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The Influence of Innovation, Planning and Distribution Factor in Improving Supply Chain Management Performance of Subsidized Fertilizer in Indonesia

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Abstract: Supply chain (SC) increasingly perceived as a critical variable for enhancing business execution. Because of that, the supply chain activities need to be optimized and this can be done through the supply chain management (SCM). This study has two key objectives: to reveal the influence of government policy in terms of planning and to check the reliability of distribution and innovation factors on the performance of the supply chain management of subsidized fertilizer in Indonesia. A total of 800 questionnaires have been distributed to the respective sample location, and a number of 587 or 73% successfully returned. Furthermore, the data from 513 respondents was analyzed using Structural Equation Modeling (SEM). The result shows that the government policy in terms of plan and the reliability of the distribution has direct and significant effect on performance management supply chain of subsidized fertilizer. However, although there is no direct influence on the performance of supply chain management, the factor of innovation indeed plays an important role because it determines the success of plan and reliability of the distribution. Moreover, the reliability of the distribution are acting as a mediator between the factors of innovation with the full performance of supply chain management. To improve the performance of supply chain management of subsidized fertilizer in Indonesia, this research suggests that the government pays attention to plan and the reliability of the distribution as well as innovation factors. Due to that, the distribution of fertilizer will be more suited to its purpose at the right time with the appropriate location, type, quantity and the right quality, and at an appropriate price. In future research, the same study could be used for other subsidized commodities.

Keywords: Supply chain management performance, plan, distribution, innovation factors, structural equation modeling (SEM).

I. INTRODUCTION

Supply Chain (SC) increasingly perceived as a critical variable to enhance the business execution. Companies that implement proficient and powerful supply chain will be successful. Due of that, the activities of the supply chain need to be optimized with the process of Supply Chain Management (SCM) [1]. Supply chain management is the administration of a few organizations from upstream to downstream; suppliers, manufacturers, distributors, retailers, logistics, transportation, warehousing, information and others involved in supplying goods to the end user [2]. According to [3] that the fundamental point of SCM is to connect all of chain of the supply to work together to maximize the productivity, adding value, reducing the cost, increasing customer satisfaction, thereby increasing the competitiveness of enterprises.

Measurement of Supply Chain Management Performance (SCMP) is needed to evaluate whether the current supply chain management is ideal or not. By measuring the performance of supply chain management, it can be seen the success that has been achieved, customer needs are met, a better understanding of the process, find out the errors and unnecessary things, understand the problems and opportunities for improvement, provide decision-factual to get progress, facilitate the work equal and open communication and better [4].

This research will lead an assessment and performance measurement of supply chain management in subsidized fertilizer. It is because fertilizer is one of the production facilities to increase the production and productivity of agricultural land. This is the reason that fertilizer got an enormous consideration from the government for accomplishing national food security. As an essential production facility, the government has made two (2) main policies on fertilizer. First, provide fertilizer subsidy to farmers, and second, assign supply chain management of fertilizers [5].

The distribution of fertilizer from the factory to the farmers was done by the Government through the SOE (State Owned Enterprises), which is PT. Pupuk Indonesia along with the distributors and retailers through the supply chain management system. In that case, fertilizer is expected to be available to farmers in 6 right; right quantity, type, time, right location, right price and right quality. Furthermore, land productivity and production of rice is expected to be improved and increase farmers' income and the availability of rice nationwide. Some phenomena occur in the performance of supply chain management subsidized fertilizer, such as 1) Statistical report from BPS (2013) states that there is no increase in rice production significantly in the last five years, because the productivity of rice plants is still low and even decreased in the year 2011. 2) Statistical data of PT. Pupuk Indonesia shows a considerable difference between the allocations of subsidized fertilizer set by the Ministry of Agriculture to the potential needs. Also there is a considerable distinction between the allocations of subsidized fertilizer to the realization of the distribution. Furthermore, 3) According to [6] if the companies do not innovate they will die. However, if the innovation does not succeed and the company still goes into default, it is still better than doing nothing. Study [7] stated that there had been several improvements in subsidized fertilizer's regulations. However, the problem of fertilizer's scarcity still appears especially during the harvest season [8]. The above issues might happen because of less innovation factors, supervision and management factor in the distribution of subsidized fertilizer supply chain.

