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This study attempts to analyze construct in supply chain and to determine which construct contribute to performance of agricultural cooperatives in Malaysia. The primary data is collected via questionnaire from top level management of agricultural cooperatives using 5-item Likert scale. Factor analysis and structural equations modeling were used to analyze the data. Findings show that cooperatives places importance on quality and technology, logistic, supplier and governance. As a whole, supply chain is significance in determining performance. However, governance alone is not significant in determining performance. The empirical result could be used to improve further studies in supply chain management.

Keywords: Agricultural cooperatives, supply chain management model

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Introduction

A cooperative can be defined as a business that is owned and controlled by the people who use its services and whose benefits are shared by the users on the basis of use (USDA, 2002). In rural areas, cooperatives enable local people to organize and improve their conditions collectively compared to private enterprise and government. Cooperatives encourage and sustain entrepreneurial development, generating productive employment, increasing income levels and helping to reduce poverty while enhancing social inclusion, social protection and community-building. Thus, even though cooperatives directly benefit their members, they also provide positive externalities for the rest of society and have a transformational impact on the economy (United Nations, 2009).

There are differences between cooperatives in developed and developing countries. For example in agricultural cooperatives, differences can be observed in changing farm demographics, consumer preference, effectiveness of the Board and organizational management (FFTC, 2006). This argument is supported by Sharma (1991) as agricultural cooperatives in Asia do face many problems relating to organizational structure, management, indifference of members, inter-cooperative relationship, business operations and finances. The scenario that can be observed from Bangladesh, Pakistan and Philippines is that if agricultural cooperatives want to serve total needs of farmers and extending benefits of advanced technology, competent management is required. Therefore, the functions of the Chairman, the Chief Executive and members of Board of Directors must be clearly defined.

In Malaysia, cooperatives originally are initiated in 1922 as an alternative socio economic system to the capitalistic structure in rural economy. Before cooperatives, loan was given to farmers by individual loaners, where they tend to use their economic power to the disadvantage of farmers. The cooperatives first started to took form as credit and marketing type. Later, different functional forms are encouraged as the cooperatives also help in eliminating rural poverty. The marketing cooperatives gain control over the flow of commodities to the market in the sense that by collectively marketing their produce, they result in higher market prices and profit rather than depending on a middleman (Abdul Hamid, 1977).

In 20th century, cooperatives are still viewed as one of the main actuating institutions for agricultural sector mainly in small producer. A good reformation on these cooperatives is able to improve the lives of fishermen and small entrepreneurs. Micro management aspect is important as it upgrade the role of cooperatives in development of agricultural industries especially among small farmers and Small Medium Industries (SMI). In May 2007, the government of Malaysia has approved a bill of Malaysian Cooperatives Commission 2006 (Malaysia, 2007). This bill was claimed to ensure a good development of cooperatives that compromises of agricultural and fisheries cooperatives. There are 842 (14%) agricultural cooperatives from 6,084 cooperatives in Malaysia.

Few studies have shown that a large number of agricultural cooperatives that have been studied are facing multi-dimensional problems that limit their performance level. Besides of facing insufficient capital, the main problem that they face is inefficient management and system level and business/marketing orientation which are not dynamic or developed (Shenoy and Mohamed Sulaiman, 1996, and Chamhuri Siwar et al,. 1999). Factors such as knowledge, skill and efficiency are important determinants for delivering optimum level of production and minimizing cost, while labour with academic credentials and new technology will increase productivity in cultivating land (Ahmad, 2006).

Supply chain plays crucial role in adding value in agricultural cooperatives (Rao and Holt, 2005). In other words, supply chain also enhances performance. In U.S., New Zealand China and Korea, agricultural cooperatives play an important part of agriculture because of their effective supply chain. USDA (2002) supported this argument as the key of success in agricultural cooperatives is to ensure product quality that satisfies their customers' specific preferences, minimum costs subject to meeting the quality specifications; and that the associated risks are managed within acceptable levels. In order to achieve this; the common tool used is "supply chain management". Thus a critical analysis of this study will focus on micro management aspect, which is supply chain system of agricultural cooperatives to upgrade the role of cooperatives in development of agricultural industries especially among small farmers.

