THE MODERATING EFFECT OF INFORMATION TECHNOLOGY CAPABILITY ON THE RELATIONSHIP OF MANAGEMENT COMPONENTS AND FIRM PERFORMANCE OF CHEMICAL INDUSTRY

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ABSTRACT

The study main objective is to figure out the relationship within the supply chain management components and firm performance with the moderating effect of information technology capability of chemical industry. The researcher collected the data from the 400 mangers of chemical industry in Indonesia by using a simple random sampling. The Structural Equation Modeling technique was applied for the current research analysis. The key findings had shown that all of direct and indirect effect results have positive and significant relationship. Therefore, all of the study hypothesis are supported. These findings had shown supply chain management components are important components to increase firm performance of chemical industry. Moreover, the empirical results could be contributed a literature in the extant literature that could provide help to enhance future research. Besides, the significant moderating effect could be considered a big contribution of the study, therefore, this contribution could be providing a future insight for the various researchers.

Keywords: Supply Chain Management Components, Information Technology Capability, Firm Performance, Chemical Industry.

INTRODUCTION

Due to globalization companies has been confronting a severe competition by local as well as international players all over the worlds. Hence, the activities among cross-countries are usual and predictable. The end result, the attention for numerous firms is increasing on international supply chain management (SCM). We have concern with the process of SCM and functions of SCM in this process. To achieve better performance of a firm and to get competitive advantage these tools are main factors (Ditkaew, Pitchayatheeranart, & Jermsittipasert, 2020). The essential feature needs to be entirely explored the ways that show the path of success and experiential study also needs to link the initiatives of supply chain (SC) by firm performance (FP). So, some previous studies make an effort to connect the SCM apparatuses with FP (Saengchai & Jermsittiparsert, 2019; Mee-ngoen, Sirariyakul, Limphothong, Tomcharoen, &

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Jermsittiparsert, 2020). The statics shows that the key components contain important effect on FP in Indonesia. It persuades to SC managers to more focus on SC apparatuses as compare to the other components. Moreover, the previous studies had a major focus on the direct effect of supply chain management components (SCMC) on the firm performance but there is a little attention on the indirect effect relationship. There are numeral studies which had to be conducted on the direct effect of SCMC (Boonjing, Chanvarasuth, & Lertwongsatien, 2017; Chen, Paulraj, & Lado, 2004; Ou, Liu, Hung, & Yen, 2010). Moreover, the previous studies in the field of SCM had a major focus on the developed as well as other developing countries but there is a little attention on the Indonesia chemical industry especially in the field of SCM. Therefore, there is a need of time to conduct a research on this sector and indirect relationship. Along with this gap, the current study had used the information technology capability as a moderating variable in this study. The information technology capabilities are considered to be important factor of the organization that could support to the organizations to increase their performance by providing assistance to other sources (Turban, Rainer, & Potter, 2003). Therefore, this is considered to be an important resource of the organization that could provide help to other resources to increase the organizational performance. Based on the previous gaps and seeking the significance of information technology capability, the current study aims to conduct the moderating effect on the supply chain management components and firm performance of chemical industry in Indonesia.

LITERATURE REVIEW

Supply Chain Management

Strategic type of cooperation and coordination is necessary among SC partners (supplier to customers), that is defined in SCM strategies. Supply chain management deals with all supply value chain and tackle all matters that are related to raw material to its consumption, so there is a chain linkage among whole elements in all process, encircling many firm boundaries (Boonjing, Chanvarasuth, & Lertwongsatien, 2015; Cooper, Lambert, & Pagh, 1997). Stephen and Philip (1995)SCM deals with the taking out of raw material to its consumption. It is necessary to make the General Supply Chain Model (GSCM) to better and proper regulation of management and all operations in SCM process (Janvier-James, 2012). In other words, supply chain management played an important role to enhance the organization performance (Saberi, Kouhizadeh, Sarkis, & Shen, 2019). This is reason, it is explained by Ben-Daya, Hassini, and Bahroun (2019) that if the organization had a greater level of supply chain management activities then the organization performance could be enhanced.