In respect of issues raised, the main purpose of this study is to empirically proving the power of innovation, plan and distribution of impact on the supply chain management performance (SCMP) subsidized fertilizer. The more specific objectives of this research are:

- To determine whether the planning has a significant influence on SCMP.
- To investigate whether the distribution has a significant impact on SCMP
- To determine whether the innovation factors have a significant influence on the plan.
- To see the extent of innovation factors have a significant impact on the distribution.
- To examine the effect of mediation plan on the relationship between the factors of innovation with SCMP.
- To empirically test the mediating effect of the distribution on the relationship between the factors of innovation with SCMP.

To help the smoothness of the acquisition and circulation stream of subsidized fertilizer, so that farmers can receive right on time and with the amount needed. In this manner it will expand the creation and profitability of rice corps, and then increase the revenue, and further increase rice production for food security. Furthermore, from a practical side is expected to provide a better understanding of the determinants of supply chain management performance supervision of goods subsidized fertilizer. Especially, in the development of supply chain management application performance monitoring items such as business analysis and decision-makers.

II. LITERATURE REVIEW

(A) Supply Chain Management Performance (SCMP)

Supply chain management involves managing demand, supply, sourcing of raw materials, manufacturing and assembly, warehouse and stock plan, order management and distribution across all channels, as well as delivery to customers [9].

(B) Relationship between Planning and SCMP

The first step in order to assess the performance of supply chain management is to analyze the action plan, which is the balance between supply and demand, actions to be taken, the budget and procurement authorities to anticipate customer needs [10]. Studies conducted by [11] also found that plans improves the performance of supply chain management. Hence, it is hypothesized that, H1: Planning has a positive effect on supply chain management performance.

(C) Relationship between Distribution and SCMP

The performance of supply chain management is determined by the distribution, which is an activity to provide goods and services, including order management, transportation management, and warehouse management to meet the demand [12]. This is in line with the findings of the study [10], [13]. Therefore, it is hypothesized that H2: Distribution has a positive structural effect on supply chain management performance.

(D) Relationship Innovation factor and Distribution

[14] using innovation factor to evaluate the performance of the distribution, as innovation must be seen as part of a business that enable the implementation of new process and service products for the customer's

needs. Similarly, [15] states that innovation is the model of the commerce realizing new value for customers, and have a direct impact on the reliability of the distribution. Hence, it is hypothesized that H3: Innovation factor has a direct effect on distribution factor.

(E) Relationship between Innovation and Planning

[6] states that the innovation process needs to be managed carefully as a set of business process analysis. Innovation also appears to depend on the organizational learning capability of the company through which novel knowledge develops, is distributed and utilized [16]. Thus, it is hypothesized that H4: Innovation factor has a positive effect on planning factor.

(F) Mediation Effects of Planning and Distribution on the Relationship between Innovation factor and SCMP

Planning and improvisation are depicted as alternate decision-making orientations in the strategy process literature, executed by two parallel cognitive contexts: rational or intuitive [17]. According to [18], planning and distribution activity may mediate the success of innovation in improving the performance of supply chain management. Hence, it is hypothesized that

H5: Distribution factor mediates the linkage between the innovation factor and supply chain management performance

H6: Planning factor mediates the linkage between the innovation factor and supply chain management performance

(G) The Conceptual Model

A structural equation model is used in this study to analyze the influence of the factor structure of planning, distribution and innovation factors on supply chain management performance (SCMP). Therefore, this flowchart provides causality variables testing [19]. In accordance with the theory, the SCMP is used as the dependent variable (endogenous), as well as reliability of the planning (PP)- (endogenous), distribution (KP)- (endogenous), while innovation factor (I) is an independent variable (exogenous). Besides, PP and KP are mediator variables between I and SCMP.

