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Inventory Management to Supply Chain Performance of Cultivates Banana in Nakhon Pathom

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Abstract:
Banana food supply in Nakhon Pathom a city of Thailand is not effective to fulfill the requirement. Significant strategies are required to fulfill the existing demand of banana in Nakhon Pathom. Therefore, the objective of this study is to examine the effect of inventory management methods on supply chain management performance (SCMP). In this regard, the relationship between inventory management methods, raw material management (RMM), unfinished goods management, finished goods management and SCMP was examined. Data were collected from the food supply companies of Thailand located in Nakhon Pathom. Only those companies were selected which were supplying the banana to Nakhon Pathom. Employee of food supply companies were selected as the respondents. By using a statistical software, data were analyzed to attain the results. Outcomes of the study shows the major role of inventory management methods in SCMP. Inventory management methods have positive effect on SCMP. Better implementation of inventory management methods shows positive influence on SCMP. Furthermore, it is found that inventory management methods have positive effect on RMM, unfinished goods management and finished goods management which causes to enhance SCMP.

Keywords: *Supply chain management, Inventory management method, RMM, Unfinished goods management, Finished good management, Nakhon Pathom*

INTRODUCTION

Inventory management is important part of every business activity. Better inventory management has influence on the performance of business activities. Generally, inventory management has effect on the time management. Timely management of inventory has influence on all other activities of the firm. Timely management of all operations are majorly based on the inventory management. However, improper management of inventory has negative influence on the business activities which has negative influence on the operations of the company. Therefore, inventory management is most crucial for the companies (Dong, Christiansen, Fagerholt, & Bektaş, 2020).

Inventory management is most important in manufacturing companies where the management of inventory is most important to timely manage the products. In manufacturing companies, the management of raw material is most important which required to manage within the time to finish the products in given time. Generally, companies take order from the customers and then they have to finish the goods on time because of the delivery to the customer. Therefore, proper management of inventory has influence on the goods. In this direction, the management of inventory in manufacturing companies is most important (Phan, Nguyen, Nguyen, Le, & Matsui, 2020; Puspita, Azwardi, & Fuadah, 2020).

Inventory management has relationship with the supply chain activities. Better inventory management has significant influence on the supply chain. Effective management of inventory effect positively on the supply chain management performance (SCMP). However, ineffective management of inventory shows negative role in SCMP. Previous studies also show the role of inventory management in supply chain activities (Erkan & Erkan, 2015; Uzsoy, Fowler, & Mönch, 2018). Supply chain activities are always important among all the companies; therefore, the smooth process of supply chain always requires better

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management of inventory. For instance, to provide the timely delivery of goods to the customer, proper management of finished goods is mandatory. Therefore, both inventory management and SCMP performance has key importance in the business activities.

Inventory management and supply chain also has relationship in the various activities of food industry. The food supply from one place to another place also requires better supply chain activities and inventory management. However, there are several issues in the food supply chain of Thailand. Thailand food industry is facing number of issues related to the food supply. Ineffective supply chain and inventory management generally shows negative influence on the performance. More importantly, it has important role in banana supply in the Nakhon Pathom a city of Thailand. Banana supply in the Nakhon Pathom require extensive amount. However, the banana supply in the Nakhon Pathom is not sufficient which require better supply chain. Therefore, supply chain in food industry is also very crucial (Miranda-Ackerman, Azzaro-Pantel, & Aguilar-Lasserre, 2017; Shelman, McLoughlin, & Pagell, 2016).

Nakhon Pathom is one of the cities in Thailand, the former capital of Nakhon Pathom Province. The significant landmark is the giant Phra Pathom Chedi. This city of Thailand is also home to Thailand's only Bhikkhuni temple Wat Song Thammakanlayani, which is also open to women from abroad. This city has central importance for the Thailand because of various business activities as well as tourism prospective. This city requires extensive supply of banana which has pressure on the food supply companies. Better supply chain food requires better supply chain as well as better management of inventory. However, supply chain activities are lacking in this area of Thailand. Low level of supply in this area may causes to the shortage of good supply, especially, it may cause the shortage of banana. The Asian countries are producing huge quantity of banana and export to different countries. Thailand is also one of big producer of banana. The major producers of banana are shown in Figure 1.