Supply Chain Management Components

While the formation of SC system and focal business processes to incorporate with SC employees are key factors in this supply chain process. Therefore, it is necessary to put into practice the supply chain management procedures and incorporate processes among employees that are involved in SC network. The processes of business are managed and controlled by management components in firms. By expanding the level of each one component, the business integration altitude of supply chain could be increase from corner to corner. The set of these components of management that help in supervising the integration among all firms in SCM processes (Ben-Daya et al., 2019; Lambert, Cooper, & Pagh, 1998). These explicit management

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components are universal among supply chain members and in processes of the business. It is the management of these common components that are critical for SCM success, since they essentially represent and determine how each process link is integrated and managed. Adding more management components or increasing the level of each component can increase the level of integration of the business process link (Lambert et al., 1998; Svensson, 2007). For achievement of SCM goals the management of these general components is vital while it is fundamentally indicating and determine that how to manage and integrate each process ink (Cooper et al., 1997). There are eleven SCM component of management that are identified in previous researches that can be divided into two main groups (1) technical and physical (2) behavioral and managerial. Six components planning and organizing methods, information and communication stream formation, management of knowledge, product flow arrangements, organization structure and work structure.

Adding up five major components in behavioral and managerial group these are power and leadership organization, culture altitude, management methods, trust commitment and reward and risk structure. The managers get help by using these components to make the firm towards achieving the goal of better amalgamation of processes, and ultimately increased firm performance.

Hypothesis Development

We are going to study every possible SCM components discussed in previous literature by discussing the eleven SCM components and categorizing them into new main groups that are components of structural management and the components of behavior management. In adding together, we also attempt to reconsider the relationships among the firm performance and these eleven SCM components and firm performance. We have taken the customer service and cost as the measurements indicator meant for firm performance.

Structural Management Components

Planning and organize of operations are described as the means to move about firm operations and its SC to follow the desired destination. Planning and organizing calculate the achievable procedures and prepare the response for the contingent events. The components of structural management (CSM) or the technical and physical component management group include measurable, visible, flexible and tangible components (Lambert et al., 1998). The scope of planning and managing is the evaluation, implementation, feedback and enhancement of the business processes and firm actions that pursue policies purpose, strategies of the firm and also its SC (Cooper et al., 1997; Majumdar & Sinha, 2019) . The implementation of planning and managing in a firm, the firm processes and business activities go to efficient direction. Any change in processes and activities of firm will concurrently cause to change in firm performance. So it is seeming to be positive relationship between controlling and managing and the firm performance.

The definition of work flow structure is the works, the place of working within an organization and the ways of working that are used for production and organizational supply chain management (Anderson & Narus, 1990; Cooper et al., 1997; Koberg & Longoni, 2019). The firm essentially knows about the organizational environment and conditions to proper management of the particular components of SCM that will ultimately build up understanding on

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reason of doing these operations. It helps in the management of firm's operations in terms of leading and controlling and managers in firm can evaluate the ways of working and how efficiently work has been done. Moreover, the work flow structure also helps in minimizing the cost of supply chain management. The performance of an organization should improve if the works are done rationally good. So it seems to be positive relationship between workflow structure and firm performance (Oettmeier & Hofmann, 2016).

Upstream SCM that includes the activities which facilitate the availability of raw material to production unit and downstream SCM that includes the activities which facilitate the delivery of products to its final consumers is called organizational structure (OS) (Dubey et al., 2020). OS needs a team to function these activities properly within the organization or crosswise the SC. The multifunctional teams help in integration of all processes in process approach in superior manners. When the OS is conducted the firm's functions and position are interacted. If these functions interacted properly with its position, the performance of firm should be improved. So that we can say that there is a positive relation between OS and FP (Azevedo, Carvalho, Ferreira, & Matias, 2017).