For the measurement of supply chain management performance (SCMP), it uses two indicators: conformity of recording data with fertilizer needs of farmers (SCMP1) and conformity of allocation with the fertilizer needs of farmers (SCMP2). Whereas, distribution flow of fertilizer from the factory to the area (KP3) and transportation flow of fertilizers (KP4) is an indicator of distribution factor [4].

Likewise, innovation for rules and regulation (I3) and innovation for service of officer (I4) are indicators of innovation factor [14]. Plan in accordance with the needs of the fertilizer needs of farmers (PP3) and a collection of farmers' ability to plan fertilizer requirements (PP5) [4]. Based on the above discussion, the conceptual framework is presented in Figure 1.

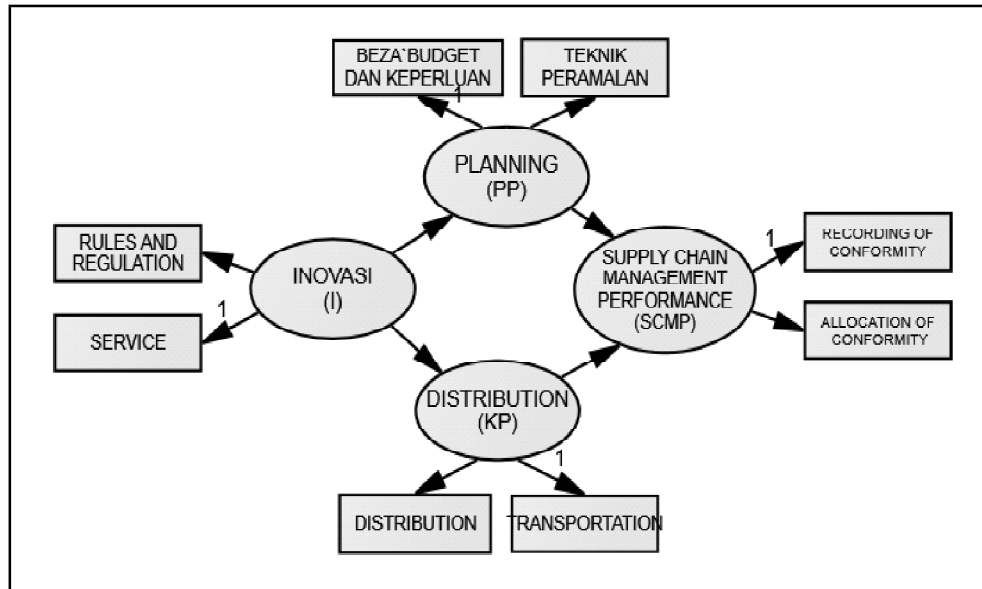


Figure 1: Proposed Conceptual Framework

III. RESEARCH METHODOLOGY

To get a valid and reliable items in the questionnaire, the study uses two (2) times the field trials, where each trial using 40 respondents. Once the questionnaire items and achieved valid reliable, eight hundred (800) questionnaires were distributed to the respondents, which is twice the sample size required (450). This is in accordance [20] which states that the number of samples using SEM to be effective on a sample size of 150 - . 450. Out of 800 questionnaires, there are 580 or 73% of the questionnaires were returned. After filtering the data, then as many as 513, or 64% can be used for analysis.

Sampling of the population carried out in two stages. The first stage, the selection of provincial samples using stratified random sampling method. From 33 provinces in Indonesia, it is obtained five (5) provinces which are chosen because those areas have good infrastructure and consume a large amount of fertilizer. The second stage, the selection of the number of samples in each province conducted with a random sample table and systematic review of 450 of the total plan [21].

Data processing is done by statistical analysis of SEM (Structural Equation Model) using software Amos 22, consists of three stages; model identification phase, the test phase measurement model and structural model of the test phase [22].

Measurement of the dependent variable and independent variables using a Likert scale (1 = strongly disagree and 7 = strongly agree) as suggested by Sugiyono (2013).

