

# The Structural Influence Of Control, Distribution And Human Factor On Supply Chain Management Performance Of Subsidized Fertilizer In Indonesia

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**Abstract :** Supply chain management (SCM) is an important aspect of any business, in which an effective and efficient SCM can determine the successful performance of the company. This paper discusses the relationship between control factors, distribution and human factors on supply chain management performance to improve the performance of supply chain management of subsidized fertilizer in Indonesia. Statistical analysis of structural equation modeling (SEM) was used to exploit the data that qualifies as many as 513, or 64% of the 800 questionnaires distributed at the study site. Overall, the findings of this study show how important control, distribution and human factors in improving the achievement of subsidized fertilizer supply chain management in Indonesia. The government's policy on the control and distribution of subsidized fertilizer has a significant impact on the performance of supply chain management. The human factor although it has no direct influence on the performance of supply chain management, but it has an important role, because it determines the success of the distribution element. In addition, while the distribution factor is a significant mediator between the human factor and the performance of supply chain management, control factor do not. This study provides advice to the government to pay more attention to the control factor, distribution and human factors so that the distribution of subsidized fertilizer is according to its purpose. This research can be used for any other commodity subsidies in the future.

**Keywords:** Supply chain management performance, control, distribution, human factors, structural equation modeling (SEM).

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## I. Introduction

Supply chain (SC) is an important matter of business, and only company that runs the supply chain effectively and efficiently can achieve success. For that purpose, supply chain activities need to be implemented as effectively and efficiently as possible, where this can be done through the supply chain management performance (SCMP) [1].

Supply chain management performance (SCMP) is defined as operational excellence, a method used to coordinate the activities of suppliers, manufacturers, distributors, and retailers, therefore commodity produced and distributed in the correct amount, to the right location, and at the right time. The basic idea of this definition is that the supply chain must be controlled so that it is fast and reliable, cost effective, and flexible enough to meet customer requirements [2].

Supply chain management performance assessment is necessary to determine whether the supply chain management has been running optimally or not.

Performance measurement of supply chain management can determine whether the success has been achieved, customer needs have been met, find out the errors and things that are not necessary, to understand the problems and opportunities for improvement, give a decision factual to get progress, facilitate cooperation and more open and better communication [3]. This study will measure the performance of the supply chain management of subsidized fertilizer, because fertilizer is one of the facilities to increase the production and productivity of agricultural land. Government pay great attention to fertilizer to achieve national food security, by making two key policy; First, subsidizing fertilizer for farmers, and second, set the fertilizer supply chain management [4].

Implementation of the distribution of the fertilizer from the factory to the farmers is implemented by the Government through the SOE (State Owned Enterprises), namely PT. Pupuk Indonesia (Holding) along with distributors and retailers through supply chain management system monitoring goods [5]. With the expected fertilizer available to farmers using six right principles: the right amount, the right type, the right time, the right location, the right price and the right quality. These principles could further improve the productivity of the soil and rice production, and could increase farmers' income and the availability of domestic rice.

Some worrisome phenomena occurred in the supply chain management performance fertilizer subsidy: 1) Statistics BPS [6], shows that the productivity of rice plants is still low in the past five years and even

declined in 2011. And also in that period, rice production is not increased significantly, 2) Data PT. Pupuk Indonesia [7], showed a considerable difference between the fertilizer subsidy allocation set by the Ministry of Agriculture to the potential needs. Similarly, there is a considerable difference between the allocations and the distribution of subsidized fertilizer and 3) Although the organization has a good system, but if the human factor is not good, it is difficult to achieve organizational goals. Therefore, man is the most important resource in achieving business goals of the organization.

The above said issues could occur because of things that are not good happening in the distribution factors, control factors and human factors involved in the supply chain management performance (SCMP) of fertilizer subsidies.