Communication Structure (CS) is the flow of information in organizations to managers, SCM members, top authorities to front line managers and also to first line workers. CS that controls the distribution of information is the special component of SCM. The function of it is the sending of original message with right information to right person at right time and format (Boonjing et al., 2015) . Moreover, the information must be timely update that provides the better results on SC activities (Cooper et al., 1997). The efficient distribution of information can direct to increase firm performance. Therefore, CS and FP may have positive effect.

Knowledge Management (KM) involves the procedure of creating, sharing, managing, storing, and transferring of information within an organization (Dalkir, 2017; Tsui & Malhotra, 2005). It refers to the best usage of information for better firm performance and achieving organizational set goals. KM refers to integrate the knowledge into business activities and its performance that increases the capability of firms to seek from organizational environment. By proper management and distribution of knowledge the FP can be changed. Therefore, there is positive relationship between KM and FP (Hislop, Bosua, & Helms, 2018).

Flow of Product Facility Structure (FPFS) is the way of flow of products with in and out of the firm in SC that includes the acquiring raw material and manufacturing to delivering the final products to consumers (Cooper et al., 1997). To gain the maximum benefits the SCM members collaborate with each other to manage the product flow. Firm's stock and ware houses also affected. By efficient flow of products and its management FP should improve. So FPFS is seemed to have positive relationship with firm performance.

H1: The structural management components are significantly associated with the firm performance.

Behavioral Management Components

The components of behavioral management (CBM) are not easy to change and assess due to these components are mostly less physical and tangible (Brennan et al., 2017; Lambert et al., 1998). These components affect the firm behavior and its performance and give support for the execution of components of structural management (CSM) to make more profit and competitive advantage. If the firm strategy associates with any specific components of CSM, so that the

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components of CBM can be altered too. Management method, reward and risk, commitment, leadership and power and attitude and culture are the group of CBM out of SCM components group which are eleven that we are going to discuss in this study (Brennan et al., 2017).

The managers must know about the employees' skills and set their goals assign their goals according to their skills and competencies and the employees must know their roles that which they have to perform (Cooper et al., 1997). The manager must be well known about management techniques and processes to efficiently manage the operations in firm and the SCM. If the manager knows about the interpersonal skills and abilities of the customers and assign duties according to "Person job fit" the performance of workers will improve. Moreover, managers can also give confidence to their employees to do their work more efficiently and effectively, so motivation to workers is very important in this method. The performance of firm must be changed if workers work effectively and efficiently. Hence it is expected that there is positive relationship between management methods and FP.

Power and leadership are the skill of a person to inspire other persons to follow their instructions and leads to workers to voluntarily accomplish their works timely and efficiently. So this structure will absolutely influence the SC and FP (Cooper & Ellram, 1993). Strong leadership provides a management of channel, give direction, and implement strategy for SC members and inside team. In case the leaders manage their power effectively, if they make their strong relationship with other firms in SC the firm performance should be improve. So it seems that there is a positive relationship between leadership and power and FP (Wang, Feng, & Lawton, 2017).

Reward is an actual or expected benefit and the risk is cost spent to get that reward. And if the reward is not according to the expectations of the firm or channels that is taking risk for reward then there is no chance of commitment for long term relation. It depends upon channel members that are ready to share reward and risk and make reasonable commitment to the firm. Rewards and risk elements can make stronger and support this relationship among SC. If the company gets success in making good relationship, the firm performance should improve. So it is expected that there is a positive relationship between reward and risk and FP (Pissaris, Heavey, & Golden, 2017).

The culture ensures that works have been doing by your front line employees according to given assignment and you know when they have been interacting with customers. So culture and altitude is important for firms to carry out as its part of chain (Cooper et al., 1997). Culture helps to understand the traditions that for what purpose and how members perform these activities in such manners in a SC. Altitude and culture affect the thinking of workers. It acknowledges the behavior as how the workers think and observe the things. Good incorporation of workers with firm, the performance should improve. So, it seems that there is a positive relationship between CA and FP.

Trust and loyalty (TL) are very important in creating a long term and strong relationship when the firm has trust in chain members and partners' trustworthiness and integrity. It also increases the information sharing and cooperation among SC partners (Moberg, Whipple, Cutler, & Speh, 2004). Therefore, it helps in building the long-term relationship and association among SC employees. We can expect that there is a relationship between TL and FP.

