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Empirical Study of Sustainable Export Coffee Supply Chain in Vietnam

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Abstract

This study focus on the Sustainability of export Coffee Supply Chain in Vietnam, ranking recently second among the world's coffee exporters. Our empirical study on a sample of 236 firms confirm the significant and positive impacts of all of economic, social and ecological factors. This page provides readers with the most basic concepts of supply chains, sustainable supply chain development, the real situation of export coffee in Vietnam, together with the advantages, difficulties which the coffee industry of Vietnam is encountering and proposes solutions for each target group having influence on the coffee export process with the wish to uphold the position of Vietnam coffee in the world market.

Keywords: coffee, export, supply chain, sustainable development, Vietnam

1. Introduction

In the context of global climate change and population growth, the concept of agro-ecosystems to remain productive in the long term (van der Werf & Petit, 2002) was studied and has been being promoted more vigorously. In agriculture, sustainability is defined as to manage and use agricultural ecosystems in a scientific manner so as to maintain the biodiversity, productivity, regenerative ability, vitality of these systems; so as to they can operate properly at present and in the future at all local, national and global levels and cause no damage to other ecosystems (Lewandowski et al., 1999).

For the market of agricultural products for export, coffee is one of the key commodities. Especially, the recent years saw the rapid growth of the coffee industry in terms of both quantity and quality. At present, Vietnam ranks second among the world's coffee exporters. In the course of integration, to build a sustainable export coffee supply chain is necessary, since this will not only solve effectively the input, output issues through the input material rotation but also help firms save on a considerable part of expenses and improve the competitive capacity with other firms and replacement commodities.

This paper is intended to study the export coffee supply chain in Vietnam. The study question posed here is in what way can Vietnam develop the export coffee supply chain in a sustainable manner? The study focuses on analyzing and defining the factors that have influence on the sustainable export coffee supply chain, from that to propose proper solutions for improving this supply chain of coffee for export of Vietnam.

2. Theoretical Framework

2.1 Supply Chain

Supply chain is a set of firms that push materials, goods forward-consumer (La Londe & Masters La Londe, 1994). Usually, many independent firms are involved in manufacture&ng a product and bring it to the end-consumer in a supply chain; material manufacturers, components, assembly facilities, wholesalers, retailers, transporters are members of a supply chain. Similarly, Lambert et al. (1998) defined: "A supply chain is the alignment of firms that bring products or services to market".

Meltzer et al. (2001) defined supply chain as a set of three or more entities (organizations or individuals) directly involved in before and after the flows of products, services, finance and/or information from origin to customers. The author also classified supply chains into three categories. Direct supply chain, which included one firm, one supplier, and one customer involved in the flows of products, services, finance and/or information. Extended

supply chain, which includes providers of intermediate providers and customers of intermediate customers, all involved in the flows of products, services, finance and/or information. Final supply chain, which includes organizations involved in before and after the flows of products, services, finance and information from end-providers to end-customers (Meltzer et al., 2001). Apart from those who directly involved in the supply chain above, the Government and the policies issued play a very important role in regulating, stabilizing prices as well as orienting the relevant parties to operate in keeping with the market economic mechanism.

Stock and Boyer (2009) pointed out that supply chain was a network of interdependent relations with business organizations and individuals including providers, manufacturers, logistics, marketing, and a system supporting forward rotation and after flows of materials, services, finance and information from the initial manufacturers to end-customers with the added values created from the operation performance and satisfy the maximum customer requirements.

2.2 Sustainable Supply Chain

Sustainability is closely associated with the interdependence of the three key contents, namely ecological, social and economic systems (Hutchins & Sutherland, 2008). According to Shrivastava and Hart (1995), sustainability is defined as "*the potential for reducing long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, and pollution and waste management*". A supply chain is regarded sustainable when it is operated in an environmentally friendly and socially dutiful way. It means that the supply chain must be operative based on the sustainable principle of nature, economy and society (Carter & Rogers, 2008). In reality, it is impossible to meet to the maximum all these three principles, thus each member in the chain must be aware of his role and responsibility so as to balance personal interest and social interest and not have adverse impact on the environment while can earn commensurate profits.