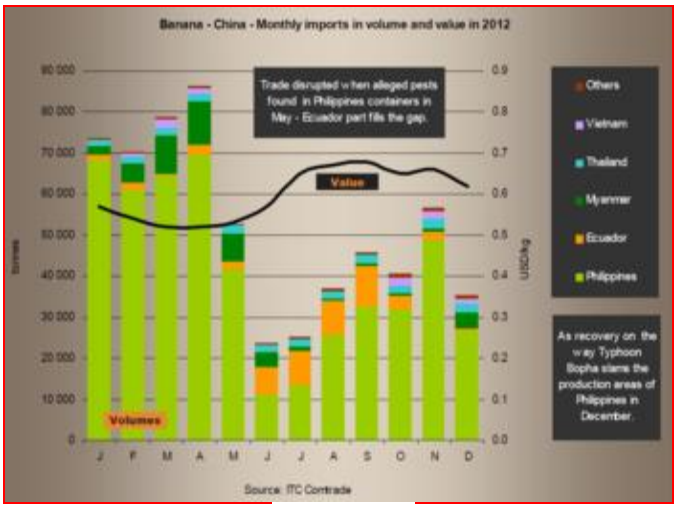

FIGURE I.
Major Producers of Banana

The issues in the SCMP can be better resolved with the help of proper inventory management method. As the inventory management method is key to the success of better supply chain. According to the current study, inventory movement has influence in the raw material management (RMM). It also has the influence on unfinished goods management. Finally, inventory management has major influence on finished goods management. Moreover, positive effect of inventory management on RMM, unfinished goods management and finished goods management has positive effect on SCMP. Therefore, inventory management method has positive role (Hutahaean & Mulyani, 2020) which promote RMM, unfinished goods management as well as finished goods management and this mechanism finally increases the SCMP.

Hence, objective of this study is to examine the effect of inventory management methods on SCMP. Various studies examined supply chain activities (Valmohammadi & Jarihi, 2019; Basheer, Siam, Awn, & Hussan, 2019; Tseng, Wu, Lim, & Wong, 2019), however, these studies did not examine the effect of inventory management method in the presence of RMM, unfinished goods management and finished goods management. Therefore, this study examined the relationship between inventory management methods, RMM, unfinished goods management, finished goods management and SCMP. This relationship has vital role to contribute to the body of knowledge.

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II. LITERATURE REVIEW

Food supply is most important in the whole world. As in most of the countries, there is shortage of food and they import food from different countries. Because different countries are not the agriculture based due to which they cannot produce food to meet the requirement of their people. In this direction, they import food form other food producer countries. Various countries are agriculture base and they produce food more than their requirement. Therefore, these countries export the access food to the countries. Therefore, in whole this process, the supply chain management is most important (Holmström, Holweg, Lawson, Pil, & Wagner, 2019). Low quality supply chain activities many causes to decrease the supply chain causes to increase in the shortage of food. The proper management of supply chain in food has major importance in the food industry.

The current study is discussing the supply of banana. The banana supply in Nakhon Pathom a city of Thailand is considered. Banana is one of the most important fruit among all fruits and it is very famous in the world, that is the reason it requires extensive imports as well as exports. To manage the import and export of banana, it is important to handle supply chain. However, to manage proper SCMP, it is important to handle inventory. Proper inventory management is required for better management of supply chain. Furthermore, inventory management has different methods which could be applied to handle inventory management. Inventory management is required to manage RMM, unfinished goods managing and finished goods management. Effective management of RMM, unfinished goods managing and finished goods management is the guaranty to produce good inventory management system which is quite helpful in supply chain. As previous studies show the significant relationship between inventory management and supply chain (Fernández-Caramés, Blanco-Novoa, Froiz-Míguez, & Fraga-Lamas, 2019; Gharaei, Karimi, & Shekarabi, 2019). The relationship between inventory management methods, RMM, unfinished goods management, finished goods management and SCMP is shown in Figure 2.