IV. DATA ANALYSIS

(A) Demographic Profile of the Respondents

The respondents in this study are the manager authorized distributor and retailer of subsidized fertilizer. Majority of them are men (78.2%) with average aged between 31-50 years (59.3%). Being a distributor and

retailer of between 5-10 years (47.8), with education background of the respondents generally graduated from high school (60.1%). Only 72 (14%) had some training as a distributor and retailer of fertilizer, and 38 people received awards (7.4%). Most of them (85%) have total sales of subsidized fertilizers generally below 1.000 tons for each growing season. 91.2% of them are having a fertilizer warehouse with 500 tons capacity, and approximately 149 people (32.9%) had a fleet of trucks. In general, respondents in work assignments generally have three employees, and the airport is less than 10 retailers or farmers.

(B) Generated Structural Model (GM)

By using a modified index, which gives the covariance relationship between E 50 and E51 research produces Structural Model Generated better and more appropriate, because the p-value of 0.078 (p-value > 0.05). Therefore, the explanation will be based on the results of the hypothesis Generated by Structural Model Revision Model (Figure 2).

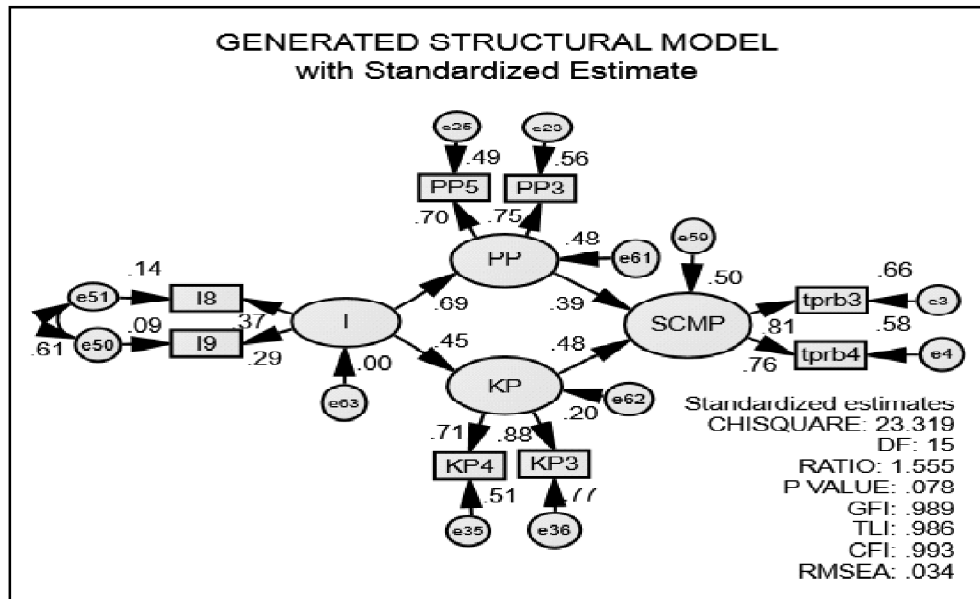


Figure 2: Generated Structural Model

(C) The Regression Estimates

The generated structural model produces regression standardized beta estimates as in Table 1.

Table 1
Direct Effects Regression Estimates (Beta)

<i>Hypo</i>	<i>Endo</i>		<i>Exo</i>	<i>Beta</i>	<i>S.E.</i>	<i>C.R.</i>	<i>P</i>	<i>Status</i>
H1	SCMP	←	PP	0.090	0.042	0.355	0.723	Not Sig
H2	SCMP	←	KP	0.346	0.041	3.330	0.00***	Sig
H3	PP	←	I	0.683	0.650	2.731	0.006	Sig
H4	KP	←	I	0.453	0.156	3.138	0.002	Sig
H5	SCMP	←	I	0.495	0.178	1.196	0.232	Not Sig

From the results shown in Table 1, it shows that planning has a positive significant effect on supply chain management performance (Beta =0.395; CR = 6.046; p <0.001), or **H1 accepted**. Secondly, distribution has a positive significant effect on supply chain management performance (Beta=0.478; CR=8.089; p<0.05) or **H2 accepted**. Thirdly, innovation factor has a positive significant effect on planning factor (Beta=0.691; CR=2.830; p<0.05) or **H3 accepted**. Lastly, innovation factor has a significant direct effect on distribution factor (Beta=0.451; CR=3.222; p<0.05) or **H4 accepted**.

