Exploring the Nexus between the Absorptive Capacity, Corporate Sustainability, Supply Chain Agility and Manufacturing Firm Performance

Chanicha Moryadee[*1], Kiatkulchai Jitt-Aer[#2]

[*1] *College of Logistics and Supply Chain, Suan Sunandha Rajabhat University, Thailand*
[#2] *Navaminda Kasatriyadhiraj Royal Air Force Academy, Thailand*
[1]chanicha.mo@ssru.ac.th
[2]kiatkulchai@yahoo.com

Abstract- **The study has intended to examine the absorptive capacity on the firm performance of the Indonesian firms. The study has also examined the mediating effect of SC agility in the relationship between the absorptive capacity and the firm performance. Lastly, the study has examined the mediating role of corporate sustainability in the relationship between the absorptive capacity and the firm performance. The data is collected from the middle managers of the mining firms in Indonesia. the authors have employed the convenient sampling. The authors have distributed in total the 320 questionnaires. The response rate of the current study is 67 percent. The influence of SC agility as a mediator has been analyzed between absorptive capacity and performance of the firm. It was found by the study that SC agility fully mediates the relation between absorptive capacity and performance of the firm. The literature on competitiveness of SC has been improved by adding empirical evidence. Moreover, there is need to leverage both absorptive capacity and SC agility to improve the performance of a firm. It has been suggested by results that superior performance could be achieved transformation of absorptive capacity through SC agility. The companies are responsible for the influence on society and environment that occurs because of their actions. The companies are responsible for the influence on society and environment that occurs because of their actions. The corporate activities not just influence the company itself rather, it affects the whole SC and society. The corporate activities not just influence the company itself rather, it affects the whole SC and society.**

Keywords; *Absorptive capacity, SC, sustainability, Indonesia*

1. Background

The competition across the globe is growing in the current business environment. This intensity of competition is making it difficult for the companies to obtain sustainable competitive advantages [1, 33-35]. It has been pointed out by several researchers that the competition among individual businesses has shifted to the competition in SCs [1]. The basic form in a firm is its SC comprised of customers and suppliers. Firms and their SC need to respond towards the market changes in an instant way through an updated portfolio of knowledge and technology. Moreover, investments can be made in R&D along with the management of external knowledge to respond towards external market or environmental changes.

SC agility (SCHAG) and absorptive capacity (ABSC) are two crucial dynamic capabilities (DCAB), which become a source of sustainable competitive advantage for the firm. The ability of a firm to recognize external knowledge, transform, and use it in their operations and processes for achieving competitive edge in business is referred as ABSC [2]. Resultantly, the company is allowed to keep its technology updated for responding to the market changes in terms of innovation and knowledge.

Alternatively, the ability of a firm to respond towards unexpected changes in the market in the changing business environment is referred as SCHAG. It has been revealed by several studies that absorptive capacities and agility of a firm can create a positive influence on its performance [3]. The external environment is changing every day and the competition has shifted to the level of SC. In this respect, the SCHAG and ABSC of an organization have become important elements, which influence global competitiveness.

Less research studies have been conducted on the above two mentioned DCAB and their influence on the performance of the firm. It has been posited by several researchers that knowledge is crucial in managing SCs [4]. Moreover, some researchers have reflected that there is a need for analyzing the impact of AC on different SC characteristics including agility. The organizations need to develop DCAB for surviving the global economy. Therefore, the relation between DCAB and their influence on firm's performance is crucial to be analyzed [5]. Nowadays, innovation has become multidisciplinary and synergies must be created by firms between different DCAB to emphasize on the significance of intangibles for improving performance of the firm. It has been suggested by several researchers that a combination of agility practices must be implemented rather than a single practice for achieving benefits from potential synergies between several practices.

The resource-based approach and DCAB aspect have been used to develop arguments of the study in theoretical form. Both these aspects help in explaining the uses of SCHAG and ABSC for gaining competitive advantage. The basic proposition of RBV is the dependence of competitive advantage on the use of different resources, which are difficult to substitute, imitable, and rare [6] . Researchers have given considerable attention to RBV in business management. However, it is becoming popular in SC management and production research. The RBV was utilized by [7] to develop a relation between strategies of SC management, entrepreneurial competence of SC management, and performance of the firm.