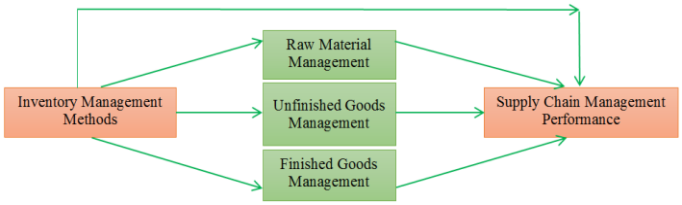

FIGURE II.
Theoretical framework of the study showing the relationship between inventory management methods, raw material management, unfinished goods management, finished goods management and SCMP

2.1. Inventory Management Methods and SCMP

Inventory management has effect on the SCMP. Better inventory management methods have positive role to improve supply chain. Most of the companies try to enhance the operations with the help of improved supply chain because it is the key part of any business. Supply chain managing can be described as the managing the flow of different goods as well as services and comprises all procedures that alter raw materials into different final products. It includes the dynamic streamlining of a various business's supply-side actions to exploit customer value as well as to gain a competitive advantage in competitive marketplace. There are different methods of inventory management. These methods include LIFO and FIFO. These two methods are most important in inventory management and most of the businesses use these two methods to control the inventory. A strong relationship is available in the literature between inventory management and supply chain (Fu, Piplani, de Souza, & Wu, 2000; Gupta, Maranas, & McDonald, 2000).

Hypothesis 1. Inventory management methods has positive effect on SCMP.

2.2. Inventory Management Methods, RMM and SCMP

Inventory management can be described as the supervision of different non-capitalized assets, or any inventory, and stock items. As a factor of supply chain activities, inventory management manages the flow of different goods from manufacturers of the goods to warehouses as well as from these services to point of sale. Further, inventory management can be defined as inventory or stock is the goods as well as materials that any type of business holds for the final objective of

resale. It is a discipline mainly about requiring the shape as well as placement of stocked goods. It is one of the most important sectors of any business. Any business always requires better inventory management. Inventory management further has relationship with the raw material. Raw material is also coming under the inventory of the business. Raw material can be managed with the help of various methods. Therefore, management of raw material with different methods is known as inventory management Methods. Implementation of better inventory methods has positive role to handle raw material. Therefore, inventory management methods have positive effect on RMM. Previous studies also show the relationship between inventory management methods and raw material methods (Chancasanampa-Mandujano, Espinoza-Poblete, Sotelo-Raffo, Alvarez, & Raymundo-Ibañez, 2019; Han, Im, & Ryu, 2007; Mulyana & Zuliana, 2019). Furthermore, RMM has positive role to enhance SCMP. RMM due to the inventory management method has positive effect on SCMP. Therefore, better management of raw material has positive effect on SCMP.

Hypothesis 2. Inventory management methods has positive effect on RMM.

Hypothesis 3. RMM has positive effect on SCMP.

2.3. Inventory Management Methods, Unfinished Goods Management and SCMP

Unfinished goods can be defined as items that are utilized to yield various finished goods items. Unfinished goods are generally called components, elements, raw materials, semi-processed materials, as well as subassemblies. In any business there is always a quantity of unfinished goods. Unfinished goods are those goods having not hundred percentage compete but almost complete require few modifications. A significant amount of unfinished good should be maintained in the company. As the present study is grounded on the supply of banana, therefore, the products from the banana should be maintained in the company to fulfil the requirements. From the literature it is evident that management of inventory is important to handle unfinished goods. There is a relationship between unfinished goods and inventory management (Guneri & Yildiz, 2019, Khan & Bosgraaf, 2009). Therefore, inventory management has vital importance for the goods management (Fillie, Arvitrida, & Pujawan, 2019; Lwiki et al. 2013). Proper management of unfinished goods has positive role to enhance SCMP. Inventory management effect positively on unfinished goods management which further increases the SCMP. Hence, inventory management has positive effect on unfinished goods management and unfinished goods management has positive effect on SCMP.

Hypothesis 4. Inventory management methods has positive effect on unfinished goods management.

Hypothesis 5. Unfinished goods management has positive effect on SCMP.