(D) Planning Mediation on Innovation and SCMP

Furthermore, the study examines the role of factors the planning and distribution as the mediator between innovation and SCMP. Test results will be compared to the direct and indirect relationships, once the Innovation factor are inserted. Model and standard regression coefficient of the estimate are shows in the Figure 3, Table 2 and Table 3 below

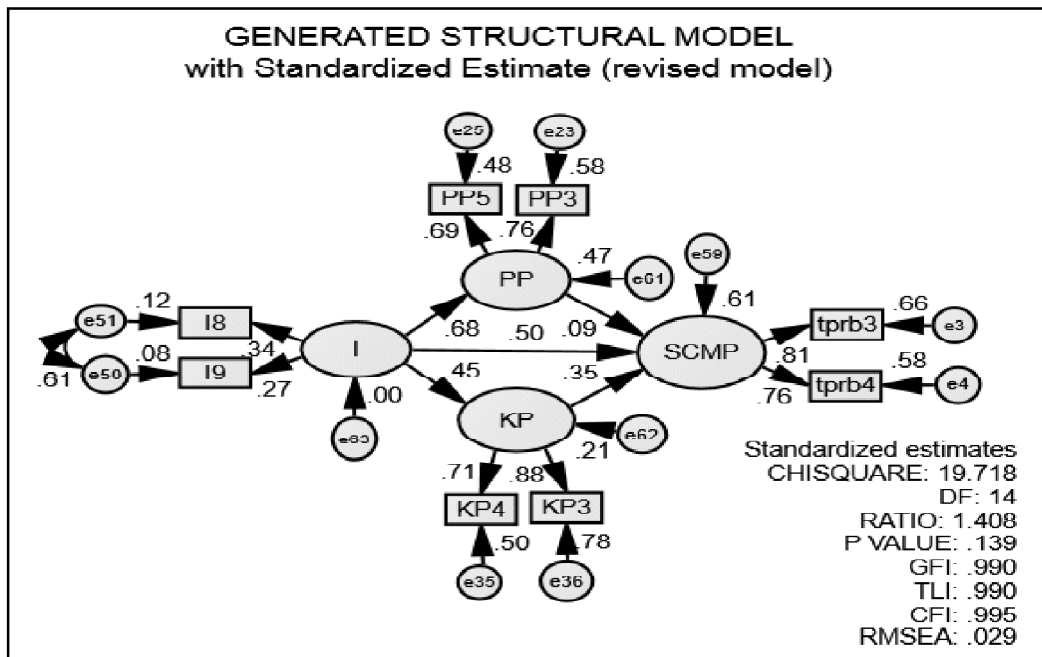


Figure 3: Generated Structural Revised Model

Table 2
Direct Effects Regression Estimates (Beta) after I direct to SCMP

Hypo	Endo		Exo	Beta	S.E.	C.R.	P	Status
H1	SCMP	←	PP	0.395	0.011	6.046	***	Sig
H2	SCMP	←	KP	0.478	0.023	8.089	***	Sig
H3	PP	←	I	0.691	0.589	2.830	.005	Sig
H4	KP	←	I	0.451	0.143	3.222	.001	Sig

The result shows when innovation factors is inserted in the model, it is not support a finding that the planning factor (PP) is significantly act as the mediator in the relationship between the innovation and the SCMP (Table 3). It can be concluded that **H5 is not accepted**.

Table 3
Plan Mediation on Innovation and SCMP

<i>Model Element</i>	<i>Test Mediation in SCMP</i>	<i>Revised model with Direct Effect</i>
	Model Fit	
Chi-square	23.319	19.718
Df	.15	.14
P-value	.078	.139
RMSEA	.034	.029
CFI	.996	.995
SD Estimates		
I→PP	.691***	.683**
PP→SCMP	.395***	.090ns
I→SCMP		
-Indirect	.273	.061
-Direct	0	.495ns
-Total Effect	.273	.556

(E) Distribution Mediation on Innovation and SCMP.