The objectives of this research are to analyze the factors or constructs in supply chain; and to determine which of the construct in supply chain contribute to performance of agricultural cooperatives in Malaysia.

This study will bring benefit for future research as there is limited quantitative research found on this topic particularly in Malaysia. Other economic players and decision makers can benefit as this study provide additional information such as SKM, MARA, FAMA, LPP, MARDI, BERNAS and others.

Literature Review

Supply chain system is defined as "planning, coordination and control to all business process in the supply chain system to provide the highest value to the consumer at the lowest cost and at the same time to give the highest return to the stakeholder" (Van der Vorst, 2000).

Supply chain can also be defined as a series of physical activities and decision making is united with good flows, information, rights on goods throughout all levels and the participant of the organization. The supply chain combines various mediator and entities for example factories and its suppliers, logistics, warehouse, wholesaler, processor and consumer. Thus the supply chain can be defined from the perspective of "network" that connects various participant (or agent or entity) in the industry. Supply chain can also be defined as "a network between business entity that is responsible of procurement activity, production and distribution of output of various related output" (Billington, 1994).

Every entity in the chain has different objective and limitations, but they need and depends on each other to make sure the supply chain reached its objective, such as on time delivery, quality and minimizing cost. Thus the performance of every entity in the supply chain depends on the performance of other entity and their willingness and ability to coordinate the activities in the supply chain (Swamintahan et al., 1998).

The management of the performance in the supply chain is important at both level of individual and organizational. The management of the performance of supply chain system can be defined as a cycle covering problem identification, understanding main problem, taking decision to overcome the problem, validating the data and process (Kuei et al., 2002). Among the important management aspects are delivery cost, efficiency, fast response, high quality services and quality of goods. The management of performance has to be done by all parties in various levels in an organization.

In reality, for an entity to maximize profit in business it has to take a strategy that will bring benefit to their own entity without disrupting the supply chain system performance. Based on the supply chain system definition in the literature, studies have identified six main elements that have been main indicators that determine the system. These elements are individual, supplier, governance, quality system, technology and logistics. All elements are

A good supply chain will also bring additional benefit to business operation. Hovelaque et al. (2009) supports this by saying that supply chain models allow emphasis on operational information, especially in material, information and financial flows in a marketing cooperative.

It is also equally important to determine variables used for determining performance. Beamon (1999) did a study on supply chain design and analysis to determine appropriate performance measures to determine efficiency of existing system. Performance measures are also use to design proposed system by placing importance on decision variable that yield highest desirable level of performance. Among performance measure that can be used are to minimize cost, minimize average inventory level and to maximize profit.