2.4. Inventory Management Methods, Finished Goods Management and SCMP

The above sections show the inventory management has positive role in SCMP. It is also discussed the inventory management methods has positive role in RMM. Furthermore, inventory management has positive role in unfinished good management. Further, RMM and unfinished goods management has positive role in SCMP. This section shows that finished good management has important role in SCPM. Better implementations of inventory management method have positive role to enhance finished goods management. Finished goods are goods that have been finalized by the manufacturing company through complete procedure, or purchased in a finished form from other company, however, which have not yet been sold to various other customers. Goods that have been purchased in finished form are known as merchandise. A significant quantity of finished goods management is most important in the company. Because to fulfill to customer orders on time require a reasonable stock of finished goods. Increase in the inventory management increases the management of finished goods which further increases the SCMP. Therefore, management of finished goods has positive role to enhance SCMP. The important role of finished goods in the business was found in the literature (Kerdpitak, 2019; Chuang & Zhao, 2019; Razzaq, Maqbool, & Hameed, 2019; Yik & Chin, 2019). Hence, the above discussion lead to the following hypotheses;

Hypothesis 6. Inventory management methods has positive effect on finished goods management.

Hypothesis 7. Finished goods management has positive effect on SCMP.

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Hypothesis 8. RMM mediates the relationship between inventory management method and SCMP.
Hypothesis 9. Unfinished goods management mediates the relationship between inventory management method and SCMP.
Hypothesis 10. Finished goods management mediates the relationship between inventory management method and SCMP.

III. RESEARCH METHOD

This study designed a research questionnaire to examine the relationship between inventory management methods, RMM, unfinished goods management, finished goods management and SCMP. Questionnaire was designed with the help of previous studies in the field of supply chain and inventory management. Therefore, various scales questions were adapted from the previous studies. This study measured the five variables. These variables are; inventory management methods, RMM, unfinished goods management, finished good management and SCMP. After development of survey questionnaire (Altaf, Hameed, Nadeem, & Arfan, 2019; Zhang et al. 2017), data were collected related to the concerned variables. Questionnaires was divided into different sections. The one section was based on the information's related to the age of the participant, gender of the participant, income of the participant and profession of the participant. The second section of the survey questionnaire was based on the questions based on the key variables of the study, namely; inventory management methods, RMM, unfinished goods management, finished good management and SCMP.

Finally, the questionnaires distributed for data collection (Naveed, Hameed, Albassami, & Moshfegyan, 2019). Population of the study is the employee of food supply companies. The food supply companies of Nakhon Pathom a city of Thailand. The other food supply companies of Thailand were not considered. Because the current study is only based on Nakhon Pathom. Only those companies were selected which were supplying the banana to Nakhon Pathom. Employee of food supply companies were selected as the respondents. 500 questionnaires were sent to the food supply companies. This study applied cluster sampling (Ul-Hameed, Mohammad, & Shahar, 2018). After the creation of clusters, simple random sampling was applied for data collection (Kaur, Patil, Shirk, & Taillie, 1996). 251 questionnaires were returned and used for analysis.

IV. FINDINGS

Finding of the study was achieved with the help of Partial Least Square (PLS) (F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014; J. F. Hair, Ringle, & Sarstedt, 2013; J. F. Hair, Sarstedt, Pieper, & Ringle, 2012; Hair et al. 2016). However, before to approach findings of the study, data were used for preliminary data analysis as given in Table 1. This analysis was performed to find out the missing value (Aydin & ŞENOĞLU, 2018) and outlier.

TABLE I.
Data Statistics

	No.	Missing	Mean	Median	Min	Max	SD	Kurtosis	Skewness
IMM1	1	0	3.38	3	1	7	1.934	-0.949	0.367
IMM2	2	0	3.316	3	1	7	1.903	-0.789	0.367
IMM3	3	0	3.335	3	1	7	2.067	-1.12	0.376
IMM4	4	0	3.424	3	1	7	2.026	-0.982	0.372
IMM5	5	0	3.222	3	1	7	1.881	-0.936	0.343
IMM6	6	0	3.354	4	1	7	1.807	-0.643	0.388
RMM1	7	0	3.139	3	1	7	1.864	-0.869	0.375
RMM2	8	0	3.329	3	1	7	2.036	-1.044	0.331
RMM3	9	0	3.342	3	1	7	1.875	-0.979	0.25
RMM4	10	0	3.032	2	1	7	2.186	-0.781	0.796
RMM5	11	0	2.886	2	1	7	2.187	-0.73	0.828

