruments. For this purpose, confirmatory factor analysis was performed. The CFA values must exhibit greater than 0.50 value to be a valid instrument. In addition, factor loadings were also observed for each item, thereby exhibiting greater than 0.40 factor loadings for each item. Afterwards, a data normality test was performed to analyze if there is any data abnormality, which can usually be avoided by using large sample size. The recommended range for sample size is 30-150. However, increase in sample size enhances the data normality, i.e. the greater the sample size the less chance of data abnormality. The data normality test for this study has shown that the chosen sample size is suitable for statistical modelling, see Table 1 below.

Table 1: Outer loadings

	OBA	OPP	SCI	VCC
OBA1	0.938			
OBA2	0.917			
OBA3	0.909			
OPP2		0.894		
OPP3		0.904		
OPP4		0.884		
OPP5		0.925		
SCI1			0.910	
SCI2			0.870	
SCI3			0.925	
SCI4			0.902	
SCI5			0.917	
SCI6			0.858	
VCC1				0.856
VCC2				0.898
VCC3				0.906
VCC4				0.889
OPP1		0.895		

The SmartPLS, a software program was employed to examine the path modelling (Hair, Ringle, & Sarstedt, 2011; Hair, Sarstedt, Hopkins, & G. Kuppelwieser, 2014). Primarily, the composite reliability test is performed to assess the internal consistency and reliability for the latent variables (Bryman & Bell, 2011). The recommended value for CR acceptability is above 0.70, which came out to be consistent with the recommended level. To check the latent variables' internal reliability Cronbach alpha test is used as a standard procedure, which must exhibit α value to be greater than 0.70. Therefore, all alpha values for each construct have shown consistent results i.e. greater than 0.50 alpha value. Convergent validity for the measurement model can be established through average variance extracted (AVE). For this study the reported

range for convergent validity is 0.511-0.725, which satisfies the threshold level of 0.5 or above (Bouwman et al., 2018; Hair et al., 2011).

Table 2: Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
OBA	**0.911**	**0.912**	**0.944**	**0.850**
OPP	**0.942**	**0.943**	**0.955**	**0.811**
SCI	**0.952**	**0.953**	**0.961**	**0.805**
VCC	**0.910**	**0.911**	**0.937**	**0.788**

Thus, the internal consistency, reliability, and convergent validity has been confirmed with the findings, as shown in Table 2 above. A large number of measurement model items were omitted as they exhibit lower factor loadings. A measured constructs' uniqueness can also be confirmed by assessing its discriminant validity (Henseler, Hubona, & Ray, 2016). According to Hair, Hult, Ringle, and Sarstedt (2016) discriminant validity is the extent a construct is actually distinct than the other constructs, in terms of empirical standards. Thus, through Fornell and Larcker (1981) criterion the discriminant validity is assessed and established. The square root AVE's must be greater than correlations between the latent variables. The square root values for AVE are presented as follows in Table 3 below:

Table 3: Discriminant Validity

	OBA	OPP	SCI	VCC
OBA	0.922			
OPP	0.673	0.921		
SCI	0.644	0.890	0.927	
VCC	0.669	0.906	0.920	0.888

Since study aims to analyze the nature of association between the latent constructs, the structural model or inner model was estimated with first order construct. Furthermore, path coefficients are also observed to assess the association among the constructs and in testing of hypothesis. The model's goodness of fit was also examined followed by the transformation of measurement model into structural model for investigating the relationship existing between the endogenous and exogenous variables see Figure 3 below.