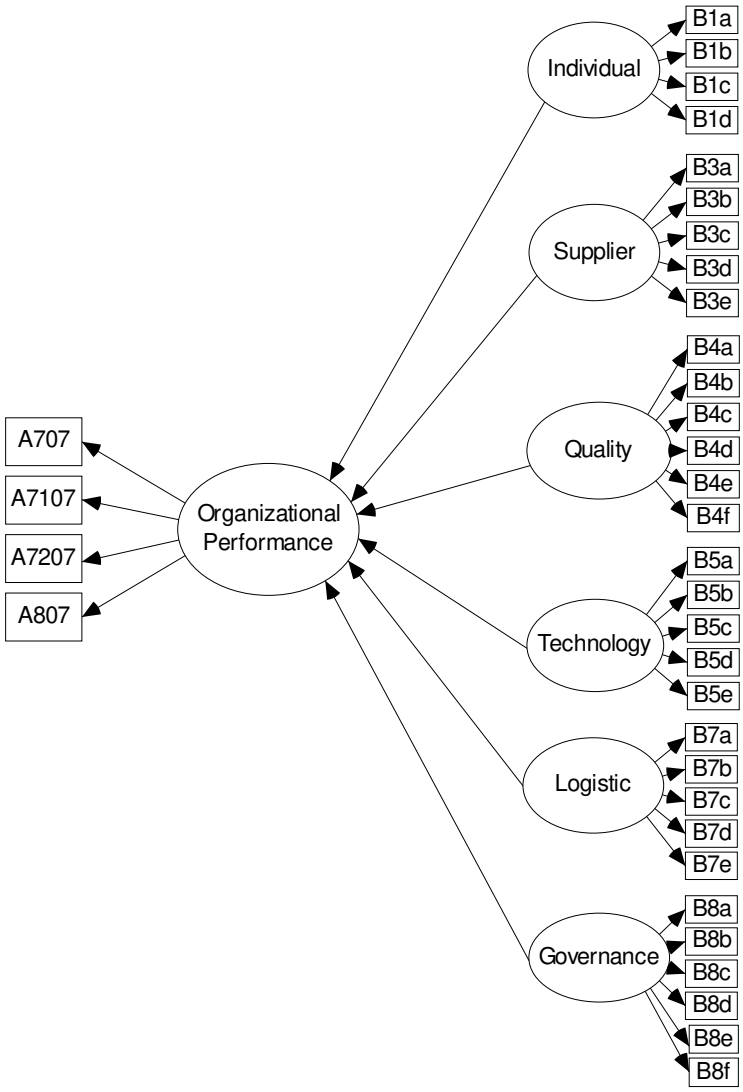
On the other hand, this study is most interested to know on what variables that determine or contribute to performance. Aramyan et al. (2007) has developed a conceptual framework for measuring the performance of agri-food supply chain, which indicators are grouped in 4 main categories which are efficiency, flexibility, responsiveness and food quality. These are also viewed as key performance indicators to as each supply chain member are also evaluated using these four categories.

Methodology

Following Beamon (1999), Kuei et al. (2002), Sahpiro (2007) and Aramyan et al. (2007), this study tries to measure the performance of management in supply chain system using six elements in supply chain, namely individual, supplier, quality, technology and logistic.

This study will evaluate the connection of the elements in supply chain model and its importance in influencing performance of agricultural cooperatives. These elements are individual, supplier, governance, marketing, quality system, technology and logistics. The conceptual model is shown as below in Figure 1.

Figure 1: Conceptual model on how elements in supply chain management determine organizational performance



Source: Adopted with modifications from Beamon (1999), Kuei et al. (2002), Shapiro (2007) and Aramyan et al. (2007)

Primary data is used to achieve the research objectives, which source from face to face interview using questionnaire with respondent. In the context of the research, respondent is referring to managers and upper level management which are responsible in making decision for the agricultural cooperatives.

Each part in the questionnaire will be divided into subsections where items related to each subsection will be asked according to 5-item likert scale. Elements in the supply chain are divided into subsections of individual, suppliers, quality, technology, marketing, logistics and governance. To test the reliability of the data, reliability analysis (Cronbach Alpha) will be done by SPSS 12.0 and 0.7 is used as indicator (Pallant, 2001). Following Plunkett (2005), descriptive statistic will be used such as percentile to provide possible insight relationship between variables.

These data will then be analyzed using factor analysis in SPSS 12.0. The reason for this is there are many items variable and factor analysis will group the items variable into a smaller set of factors or components. This is done by looking at its inter-correlation (Pallant, 2001). The strength of inter-correlation among the items will be analyzed using Bartlett's test of sphericity and Kaiser Meyer Olkin (KMO) measure of sampling adequacy. Factor analysis is considered appropriate with Bartlett's test of sphericity less than 0.05 and KMO index less than 0.6, which is the minimum value (Pallant, 2001).

