

# THE COMPARATIVE ADVANTAGE OF COFFEE PRODUCTION IN LAM HA DISTRICT, LAM DONG PROVINCE, VIETNAM: A DOMESTIC RESOURCE COST APPROACH

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Received: 24/05/2017; Accepted: 27/6/2017

## ABSTRACT

*Lam Dong has its very potentials of being a strategic coffee producing region serving the domestic market and export. However, the volatility of coffee price along with intrinsic weaknesses had recently affected the competitiveness of coffee production of the province. The Domestic Resource Cost approach (DRC) was employed in this study to analyze the factors affecting the comparative advantage of coffee production in Lam Ha, Lam Dong. Key results showed that despite of the obvious dependence on the world price of coffee, Lam Ha remains highly competitive of coffee production and the competitiveness is highly sensitive to domestic resource costs, foreign resource cost and the exchange rate. In particular, if the cost of domestic resources increased by 25%,  $DRC/SER = 0.7$ ; or if the cost of foreign resources increased by 25%,  $DRC/SER = 0.641$ ; or if the exchange rate fell 25%,  $DRC/SER = 0.43$ ; or if the price of coffee exports fell 25%,  $DRC/SER = 0.866$ . The approach used in this study gains more insights about the differences in comparative advantages of coffee production in Lam Ha District, Lam Dong Province; it could be, therefore, adapted and applied for coffee production in other provinces in Central Highlands or perennial plants in Vietnam.*

**Keywords:** Domestic Resource Cost (DRC), Comparative advantage, Coffee production, Lam Ha-Lam Dong.

## TÓM TẮT

**Tính cạnh tranh trong sản xuất cà phê ở huyện Lâm Hà, tỉnh Lâm Đồng, Việt Nam: cách tiếp cận theo chi phí nguồn lực nội địa**

*Lâm Đồng có tiềm năng trở thành một vùng sản xuất cà phê chiến lược phục vụ thị trường trong nước và xuất khẩu. Tuy nhiên, sự biến động của giá cà phê cùng với những khó khăn gần đây đã ảnh hưởng đến khả năng cạnh tranh trong sản xuất cà phê của tỉnh. Cách tiếp cận tính toán chi phí nguồn lực nội địa (DRC) được sử dụng trong nghiên cứu này để phân tích các yếu tố ảnh hưởng đến tính cạnh tranh của sản xuất cà phê tại Lâm Hà, Lâm Đồng. Kết quả nghiên cứu cho thấy, mặc dù phụ thuộc nhiều vào giá cà phê trên thế giới nhưng Lâm Hà, Lâm Đồng vẫn có sức cạnh tranh cao trong sản xuất cà phê và tính cạnh tranh phụ thuộc rất lớn vào chi phí của các yếu tố sản xuất nội địa, chi phí của*

*các yếu tố sản xuất ngoại nhập và tỷ giá hối đoái. Cụ thể, nếu chi phí của các yếu tố sản xuất nội địa tăng 25%,  $DRC/SER = 0,7$ ; hoặc nếu chi phí của các yếu tố sản xuất ngoại nhập tăng 25%,  $DRC/SER = 0,641$ ; hoặc nếu tỷ giá hối đoái giảm 25%,  $DRC/SER = 0,43$ ; hoặc nếu giá cà phê xuất khẩu giảm 25%,  $DRC/SER = 0,86$ . Phương pháp tiếp cận được sử dụng trong nghiên cứu này thể hiện được tính ưu việt trong việc phân tích sâu về sự khác biệt trong lợi thế sản xuất cà phê tại huyện Lâm Hà, tỉnh Lâm Đồng. Do đó nó có thể được điều chỉnh và áp dụng trong xác định lợi thế sản xuất cà phê ở các tỉnh Tây Nguyên hoặc các loại cây dài ngày ở Việt Nam.*

**Từ khóa:** chi phí nguồn lực nội địa, tính cạnh tranh, sản xuất cà phê, Lâm Hà – Lâm Đồng.

## 1. Introduction

Since 1994, coffee has always been one of the major exports of agricultural products of Vietnam with annual export turnover up to around US\$ 2 billion and has contributed to the cause of industrialization, modernization, and international economic integration of the country (Trinh, 2007). However Vietnam's coffee sector was evaluated as imperfect at all stages including producing, processing and marketing.