H2: The behavioral management components had a significant relation with the firm performance.

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Information Technology Capability as a Moderating Variable

The nature of manufacturing industry challenges the industry to fulfill the unpredictable demand in short time period (Basheer, Siam, Awn, & Hassan, 2019). The technology adoption may become a real contribution to SCM (Iyer, 2011; Mao, Liu, Zhang, & Deng, 2016), if the organization able to understand the technology functions and complete processes flow (Basheer et al., 2019; Kamaruddin & Udin, 2009). This can be empirically supported by the study of Wu, Yeniyurt, Kim, and Cavusgil (2006) with the significant mediating effect of supply chain technology adoption. Wu et al. (2006) stressed that the adoption of supply chain technology is significantly influenced by environmental, technological, and organizational characteristics and the adoption have further improved firm's supply chain performance. As a summary for above arguments, supply chain technology adoption is potentials as a moderator in the relationship between supply chain management components and firm performance.

H3: The information technology capability is significant moderating variable among the relationship of structural management components and firm performance of chemical industry in Indonesia.

H4: The information technology capability is significant moderating variable among the relationship of behavior management components and firm performance of chemical industry in Indonesia.

The research framework is to configure out based on the previous discussion. There are four variables in the research framework. In which two variables are independent, one is moderating and one is dependent variable. The structural management components and behavior management components are the independent variables, information technology capability is a moderating and firm performance is dependent variable.

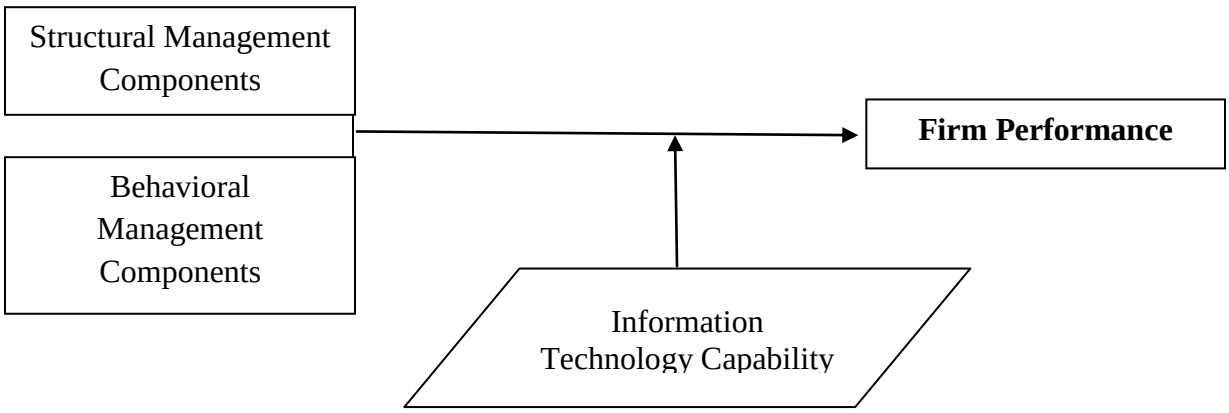

FIGURE 1
RESEARCH FRAMEWORK

RESEARCH METHODOLOGY

The current study had used the quantitative research design. As, per study nature, the cross-sectional research design has been selected. The self-administered survey questionnaire was conducted to collect the data through the simple random sampling technique. Nevertheless,

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sample size was selected based on Comrey and Lee (1992) series for inferential statistics. According to this series, "sample having less than 50 participants will observe to be a weaker sample; a sample of 100 sizes will be weak; 200 will be adequate; a sample of 300 will be considered as good; 500 very good whereas 1000 will be excellent." There were 600 questionnaires distributed to senior managers of chemical industry that were selected through using the simple random sampling technique. The 400 questionnaires were returned back that shows 66.67% response that is considered to be a good. In addition, the Smart PLS had been used for analyzing the collected data.