In addressing the methodology for the objective, the study is interested in measure of supply chain in affecting economic performance of agricultural cooperatives. This output of smaller set of factors analyzed using factor analysis in SPSS 12.0 will then be used as a model for Structural Equations Modeling AMOS 14.0. Factor analysis is used first to analyze the structure of interrelationship among a large number of items variables, and to group them in a set of highly correlated factors (Hair et al., 2006, pp.94). Next, multiple

regression model is applied to identify the link between determinants in supply chain such as individual, supplier, governance, quality system, technology and logistics.

This model will be estimated by Structural Equations Modeling (SEM). Following Rao and Holt (2005), SEM estimates a series of separate but interdependent multiple regression equations simultaneously. This study will use a linear SEM approach (Bryne, 2001, pp. 287) to validate the causal relationships between the different latent constructs of determinants of supply chain. The significance of the overall models is determined by the chi-square value, degrees of freedom and the associated p-value 0.05. The result will be first examined for offending estimates, and in assessing the goodness of fit indices, chi-square statistic will be used. The most important is that parameters estimates must be significant for the factor to be accepted in the model. In addition, GFI, AGFI, IFI, CFI, TLI, NFI and RMSEA will be used to measure the fit of the model (Hair et al., 1998, pp. 610). All variables are expected to be significant, especially governance and logistic.

Result and Discussion

Data is collected by questionnaire from 192 cooperatives from August – September 2008. The study has interviewed 252 respondents from 192 cooperatives via survey. The distribution of respondents according to cooperatives are 152 respondents from agriculture based cooperatives, 12 respondents from fishermen's cooperatives and 88 respondents from farmer's cooperatives. The distribution of cooperatives that has been interviewed is 118

agriculture based cooperatives, 7 fishermen's cooperatives and 67 farmer's cooperatives.

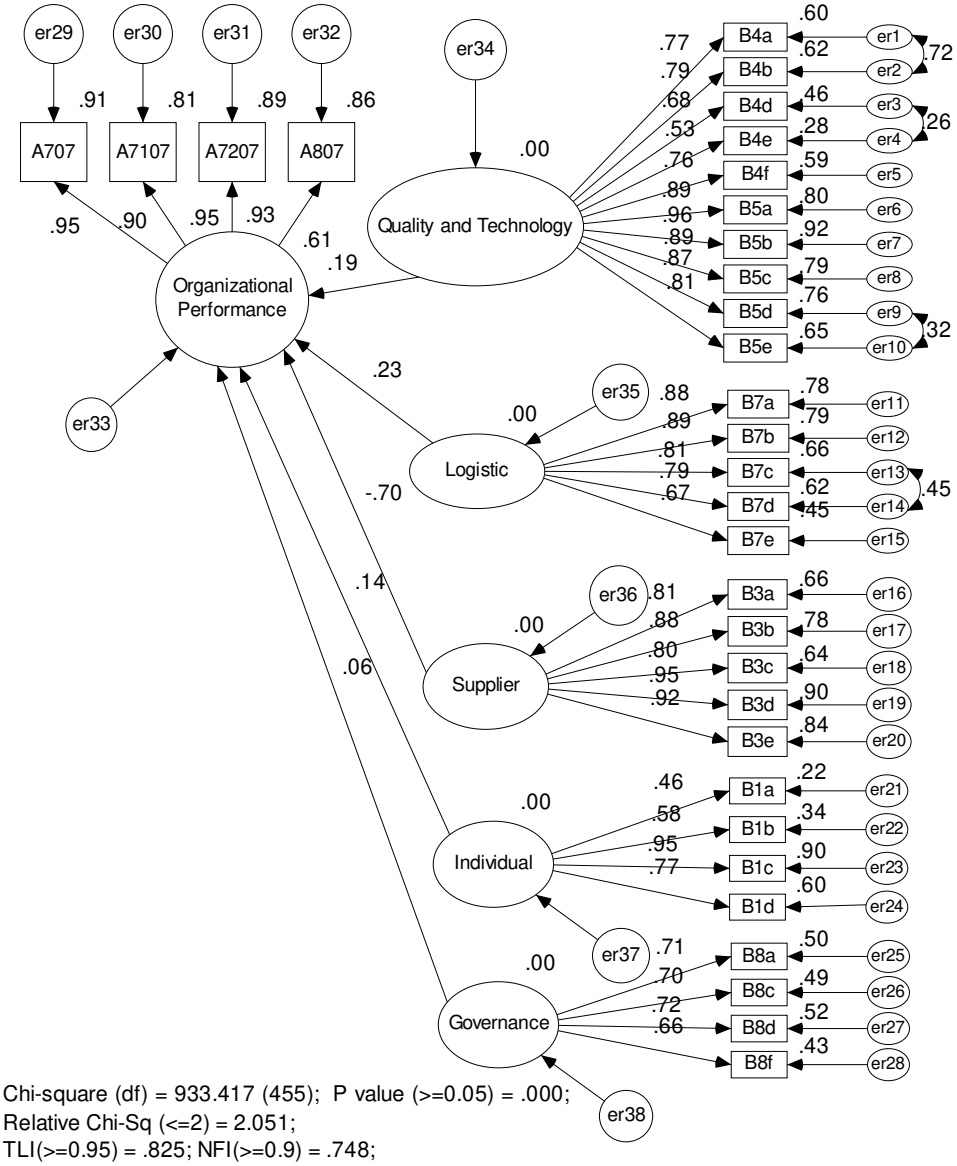
A brief background of respondent's socio economic profile can be described as follows. Majority of respondent (88.1%) are male and the rest is female, while more than half of the respondents (65.2%) are in upper level management. Most of the respondent (74.3%) is more than 50 years old. Meanwhile, on education level only 11.3% graduates from university and less than half (39.3%) has secondary level education, although on cooperatives experience level, almost all respondent (91.9%) has more than 10 years of experience in agricultural cooperatives.