Empirically, the main objectives of this paper are:

- a) To determine whether control has significant influence on SCMP.
- b) To investigate whether distribution has significant impact on SCMP
- c) To discover whether human factor has significant effect on control.
- d) To test the extent to which the human factor has significant impact on distribution.
- e) To test the mediation effect of the control on the relationship between human factor and SCMP.
- f) To test the mediation effect of the distribution on the relationship between human factor and SCMP.

## **II. Literature Review**

### **Supply Chain Management Performance (SCMP)**

Supply chain management include managing supply and demand, sourcing raw materials, manufacturing and assembly, warehouse and inventory tracking, order management, distributions across all channels and delivery to customer [8].

The basic objective of supply chain management is to connect all of the chain of the supply to work together to maximizing the productivity, adding value, reducing the cost, increasing customer satisfaction, thereby increasing the competitiveness of enterprises [2].

### **Relationship Between Control And SCMP**

Abu-Suleiman, Boardman and Priest (2004) [9] stated that the feedback is an essential part of any process. Measuring systems for efficient supply chain management enables monitoring compliance with business processes. Similarly, Janvier-James (2012) [1] stated that the supply chain management process depends on control over what happens in each supply chain.

### **Relationship Between Distribution And SCMP**

Performance of supply chain management is determined by the activity of distribution to provide goods and services, including order management, transportation management, and warehouse management to meet the demand [10]. This is in line with the findings of the previous studies [11];[12].

### **Relationship Human Factor And Distribution**

Theeranuphattana & Tang (2008)[13] used the human factor to evaluate the performance of the distribution, with a view: 1) the reliability, organize the distribution to the right place, at the right time, in the right conditions, the right amount, with proper documentation, to the right customer, 2) the responsiveness, speed to deliver goods to customers, and 3) flexibility or agility in responding to market changes to gain or maintain a competitive advantage. Studies by Janvier-James. (2012)[1] and Bologne and Singleton (2006)[14] also found that the human factor has a direct impact on the reliability of the distribution.

### **Relationship Between Human And Control**

GONE theory by Bologne (2006)[14], stated that fraud and irregularities by humans occurs due to: 1) Greed, people who are not satisfied with the state itself, 2) Opportunities, a system that gives an opportunity to commit fraud, and 3) Needs, mental attitude is never enough. 4) Exposing, sentences handed down to the manipulator that does not provide a deterrent effect perpetrator or others.. Furthermore, Fishbein and Ajzen (1975)[15] stated that intensity depends on the behavior of three behavioral deviations; (a) Attitude toward behavior (ATB), which is a positive or negative evaluation to a certain behavior, (b) Subjective norm (SN), the subjective norm around people who expect the individual should behave in certain ways or not. (c) Control belief (CB), which is influenced by the perceived behavior control, namely the difficulty and ease of reference to bring a behavior.

### **Mediation Effects of Control and Distribution on the Relationship between Human factor and SCMP.**

The proper attitude of a man giving an indirect effect on the performance of the supply chain management [16].

### III. The Conceptual Model And Hypothesis.

#### The Conceptual Model

A structural equation model is used in this study to analyze the influence of the factor structure of control, distribution and human factors on supply chain management performance (SCMP).

Therefore, this flowchart provides causality variables testing [17]. In accordance with the theory, the SCMP is the dependent variable (endogenous), as well as reliability of the control (K)- (endogenous), distribution (KP)- (endogenous), while human factor (M) is an independent variable (exogenous). Besides, K and KP are mediator variables between M 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) [3]. Smooth distribution of fertilizer from the factory to the area (KP3) and smooth transportation of fertilizers (KP4) is an indicator of distribution factor [3], Likewise, faith (M3) and service of officer (M4) are indicators of human factor [18]. Control of the allocation distribution (K1) and control for distribution by location (K2) are indicators of Control [3].

Based on the above discussion, the conceptual framework is presented in Figure 1.