RESEARCH RESULTS

The current study analysis had been divided into two major sections. One measurement model that shows assessment of outer model in which the validity and reliability examined. Second section is consisting of structural model that shows the assessment of inner model in which hypothesis of the study are tested. To test the hypothesis in inner model outer model of the study is very important. As per the recommended literature, the factor of every item should be greater 0.5, Cronbach alpha value of every construct should be a greater than 0.7, composite reliability of every construct should be a greater than 0.7 and lastly average variance construct of every construct should be a greater than 0.5 (Hair, Hult, Ringle, & Sarstedt, 2017; Hair, Sarstedt, Ringle, & Mena, 2012). The Table 1 presented values had shown that all of the value are fulfilled the recommend values criteria's.

TABLE 1
RELIABILITY AND VALIDITY OF MODEL

Constructs	Items	Loadings	Alpha	CR	AVE
Planning and control methods	PACM1	0.814	0.907	0.931	0.729
	PACM2	0.888			
	PACM3	0.853			
	PACM4	0.895			
Work flow activity	WSA1	0.816			
	WSA2	0.826	0.905	0.934	0.78
	WSA3	0.909			
	WSA4	0.923			
Organization structure	OS1	0.875			
	OS2	0.783	0.869	0.902	0.607
	OS3	0.849			
	OS4	0.756			
Communication structure	CS1	0.734			
	CS2	0.723			
	CS3	0.856	0.908	0.935	0.784
	CS4	0.916			
	CS5	0.885			
	CS6	0.883			
Knowledge management	KM1	0.820	0.869	0.911	0.718

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	KM2	0.864			
	KM3	0.823			
Product from facility structure	PFFS1	0.884			
	PFFS2	0.882	0.844	0.906	0.763
	PFFS3	0.862			
	PFFS4	0.875			
	PFFS5	0.945	0.942	0.958	0.851
Management methods	MM1	0.920			
	MM2	0.915			
	MM3	0.910			
Power and leadership structure	PLS1	0.733	0.843	0.890	0.673
	PLS2	0.842			
	PLS3	0.851			
	PLS4	0.561			
	PLS5	0.562			
Risk and rewards	RAR1	0.568	0.834	0.853	0.712
	RAR2	0.789			
	RAR3	0.671			
	RAR4	0.789			
	RAR5	0.901			
Culture attitude	CA1	0.821	0.870	0.881	0.721
	CA2	0.681			
	CA3	0.971			
	CA4	0.674			
Trust and commitments	TAC1	0.733	0.863	0.891	0.731
	TAC2	0.842			
	TAC3	0.851			
	TAC4	0.561			
	TAC5	0.562			
	TAC6	0.568			
Information technology capability	ITC1	0.789	0.915	0.959	0.922
	ITC2	0.671			
	ITC3	0.789			
	ITC4	0.901			
	ITC5	0.821			
Firm performance	FP1	0.681	0.892	0.901	0.675
	FP2	0.971			
	FP3	0.782			
	FP4	0.785			
	FP5	0.902			
	FP7	0.893			
	FP9	0.893			

While, the discriminant validity could be measured by three following criteria's, Fornell & Lacker, cross loadings, and Heterotrait-Monotrait ratio (HTMT). The Fornell $ Lacker values

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is examined by the square root of AVE that should be a greater than from other below values (Henseler, Ringle, & Sarstedt, 2015), HTMT value should have correlation minimum from 0.85 (Henseler et al., 2015). The Table 2 and Table 3 values had shown that construct had the discriminant validity.