To test the reliability of the data, reliability analysis is done by SPSS 12.0 and the Cronbach Alpha above 0.7 is used as indicator (Pallant, 2001). The result shows all items variable is highly reliable (0.95) with 31 items. Factors that contribute are people, supplier, governance, marketing, quality systems, technology, and logistic.

The data is analyzed using factor analysis in SPSS 12.0. Kaiser Meyer Olkin is 0.65, greater than 0.5 which indicates sample are adequate with small partial correlations among variables and Bartlett test of equal variance is 0.00 which is significance at 5% level of significance, stating that the factor model is appropriate for analysis. The variables are analyzed using Principal Component Analysis of Factor Analysis then grouped according to rotated component using varimax. The number of factors extracted is five with eigen

values above 1.0 with total variance explained 74.5%. This output is then used as the measurement model for Structural Equations Modeling or Confirmatory Factor Analysis. The results are shown in Figure 2.

Figure 2: Validated Model and Path Coefficients



Chi-square (df) = 933.417 (455); P value (>=0.05) = .000;
Relative Chi-Sq (<=2) = 2.051;
TLI(>=0.95) = .825; NFI(>=0.9) = .748;
CFI(>=0.9) = .850; Pratio = .862;
RMSEA(<=0.08) = .065.
(Standardized estimates)
Note: R^2 is not estimated in this model because of incomplete data set.

The results are examined for offending estimates, and there are no offending estimates found in the standardized estimates of coefficients. In assessing the goodness of fit indices, the p-value of chi-square statistic is 0.00, which indicates the actual and predicted input matrices are not statistically different. However, as sample size exceeds 200, chi-square becomes too sensitive and tends to indicate significant differences. Thus, other measures of goodness of fit are used (Hair et al., 1998).

Hair et al. (1998) indicates that the goodness-of-fit measures are when GFI, AGFI, IFI, CFI, TLI and NFI were > 0.90 and RMSEA was < 0.08. The results (Table 1) show that although the data revealed that the fit statistics for model does not meet conventional standards, but the model fulfilled the root mean square of error of approximation (RMSEA= 0.069) below 0.08.