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UGM1	12	0	3.095	2	1	7	2.195-0.891	0.726
UGM2	13	0	2.905	2	1	7	2.049-0.539	0.829
UGM3	14	0	2.975	2	1	7	2.371-0.99	0.816
UGM4	15	0	2.848	2	1	7	2.129-0.467	0.963
UGM5	16	0	3.013	2	1	7	1.945-0.453	0.794
FGM1	17	0	2.93	2	1	7	1.975-0.367	0.864
FGM2	18	0	3.038	2	1	7	2.23 -0.844	0.799
FGM3	19	0	3.006	2	1	7	2.097-0.669	0.789
FGM4	20	0	3.089	2	1	7	2.274-0.933	0.751
FGM5	21	0	2.949	2	1	7	2.423-1.03	0.812
IMP1	22	0	2.791	2	1	7	2.084-0.33	0.997
IMP2	23	0	3.07	2	1	7	2.27 -0.877	0.854
IMP3	24	0	3.405	4	1	6	1.355-0.937	0.095
IMP4	25	0	3.297	3	1	6	1.569-1.331	0.013
IMP5	26	0	3.354	3	1	6	1.48 -1.22	-0.049
IMP6	27	0	3.323	3	1	6	1.506-1.342	0.064

Note: IMM = Inventory Management Methods; RMM = RMM; UGM = Unfinished Goods Management; FGM = Finished Goods Management; SCMP = Supply Chain Management Performance

This study used PLS measurement model for factor loadings as given in Figure 3. Inventory management method was measured by using six items. Raw material measurement was measured by using five items. Finished goods management was measured by using five items. Unfinished goods management was measured by using five items and finally SCMP was measured by using six items. All the items must have factor loadings above 0.7 (J. Hair, Hollingsworth, Randolph, & Chong, 2017). Few studies show that factor loadings should be above 0.5. In the current study, all the items of all variables, namely; inventory management methods, RMM, unfinished goods management, finished good management and SCMP have factor loadings above 0.5 which is given in Table 2.

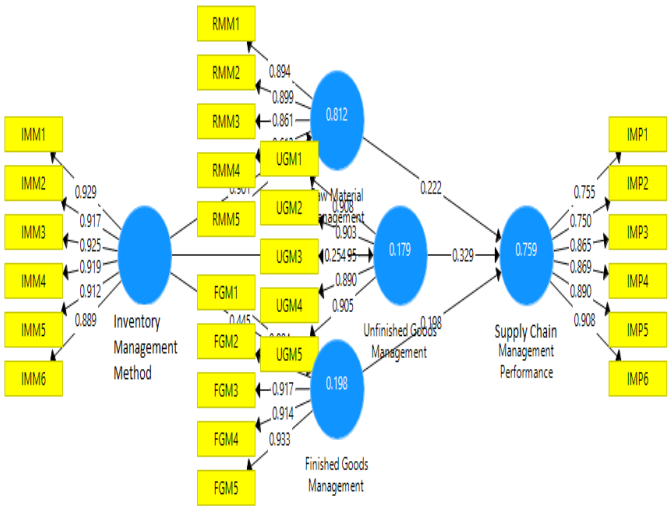

FIGURE III.
Measurement Model

TABLE II.
Factor Loadings

	Finished Goods Management	Inventory Management Methods	Inventory Management Performance	RMM	Unfinished Goods Management
FGM1	0.904				
FGM2	0.92				
FGM3	0.917				
FGM4	0.914				
FGM5	0.933				
IMM1		0.929			
IMM2		0.917			
IMM3		0.925			
IMM4		0.919			
IMM5		0.912			

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IMM6	0.889			
SCMP 1		0.755		
SCMP 2		0.75		
SCMP 3		0.865		
SCMP 4		0.869		
SCMP 5		0.89		
SCMP 6		0.908		
RMM1			0.894	
RMM2			0.899	
RMM3			0.861	
RMM4			0.613	
RMM5			0.682	
UGM1				0.908
UGM2				0.903
UGM3				0.895
UGM4				0.89
UGM5				0.905

Note: IMM = Inventory Management Methods; RMM = Raw Material Management; UGM = Unfinished Goods Management; FGM = Finished Goods Management; SCMP = Supply Chain Management Performance

According to the results in Table 3, all the variables; inventory management methods, RMM, unfinished goods management, finished good management and SCMP have composite reliability (CR) above 0.7. It is also found that all the variables; inventory management methods, RMM, unfinished goods management, finished goods management and SCMP have AVE above 0.5. Cross-loadings for discriminant validity (Fornell & Larcker, 1981) is given in Table 4.

