Revenue Sharing in Green Cluster Supply Chain of Highland Arabica Coffee

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Abstract

It was the advances in understanding the collaboration between the farmers and the other stakeholders in supply chain that resulted in the development of the concept of green cluster supply chain (GCSC), which is the program letting the farmers do environmental friendly activities, cooperate and share the information of their coffee products, and set the revenue sharing contracts between the farmer clusters, the assemblers, and the processor. This research aims to explore the optimum revenue sharing contracts prototype that leads to the rise of farmers' income. The samples of 29 and 27 farmers in Pamiang and Pang Ma-O areas who are willing to participate in GCSC were selected by using the purposive sampling method, two assembler, and only one processor. The scenario and adjustment of the parameters techniques are used for determining the revenue sharing between non-GCSC and GCSC models and investigating the best results. The results show that the decision of contracts selection depends on the goal of supply chain agreements. If the goal is the profit maximization of the farmers, then the appropriate contracts of revenue sharing associates with the share of revenue are about 10% from the RPF to the assemblers and 10% from the assemblers to the farmer clusters. In another view, if the goal is the profit maximization of the supply chain, then the suitable form is only the share of revenue about 10% from the assemblers to the farmer clusters. The findings of this research bring about the optimum GCSC prototype in the selected highland areas leading to the rise of farmers' income and well-being. Moreover, the relevant agencies can bring this prototype to impose the policy of highland development and expand to the other areas.

Keywords: Arabica coffee, Green cluster supply chain, Revenue sharing

JEL classification: C61, L14, Q12

Introduction

Cluster is the key factor of area-based development whereas the environmental friendly relation brings about the balance of economic and ecological systems leading to sustainable development. Therefore, the uses of two concepts above to develop the Arabica coffee supply chain of highland farmers cause sustainability and builds the competitiveness of the farmers under uncertain competition from the ASEAN Economic Community (AEC).

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Arabica coffee is one of the famous economic crops in the northern region of Thailand. Various organizations have promoted the highland farmers to cultivate Arabica coffee for creating their occupations and income, as well as decreasing opium areas and forest encroachment. Because of the appropriate geography and climate of the highland areas in the northern region, Arabica coffee is successful in production and market acceptance, both in quantitative and qualitative aspects. However, under the changes from the traditional trade systems to free trade systems, especially entering into the AEC in 2015, the method allows for high international trade and competition of various agricultural products, such as palm oil, soy bean oil, raw silk, sugar, fruit and vegetables, and tea and coffee. These changes will inescapably affect the highland Arabica coffee farmers, particularly the farmers who receive incomplete information. The less capable farmers who have less access to information will be in a very precarious situation as they become affected by the trade liberalization.

With the philosophy of sufficiency economy, the strength of the community will occur if the local economy is able to associate with the industries by means of the supply chain networks. Key and common issue in establishing a linkage in supply chain based on the agricultural community is the industrial cluster defined as geographic concentrations of linked agricultural organizations in the vertical linkages for achieving the goal of sustainable competitiveness enhancement (Porter, 1998, 2003; Patti, 2006). The revenue sharing is resulted from the vertical coordination between organizations that aims to create the higher value arising from a cooperative comparing with individual operation (Giannoccaro and Pontrandolfo, 2004; Cachon and Lariviere, 2005; van der Rhee et al., 2010). In the development process of Arabica coffee supply chain system consisting of many actors having the different operations and complex network, the revenue sharing is necessary and there is a benefit tool for creating the added value into the supply chain.

Moreover, the supply chain development taking into account the environmental friendliness such as green production, green waste management, green transportation, etc., which is known as the green supply chain, is another important means for creating the value for Arabica coffee supply chain and enhancing the competitiveness of Arabica coffee growers in the highland areas (Sheu, Chou and Hu, 2005; Kampstra, Ashayeri and Gattorna, 2006; Vachon and Klassen, 2006). Thus, in the green cluster development of highland Arabica coffee supply chain, the revenue sharing contracts is the useful tool for establishing the coordination between farmers and stakeholders, and increasing the revenue of the farmers.

