

Comparative Advantage OF Tuong-Mango Export Marketing Channels in Dong Nai, Vietnam

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Abstract

The primary objective of this research is to analyze the key stakeholders involved in the Tuong-mango export channels, specifically by investigating their production cost structures in relation to the prevailing market price. This research aims to examine the comparative advantage of the export supply chain in relation to its social price. The competitive advantage of the Tuong-mango trading system is determined by the systematic approach to supply chain management, namely via the evaluation of the domestic resource cost per shadow exchange rate (DRC/SER) ratio. A total of 213 observations were conducted in Dong Nai, Vietnam, with a specific emphasis on the main actors. Based on the findings, it is evident that the export supply chain of Dong Nai Tuong-mango has three discernible components. The DRC/SER ratio of the Tuong-mango trade system was determined to be less than one, indicating a competitive advantage resulting from the presence of three distinct export channels. The first three seasons of export channel 1 had DRC/SER ratios of 0.59, 0.62, and 0.59, in sequential order. The value of Season 1 on export channel 2 was recorded as 0.50, whilst Season 2 had a slightly higher value of 0.55. In Season 3, there was a notable increase in value, with a peak of 0.57 seen on the same export route. The first three seasons shown on export channel 3 had DRC/SER ratios of 0.51, 0.57, and 0.74, in sequential order. In order to facilitate the sustainable growth and economic prosperity of the Tuong-mango industry, it is recommended that policymakers and governments implement export-oriented incentives that prioritize the maximization of comparative advantage. This research offers valuable insights into the concept of comparative advantage within export supply chains, with a specific emphasis on a wide range of tropical fruits and vegetables. Furthermore, it provides empirical data supporting the use and validity of the Ricardian model.

Keywords: Export channels, Tuong-mango, Economic efficiency.

1. INTRODUCTION

Vietnam is currently the seventh largest mango cultivator in Asia and the thirteenth largest in the globe. Vietnam ranks third in Southeast Asia for mango production, according to the 2019 Food and Agriculture Organization Statistical Yearbook for Asia and the Pacific (FAOSAT). Vietnam is the third-largest mango producer in Southeast Asia, after Indonesia and Thailand. The Covid-19 pandemic is likely to reduce the export

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value of fruits and vegetables in 2019 and 2020 relative to 2018 levels. According to research by Khoi (2021), the value of Vietnamese mango exports is projected to increase substantially, possibly eclipsing a twofold increase. In 2020, the value is projected to increase to \$279 million from the current value of \$68 million. According to the Vietnam General Statistics Office, as of 2022, all Vietnamese provinces will participate in mango cultivation. In 2019, the cultivation of mangos on a vast land area of more than 100,000 acres resulted in a substantial domestic output of 815,200 tons.

There appears to be a connection between the Mekong Delta (MD) and Vietnam's extensive mango plantations, according to observational evidence. This link encompasses an estimated 62.2% of the nation's mango production capacity and 46.3% of the total acreage devoted to mango cultivation. The investigation's outcome was determined by combining numerous distinct estimates. Mangoes can be effectively cultivated on parcels of land as small as 0.5 hectares, allowing even low-income producers to earn a livelihood. Several factors contribute to the challenges smallholder farmers have when attempting to implement new technology and establish strong market contacts, which would otherwise expedite the emergence of a sophisticated web of producer-consumer interactions. Peter's research from 2020 and William's from 2014 indicate that the agriculture industry has difficulty translating market demand, variety, quality, and food safety into actual market advancements. Pilar et al. (2021) identified difficulties in Vietnam's fresh produce supply chain. Inadequate refrigerated storage facilities, restricted access to client data, insufficient market information distribution, communication disruptions between businesses, and logistical obstacles all contribute to the difficulties of the current situation. The expansion and enhancement of Vietnam's export operations are a top priority. According to Anh et al. (2020), the overwhelming majority of commodity processing occurs in export markets. China purchases approximately 60% of the world's supply of Chu-mangoes (William, 2014).