TABLE III.
Reliability and Convergent Validity

	Alpha	**rho_A**	**Composite Reliability**	**AVE**
Finished Goods Management	0.953	0.954	0.964	0.842
Inventory Management Methods	0.961	0.962	0.969	0.838
SCMP	0.917	0.916	0.936	0.709
RMM	0.854	0.881	0.896	0.638
Unfinished Goods Management	0.942	0.943	0.955	0.81

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TABLE IV.
Cross-Loadings

	Finished Goods Management	Inventory Management Methods	Inventory Management Performance	RMM	Unfinished Goods Management
FGM1	0.904	0.398	0.708	0.611	0.843
FGM2	0.92	0.444	0.729	0.652	0.89
FGM3	0.917	0.365	0.666	0.584	0.853
FGM4	0.914	0.417	0.734	0.624	0.895
FGM5	0.933	0.411	0.717	0.628	0.906
IMM1	0.428	0.929	0.629	0.837	0.4
IMM2	0.432	0.917	0.657	0.835	0.4
IMM3	0.384	0.925	0.625	0.85	0.383
IMM4	0.34	0.919	0.584	0.785	0.318
IMM5	0.411	0.912	0.595	0.806	0.386
IMM6	0.44	0.889	0.644	0.83	0.426
IMP1	0.845	0.38	0.955	0.594	0.889
IMP2	0.863	0.38	0.885	0.596	0.868
IMP3	0.516	0.649	0.865	0.68	0.495
IMP4	0.492	0.697	0.869	0.725	0.475
IMP5	0.527	0.65	0.89	0.706	0.514
IMP6	0.586	0.708	0.908	0.755	0.576
RMM1	0.411	0.883	0.649	0.894	0.398
RMM2	0.423	0.807	0.663	0.899	0.411
RMM3	0.351	0.865	0.579	0.891	0.346
RMM4	0.872	0.361	0.661	0.913	0.88
RMM5	0.875	0.429	0.729	0.92	0.88
UGM1	0.862	0.397	0.733	0.63	0.908
UGM2	0.837	0.393	0.692	0.634	0.903
UGM3	0.881	0.401	0.727	0.603	0.895
UGM4	0.867	0.319	0.654	0.542	0.89
UGM5	0.86	0.386	0.671	0.603	0.905

Note: IMM = Inventory Management Methods; RMM = Raw Material Management; UGM = Unfinished Goods Management; FGM = Finished Goods Management; SCMP = Supply Chain Management Performance

After the assessment of factor loadings, this study used PLS bootstrapping for hypothesis testing (Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018; Henseler & Chin, 2010; Henseler et al., 2014; Henseler, Ringle, & Sinkovics, 2009). The direct effect of inventory management method was examined on RMM. The direct effect of inventory management method was examined on finished goods management. The direct effect of inventory management method was examined on unfinished goods management. Results in Table 5 shows that inventory management method has positive effect on RMM. Inventory management method also has positive effect on unfinished goods management. Moreover, inventory management method also has positive effect on finished goods. Finally, inventory management method has positive role to enhance SCMP. Furthermore, RMM, unfinished goods management and finished good management has positive effect on SCMP.