However, there are some research questions regarding the coordination in the green cluster supply chain (GCSC), cluster supply chains concerning with environmental friendly, willingness to help the farmers increase their revenue, or not, and what is the suitable proportion for sharing. Therefore, this research aims to analyze the revenue sharing to the Arabica coffee farmers in the GCSC. The findings of this research bring about the optimum GCSC prototype in the selected highland areas leading to the rise of farmers' income and well-being. Moreover, the relevant agencies can bring this prototype to impose the policy of highland development and expand to the other areas.

Theoretical Framework

Green Cluster Supply Chain (GCSC)

Green cluster supply chain is the integration between the cluster supply chain and green supply chain concepts involving in the collaboration and environmental friendly activities. Yan and Wang (2009(defined cluster supply chain as a network system consisting of different actors or firms belonging to the same industry in a specific agglomeration location, i.e. suppliers, producers, retailers, consumers, government and private agencies, R&D institutions, etc. These actors perform the multiple supply chains through the interdependence of suppliers and consumers by the means of formal contracts or informal trust and commitment. Thus, there is internal cooperation among the different actors of each individual supply chain and external coordination of the actors from different supply chains. At present, cluster supply chain has been used as a tool to gain a competitive advantage. This concept plays an important role in enhancing the competitiveness of production units in the cluster)Yan and Wang, 2009; Xue, Huang and Xiao, (2009.

However, the GCSC concept is not only defined as a network system of different actors in supply chains, but it is also involved in environmentally concerned practices. Most firms have given attention to practices regarding to the environmental concern issues by using green supply chain management as a tool. The effort brings about a good image of being environmentally friendly, increasing profits, and enhancing competitive advantage)Sarkis, 2003; Rao and Holt, 2005; Srivastava, 2007(. Green supply chain is a supply chain stressing on the processes concerning with environmental awareness, collaboration networks from suppliers to final consumers, and taking into account the environmental impacts that may occur at various stages such as production, transportation, and waste disposal, etc.) Green, Morton and New, 1996; Srivastava, (2007.

Green supply chain management is divided into six models which include (1) green designs associating with the design activities for the minimum environmental impact over the life of the product)Walton, Handfield and Melnyk, 1998; Hervani, Helms and Sarkis, 2005; Zhu, Sarkis and Lai, 2007; Eltayeba, Zailani and Ramayah, 2011; Ying and Zhou, 2012(, (2) green procurement involving activities that aim to purchase materials which has environmental performance and the characteristics of reused ability, recycling and no harmful substances)Walton, Handfield and Melnyk, 1998; Hervani, Helms and Sarkis, 2005; Ying and Zhou, 2012(, (3) green production and processing)Ying and Zhou, 2012(, (4) green logistics)Ying and Zhou, 2012; Andic, 2012(, (5) Green recycling)Ying and Zhou, 2012(, and (6) waste disposal)Andic, (2012.

Revenue Sharing

The nature of value sharing contracts are separated in two forms consisting of pairwise contracts that are controlled by the value sharing between two actors which are adjacent to each partner in the supply chain between the suppliers and farmers, farmers and retailer, etc. (Giannoccaro and Pontrandolfo, 2004; Cachon and Lariviere, 2005; van der Rhee et al., 2010). In this case, the seller will sell his products with a wholesale price, ω, to the buyer and getting the value proportion, $(1-\phi)$, from the buyer. However, some contracts may not occur from an agreement between the buyer and seller but they engage from the promise of all parties in the supply chain. This form of contract is called 'spanning contracts' covering the entire value share. Spanning contracts are resulted from a one unit in supply chain playing the role as a leader to negotiate the agreement of sharing revenue with other units at once and with a single contract (van der Rhee et al., 2010)

Most related researches and studies on revenue sharing contracts have shown that the revenue would be shared between two parties in the different level in the supply chain such as contracts between suppliers and retailers (Chauhan and Proth, 2005; Qin and Yang, 2008) contracts between suppliers and buyers (van der Veen and Venugopal, 2005), and between firm and retailers (Yao, Leung and Lai, 2008; Yang and Zhao, 2011). The model mostly used in various related researches is started by defining a simple profit model in the absence of revenue sharing agreement and extending to the model with a revenue sharing contract by adding the parameter concerning the ratio of revenue sharing between the parties (Giannoccaro and Pontrandolfo, 2004). Numerical examples are used to present the results by adjusting the parameters for the best results.