The Vietnamese government is currently engaged in bilateral and international Free Trade Agreement (FTA) negotiations to increase agricultural exports, one of its strategic objectives. There are currently thirteen countries participating in Vietnam's Free Trade Agreements (FTAs), and negotiations are ongoing with three more. As a consequence of Vietnam's increased participation in global value chains, the nation's exporters and manufacturers will have to exert greater effort to attract foreign capital. Free trade agreements (FTAs) such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Europe-Vietnam Free Trade Agreement (EVFTA), and the United Kingdom-Vietnam Free Trade Agreement (UKVFTA) have a significant impact on the mango trade. If the increase in mango exports can be attributed to the formation of the ASEAN Economic Community (AEC), then it is probable that a second Free Trade Agreement (FTA) was established between ASEAN members. According to Brian et al. (2021) and Thang (2018), free trade agreement (FTA) partners of Vietnam do not impose tariffs on the export of Vietnamese fresh mangoes and mango-derived products. The significance of this decline in shipments to nations that have signed Free Trade Agreements (FTAs) for the mango trading industry cannot be exaggerated. There is room for growth in Vietnam's mango export industry, as the country is already among the top 10 mango-importing nations in the globe, alongside the United States, the United Kingdom, Canada, and Malaysia. In 2020, a substantial increase in the valuation of Vietnamese mango imports is anticipated to be driven primarily by rising demand in China and the United States. The Food and Agriculture Organization (FAO) reports substantial increases in imports and exports over the prior year. The growth rate of imports, at 7.7 percent, was greater than the growth rate of exports, at 5.2%. Recent data suggests that international mango trade has been on the rise and is currently at an all-time high. Over the next decade, mango exports are projected to increase by an average of 2.9% per year. In this investigation, forecasting algorithms were used to compile the findings. Asia is projected to produce 71.1 percent of the world's mangos by 2029, or

approximately 72.8 million tons. OECD-FAO (2020) forecasts that the average annual food intake will increase from 9,8 kg in 2019 to 12,1 kg in 2020.

Rising demand on both domestic and international markets bodes well for the Vietnamese mango industry. The potential for growth and development is substantial. A comprehensive strategy that ensures the observance of improved standards throughout the entire manufacturing and distribution processes is essential for maintaining a competitive advantage over other organizations operating in the same industry. The long-term survival of the supply chain is contingent on the implementation of policies that actively support it. The primary objective of this study is to shed light on the dynamic nature of Vietnam's mango export industry by analyzing its numerous components, competitive advantages, and propelling forces. These findings suggest that increasing mango exports could help Vietnam become more competitive on the global stage.

2. METHODOLOGY

2.1. Sampling technique

The data collection procedures were meticulously developed and executed with meticulous attention to detail at each level of the process. The choice to concentrate the research on the southern region of Vietnam was motivated by the unique agricultural methods used in cultivating mangoes in that area. In 2022, the General Statistics Office (GSO) made the determination that the Dong Nai province accounted for 50% of mango production area in the Southeast region and 55% of mango production volume in the region. The aforementioned information was derived from an estimate conducted in the year 2022. A random sample of 213 data points was selected from a vast pool of accessible information. The research study included a cohort of 158 farmers, whose collective efforts yielded a cumulative count of 43, 49, and 66 observations for the first, second, and third seasons, respectively. Furthermore, a comprehensive dataset was generated by gathering data from a representative sample including four cooperative, fifteen collectors, eight wholesalers, and eight supermarkets, and twenty retailers.