Alternatively, it is considered by the DCAB perspective that accumulation of resources is not sufficient. There is a need for a firm to integrate capabilities, reconfigure, develop, and utilize resources for achieving competitive advantage [8] . For increasing the performance and competitiveness of a firm, innovation management is not sufficient. The dynamic resources, which allow the firm to develop, expand, and modify their resource base, are required [9]. The competitive advantage can be achieved by a firm through effective DCAB. Moreover, these enable the firm in achieving several temporary advantages making them stay ahead in competition and achieve competitive advantage. Considerable benefits could be achieved by acquisition of DCAB, including the reconfiguration of the SC of the firm in this dynamic and rapidly changing environment. There are similar arguments in literature studies for ABSC [10].

2. Hypothesis Development

[11] initially proposed the concept of absorptive capacity. It was revealed by the researchers that exposition to external knowledge flow is not enough for achieving competitive benefits by a firm. There is a need for companies to develop the capability of identifying the value and worth of external knowledge and use it in the organizational processes and practices. Some other researchers expanded the initial typology of three dimensions, including identification of knowledge, assimilation, and exploitation. Four dimensions were proposed by[12] which have been adopted by many researchers. These four dimensions include acquisition of knowledge, its assimilation, the transformation of knowledge, and exploitation as per the organizational needs. The new knowledge is identified in the initial phase, i.e. knowledge acquisition. The knowledge is transferred or communication between firms. The ability of a firm to use its skills, resources, and routines for assimilating knowledge is referred as assimilation. The knowledge transformation is referred as the use of in-house and external knowledge for fulfilling needs of the firm. Lastly, the knowledge is exploited for achievement of specific organizational goals using a combination of strategies and resources. The dynamic capability of a firm, which is difficult to imitate and valuable is referred as ABSCC. This capability depends on the previous knowledge of every firm and trajectory [13]. The AC of a firm is difficult to imitate, and irreplaceable for aching competitive advantage.

AC becomes a dynamic capability because of the four dimensions including acquisition of knowledge, its assimilation, transformation of knowledge and exploitation. This capability improves the level of innovation by a firm and its performance [14]. The firms can respond to the needs of customers when they have high ABSC. Such firms are able to develop new products, improve their management practices, and organizational routines for better performance.

H1: ABSC is in the significant relationship with the firm performance

The firms' configurations, which work collectively in the network and need to improve their capacity and operations by customers or suppliers, are referred as SCs. Increased attention has been received by the concept of agility in SC management and production research because of its significant for the management. The firms become able to respond towards external environment by making changes in the entire SC through SCHAG [15]. Therefore, SCHAG involves the collaboration between suppliers and customers. Some recent research works have been done by [16]. The relation between SCHAG and integration was analyzed by[17]. The relation between operational performance and SCHAG was analyzed empirically by[18].

The concept of SCHAG is multi-dimensional and broad like AC, which connects different disciplines. Increased attention has been gained by the positive influence of agility and different concepts of agility have been given by researchers. This results in a variety of normative frameworks to suggest an association between variables of interest within the concept of agility. The frameworks of models related to agility were reviewed by [19] based on their benefits and shortcomings to analyze SCHAG. The focus of this study was on identifying the supporting variables for agility 'across firms' and the SC characteristics for becoming agile. The frameworks, which have a focus on a single firm, are not helpful in developing a relation between SCHAG and ABSC. Therefore, this study has used the framework, which was developed by[20]. Later, it was adapted by [10] The characteristics such as process integration, the sensitivity of market, virtual and network based are included in this framework of an agile SC.

Based on market sensitivity, the firms can anticipate about the opportunities and threats in the market and respond to real consumer demand. The SCs, which are based on information and not inventory, are regarded as virtual SCs [21]. Virtual SCs involve the use of

information technology for sharing of information between the suppliers and buyers. In a similar way, collaborative networks between the members are created through agile SCs. The firms with higher collaborative strength can quickly respond to the changes in the market. With these characteristics in SCs, the firms can quickly respond to the changes in the market and become competitive [22].