Methodology

This research framework focuses on highland coffee farmers in Chiang Mai province. Consequently, 29 and 27 farmers in Pamiang and Pang Ma-O areas who are willing to participate in GCSC by using the purposive sampling method. In addition, there are two assembler samples, the Pamiang Royal Project Development Center (Pamiang RPDC), and the Pang Ma-O Royal Project Extension Center (Pang Ma-O RPEC), and only one processor sample, the royal project foundation (RPF).

To achieve the vertical coordination, the analysis method has applied the revenue sharing contracts as mechanism for creating the GCSC by extending the concept of Giannoccaro and Pontrandolfo (2004). The analysis uses the scenario techniques by determining the supply chain of Arabica coffee between the non-GCSC (non-cluster, non-green practices and non-revenue sharing contracts) and the GCSC with revenue sharing models. The definitions of the variables for analyzing the revenue sharing in GCSC are shown in Table 1.

Table 1 The definitions of the indices and variables for analyzing the revenue sharing models.

Indices/variables	Definitions	Units
i	The i^{th} individual farmer in Pamiang area (i = 1, 2, …, 29)	-
j	The j^{th} individual farmer in Pang Ma-O area (j = 1, 2, …, 27)	
m	The farmer cluster in Pamiang area	-
n	The farmer cluster in Pang Ma-O area	
a	The assemblers in Pamiang area (Pamiang RPDC)	-
b	The assemblers in Pang Ma-O area (Pang Ma-O RPEC)	-
r	The processor (RPF)	-
s	The overall supply chain	-
c	Cost in the supply chain	US Dollar/kg
p	Selling price of the parchment coffee or coffee bean	US Dollar/kg
q	Selling volume of the parchment coffee or coffee bean	kg
π	Profit	US Dollar
ϕ	Proportion of revenue sharing	Percent
α	Weights of the revenue sharing across the chain of the processor	Percent

The analysis uses the scenario techniques by determining GCSC with revenue sharing in the two scenario models as the following:

Model 1: The Non-GCSC Model

The non-GCSC model is the traditional model representing the non-cluster and non-revenue sharing contracts in the Arabica coffee supply chain. The farmers, the assemblers (Pamiang RPDC and Pang Ma-O RPEC) and the processor (RPF) independently do their activities in a supply chain to achieve their maximized profit or revenue. Consequently, the model structure is presented in Figure 1.

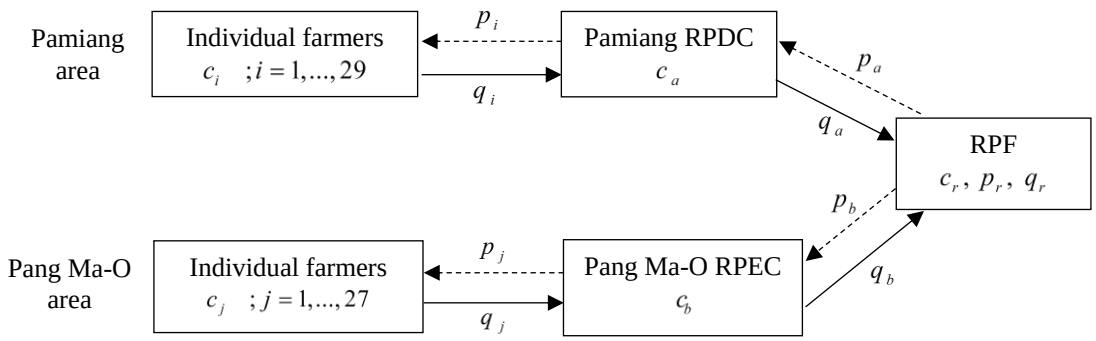

Figure 1 The non-GCSC model of Arabica coffee (Model 1).