After signing Comprehensive Partnership Agreements such as Regional Comprehensive Economic Partnership (ASEAN + 6, ASEAN Free Trade Agreement – Hong Kong, Vietnam - European Free Trade Agreement) Vietnam will become one of the economies most open wide and deep integration in the world. This has brought great opportunities for Vietnam's coffee industry in bringing the products to consumers at global scale, but it may also pose challenges if Vietnam's coffee industry does not have the policies to raise incomes, and to stabilize the life of direct coffee growers.

This study examines the actual and potential comparative advantages of coffee production in Lam Ha, Lam Dong, Vietnam where there are favorable

conditions for land and climate for agricultural development of high technology and high quality to make a breakthrough in the development of agriculture and rural economy. The coffee plant here has become traditional industries, plays a key role in the income of farmers for a long time. Recently, changes from the integration of the country into the international economy, the local coffee industry faces uncertainties, such as demanding strategic and long-term solutions for sustainable development. By estimating the domestic resource cost (DRC) of coffee production, this paper examines: (1) how well the coffee production in Lam Ha, Lam dong has progressed to improve its comparative advantage; and (2) how the provincial government has done to push up the development of coffee production.

## 2. Literature review

### 2.1. Domestic resource cost

The present research uses DRC approach to provide a comparison between the domestic costs to the value added it generates (Gorton and Davidova, 2001). The DRC is a measurement of the opportunity cost of producing or saving products to foreign exchange (Bruno,

1972). The numerator is the sum of the costs of using domestic primary resources including land, labor, and capital which its value is measured by shadow prices. The denominator is the value-added (value of output minus tradable input costs per unit of output) in border prices. The original formula of calculating DRC was converted into a much simplified form by Pearson and Meyer (1974) as follows:

$$DRC = \frac{(1) + (2) + (3)}{(5) - (4)}$$

Where: (1) Domestic resource factors including land, labor, and capital; (2) Costs of non-tradable or domestic resources inputs; (3) Costs of purchasing, processing, and exporting, including marketing and transporting costs; (4) Costs of tradable or foreign sourced inputs; and (5) Border price of traded inputs.

The following DRC/SER index possibilities can be explained as follows:

$DRC/SER = 1$ , product produces beneficial neutrality meaning that the product does not have any comparative advantages or disadvantages.

$DRC/SER < 1$ , this shows the product has comparative advantage which means that the product requires less the cost of domestic resources to produce one unit for the net foreign exchange that can be earned by exporting.

$DRC/SER > 1$ , this shows the product has comparative disadvantage which means that the product requires more the cost of domestic resources to produce one unit for the net foreign exchange that can be earned by exporting.

## 2.2. Previous studies

Various scientists conduct research

about the comparative advantage of Vietnam's agricultural products (Mai, 2002; Nguyen and Mai, 2013; Nguyen, 2004; Pham, 2003; Trinh, 2007; Truong, 2014). The key results of these studies showed positive signals about the country's comparative advantage when many agricultural products remain competitive in comparison. For example, Nguyen (2004) have used DRC approach to analyze the comparative advantage of dairy products of the South East Vietnam. The results found in the study were very promising. Not only did the dairy cows show promising advantages by specific methods DRC but also Mekong Delta pigs did. However, farmers were still using decentralized self-raising mechanism, and self-produced, as well in small scale which did not harness long-term benefits, mainly aimed for short-terms.

DRC was also engaged in studies regarding the comparative advantage in rice production which can be found in the study of Pham (2003). The results showed that DRC/SER is about 1.11 and 0.59 for the season crops and spring crops, respectively. The research on the comparative advantage of rice production in the Mekong Delta was also conducted by Mai (2002). The authors have employed Cobb-Douglas regression and correlation model along with the analysis of comparative advantage with DRC. Results showed promising comparative advantages of the rice products. Yet, it has to attract a suitable concern and investment from the government and farmers.

Nguyen (2004) also studied the comparative advantages of rubber production in South East Vietnam. The results of the study have confirmed the

efficient of foreign currency generated from exports of rubber production reflected by a relatively small DRC (0.48). Recently, Truong (2014) studied the comparative advantages of rubber products in Dak Doa- Gia Lai. Research was done at the time of the rubber market has large fluctuations in prices. Farmers rampantly switch rubber to others. Even so, results of the study insisted that rubber products still have a comparative advantage (DRC/SER = 0.77). However, the quality of latex was not highly emphasized right from the production.

Directly related to the competitiveness of the coffee production, Ngo (2004) studied the advantages of coffee production in Central Highlands, Vietnam. This study demonstrated actual positive results of coffee competitiveness even those measured figure (DRC=0.73) was relatively higher than rubber's (DRC/SER = 0.43) at the same period. Similarly, Nguyen and Mai (2013) used the DRC approach to prove the competitiveness of coffee production in Vietnam.