Table 1: Comparison of Goodness of Fit Indices – GFI, NFI, CFI, TLI, RMSEA

n	GFI (>=0.9)	NFI(>=0.9)	CFI(>=0.9)	TLI(>=0.9)	RMSEA (<=0.08)
252	n.a.	.75	.85	.83	.07

Note: In this model, the items variable error term is allowed to correlate with each other

GFI: Goodness of Fit Index , NFI: Normed Fit Index, CFI: Comparative Fit Index, TLI: Tucker Lewis Index, RMSEA: Root Mean Squared Error Approximation

This result is further strengthen by all parameters estimates are significance at 1% level of significance with loading greater than 0.4 (Table 2). Hair et al. (1998) states that significance of estimated coefficients is the most obvious examination of structural equation model. Thus, the model is deemed acceptable.

Table 2: CFA result of loadings, estimates, standard error, critical ratio, significant p-value and item description for the supply chain model items variable

Construct	Item	Statement	Loadings	Est.	S.E	C.R (t-value)	P
Organizational Performance	A707	Paid capital 2007	.91	1.00	*	*	*
	A7107	Total asset 2007	.90	3.33	.15	22.67	.00
	A7207	Profit 2007	.94	.27	.01	26.83	.00
	A807	Income 2007	.93	1.25	.05	25.18	.00
Quality and Technology	B4a	Supplies fulfill standard	.77	1.00	*	*	*
	B4b	Product fulfill standard	.79	.98	.06	16.16	.00
	B4d	Safety procedure	.68	1.00	.14	7.27	.00
	B4e	Feedback to complaints	.53	.77	.14	5.47	.00
	B4f	Production by demand	.76	.97	.12	8.38	.00
	B5a	New technology	.89	1.26	.11	10.55	.00
	B5b	Technology efficiency	.96	1.22	.11	11.28	.00
	B5c	Tech. acceptance level	.89	1.17	.11	10.41	.00
	B5d	Goods delivery service	.87	1.08	.11	10.21	.00
	B5e	Technology compatibleness	.81	1.09	.12	9.33	.00
Logistic	B7a	Cost supplies going in	.88	1.00	*	*	*
	B7b	Cost supplies going out	.89	1.06	.09	11.69	.00
	B7c	Monitor supplies going in	.81	.98	.10	10.10	.00
	B7d	Monitor supplies going out	.79	1.01	.11	9.64	.00
	B7e	Computerized logistic system	.67	0.92	.12	7.51	.00
Supplier	B3a	External supplier	.81	1.00	*	*	*
	B3b	Suppliers deliver on time	.88	1.02	.09	10.85	.00
	B3c	Bargaining power	.80	.94	.10	9.44	.00
	B3d	Corporation between suppliers	.95	1.11	.09	12.15	.00
	B3e	Relationship with suppliers	.92	1.06	.09	11.61	.00
Individual	B1a	Workers experienced>2 yrs	.46	1.00	*	*	*
	B1b	Workers trained > 1year	.58	1.73	.33	5.21	.00
	B1c	Workers fulfilled standard	.95	2.49	.42	5.96	.00
	B1d	Mgt commitment to HR	.77	1.88	.37	5.96	.00
Governance	B8a	Vision/mission	.71	1.00	*	*	*
	B8c	Info. sharing	.70	.94	.13	7.49	.00
	B8d	Dedicated workers	.72	.98	.13	7.63	.00
	B8f	Annual meeting abide law	.66	.86	.12	7.31	.00

Notes:

- * The value do not count because unstandardized regression weight of the item is fixed to default 1 as a required constraint for model
- t value of 1.96 or greater are significant at 0.05 level

In this model, agricultural viewed quality and technology are viewed as one of the main factors in determining supply chain management. This variable places importance on supplies and product fulfilling standard, safety of procedures and whether the product is demanded by customers. In order to produce and deliver high quality product, new and efficient technology is needed. It is also important for workers to accept and is compatible with the technology. Ahmad (2006) supports this result as a number of agricultural cooperatives in Malaysia lack competitiveness in the market due to economies of scale and is currently plagued by inefficiency, uneconomical scale of operation, low technology and inefficient marketing systems. An important and effective marketing organization for fresh agriculture produce and agricultural food products are important and this will require a long term coordinated consumer-based and quality assurance approach.