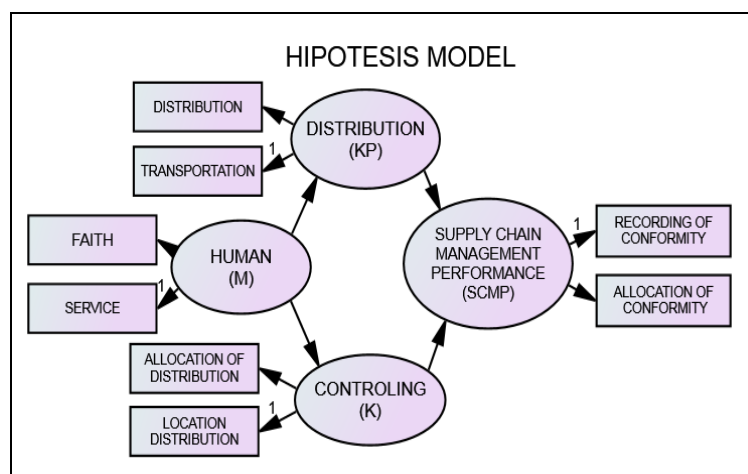


Fig. 1. The Conceptual Framework

#### Hypothesis

The researcher proposes that factors of control, distribution, human have important influence on supply chain management performance of subsidized fertilizer in Indonesia. The main hypotheses of this study are on the relationship between the factors of control, distribution and human factors on the SCMP. The first hypothesis, states that effective control factor increase the SCMP. The second hypothesis, proposes that implementing good distribution increases the SCMP.

In addition, this study also tests the third hypothesis that is human quality has a positive effect on the control factor, and the fourth hypothesis on the distribution. Lastly, it is interesting to investigate whether factors mediate the control and distribution of linkage between human and SCM (fourth and fifth hypotheses).

Therefore, the main proposed research hypotheses are as follows:

- H1: Control has a positive effect on supply chain management performance.
- H2: Distribution has a positive effect on supply chain management performance.
- H3: Human factor has a direct effect on distribution factor
- H4: Human factor has a positive effect on control factor
- H5: Distribution factor mediates the linkage between the human factor and supply chain management performance
- H6: Control factor mediates the linkage between the human factor and supply chain management performance.

### IV. Research Methodology

#### Sample And Data Collection

To get a reliable and valid questionnaire items, three (3) field trials were conducted, whereby each trial used 40 respondents. Once the questionnaire items achieved reliability and validity in the trials, eight hundred (800) questionnaires were distributed to the respondents, which is about twice the sample size required (450) to cater for non-response rate. This is according to Hair et al, (1998)[19], who proposed that sample size of 150-450 samples could be an effective sample size using structural equation modeling (SEM). Sampling of the

population was carried out in two stages. The first stage, the selection of provinces was based on stratified random sampling method. From the 33 provinces in Indonesia, five provinces have been selected, since according to the writer's observation, it is quite representative of the province due to local granary with varied infrastructure. The second stage, the selection of the number of samples in each province was carried out with a random table and a sample of 450 was derived [20]. Out of the 800 questionnaire distributed, five hundred and eighty (580) or 73% of the questionnaires were returned. After filtering the data, a final total of 513 or 64% can be used for analysis.

**Measurement And Analysis Method**

Data processing was done by statistical analysis of SEM, consists of three stages; the model identification phase, the test phase measurement model and test phase structural model [21]. Measurements of both dependent and independent variables consist of thirty eight (38) items and used Likert scale (1=strongly disagree and 7=strongly agree)[17].

**V. Results**

**Demographic Profile Of The Respondents**

Respondents were subsidized fertilizer distributors and retailers, generally were male (78.2%), with the average age of 31-50 years old (59.3%). Generally operates as a distributor and retailer of between 5-10 years (47.8%). Most respondents graduated with high school qualification (60.1%), and 14% had followed the course of distributors and retailers of fertilizer, while 7.4% have received awards. The amount of the subsidy sales by the respondents generally is below 1,000 tons for each growing season (85%). Respondents have a fertilizer warehouse for the small size of 500 tonnes (91.2%), and approximately 32.9% had a fleet of trucks. In general, respondents had three (3) workers, and serve less than 10 retailers of farmer's collection.