DRC approach was also employed to compare the opportunities of using the domestic production inputs to gain the foreign exchange in agriculture for varieties of products (Fang and Beghin, 2003; Greenaway and Milner, 1993; Ling *et al.*, 1999; Masters and Winter-Nelson, 1995; Nivievskyi and von Cramon-Taubadel, 2008). For example, Islam (1984) applied the principle of comparative advantage in the choice of agricultural crops. More related to the present study, Pearson and Meyer (1974) applied the DRC approach to analyze the competitiveness of coffee production in African countries.

In recent years, the world economy is increasingly fiercely competitive. A new study in the context of integration is necessary to be in place to examine as if regional comparative advantage of coffee in Central Highlands still remains unchanged. Additionally, conducting study using the DRC approach among different regions in the Central Highlands will gain more insights about the differences within provinces in Central Highlands, if any, housing useful data for other further researches. More importantly, the DRC approach used in the present study brings with its several advantages. In particular, this approach evaluates gains or losses of the opportunity costs of domestic production input used to produce final commodities being exported to earn foreign exchange which is often scarce in many agricultural countries such as Vietnam.

### **3. Research methodology**

#### **3.1. Data collection**

The DRC analysis requires a large variety of data. The data obtained in this study comprised two sources: secondary and primary data. For secondary data, the following materials are included: current and historical reports of production and market intelligent of the coffee sector in Lam Dong and Vietnam, statistics from subsidy programs of the province regarding the coffee sector. For primary data, 303 coffee producers in Lam Ha, Lam Dong was interviewed. The key information collected are farming, processing, and trading coffee.

In this study, the DRC is defined as the cost of each item in production stage which is calculated by the total costs of the item divided by the total yield of one

hectare of coffee in the whole life cycle.

Cost of land is determined using the opportunity cost of land. The reason for this is that, in agricultural production, land is considered as one kind of property which cannot transfer its value to the product at all time. Alternatively, land can be put out to lease. Money earned from the lease can be considered as the opportunity cost of land in coffee production. The arguments supporting for this were also found in the research by Nguyen (Ngo, 2004; Nguyen and Mai, 2013). Within the scope of this study, the opportunity cost of land is determined according to the price of land leased by farmers for growing coffee. Land cost is counted as domestic resource input cost; and it worth 9.390.231 VND (see Table 1).

Labor costs are calculated from planting to harvesting coffee at farm (Mohanty *et al.*, 2002; Truong, 2014). The opportunity cost of labor in the production phase is measured by labor prices paid by farmers with an assumption that the labor market is relatively perfect. The opportunity cost of labor in processing is determined by wages, social insurance, and other labor allowances; and it worth 1.073.218 VND (see Table 1).

The cost of fertilizer is divided into two power sources including domestic input costs and foreign source input costs (Ngo, 2004; Raynolds *et al.*, 2007). The main fertilizers are manure and synthetic fertilizers NPK. The fertilizers are partly imported fertilizers from abroad, some are domestic production. However, the domestic fertilizers still have to use some of the imported materials and machineries. Therefore, the cost of synthetic fertilizers NPK was identified as foreign sources of

input costs (248 US\$, see Table 1), while the cost of organic fertilizers as domestic sources (3.675.020 VND, see Table 1). Assumingly, organic fertilizer market is perfect. The real cost spent for organic fertilizers is also considered opportunity costs. Foreign sources fertilizer costs are calculated by CIF price. All other miscellaneous costs added to the farm are counted toward domestic sources.

Pesticide costs are also divided into two categories including domestic costs (372.686 VND, see Table 1) and foreign costs (39 VND, see Table 1). The opportunity cost of pesticide and import fuel from oversea are calculated as CIF price. All domestic pesticide and fuel composed from imported raw material are considered foreign source costs (Ngo, 2004). However, transportation costs and other expenses are accounted as expenses of domestic source and retrieved from actual price as opportunity costs.

The opportunity cost of tools and equipments is determined by the market prices (Ngo, 2004; Nguyễn and Mai, 2013; Pearson and Meyer, 1974). Most of these are domestic sources. Other costs included shipping, lease, packaging, fees, and charges are domestic resource costs (3.843.664 VND, see Table 1).