From the comparison of test results on the relationship of direct and indirect influence, having entered the Innovation (I) factor, the model support the finding that KP is a significant mediator on the relationship between innovation and SCMP (Table 4). It can be concluded that the H6 is accepted.

Table 4
Distribution Mediation on Innovation and SCMP

<i>Model Element</i>	<i>Test Mediation in SCMP</i>	<i>Revised model with Direct Effect</i>
	Model Fit	
Chi-square	23.319	19.718
Df	.15	.14
P-value	.078	.139
RMSEA	.034	.029
CFI	.996	.995
Std Estimates		
I→KP	.451***	.453***
KP→SCMP	.478***	.346***
I→SCMP		
-Indirect	.207	.157
-Direct	0	.495ns
-Total Effect	.215	.652

V. DISCUSSION

The result from this study found that the government policy in terms of planning and distribution has a direct and significant effect on the performance of the supply chain management of subsidized fertilizer in Indonesia.

Distribution factors have greater strength to improve the performance of supply chain management success. The success factors will determine the distribution of the fertilizer are provided according to the needs of farmers in the proper amount, type, time, exact location, price and quality are set accordingly. This is in line with the findings [23], [24] which mentioned that the shortages of fertilizers to farmers in Indonesia are not caused by a lack of fertilizer production, but because of the weakness of the distribution system.

The problem that almost always happens is a shortage of fertilizer. It appears especially in the growing season, because farmers need fertilizer simultaneously so fertilizer is needed in large quantities. If there are problems in the distribution system, farmers will have difficulty in obtaining fertilizer, or better known as the phenomenon of “scarcity of fertilizer”. Similarly, problems in terms of storage and marketing are generally derived from the distribution system that has not been effectively coordinated.

There are two things that need attention on the distribution factor. First is distribution of the subsidized fertilizer from the factory to the farmers (KP3) and second is fertilizer transportation from the factory to the farmers (KP4).

The study results further indicate that the planning (PP) directly affects the performance of supply chain management subsidized fertilizer. Planning is the relationship between the budget planning for the distribution of subsidized fertilizer quota set by the government (Ministry of Agriculture) and fertilizer needs in accordance with customer demand (farmers).

Experience shows that with the budget constraints the government will make two conditions; (1) the subsidized fertilizer is given priority to crops that scale is generally small, and (2) the calculation of the total volume of subsidized fertilizers for agricultural crops is area times the recommended dose of fertilizer. The first condition, can lead to leakage of subsidized fertilizer to non-subsidized fertilizer market. However, the second condition can cause total volume of subsidized fertilizer to be much lower than the needs of farmers.

Factors innovation has an important role although it has no direct influence on the performance of supply chain management, because it determines the success factors such as control and distribution. In other words, the performance of supply chain management starting from the innovation factor, due to the success of the distribution and the direct supervision influenced by factors of innovation. The development of constructive management of supply chain requires innovation. Improvements in innovation could be done, especially against regulations the distribution of subsidized fertilizer (I8) and administrative redemption subsidized fertilizer (I9). With a good factor of innovation, it can affect the success and reliability of distribution and supervision, which in turn will determine the success of the performance management of the supply chain of subsidized fertilizer in the future.

VI. CONCLUSION

Plan and distribution factors have significant power in influencing the performance of the supply chain management of subsidized fertilizer.

While the innovation factor, although not directly affect the performance of the supply chain management of subsidized fertilizer, but its role is very important because of the significant innovations affecting planning and distribution factors.

However, the distribution factor is acting as the mediator correlation between innovation performances supplies chain management.

VII. MANAGERIAL IMPLICATION

With this research has revealed just how important planning factor, distribution factor and the factor of innovation in improving the performance of the supply chain management of subsidized fertilizer, so that relevant organizations can determine the pace and attitude in making decisions for improvement in the future.

The study found that some important aspects of the performance of the supply chain management of subsidized fertilizer in Indonesia needs to be addressed in the future, so that policies can be adapted to the condition of these factors.

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