**Generated Structural Model (GM)**

By using modification index, which gives the covariance relationship between e40 and e46, the findings of the SEM model indicated that the resulting fit generated structural model indicate p-value of 0.144 (p-value > 0.05); ratio of 1.399 (<2); Goodness of fit (GFI) of .990 (> .95); Tucker Lewis Index (TLI) of .993 (>.95); Comparative Fit Index (CFI) of .996 (>.95) and Root mean square error of approximation (RMSEA) of 0.029 (<.08). Thus, this structural model achieved all goodness of fit indices rendering it suitable for generalization to be made to the population. Therefore, the explanation of direct hypotheses findings are based on the results of the Generated Structural Model (Figure 2).

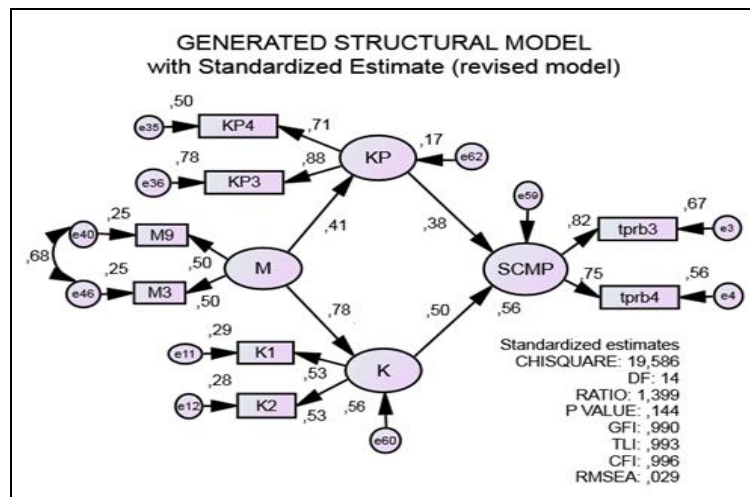


Fig. 2. Generated Structural Model

**The Regression Estimates**

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

**Table 1: Direct Effects Regression Estimates (Beta)**

Hypo	Endo		Exo	Beta	S.E.	C.R.	P	Status
H1	SCMP	<---	K	.504	.034	4.379	***	Sig
H2	SCMP	<--	KP	.382	.032	4.842	***	Sig

H3	K	<---	M	.781	.291	3.782	***	Sig
H4	KP	<---	M	.412	.078	4.070	***	Sig

From the results shown in Table 1, it shows that control has a positive significant effect on supply chain management performance (Beta = 0.504; CR = 4.379; p < 0.001), or **H1 accepted**.

Secondly, distribution has a positive significant effect on supply chain management performance (Beta = 0.382; CR = 4.842; p < 0.05) or **H2 accepted**. Thirdly, human factor has a positive significant effect on control factor (Beta = 0.781; CR = 3.782; p < 0.05) or **H3 accepted**. Fourthly, human factor has a significant direct effect on distribution factor (Beta = 0.412; CR = 4.070; p < 0.05) or **H4 accepted**.

**Control Mediation On Human And SCMP**

From the comparison of test results of direct and indirect relationships, having entered the M factor, the model do not support the findings that the K gives a significant mediation on relationship between M and SCMP (Table 2). It can be concluded that **H5 could not accepted**.

**Table 2: Control Mediation On Human And SCMP**

Model Element	Test Mediation in SCMP	Revised model with Direct Effect
Model Fit		
Chi-square	19.586	19.586
Df	.14	.14
P-value	.144	.144
RMSEA	.029	.029
CFI	.996	.996
Std Estimates		
M → K	.781***	.624***
K → SCMP	.504***	-0.031ns
M → SCMP		
-Indirect	.393	.019
-Direct	0	.539
-Total Effect	.393	.558

**Distribution Mediation On Human And SCMP.**

From the comparison of test results on the relationship of direct and indirect influence, having entered the M factor, the model support the finding that KP is a significant mediator on the relationship between human and SCMP (Table 3). It can be concluded that the hypothesis **H6 is accepted**.