To calculate and convert the DRC to a more unified currency, the shadow exchange rate (SER) was used. SER is the floating rate without government intervention. In fact, the official exchange rate (OER) might not same as the SER due to market distortion of export tax, subsidy. The formula of SER used in this study was employed by the research of Nguyen and Mai (2013), which is as follows:

$$\text{SER} = \text{OER} * (1 + \text{FX premium})$$

Where:

The FX premium is the coefficient reflecting the difference between official exchange rate and its opportunity cost (shadow price). For developing countries, World Bank proposed coefficient FX premium is 20%. The official exchange rate (OER) of Vietnam in 2015 (published by the State Bank of Vietnam) is 22,370 VND/USD.

In this paper, the SER was calculated as follows:

$$\text{SER} = 1.2 * \text{OER} = 1.2 * 22,370 = 26,844 \text{ VND/USD}$$

### 3.2. Data analysis

First, the DRC/SER index was calculated on average on one ton of coffee for export, using the formulation proposed by Pearson and Meyer (1974). Second, sensitivity analysis was employed to

measure possibilities of the comparative advantage of coffee production in Lam Ha, Lam Dong when there are changes in factors affecting DRC, including costs of domestic resource and foreign resource; coffee price for export, and exchange rate. Details of the changes are shown in Table 2.

## 4. Results and discussions

### 4.1. Domestic Resource Cost of Coffee Production

The results from Table 1 show the DRC/SER index of coffee production in Lam Ha, Lam Dong is 0.573. This means that if farmers spend \$0.573 domestic resource costs on planting, processing, and exporting one unit of coffee, the net benefit of foreign currency worth \$1. The results demonstrate that the coffee industry in the province of Lam Ha, Lam Dong has a comparative advantage.

**Table 1: Comparative advantage of Lam Dong's coffee industry**

“Calculated on average on 1 ton of coffee for export”

Items	Unit	Value
<b>I. Domestic cost</b>	VND	<b>21.158.283</b>
1. Land	VND	9.390.231
2. Labor	VND	1.073.218
3. Capital	VND	251.932
4. Seed	VND	1.776.632
5. Fertilizer	VND	3.675.020
6. Pesticide	VND	372.867
7. Fuel	VND	774.720
9. Equipment depreciation	VND	3.843.664
<b>II. Foreign cost</b>	USD	<b>545</b>
1. Fertilizer	USD	248
2. Pesticide	USD	39

Items	Unit	Value
3. Imported equipment depreciation	USD	258
<b>III. Cost of procurement and export</b>	VND	<b>2.622.598</b>
1. Collecting cost	VND	2.259.243
2. Cost of processing and exporting	VND	363.355
<b>IV. Coffee export value</b>	USD/ton	2.091
(Average price of the first 3 months in 2015, FOB price )		
<b>V. DRC</b>	VND/USD	15.380
<b>VI. OER</b>	VND/USD	22.370
<b>VII. SER</b>	VND/USD	26.844
<b>VIII. DRC/SER</b>		<b>0,573</b>

Source: compile from survey data and calculation by the authors in 2015

#### 4.2. Analysis of Factors Affecting the DRC Index

The comparative advantage of a product is only meaningful and significant in certain time periods. Changes will happen as if all the required conditions of comparative advantages are not secured. The prices of inputs and outputs remain fluctuated in all time. Besides, policies and legal framework are often changed accordingly over time. The change in

coffee price, the cost of input materials, or exchange rate would add up to DRC volatility. To examine and access the changing comparative advantage of coffee industry, this study utilizes the analysis of factors affecting DRC index under different scenario to find a stabilized solution enhancing comparative advantage of coffee products. The scenarios are calculated as shown in Table 2.

**Table 2: Scenarios of the DRC/SER index of Lam Dong's coffee production**

“Calculated on average on 1 ton of coffee for export”

Scenarios	DRC/SER	Scenarios	DRC/SER
Baseline scenario DRC/SER	0,573	Base scenario DRC/SER	0,573
<b>Cost of Domestic Resources</b>		<b>Cost of Foreign Resources</b>	
Increase 15%	0,649	Increase 15%	0,605
Increase 25%	0,700	Increase 25%	0,628
Increase 30%	0,726	Increase 30%	0,641
Decrease 15%	0,496	Decrease 15%	0,527