H2: SCHAG is in the significant relationship with the firm performance

According to RBV, the key resource for gaining a competitive advantage is the firm's knowledge. The knowledge of a firm is crucial for the management of SCs [23]. The way, in which flow of knowledge is carried out between members of SC, has not been explained by literature studies. Moreover, the studies have not addressed the influence of new knowledge on SC management [24] . The research framework in this study has incorporated the role of SCHAG as a mediator on the relation between firm's performance and ABSC. The way in which AC could be transformed to improved business performance through SCHAG could by suggested by this analysis. Superior performance could be achieved by the firms with higher absorptive capacity. This is because of acquisition of new knowledge, its assimilation, transformation, and application in the organizational process. However, it is still not understood that with favorable SCHAG conditions, the improvement will be greater. The role of SCHAG as a mediator has been analyzed by a limited number of studies. The role of agility as a mediator was analyzed by [25] on the relation of antecedents and performance of the firm. The antecedents included organizational initiatives in SC and information technology in SC.

[26] analyzed the role of agility as a mediator on the relation of IT integration and competitive business performance. In a similar way, a mediating influence was found by [27] between the relation of demand and supply side competence and firm's performance. It was found by [13]that the relation between efficiency performance and customer integration is influenced by a fast structure of network supply. It has been suggested in this study that elevated performance could be achieved by SCHAG, enables ABSC to respond to the external changes in the environment. The world has become highly competitive because of diverse customer needs and advancements in technology. The technology and knowledge must be kept updated by companies. The company is enabled by ABSC to use new knowledge for improving in-house activities and practices. The knowledge can be renewed through development of ABSC, which influences the performance.

The knowledge about the needs of customer, processes, and market knowledge is improved through increase of know how. The firms are allowed to have updated SC and SC with greater absorptive capacity[28]. The needs of customers can be fulfilled by firms with higher ABSC and market changes can be responded quickly. The updated knowledge helps firms in giving precise understanding of the interactions and process among the members of SC. Therefore, the efficiency and effectiveness of internal processes can be improved when firms have higher SCHAG. Moreover, their SC relations are enhanced as well. Firms remain updated in terms of technology because of new knowledge. Based on the above discussion, the following research hypothesis has been formulated:

H3: ABSC in the significant relationship with on the SCHAG.

H4: SCHAG mediates between the ABSC and the firm performance

The seminal research work of [29] helps in tracing corporate sustainability, which define the four basic responsibilities of a firm including legal, ethical, economic, and voluntary. The companies are responsible for the influence on society and environment that occurs because of their actions. The corporate activities not just influence the company itself rather, it affects the whole SC and society. Further, these influences are expanded to different continents. In academic literature, momentum has been gained by SC sustainability. The management of capital, flow of information, and management of material, cooperation between members of the SC working on collective goals from all three sustainable development's dimension is referred as SC sustainability. The organizations work on the requirements of stakeholders and customers. [30] proposed the definition of sustainability, which is used widely. According to the researchers, sustainability is fulfilling the present needs of people without compromise on the needs of people in future. This definition was further transposed by [31] as fulfilling the direct and indirect stakeholders of a firm without compromise on the firm's ability to fulfil the needs of these stakeholders in future. These stakeholders include clients, communities, pressure groups, employees, and stakeholders. Corporate social responsibility and sustainability have been used interchangeably because of their convergence over recent some time. It has been argued by scholars that use of CSR term pervasively creates confusion. This captures the general organizational duties and obligations to society. Alternatively, social and environmental issues are included in CSR as elements of triple bottom line. Excessive attention was given to the green and environmental aspects in literature on sustainability. However, less significance was attributed to the social aspect due to higher complexity involved in measuring these issues[31].

H5: ABSC in the significant relationship with the CSUS.

H6: CSUS in the significant relationship with the firm performance.

H7: CSUS mediates between the ABSC and the firm performance.