Figure 3. Structural Model

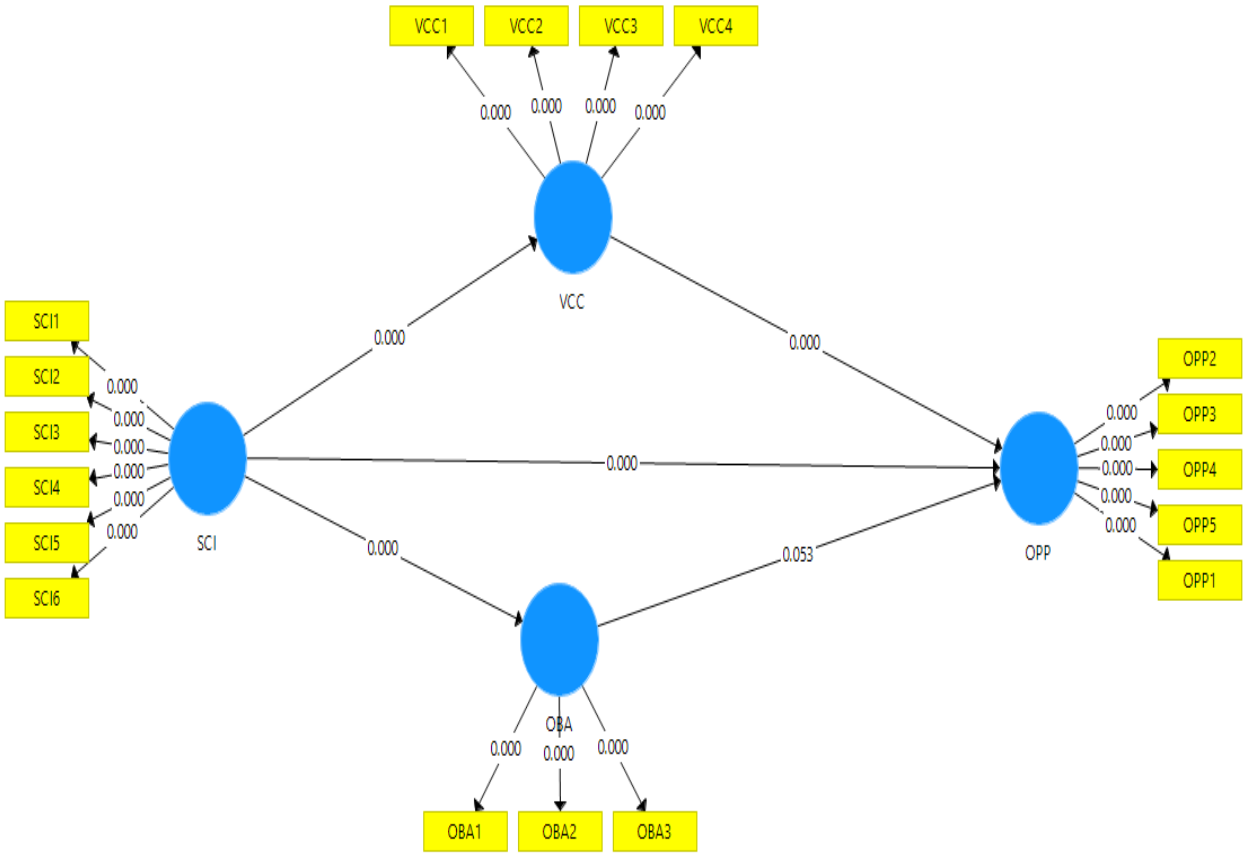


Table 4 below shows the results for direct hypotheses, which indicated the acceptance of all expect one direct hypothesis, due to significant t and p values.

Table 4: Direct relationships

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
OBA -> OPP	0.102	0.106	0.053	1.932	**0.053**
SCI -> OBA	0.644	0.644	0.070	9.177	**0.000**
SCI -> OPP	0.890	0.889	0.020	43.625	**0.000**
SCI -> VCC	0.920	0.920	0.016	57.010	**0.000**
VCC -> OPP	0.516	0.516	0.092	5.621	**0.000**

The open book accounting is the only variable which fails to mediate the relationship between supply chain integration and operational performance.

Table 5: Mediation

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
SCI -> OBA -> OPP	0.066	0.070	0.040	1.664	**0.096**
SCI -> VCC -> OPP	0.475	0.474	0.085	5.590	**0.000**

The structural model estimation involves, checking significance of path coefficients, moderating effect, R^2 square values, predictive relevance, and effect size (Henseler, Ringle, & Sinkovics, 2009). Therefore, the study carried out bootstrapping procedure to determine the path coefficients' significance, following Henseler et al. (2009) and Hair et al. (2014). For this purpose, 5000 samples were incorporated with around 266 cases. Subsequently, the variance in endogenous variables is determined by observing the coefficient of determination or R^2, which shows the degree or proportion of variance in endogenous variables that can be predictable from one or more exogenous variables or predictors. The R^2 value ranges within 0-1, the closer the R^2 value to 1, the greater the variation in dependent variable, explained by the independent variables.

Table 6: R-square

	R Square
OBA	0.415
OPP	0.847
VCC	0.846

According to Hair et al. (2011) predictive relevance should also be considered while estimating the model, since it provides the quality and predictive power of the model (Duarte & Raposo, 2010). Thus, the study performed predictive relevance test using Stone (1974) criteria.

Table 7: Q^2

	Q^2 (=1-SSE/SSO)
OBA	0.334
OPP	0.649
VCC	0.633

Finally, the effect size provides the relative impact on dependent variable caused by the independent variables, by omitting the predecessors, thus in order to examine R^2 significance, the change in R^2 is again observed. Therefore, effect size shows the difference in the values of R^2 by including and excluding the predecessor variables. The difference among with and

without predecessor R^2 values is then included into the study, if the previous R^2 value is less than the new obtained value, which results in greater effect size. The values for f^2 i.e. 0.02, 0.15 and 0.35 shows small, medium and large effect sizes, respectively. The findings have shown significant correlation and support all the hypotheses.

Table 8: f^2

	OBA	OPP	SCI	VCC
OBA		**0.321**		
OPP				
SCI	**0.708**	**0.372**		**5.474**
VCC		**0.251**		

Conclusion

Performance measurement is the primary task of management accounting across supply chain. The measurement of resources, flexibility and output are the key elements of strategic goals. To gain profitability, there is need for efficient management of resources. When products are not valued by customers, they may switch to other supply chains. There is further need for agility in the supply chains because of the changing business environment and customer demands. Total costs, distribution and manufacturing costs along with inventory measures and rate of return are included in the measures for resource performance. The prime focus of the current study was to examine the relationship among the supply chain manufacturing firms. In addition to that the study argued that the managerial accounting techniques such as open book accounting and value chain accounting mediates the relationship between supply chain integration and operational performance. It has been argued that there is positive relation between supply chain integration and a firm's optimum performance. This research has taken a single latent factor h for SCI, and this does not contradict the research preferring individual sub-level components of supply chain integration.

Operational Performance (OP) has been chosen in this research as a construct for two reasons (Liu, Huang, Wei, & Huang, 2015). The first is evidence through literature that OP is a supportive factor for supply chain performance. The second reason is that it can be measured and is dependent on level of supply chain integration. Moreover, there is some doubt that it is the most indispensable and critical part of several frameworks of performance measurement. However, the findings in the literature are not consistent with each other.

The study has used the SEM-PLS as a statistical tool to answer the research questions. This study adopted structural equation model with the purpose of analyzing the structural association between the observed and the latent variables, as well as to estimate the structural model. Estimating the appropriate sample size is one of the important aspects of SEM-PLS.

The sample size for this study was 322 based on the population size. The findings of the study are in line with the proposed hypotheses of the study. The results of the study will be helpful for policymakers and researchers in this field.

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