The profit of the RPF is shown in equation (1).

$$\pi_r^{\text{model1}} = p_r q_r - p_a q_a - p_b q_b - c_r q_r \quad (1)$$

The profits of the Pamiang RPDC and Pang Ma-O RPEC are represented as the following:

$$\pi_a^{\text{model1}} = p_a q_a - \sum_i p_i q_i - c_a q_a \quad (2)$$

$$\pi_b^{\text{model1}} = p_b q_b - \sum_j p_j q_j - c_b q_b \quad (3)$$

The profits of the farmers are displayed in equation (4) and (5).

$$\sum_i \pi_i^{\text{model1}} = \sum_i p_i q_i - \sum_i c_i q_i \quad (4)$$

$$\sum_j \pi_j^{\text{model1}} = \sum_j p_j q_j - \sum_j c_j q_j \quad (5)$$

The overall supply chain profits are expressed in equation (6).

$$\begin{aligned} \pi_s^{\text{model1}} &= \pi_r^{\text{model1}} + \pi_a^{\text{model1}} + \pi_b^{\text{model1}} + \sum_i \pi_i^{\text{model1}} + \sum_j \pi_j^{\text{model1}} \\ &= p_r q_r - c_r q_r - c_a q_a - c_b q_b - \sum_i c_i q_i - \sum_j c_j q_j \end{aligned} \quad (6)$$

Model 2: The GCSC with Revenue Sharing Contracts Model

In this model, the farmers work in cooperation within their communities. The scenario is simulated by letting the farmers group together and share the information in both the volume and price of coffee products resulting in a one selling price of parchment coffee of the farmer clusters in each areas (p_m, p_n).

In addition, the scenario has also set the revenue sharing contracts between the farmer clusters, the Pamiang RPDC, the Pang Ma-O RPEC, and the RPF by defining the independency between the supply chains in two areas. So, the revenue of the RPF, $p_r q_r$, is shared to the Pamiang RPDC and the Pang Ma-O RPEC about ϕ_r, and remains the portion of itself about $(1-\phi_r)$. The weights of revenue sharing from the RPF is divided to both assemblers with the proportions of $\alpha\phi_r$ and $(1-\alpha)\phi_r$, respectively. In terms of the Pamiang RPDC, the revenue $(p_a q_a)$ is shared to the farmer cluster in Pamiang area with the proportion of ϕ_a and the remains of the proportion received about $(1-\phi_a)$. In the same time, the Pang Ma-O RPEC shares the revenue to the farmer cluster in his area with the proportion of ϕ_b and the remains of the net revenue around $(1-\phi_b)p_b q_b$. The structure of the model is presented in Figure 2.

The profit of the RPF is shown as the following:

$$\pi_r^{model2} = (1-\phi_r)(p_r q_r) - p_a q_a - p_b q_b - c_r q_r \quad (7)$$

The profits of assemblers are represented in equation (8) and (9).

$$\pi_a^{model2} = (1-\phi_a)\left[(p_a q_a) + \alpha\phi_r (p_r q_r)\right] - p_m q_m - c_a q_a \quad (8)$$

$$\pi_b^{model2} = (1-\phi_b)\left[(p_b q_b) + (1-\alpha)\phi_r (p_r q_r)\right] - p_n q_n - c_b q_b \quad (9)$$

The profits of the farmers are displayed in equation (10) and (11).

$$\pi_m^{model2} = p_m q_m + \phi_a\left[(p_a q_a) + \alpha\phi_r (p_r q_r)\right] - c_m q_m \quad (10)$$

$$\pi_n^{model2} = p_n q_n + \phi_b\left[(p_b q_b) + (1-\alpha)\phi_r (p_r q_r)\right] - c_n q_n \quad (11)$$

The profits of overall supply chain are expressed as the following:

$$\begin{aligned}\pi_s^{model2} &= \pi_r^{model2} + \pi_a^{model2} + \pi_b^{model2} + \pi_m^{model2} + \pi_n^{model2} \\ &= p_r q_r - c_r q_r - c_a q_a - c_b q_b - c_m q_m - c_n q_n\end{aligned} \quad (12)$$