Specifically, in order to operate a sustainable supply chain, each member involved must feel that he is an integral part of the network, must work together for the final end of the chain and also for their existence. To that end, the supply chain should be built and developed basing on equality, voluntariness and confidence in the development of each member. On the other hand, members should also identify the sustainable factors that have influence on the performance of the supply chain they are involved in the three aspects of economy, society and environment (Carter & Rogers, 2008; Hutchins & Sutherland, 2008). Firstly, economically, to make supply chain sustainable, profit must be ensured for all the members involved, from generating jobs for peasants, assuring quantity and quality for providers to guaranteeing that the finished products will meet customer requirements. Secondly, socially, the most important condition for society to develop sustainably is to provide the resources for the members involved in the supply chain. This means that they can live in a peaceful and cooperative in the manner of voluntariness, of equality in terms of opportunities, of training to improve their competences and awareness for a more developed society. Thirdly, eco-environmentally, to have a sustainable supply chain, one has to allow for the impact of manufacture and business on the environment. The process of producing and processing coffee entails substantial mobilization of natural resources such as power, water, pesticides, fertilizers… and the consequence of this is the phenomenon of discharging flue gas, wastewater into the environment. Hence, one has to monitor and reduce adverse environmental effects, as well as to propagate and educate employees and the community on a clean and sustainable environment through the media such as speakers, radio, reports, forums, workshops… (Behrens et al., 2006).

For the coffee industry, a coffee supply chain normally involves such members as: input material supplies, manufacturers and distributors. Input suppliers include branches and subsidiaries of firms, the people and hubs in coffee growing provinces. Manufacturers are the very processors of coffee from raw material. Distributors are the very importers of coffee from Vietnam in such major markets like Germany, the USA, Japan, EU… These distributors shall sell their coffee products to companies that process instant coffee or other relevant products to gain profit.

During its functioning, supply chain will not only facilitate the firms' operations but also help them create a good competitive status in the international market place, step up production an earn considerable profits. In the research on sustainable coffee supply chain of Behrens et al. (2006), resource exchange relationships between steps of managing and developing sustainable coffee supply chain are inseparable, since all the members involved in provide for each other and for the entire system material and immaterial sources. Coffee fruit, coffee bean, processed coffee products, financial resources, energy from nature, human resources or standard values to ensure sustainability for society and the natural environment… all are the resources that must be included in the supply chain. If the members involved in the chain can find out the resources that fit them, they'll be provided with the necessary resources for keeping on their production.

Finally, a system for assessing the supply chain results to identify the positive, negative points and find out solutions for the arising issues is indispensable. For each supply chain, there should be a team of supervisors set up to assess the operation performance at each step, to encourage beneficial contributions and to minimize the harmful effects on the environment, society and economy (Carter & Rogers, 2008; Hutchins & Sutherland, 2008). It's the same as in a coffee supply chain; each the member involved in has a different objective which must be split from the general objectives of sustainable development. Coffee products can only be manufactured on a long-term basis if the requirements are viewed and met in the most thorough way. Through their assessment system, each member will have a suitable way of adjustment so as to improve business operations and bring about highest interests for them.

3. Methodology

3.1 Research Field

Vietnam at present has over 640,000 ha of coffee, mainly in the Central Highlands. Our country's coffee has been exported to more than 60 countries and territories over the world; in 2014, coffee turnover reached US$ 3.4 billion and Vietnam was the world's second largest coffee exporter. Nevertheless, in the coffee industry of Vietnam in recent years there still remained many restrictions which have not been resolved, namely instable development scope, large unplanned areas, areas of old and stunted coffee plants increased by year, pressing recultivation demand; along with these were the restrictions on quality management, processing technology, and particularly, the issue of sustainable supply chain development, from manufacture to export.

3.2 Research Sample

Subject of the study as identified are the firms involved in the export coffee supply chain in Vietnam, including input material suppliers, manufacturers and distributors. Input materials suppliers are branches and subsidiaries of firms, organizations and representatives of the people. Questionnaires were delivered basing on the information finished by VICOFA (Vietnam Coffee-Cocoa Association); as a result, 236 valid questionnaires were obtained. This research sample includes 236 firms entered, coded and procedure by SPSS software.