TABLE 2A
FORNELL AND LACKER DISCRIMINANT VALIDITY

	PACM	WSA	OS	CS	KM	PFFS
PACM	0.808					
WSA	0.371	0.76				
OS	0.362	0.219	0.901			
CS	0.496	0.156	0.489	0.95		
KM	0.411	0.364	0.433	0.499	0.86	
PFFS	0.175	0.132	0.341	0.316	0.557	0.845
MM	0.376	0.204	0.345	0.478	0.0261	0.079
PLS	0.593	0.387	0.128	0.404	0.534	0.49
PAR	0.411	0.377	0.463	0.495	0.45	0.482
CA	0.434	0.176	0.379	0.569	0.315	0.351
TAC	0.531	0.112	0.473	0.336	0.363	0.223
ITC	0.378	0.382	0.271	0.451	0.361	0.41
FP	0.278	0.382	0.271	0.551	0.461	0.41

TABLE 2B
FORNELL AND LACKER DISCRIMINANT VALIDITY

	MM	PLS	PAR	CA	TAC	ITC	FP
PACM							
WSA							
OS							
CS							
KM							
PFFS							
MM	0.865						
PLS	0.748	0.9					
PAR	0.146	0.607	0.78				
CA	0.451	0.483	0.513	0.79			
TAC	0.341	0.672	0.232	0.171	0.895		
ITC	0.21	0.012	0.621	0.134	0.123	0.78	
FP	0.21	0.012	0.621	0.134	0.123	0.23	0.89

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TABLE 3A HTMT DISCRIMINANT VALIDITY						
	PACM	WSA	OS	CS	KM	PFFS
PACM						
WSA	0.271					
OS	0.362	0.229				
CS	0.796	0.056	0.289			
KM	0.511	0.164	0.333	0.499		
PFFS	0.275	0.032	0.41	0.416	0.357	
MM	0.476	0.104	0.715	0.578	0.0216	0.069
PLS	0.693	0.087	0.698	0.704	0.549	0.39
PAR	0.511	0.177	0.46	0.495	0.836	0.482
CA	0.334	0.076	0.579	0.469	0.615	0.451
TAC	0.331	0.012	0.673	0.536	0.563	0.123
ITC	0.178	0.582	0.271	0.451	0.561	0.41
FP	0.178	0.582	0.271	0.451	0.561	0.41

TABLE 3B HTMT DISCRIMINANT VALIDITY							
	MM	PLS	PAR	CA	TAC	ITC	FP
PACM							
WSA							
OS							
CS							
KM							
PFFS							
MM							
PLS	0.748						
PAR	0.026	0.607					
CA	0.451	0.483	0.513				
TAC	0.341	0.672	0.232	0.171			
ITC	0.21	0.012	0.141	0.134	0.123		
FP	0.21	0.012	0.621	0.134	0.123	0.23	

In the next section, after the assessment of the outer model, the next process is to test the inner model assessment for the hypothesis testing by using a 500-resampling technique. The Structural Equation Modeling (SEM) technique was run to test this model. In this section, both of the direct and indirect hypothesis were tested in this model. The minimum T value was selected is 1.96 for the acceptance of the hypothesis. The SEM analysis had shown that structural management components (SMC) had a significant and positive relation with the firm performance that had supported to hypothesis (1). On the other hand, behavioral management components also had a significant positive connection with firm performance that had also

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supported to hypothesis (2). The Table 4 presented results had shown that supply chain management components are essential components to increase the performance of the chemical industry. The indirect effect presented value in Table 4 also shown that information technology capability had a significant moderating with the association of structural management components and firm performance. This result had supported to hypothesis 3. On the other hand, behavior management components also significantly moderated by information technology capability that also supports to hypothesis 4. This study is considered to be a good research because all of the hypothesis of the study are accepted. Therefore, this study had contributed an empirical literature in the extant literature. The information technology capability is considered to be an effective moderator among their relationship. In these regards, this is considered to be a good contribution of the study. The direct and indirect effect results are predicted in the following Table 5.

TABLE 5
REGRESSION RESULTS

Hypothesis	coefficients	Original sample	Standard deviation	t statistics	P values	Results
SMC -> FP	0.698	0.7	0.031	22.63	0	Accepted
BMC -> FP	0.364	0.364	0.056	6.479	0	Accepted
ITC*SMC -> FP	0.42	0.423	0.047	8.901	0	Accepted
ITC*BMC -> FP	0.542	0.545	0.041	13.186	0	Accepted

Note: SMC- structural management components, BMC-behavioral management components, FP-firm performance, ITC-information technology capability.