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FIGURE IV.
Structural Model

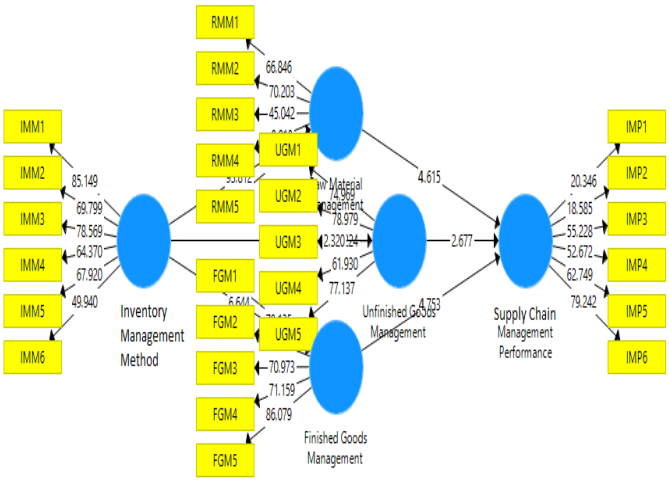

TABLE V.
Direct Effect Results

	(O)	M	SD	T Statistics	P Values
Finished Goods Management -> SCMP	0.198	0.202	0.042	4.753	0
Inventory Management Methods -> Finished Goods Management	0.445	0.45	0.067	6.644	0
Inventory Management Methods -> SCMP	0.254	0.251	0.11	2.32	0.021
Inventory Management Methods -> RMM	0.901	0.903	0.01	93.812	0
Inventory Management Methods -> Unfinished Goods Management	0.423	0.43	0.07	6.068	0
RMM -> SCMP	0.222	0.226	0.137	1.615	0.107
Unfinished Goods Management -> SCMP	0.329	0.321	0.048	4.677	0

The indirect effect of RMM, unfinished goods management and finished goods management is highlighted in Table 6. This study examined the mediation effect of raw material between inventory management method and SCMP. The mediation effect of finished good management between inventory management method and SCMP was examined. Finally, the mediation effect of finished good management between inventory management method and SCMP was examined. It is found that mediation effect of raw material between inventory management method and SCMP is not significant with t-value 1.604. The mediation effect of finished goods management between inventory management method and SCMP is also not significant with t-value 2.441. The direct effect is also given in Figure 5. Finally, the r-square value for SCMP is given in Figure 3 which is 0.759 and it is strong (Chin, 1998). It indicates that all the variables; inventory management methods, RMM, unfinished goods

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management and finished good management are expected to bring 75.9% change in SCMP.

TABLE VI.
Indirect Effect Results

	(O)	M	SD	T Statistics	P Values
Inventory Management Methods -> Finished Goods Management -> SCMP	0.088	0.091	0.052	1.7	0.09
Inventory Management Methods -> RMM -> SCMP	0.2	0.204	0.125	1.604	0.109
Inventory Management Methods -> Unfinished Goods Management -> SCMP	0.139	0.138	0.057	2.441	0.015

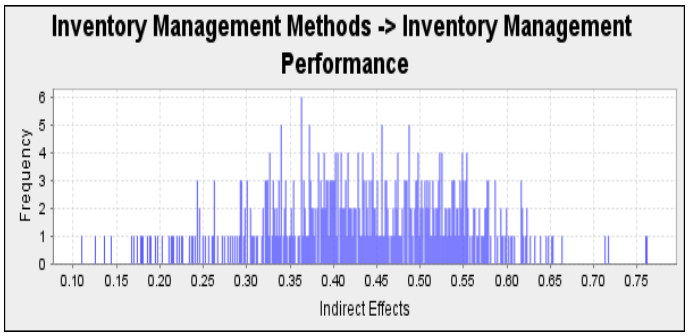

FIGURE V.
Indirect Effect

V. CONCLUSION

The objective of this study was to examine the effect of inventory management methods on supply chain management performance (SCMP). The relationship between inventory management methods, RMM, unfinished goods management, finished goods management and SCMP was examined. Data were collected from the food supply companies of Thailand located in Nakhon Pathom with the help of survey questionnaire. Results of the study highlighted that the major role of inventory management methods in SCMP. Inventory management methods have positive effect on SCMP. Increase in the inventory management methods increases the SCMP. Better implementation of inventory management methods shows positive influence on SCMP. Additionally, it is found that inventory management methods have positive effect on RMM, unfinished goods management and finished goods management which causes to enhance SCMP. Therefore, results of the study show that inventory management methods have positive effect on RMM, unfinished goods management and finished goods management which has positive influence on SCMP.

VI. REFERENCES

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