Dependent variable (SUB) means the general satisfaction of firms as members of the coffee supply chain. This variable is established basing on the 5-point Likert scale from 'very dissatisfactory' to 'very satisfactory'.

3.3 Variables

Dependent variable (SUB) means the general satisfaction of firms as members of the coffee supply chain. This variable is established basing on the 5-point Likert scale from 'very dissatisfactory' to 'very satisfactory'.

Three independent variables are ecological, social and economic factors (ELG, SOC, ECO); that are measured by several items on 5-point Likert scale from very disagreed to very agreed with our proposition question. The validity of these variables is presented in the following table:

Table 1. Independent variable validity

Variable	Item number	Cronbach's Alpha	KMO and Bartlett's Test		Total Variance Explained by the first Component (%)
			Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Sig.	
ELG	5	0.820	0.711	.000	59.256
SOC	4	0.861	0.804	.000	70.935
ECO	4	0.841	0.765	.000	68.735

We can see that, the values of all Cronbach's Alpha coefficients are greater than 0.7 that validate the variable measurement. Kaiser-Meyer-Olkin Measure of Sampling Adequacies are greater than 0.7 at 99% confidence level. The factor analyses indicate that the first component created of each factor can explain more than 59% of the total variance.

Also, we introduce control variables into the regression model. These variable include: firm age (AGE) that is measured by the year number from firm foundation to 2014 (coded as 1 if firm age is smaller than 1 year; as 2 from 1 to 3 years; as 3 from 3 to 5 years; as 4 from 4 to 10 years; and as 5 if firm age is greater than 10 years); and firm size (SIZ) that is measured by its employee number (coded as 1 if firm has less than 100 employees; as 2 from 100 to 499 employees; as 3 from 500 to 999 employees; as 4 from 1,000 to 1999 employees; and as 5 if

firm has more than 2,000 employees).

3.4 Method

The paper use linear regression method. The regression equation is as follow:

$$SUB = ELG + SOC + ECO + AGE + SIZ + \varepsilon$$

With SUB: the sustainability of the export coffee supply chain perceived by firm member;

ELG: ecological factor perceived by firm member;

SOC: social factor perceived by firm member;

ECO: economic factor perceived by firm member;

AGE: firm age;

SIZ: firm size;

ε: error term.

4. Research Results

The results above permit the adoption of the variables inspection results to analyze the linear regression that influences the sustainability of the export coffee supply chain in Vietnam. The results were as follows: that values R and R Square were both high, 0.7, showed that the analysis model reflects properly and has the full effect of independent variables on dependent variables; that the F test achieved the reliability of 99% further indicates that the regression model is highly validated.

Table 2. Regression results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Variable	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.544	0.326		7.800	0.000		
ELG	0.245	0.112	0.197	2.182	0.032	0.687	1.456
SOC	0.460	0.098	0.372	4.688	0.000	0.892	1.121
ECO	0.427	0.098	0.366	4.357	0.000	0.794	1.259
AGE	0.033	0.065	0.038	0.510	0.611	0.990	1.011
SIZ	0.034	0.098	0.029	0.343	0.732	0.804	1.243
R	0.707		Adjusted R Square			0.472	
R Square	0.500		Std. Error of the Estimate			0.897	
F	17.832		Sig.			0.000	

Note. *Significant at p < .01; **Significant at p < .05; ***Significant at p < .10.

Concerning the economic factors, the regression results indicate a significant and positive relation (B = 0.427 with Sig. = 0.000 < 0.05) between this variable and the Sustainability of export Coffee Supply Chain in Vietnam. It means that the more the business is beneficial, the more the supply chain is sustainable. The recent years saw complicated changes in Vietnam's coffee export situation, at some time, it was high but at other there was a decrease in both productivity and value. This had a great effect on the interest of the parties involved, from farmers to firms and customers. At the same time, this instability causes obstacles to the supply chain in balancing the interest of the members in the chain. How to make farmers, processing and exporting firms and consumers as well feel that their needs are satisfied-that's the target which a sustainable supply chain should aim at.