3. Methodology

In consideration with the unique objectives of the study the authors have used the survey-based methodology and data is collected from the questionnaire adopted form the prior studies. The data is collected from the middle managers of the firms in Indonesia. Basing on unique research objectives of the study, the authors have employed the convenient sampling. A total of 320 questionnaires were distributed. The response rate of the current study is 67 percent. which according to [32] is appropriate. The study has chosen the SEM-PLS for the analysis of data. The SEM-PLS is one of the most advance and robust SEM techniques for the analysis of structural models.

4. Results

Basically, the valuation of measurement model (MM) is concerned with measurement of reliability and validity of construct indicators. Determination of MM is specifically to make sure that before investigation of models, the structural relation has used the reliable and valid construct measures. Depending on the formative and reflective measured construct different criteria are required for the assessment of MM.

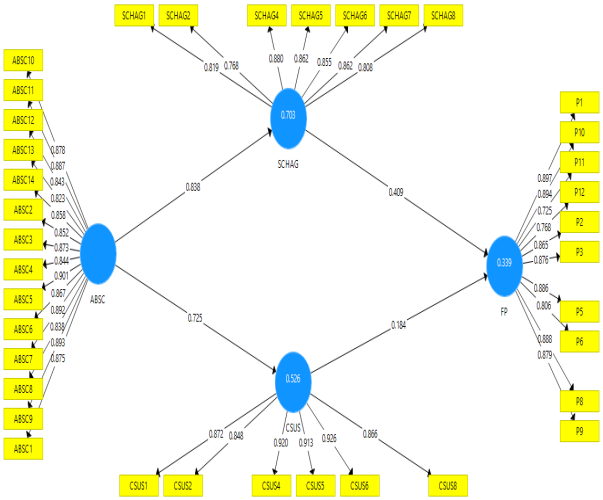

Figure 1. Measurement Model

Reliability and validity of reflective MM can be ensured with the help of discriminant validity, convergent validity, indicator reliability and composite reliability [7]. The composite reliability is the first quality criteria which is linked with the indicator variable of internal consistency for representing the latent construct. The range of composite reliability is between 0-1, in which high reliability is indicated by the higher value, the range of satisfactory value is between 0.90 and 0.70. For the assessment of reflective model, the measurement of convergent validity is the second criteria. We must consider the two keys for the establishment of convergent validity. The outer loadings are known as reliability indicators and values of all indicators must be significant and greater than 0.708. with related to this all indicators mean of square loadings linked with the construct can be described by the AVE. The value of AVE must be 0.5 or above for the establishment of convergent validity. Logically for the establishment of CV if the value of AVE greater than 0.50 it indicates that averagely more than half of variance in indicator is explained by the construct.

Table 1. Outer Loadings

	ABSC	CSUS	FP	SCHAG
ABSC10	0.878			
ABSC11	0.887			
ABSC12	0.843			
ABSC13	0.823			
ABSC14	0.858			
ABSC2	0.852			
ABSC3	0.873			
ABSC4	0.844			
ABSC5	0.901			
ABSC6	0.867			
ABSC7	0.892			
ABSC8	0.838			
ABSC9	0.893			
CSUS1		0.872		
CSUS2		0.848		
CSUS4		0.920		
CSUS5		0.913		
CSUS6		0.926		
CSUS8		0.866		
P1			0.897	
P10			0.894	
P11			0.725	
P12			0.768	
P2			0.865	
P3			0.876	
P5			0.886	
P6			0.806	
P8			0.888	
P9			0.879	
SCHAG1				0.819
SCHAG2				0.768
SCHAG4				0.880
SCHAG5				0.862
SCHAG6				0.855
SCHAG7				0.862
SCHAG8				0.808
ABSC1	0.875			

Table 2. Reliability

	Cronbach's Alpha	rho_A	CR	(AVE)
ABSC	**0.974**	**0.975**	**0.977**	**0.751**
CSUS	**0.948**	**0.953**	**0.959**	**0.795**
FP	**0.957**	**0.963**	**0.963**	**0.723**
SCHAG	**0.929**	**0.933**	**0.942**	**0.701**

The assessment of reflective MM validity is discriminant validity (DV) which is the third quality criterion. According to the study of [7] the extent or degree at which a measure differently measures the correlation level as compare to other constructs, and one construct is represented b the single indicator. We can establish the discriminant validity only when square root of AVE is higher than correlated constructs.