**Table 3: Distribution Mediation On Human And SCMP**

Model Element	Test Mediation in SCMP	Revised model with Direct Effect
Model Fit		
Chi-square	19.586	19.586
Df	.14	.14
P-value	.144	.144
RMSEA	.029	.029
CFI	.996	.996
Std Estimates		
M → KP	.412***	.412***
KP → SCMP	.382***	.382***
M → SCMP		
-Indirect	.157	.157
-Direct	0	.539
-Total Effect	.157	.696

**VI. Discussion**

The conclusion from this study is the policy in terms of controlling and distribution has a direct and significant effect on the performance of the supply chain management of subsidized fertilizer subsidies in Indonesia.

It turns out that the distribution factor, plays a more important role for the success of supply chain management performance. Success will determine the distribution of fertilizers can be available according to the needs of farmers in the proper amount, type, time, the right location, the right price and the right quality. This is in line with the findings of the Darwis & Chairul (2007)[22], that the shortage of fertilizers to farmers in Indonesia are not caused by lack of fertilizer production, but because of the weakness of the distribution system.

According to our analysis, the problem is almost always the case is a shortage of fertilizer, especially in the growing season, because farmers need fertilizer simultaneously, so fertilizer is needed in large quantities. In the event of disruption in the distribution system, farmers will have difficulty in obtaining fertilizer, or better known as the phenomenon of "scarcity of fertilizer". Similarly, the problem of distribution, such as in terms of storage and marketing are generally derived from the distribution system that has not been effectively coordinated.

According to the results of the study, there are two issues that need to be under the spotlight i.e distribution main procurement and distribution of subsidized fertilizer from the factory to the farmers (KP3), and transportation for distribution of fertilizer from the factory to the farmers (KP5). This will improve performance with the distribution of subsidized fertilizer from the factory to the distributor and then to retailer and to the end users, ie farmers.

The study results further indicate that the control (K) directly affect the performance of the supply chain management of subsidized fertilizer. For this control factor, there are two things that need attention for improvement, namely control of the allocation of distribution (K1) and the control of the distribution of fertilizer in the field to the intended location (K2).

According to the authors, the deviation of the distribution of subsidized fertilizer can occur because of differences in domestic fertilizer prices, namely the price of subsidized and non-subsidized large enough. Therefore, without being followed control and strict application of sanctions, shall be the permeation of fertilizer from subsidized to non-subsidized market. This is consistent with previous studies of Sarjono (2011)[23] that the Indonesian government must firmly carry out control over the supply chain, meaning that strict sanctions should be applied against irregularities, and published so as to provide shock therapy for other actors.

The human factor although it has no direct influence on the performance of supply chain management, but it has an important role, because it determines the success factors of the distribution factor. In other words, the supply chain management performance begins from the human factor, due to the success of the distribution which directly influenced by human factors. This is consistent with research from Gunn & Ritchie (2012)[16] in the development of a constructive supply chain management requires the right attitude of staff and officers. Improvement in humans can be done, especially against faith clerk (M3), and second, that is, a service officer with rules and regulations (M9). With good human factors, it can affect the success and reliability of the distribution plan and control, which in turn will determine the success of the performance of the supply chain management of subsidized fertilizer in the future.

## **VII. Conclusion**

Control factors and distribution factors have significant direct influence on the performance of the supply chain management of subsidized fertilizer.

Although the human factor does not directly affect the performance of subsidized fertilizer supply chain management, but its role is very important because of the human factor significantly influencing distribution factors.

Control factors did not mediate the relationship between human factors and performance of supply chain management.

## **VIII. Managerial Implication**

This study reveals the importance of the control factor, distribution and human factors in the performance of subsidized fertilizer supply management, 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 the policy can be adapted to the conditions of these findings.

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