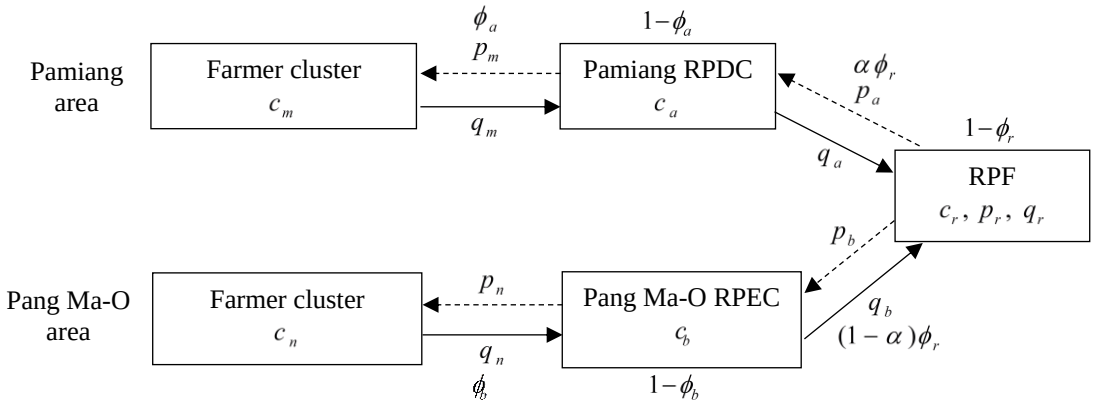

Figure 2 The GCSC with revenue sharing model of Arabica coffee (Model 2).

Two models above are estimated by using the adjustment of the parameters for investigating the best results.

Empirical Results

Profits in the Non-GCSC Model

The profit of the farmers, the Pamiang RPDC, the Pang Ma-O RPEC, the RPF, and the supply chain are shown in Table 2.

Table 2 Profits in the non-GCSC model.

Unit: US Dollar

Areas	Profits of			
	The farmers	The assemblers	The RPF	Overall supply chain
Pamiang	10,643.82	3,901.45	15,305.02	42,968.73
Pang Ma-O	9,378.48	3,739.96		

Note: The quote exchange rate is 1 US Dollar = 35.69 Thai Baht.

In case of the farmers doing their activities such as purchasing inputs by themselves, not sharing information, and selling the coffee products without cooperation (Table 2), the costs of purchasing inputs and production, and the selling prices are different. The total profit of all farmer samples in Pamiang area is equal to 10,643.82 US Dollars, while the total profit of all farmer samples in Pang Ma-O is equal to 9,378.48 US Dollars. Moreover, the profit of overall supply chain is about 42,968.73 US Dollars.

Profits in the GCSC with Revenue Sharing Contracts Model

The results from the revenue sharing analysis lead towards knowing the optimal proportion of the share value from the RPF to the Pamiang RPDC and the Pang Ma-O RPEC, and from both assemblers to the farmer clusters. Let the weight of revenue share from RPF to the Pamiang RPDC (α) and the Pang Ma-O RPEC ($1-\alpha$) be equal to 0.5 and 0.5, respectively; there are seven feasible alternative contracts which do not cause the losses for all three parties (Table 3). The decision of contracts selection depends on the goal of the stakeholders in the supply chain. If the goal of supply chain is the profit maximization of the farmers in Pamiang and Pang Ma-O areas, then the appropriate contracts of revenue sharing associates with the share of revenue, which is about 10% from the RPF to the assemblers and 10% from the assemblers to the farmer clusters. These contracts lead to the maximized profit of the farmer clusters in Pamiang and Pang Ma-O areas which have been accounted for 18,464.93 and 17,380.44 US Dollars, respectively. When comparing with the farmer clusters' profits in the traditional model, the revenue sharing contracts contributes to the higher profits at about 73.48% of the Pamiang farmer cluster and 85.32% of the Pang Ma-O farmer cluster.

In another view, if the goal of supply chain is the profit maximization of the overall supply chain, the suitable form of revenue sharing is only the share of revenue which is about 10% from the assemblers to the farmer clusters. The farmer clusters in Pamiang and Pang Ma-O areas will gain a profit at about 18,195.63 and 17,120.30 US Dollars, respectively. The revenue sharing contracts brings about the maximized profit in supply chain that have accounted for 51,039.51 US Dollars. This goal contributes to the higher profits at about 70.95% of the Pamiang farmer cluster and 82.55% of the Pang Ma-O farmer cluster when compared with the farmer clusters' profits in the non-GCSC model.

Table 3 Profits in the GCSC with revenue sharing contracts model ($\alpha = 0.50$).