Scenarios	DRC/SER	Scenarios	DRC/SER
Decrease 25%	0,445	Decrease 25%	0,518
Decrease 30%	0,420	Decrease 30%	0,424
<b>Coffee Price for Export</b>		<b>Exchange Rate</b>	
Increase 15%	0,476	Increase 15%	0,659
Increase 25%	0,428	Increase 25%	0,716
Increase 30%	0,408	Increase 30%	0,745
Decrease 15%	0,719	Decrease 15%	0,487
Decrease 25%	0,866	Decrease 25%	0,430
Decrease 30%	0,964	Decrease 30%	0,401
Cost of Domestic and Foreign Resources increased by 5% while Coffee price for export and exchange rate decreased by 5%			0.692
Cost of Domestic and Foreign Resources increased by 15% while Coffee price for export and exchange rate decreased by 15%			1.042
Cost of Domestic and Foreign Resources decreased by 5% while Coffee price for export and exchange rate increased by 5%			0.478
Cost of Domestic and Foreign Resources decreased by 10% while Coffee price for export and exchange rate increased by 10%			0.401
Cost of Domestic and Foreign Resources decreased by 20% while Coffee price for export and exchange rate increased by 20%			0.285

*Source: compile from survey data and calculation by the authors in 2015*

The results showed that, compared to the baseline scenario, in terms of other factors constant. In particular, (1) if the cost of domestic resources increased by 25%, DRC/SER = 0.7; or (2) if the cost of foreign resources increased by 25%, DRC/SER = 0.64; or (3) if the exchange rate fell 25%, DRC/SER = 0.43; or (4) if the price of coffee exports fell 25%, DRC/SER = 0.86.

The coffee production in Lam Ha, Lam Dong has the ability to withstand the volatility of the prices of input factors (including the costs of domestic and

foreign sources) with an increase of 25% compared to the baseline scenario. Accordingly, the exchange rate declined by 25% compared to the baseline scenario will produce DRC/SER = 0.43. In the past decade, the exchange rate between VND and USD is always increased. This trend increases the competitiveness of Vietnamese coffee in general and Lam Dong in particular. However, when the price of coffee exports fell 30%, the coffee production almost lost competitiveness (DRC/SER = 0.96). This analysis shows that the competitiveness of the coffee



sector is significantly dependent on the volatility of prices. The results also showed that the DRC/SER index is very sensitive to export coffee prices. In the past, the price of coffee has dropped to a record low (lowest price recorded a dramatically steep in coffee export price down to 10 times compared with prices in the first three months of crop year 2015). Table 2 also clarifies further the impact of the price sensitivity on coffee exports from the perspective of index DRC/SER. Thus, scenario analysis of coffee DRC showed potential comparative advantages in Lam Dong's coffee sector in the near future.

### 5. Policy Implications

Lam Dong has its very potentials of being a strategic coffee producing region serving the domestic market and export (Ngo, 2004). It requires attention and resolution to make coffee trees to be the fuel for the development of local economy. Securing a stable output for local coffee should be prioritized among leaders of Lam Dong province. Resolution for Lam Dong coffee industry contains 2 parts including the domestic consumption market, and the world market. Reselecting the homogeneous varieties with highest yield and reconstructing cultivated lands to boost output uniformity for final coffee products must be in place. Trainings for farmers to master the process and the coffee growing techniques aim for high performance capabilities and the application of technology into production. Agricultural Extension Center needs to invest in RandD to find high yield varieties in line with local practice. Encouraging the establishment of high-yield coffee clubs is

to create an environment to exchange and share information and experiences among coffee farmers to keep track of market price and avoid unfair bargaining.

### 6. Conclusion

The comparative advantages of coffee production in Lam H, Lam Dong is clearly shown related and sensitive to the fluctuation in prices of export coffee. However, Lam Dong's coffee production barely loses its comparative advantages when coffee price drops down to 30% (DRC/SER= 0.96). Meanwhile, the coffee production in Lam Dong province can withstand the volatility of domestic and foreign input costs of up to 30% compared to the baseline scenario (with DRC/SER = 0.72 and 0.64 respectively). The DRC coefficient in the past twenty years of the coffee production in Vietnam showed a major dependence on price of export, especially in periods 2000-2005. In particular, when world prices of coffee were on a vertical dive (302 – 830 USD/Ton) in 2001, DRC/SER showed a very negative scenario for the industry with the highest record of 13.73.

The DRC approach used in the present study brings with its two advantages. First, this approach evaluates gains or losses of the opportunity costs of domestic production inputs used to produce final commodities being exported to earn foreign exchange which is often scarce in many agricultural countries such as Vietnam. Second, The approach used in this study gains more insights about the differences in comparative advances of coffee production in Lam Ha District, Lam Dong Province; it could be, therefore,

adapted and applied for coffee production in other provinces in Central Highlands or perennial plants in Vietnam.

However, the findings of this study were just only validated in Lam Ha District as a part of Lam Dong Province. The

findings, therefore, may not be totally suitable for Lam Dong context and conditions. This is also a suggestion for further studies aiming at validating the findings at more general level of Lam Dong Province.

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