Table 3. Validity

	ABSC	CSUS	FP	SCHAG
ABSC	**0.866**			
CSUS	0.825	**0.892**		
FP	0.768	0.859	**0.850**	
SCHAG	0.738	0.816	0.778	**0.837**

After the establishment of outer models construct validity and reliability the next step is the assessment of structural relation according to hypothesis which involves the assessment of inner model. Hypothesis testing is the is the main purpose of structural model, which include relation evaluation of relation among the latent constructs of structural model. In PLS-SEM we have tested the hypothesis of structural model by using the bootstrapping and algorithm [27]. As in PLS-SEM there is no assumption for normal distribution of data so for checking the significance in PLS we rely on non-parametric procedure of boot strapping [7]. Bootstrapping is basically a resampling technique in which we draw down many subsamples randomly from the sample population. In this procedure for computing the slandered error many subsamples can be used randomly. So, by following the study of [28] the present study has used 500 subsamples from the sample population. For the estimation of parameters, the normal data is produced by the boot strapping of 500 re sample. [7] has purposed a five-step procedure for the assessment of structural model that is collinearity assessment, predictive relevance (Q2) and R2.

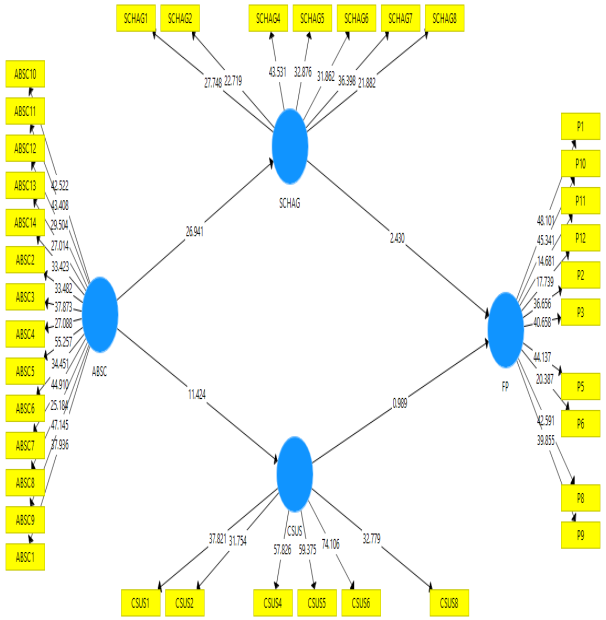

Figure 2. Structural Model

The slandered error has determined the significance of a coefficient which was found from the bootstrapping procedure where it computes the t value. The permission for computing t-value was provided by standard error of bootstrap. So, in the present study the bootstrapping procedure has contributed for estimating the significance of path coefficients.

Table 4. Direct Relationships

	(O)	(M)	(STDEV)	(|O/STDEV|)	P Values
ABSC -> CSUS	0.725	0.727	0.063	11.424	**0.000**
ABSC -> FP	0.477	0.484	0.059	8.106	**0.000**
ABSC -> SCHAG	0.838	0.841	0.031	26.941	**0.000**
CSUS -> FP	0.184	0.184	0.186	0.989	**0.161**
SCHAG -> FP	0.409	0.414	0.169	2.430	**0.008**

In PLS-SEM there are robust methods as compare to the other techniques for checking the mediating effect by [32]. So, by using PLS-SEM we can immediately test the hypothesized relation of variables. As compare to the Sobel test PLS-SEM bootstrapping shows high level of statistical power.

Table 5. Mediation

	(O)	(M)	(STDEV)	(|O/STDEV|)	P Values
ABSC -> CSUS -> FP	0.133	0.137	0.139	0.956	**0.170**
ABSC -> SCHAG -> FP	0.343	0.347	0.140	2.447	**0.007**

For evaluating the structural model in PLS-SEM the third commonly used step is R- square or coefficient of determination, which shows the predictive accuracy and combine effects of endogenous variable by exogenous variables of model as well.