Unit: US Dollar

Proportions of sharing			Areas	Profits of			
ϕ_r	ϕ_a	ϕ_b		The farmer cluster	The assemblers	The RPF	Overall supply chain
0.00	0.00	0.10	Pamiang	14,523.37	3,901.45	15,305.02	51,039.51
			Pang Ma-O	17,120.30	189.36		
0.00	0.10	0.00	Pamiang	18,195.63	229.19	15,305.02	51,039.51
			Pang Ma-O	13,573.05	3,736.62		
0.00	**0.10**	**0.10**	**Pamiang**	**18,195.63**	**229.19**	**15,305.02**	**51,039.51**
			Pang Ma-O	**17,120.30**	**189.36**		
0.10	0.00	0.00	Pamiang	14,523.37	6,594.44	4,716.39	43,143.87
			Pang Ma-O	13,573.05	3,736.62		
0.10	0.00	0.10	Pamiang	14,523.37	6,594.44	4,716.39	43,143.87
			Pang Ma-O	17,380.44	189.36		
0.10	0.10	0.00	Pamiang	18,464.93	2,652.88	4,716.39	43,143.87
			Pang Ma-O	13,573.05	3,736.62		
0.10	**0.10**	**0.10**	**Pamiang**	**18,464.93**	**2,652.88**	**4,716.39**	**43,143.87**
			Pang Ma-O	**17,380.44**	**189.36**		

Note: The quote exchange rate is 1 US Dollar = 35.69 Thai Baht.

Apart from the equal weight of revenue sharing (α) mentioned above, this research has defined the different weights of revenue sharing between two areas. When letting $\alpha = 0.25$, the results in Table 4 show that for the goal of the profit maximization of the farmers, the proper pattern of revenue sharing contract is the revenue share at about 10% from the RPF to the assemblers and 10% from the assemblers to the farmer clusters: bringing about the maximized profit of the Pamiang and Pang Ma-O farmer clusters at around 18,330.28 and 17,510.50 US Dollars, respectively, and the profit of supply chain is around 41,797.37 US Dollars.

Moreover, when letting $\alpha = 0.75$, the results in Table 5 represented that the suitable pattern of revenue sharing contract in the Pamiang and Pang Ma-O areas is the revenue share that is about 10% from the RPF to the assemblers and 10% from the assemblers to the farmer clusters; resulting in the maximized profit of the farmer clusters in Pamiang area at about 18,599.58 US Dollars, the maximized profit of the farmer clusters in Pang Ma-O area is about 17,250.37 US Dollars, and the profit of supply chain is around 44,490.36 US Dollars.

However, if the agreement goal is on sharing revenue at the highest profit made then there has to be a study on the supply chain to maximize the efficiency. The right form of revenue sharing is only 10% of revenue share from the assemblers to the farmer clusters. The

total profit of supply chain is equal to 51,039.51 US Dollars when letting the $\alpha = 0.25$ and $\alpha = 0.75$.

Table 4 Profits in the GCSC with revenue sharing contracts model ($\alpha = 0.25$).

Unit: US Dollar

Proportions of sharing			Areas	Profits of			
ϕ_r	ϕ_a	ϕ_b		The farmer	The	The RPF	Overall
0.00	0.00	0.10	Pamiang	14,523.37	3,901.45	15,305.02	51,039.51
			Pang Ma-O	17,120.30	189.36		
0.00	0.10	0.00	Pamiang	18,195.63	229.19	15,305.02	51,039.51
			Pang Ma-O	13,573.05	3,736.62		
0.00	**0.10**	**0.10**	**Pamiang**	**18,195.63**	**229.19**	**15,305.02**	**51,039.51**
			Pang Ma-O	**17,120.30**	**189.36**		
0.10	0.00	0.00	Pamiang	14,523.37	5,247.95	4,716.39	41,797.37
			Pang Ma-O	13,573.05	3,736.62		
0.10	0.00	0.10	Pamiang	14,523.37	5,247.95	4,716.39	41,797.37
			Pang Ma-O	17,510.50	189.36		
0.10	0.10	0.00	Pamiang	18,330.28	1,441.03	4,716.39	41,797.37
			Pang Ma-O	13,573.05	3,736.62		
0.10	**0.10**	**0.10**	**Pamiang**	**18,330.28**	**1,441.03**	**4,716.39**	**41,797.37**
			Pang Ma-O	**17,510.50**	**189.36**		

Note: The quote exchange rate is 1 US Dollar = 35.69 Thai Baht.