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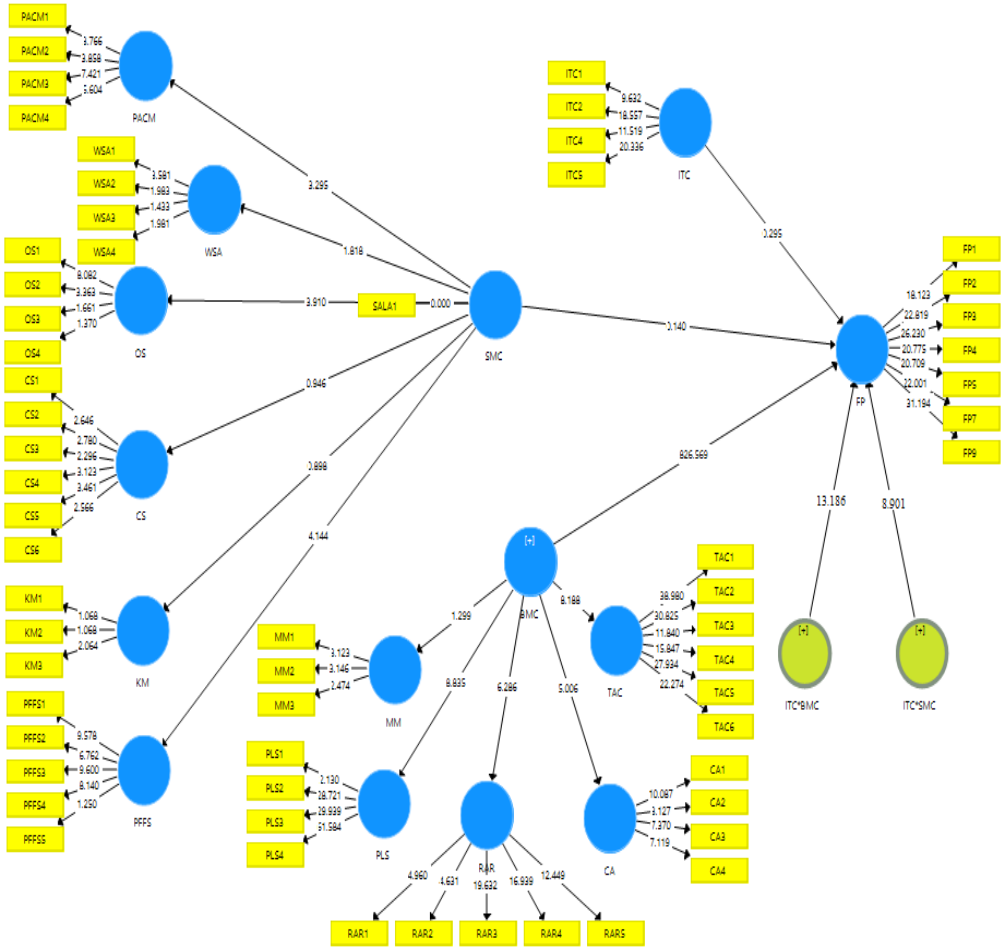

FIGURE 2
STRUCTURAL MODEL

CONCLUSION

The study main objective is to figure out the relationship within the supply chain management components and firm performance with the moderating effect of information technology capability of chemical industry in Indonesia. The key findings had shown that all of direct and indirect effect results have positive and significant relationship. Therefore, all of the study hypothesis are supported. These findings had shown supply chain management components are important components to increase firm performance of chemical industry in Indonesia. Moreover, the empirical results could be contributed a literature in the extant literature that could provide help to enhance future research. Besides, the significant moderating effect could be considered a big contribution of the study, therefore, this contribution could be providing a future insight for the various researchers. The research also had various limitations, at first, the study had a limited generalizability because it had. At second, the study had quantitative approach, there is also a qualitative approach, therefore, a future research could be done on mixed method of study. At forth, the research had used the cross-sectional research design in which data is collected at one time, this a reason this research had a limited generalizability a future study could be done on longitudinal research design.

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