Logistic is viewed as an important factor by itself in determining supply chain management. Transportation is important for carrying the goods from the supplier to cooperatives, as majority of agriculture cooperatives purpose is to serve farmers in rural areas. Logistic system is important to minimize delivery cost of supplies, and by monitoring the delivery and acceptance of supplies cooperatives can be ensure of the quality of goods is not damaged during the process of transferring the goods from one place to another. For that, a computerized logistic system is needed.

Another main factor is supplier, which include farmers in rural areas. It is important for cycle time scale of production for the supplies to be delivered on

time. Through good relationship and corporation between suppliers, cooperative can increase its bargaining power for cheaper goods to minimize cost.

Individual or worker is another key factor in determining supply chain. For a worker to reach maximum productivity and fulfill standard, cooperatives agreed that a worker must have at least 2 years experience and 1 year training. Meanwhile, managers must also commit to the development of human resource.

Governance must ensure that annual meeting abide law so that shareholder's utility is maximized. Through good governance, this will help to encouraged dedicated workers and increase information sharing in order to achieve vision and mission of a cooperative.

Table 3: CFA result of loadings, estimates, standard error, critical ratio, significant p-value and item description for the supply chain model items variable

Variable	Construct	Loadings	Est.	S.E	C.R (t-value)	P
Performance	Quality and Technology	.19	1,424,486	497,270	2.87	.00
	Logistic	.23	1,594,774	529,447	3.01	.00
	Supplier	-.70	-3,926,055	455,496	-8.62	.00
	Individual	.13	1,937,117	968,682	2.00	.05
	Governance	.06	589,359	624,819	.943	.35

Notes:
t value of 1.96 or greater are significant at 0.05 level

In table 3, all construct are significance at 10% level of significance in determining performance except governance. However, governance is maintained in the model as it contributes to the overall significance of the model.

Limitations of the model include non-normality of the data and many missing values in the observations.

Conclusion

Findings show that although some construct in supply chain model are combined, however all construct is significance in determining supply chain. As a whole, supply chain is significance in determining performance; however governance alone is not significant in determining performance. The model fit the data as there are no offending estimates and all items variable are significance, but it lacks goodness of fit indices (only RMSEA is found significant) as there are many missing values in the data collected.

Among few other observations that can be included in further study is an efficient human resource management can improve performance of cooperative by setting up a key performance indices and surveillance process by governance. Governance played an important part as they have to portray a high level of professionalism without affecting shareholder's interest.

Governance of cooperatives should also be transparent and just to their members in governing the cooperatives. Additional information from the survey is that a good cooperative puts high responsibility on the governance and conducted more that 10 meetings to discuss future plans and assign task before presenting its performance result to shareholders in annual board meeting.

However, in order to develop good governance, board members must be more dynamic in accepting new technology and have more strategic management to fulfill market needs. A few cooperatives also faced serious governance problem for example financial malpractice, noncompliance cooperatives act for not conducting annual meeting, not allowing new members to enter and others.

Supply chain management can also be improved by emphasizing the importance of quality and technology to individual or workers. Main cooperative staff has to undergo a management training comprehensive of IT and entrepreneurship skills. Among main contents that can be included in the training are business extension, importance of branding, quality and traceability, collective marketing, marketing technology, business plan, financial management and fiduciary liability.

This management model can also be used for other investor owned firm (IOF) and other business organization. An efficient supply chain management model can also transform administration of a business organization and enhance

performance. Thus, further studies can be done to estimate the validity of this model in estimating the best practice in an organization.

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