Ecologically, natural conditions and events have great effect on the export coffee supply chain, from purchasing to transporting and storing goods, since this industry takes raw material chiefly from nature. The regression results show that this factor has considerable and positive effect on the sustainability of export coffee supply chain in Vietnam (B = 0.245 with Sig. = 0.032 < 0.05). This allows us to confirm the better the ecological environment the more sustainable supply chain. The general responsibility by the Government, firms and each individual should be in the first place, because it has great influence on the existence of the supply chain, as this operation cannot be sustainable if the environment is deteriorated.

Socially, the regression results indicate that this factor has considerable and positive effect on the sustainability of export coffee supply chain in Vietnam (B = 0.460 with Sig. = 0.000 < 0.05). That means the firmer the society

the more steady the supply chain. Facts at present have shown that non-governmental organizations are bringing into play their role and performance in linking the members with their participation in the supply chain as well as disseminating the Government's policies to them so as to orient operations of the supply chain in the right direction of the State, to guarantee security for society without detrimental to the interest of firms. Resources of the participants are usually considered in order to ensure the equality and sustainability of the supply chain in general and of each member in particular.

As a whole, in recent years, the coffee industry of Vietnam has made a good deal of achievements in terms of scope, productivity, quality and volume to help Vietnam became one among the world's largest coffee exporters. In addition to that, Vietnam's coffee export is still facing many difficulties, particularly Vietnam's coffee for export is still of low quality (broken beans, high moisture, a lot of impurities). This is due to the lack of capital for production and coffee export activities. Further, that the Government's policies towards coffee production and export have not brought into play has caused the psychology of worriment of the people and firms.

5. Implications of the Results

From the research results mentioned above as well as the advantages and difficulties as analyzed, the author has proposed groups of solutions for the immanence of firms, environmental policies and the Government from that to step by step improve the performance and develop the coffee for export of Vietnam in a sustainable manner. First, coffee exporters should improve their export coffee quality to meet international market standards and to create competitive capacity with other countries by innovating new coffee varieties of high quality, investing in machinery and equipment to strengthen the processing machinery and to improve the professional knowledge and skills at managing the supply chain as well. At the same time, to maintain regular updates on information from State bodies, domestic and international markets, in parallel with to observe the standards for environmental protection so that the supply chain can develop towards sustainable and expedience for the participants. In addition, in crops for export, attention should be paid to planning reserve, avoiding selling off, which can help hindering coffee price from reducing dramatically as well as preventing foreign speculators from seeking profits thus cornering the market.

On the macroeconomic plan, the Government and the State should have plan and provide farmers with land for growing coffee plants, as well as support in capital, seedlings and growing techniques to improve quality and productivity of Vietnam's coffee. In addition, the Government should also establish good relationships with potential markets so as to attract domestic and foreign capital, to boost coffee consumption. This is also an opportunity for domestic firms to approach and learn about advanced techniques for and experiences in managing, and particularly, administering and developing a sustainable supply chain. There should be policies on sanctions policies against manufacturers that bring about bad effects on the prestige of the industry as well as on the natural environment, since this is a very important factor in improving Vietnam's standing in the international arena and a prerequisite for a highly sustainable and effective supply chain.

At the same time, policies that provide guidance for coffee exporters on procedures, support programs and forecast of the economic situation in general and of export in particular should be issued for firms to ascertain on time and to arrive at proper business decisions. In addition, detailed legal documents for activities of export coffee supply chain should also be written, since this is a still new yet very important activity of firms. Clubs, associations specializing in coffee export should be set up in order to create a wholesome business environment, to learn about one another's experiences for firms to thrive.

6. Concluding Remarks

This empirical study focuses on a sample of 236 firms. The study findings have shown that all economic, social and ecological factors have significant and positive impact on the sustainability of export coffee supply chain in Vietnam. Through this subject, the author provides readers with the most basic concepts of supply chains, sustainable supply chain development, the real situation of export coffee in Vietnam, together with the advantages, difficulties which the coffee industry of Vietnam is encountering and proposes solutions for each target group having influence on the coffee export process with the wish to uphold the position of Vietnam coffee in the world market.

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