Table 5 Profits in the GCSC with revenue sharing contracts model ($\alpha = 0.75$).

Unit: US Dollar

Proportions of sharing			Areas	Profits of			
ϕ_r	ϕ_a	ϕ_b		The farmer	The	The RPF	Overall
0.00	0.00	0.10	Pamiang	14,523.37	3,901.45	15,305.02	51,039.51
			Pang Ma-O	17,120.30	189.36		
0.00	0.10	0.00	Pamiang	18,195.63	229.19	15,305.02	51,039.51
			Pang Ma-O	13,573.05	3,736.62		
0.00	**0.10**	**0.10**	**Pamiang**	**18,195.63**	**229.19**	**15,305.02**	**51,039.51**
			Pang Ma-O	**17,120.30**	**189.36**		
0.10	0.00	0.00	Pamiang	14,523.37	7,940.94	4,716.39	44,490.36
			Pang Ma-O	13,573.05	3,736.62		
0.10	0.00	0.10	Pamiang	14,523.37	7,940.94	4,716.39	44,490.36
			Pang Ma-O	17,250.37	189.36		
0.10	0.10	0.00	Pamiang	18,599.58	3,864.73	4,716.39	44,490.36
			Pang Ma-O	13,573.05	3,736.62		
0.10	**0.10**	**0.10**	**Pamiang**	**18,599.58**	**3,864.73**	**4,716.39**	**44,490.36**
			Pang Ma-O	**17,250.37**	**189.36**		

Note: The quote exchange rate is 1 US Dollar = 35.69 Thai Baht.

Discussion and Conclusion

This research also considers the cluster building by vertical coordination between the farmers and the stakeholders in the GCSC of Arabica coffee. The revenue sharing contracts uses the tools for establishing the coordination. There are two scenario models consisting of the non-GCSC model representing the non-cluster, non-green practices and non-revenue sharing contracts in the Arabica coffee supply chain, and the GCSC of Arabica coffee with revenue sharing contracts. The results showed that the decision of revenue sharing contracts selection depends on the goal of the stakeholders in the supply chain. If the goal of the contracts is the profit maximization of the farmers, the model of the overall cluster in both areas with revenue sharing contracts, which is the 10% of revenue share from the RPF to the assembly center and the 10% of assembly center to the farmer cluster, is the best choice. From a different perspective, if the revenue sharing contracts focuses on the maximum of the total profit of the supply chain, the optimal model is the 10% of revenue share from the assemblers in each area to the farmer cluster in the same area without the sharing of the RPF.

In deciding on selecting the best model for revenue sharing contracts, the model results in the win - win solution for both goals as this is the only share of revenue which is about 10% from the assemblers to the farmer clusters, because it would not only make the maximum profit of the supply chain but also brings about the second highest earnings for the farmers. When comparing with the farmer clusters' profits in the non-GCSC model, the revenue sharing contracts contributes to the higher profits of about 70.95% and 82.55% of the Pamiang and the Pang Ma-O farmer cluster, respectively. The increase in the farmers' profit is caused from the reduction in production cost. The collaborations of the farmers in each area through buying large amount of fertilizers and other inputs bring about a lower price and discount, as well as having farmers jointly preparing the wastewater treatment systems or managing the waste from coffee cherries peels together to contribute to the reduction in cost of waste disposal. Moreover, the sharing of processing or drying spaces helps the farmers make a joint transportation of their coffee products to the assemblers, thus leading saving time and reducing the transportation cost.

The findings above suggested that the goal of development is important because it is an indication of the occurring outcomes. The findings of this research make the prototype models for development that is an ideal model of farmer clusters in each community having the revenue sharing contracts. Thus, the pattern of conduct that would occur has to be the coordination between farmers, assemblers and the RPF by creating a joint agreement for ways to achieve the best results for all segments of the supply chain.

Acknowledgement

This research was supported by the graduate thesis grant from the Office of the National Research Council of Thailand (NRCT) in 2013. The authors would like to thank the staffs of the Royal Project Foundation and the Highland Research and Development Institutes as well as the farmers in Pamiang and Pang Ma-O areas for providing valuable knowledge and

beneficial data of this research. The facility support of the Faculty of Agriculture at Chiang Mai University are gratefully acknowledged.

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