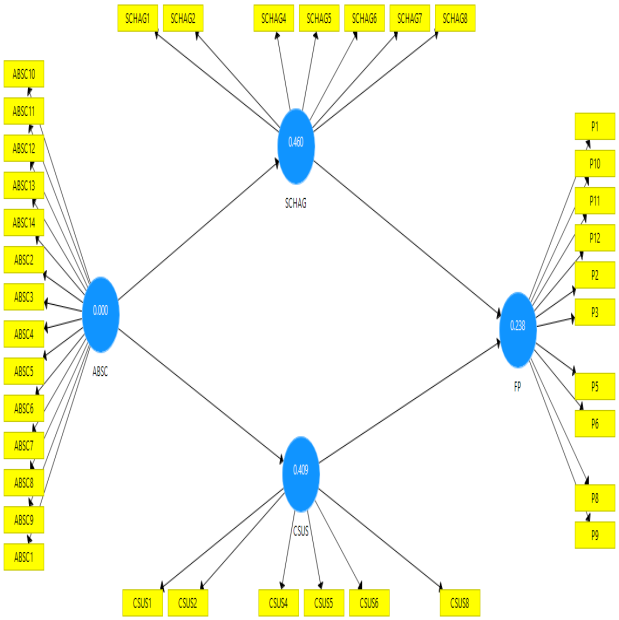

Figure 3. Blindfolding

In addition to this PLS-SEM can evaluate the predictive relevance (Q2), and by using the value of R square can measure the predictive accuracy of structural model. In simple words the indicators of reflective measurement of the endogenous constructs must be able to predict accurate model.

Table 6. Q-square

	SSO	SSE	Q^2	R Square
CSUS	1302.000	769.906	0.409	0.526
FP	2170.000	1652.788	0.238	0.339
SCHAG	1519.000	820.975	0.460	0.703

5. Conclusions

Contributions have been made by this study to the research on SC management. It has been found by the study that with high level of ABSC, the firm is able to achieve superior performance. The findings are supported by literature studies that competitive advantage can be achieved through SCHAG. Each dimension of SCHAG provides distinct benefits for the firm, which results in improved performance of the firm. For instance, the collaboration between the members in the SC helps firms in responding quickly to the changes in market. This increases visibility across the SC. In a similar way, information and processes' integration increases the efficiency and effectiveness of decision making based on the current and real information. The efficiency of SC is improved through interaction between the activities of every agent in SC.

The main contribution of the study is the role of SCHAG in the influence of ABSC on performance of the firm. The key issue for success of a SC is interchange of knowledge. However, it is important to analyze the way in which knowledge is developed and communicated across the members of SC. It is crucial to analyze the influence of new knowledge about different aspects of SC management. It has been proposed by our research that the efforts of ABSC can be transformed in improved firm's performance through SCHAG. The higher level of ABSC can offer several benefits to the firm and new knowledge can be applied in the areas, which result in improved SCHAG.

The market changes could be identified by firms with high ABSC level because of their sensitivity to identify the needs of customers, predict the moves of competitors, and explore new areas for business. In a similar way, higher knowledge about the information processing of demand enables firms to focus on customers through an increase in market dimension of SCHAG.

The SC relationships could be positively influenced by ABSC. The acquisition, knowledge transformation, and its utilization help firms in understanding their suppliers and customers for improving product development and alignment of resources within the SC. Moreover, it improves the SC management in efficient and effective way. Information can be integrated through ABSC as firms update their ICT, which are used to communicate information among members of SC, suppliers, and customers. Therefore, SCHAG is considered as a mechanism, which supports AC in improving the performance of a firm. It has been suggested in this study that elevated performance could be achieved by SCHAG, enables ABSC to respond to the external changes in the environment. The world has become highly competitive because of diverse customer needs and advancements in technology. The technology and knowledge must be kept updated by companies.

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