2.2. Literature Review

Throughout history, two distinct criteria of appraisal have vied for supremacy. In the field of international trade, researchers mostly use two distinct methodologies. The following discussion will be based on Ricardo's theoretical framework, which is often regarded as the foundation of conventional economics. The second approach, often referred to as the Balassa technique, derives its name from its originator, Balassa, who first formulated it in 1965. This strategy is grounded on the idea of comparative advantage. Conventional business practice is founded upon four fundamental pillars, namely profit, specialization, resources, and technical innovation. In some circumstances, the use of technical intensity indicators, manufacturing input unit costs, and local and global output prices might prove to be advantageous. According to the theoretical framework behind Balassa's method, changes in relative prices and non-price variables have the potential to impact economic activity. This method is grounded on the fundamental concept. This methodology incorporates the fluctuations of the economic cycle, as proposed by Zawalinska (2002). The notion of revealed comparative advantage, as proposed by Balassa, posits that a country's "export competitiveness" may be assessed by examining its actual export performance. The fundamental concept of this proclamation may be succinctly expressed. The central policy proposition of this strategic framework is to enhance the nation's export capability in sectors where it has shown proficiency in exporting. A competitive advantage is attained when a company formulates a strategic approach that sets it apart from its rivals. This may potentially facilitate the accelerated growth of the firm in comparison to its competitors. One of the most significant sources of competitive advantage for a business lies in the perception held by its customers that the collaborative

work it engages in with a competitor yields superior quality and more benefits. The notion of "competitive advantage," sometimes referred to as "competitiveness," is used in the domain of financial analysis to assess the financial feasibility of a firm or individual's profitability in light of prevailing market prices. Nevertheless, Porter (1990) contends that the notion of competition is often oversimplified within the realm of economic institutions, despite its evident importance. To ascertain the level of international competitiveness of a country, it is advisable to examine the extent to which its markets are accessible to global trade. This perspective posits that some individuals see conflict as a "zero-sum game," whereby one nation's gains come at the expense of another.

The DRCs are widely employed in ex-ante research to identify the existence or absence of a competitive advantage. The use of this strategy, which has a longstanding history, might perhaps be associated with the theoretical framework put forward by Ricardo in 1817. The comparison of the DRC is often used as a statistical measure to determine the relative benefit of a product. When conducting an assessment of a nation's economic output, it is important to consider the utilization rates of different economic activities in relation to its resources. These components have a crucial role in the economy and are thus strongly suggested for use. These expenditures might serve as a reference point for calculating the societal cost associated with obtaining an additional unit of foreign currency. The anticipated costs associated with producing net foreign exchange via the expansion of commodity exports or the use of home resources to decrease imports and foreign exchange needs are often known as "domestic resource cost" (DRC). The evaluation of the prospective advantages should always be taken into consideration when analyzing an increase in net foreign exchange. The subject under discussion is intricately linked to the fundamental issue of global trade: the concept of comparative advantage. Hence, the notion of comparative advantage has paramount importance within this perspective. To conduct the DRC analysis, it is important to establish a number of assumptions. Hence, inputs and outputs may be classified into local or foreign categories, depending on their origins. There is a proposal suggesting that the inputs and outputs of the system may potentially be subject to undisclosed costs. The validity of this assumption will be contingent upon the accessibility of similar costs for components. The maintenance of a steady level of production is contingent upon the government's diligent execution of regulations and legislation. Consequently, both the commodities transaction in issue and the currency's value are directly impacted by these measures.

Conducting comprehensive research on the DRC is a customary component of several research and development (R&D) endeavors. The approaches used by Gorton et al. (2000) provide a clear distinction between functional and inefficient production and management organizations. There exists a pressing need to develop and implement focused strategies aimed at reducing manufacturing costs. Hence, it is apparent that the DRC index has a strong correlation with comparative advantage, a significant concept within the field of international trade analysis. The DRC has been used as a subject of analysis in a thorough investigation of the advantages associated with the exportation of fruits and vegetables. There is a significant level of interest among academics and students in the pursuit of broadening their understanding and expertise in the field of agriculture. In their comprehensive investigation, Gao et al. (2012) undertook a thorough examination of the global competitiveness of China's agriculture sector, with a specific emphasis on the produce business. A comprehensive analysis was conducted on China's manufacturing sector, including a meticulous examination of seven essential fruit tree varieties. Among the seven fruit species examined, it is noteworthy that only the pear exhibits a statistically significant competitive advantage in the realm of international markets. The competitiveness of China's fresh vegetable export sector was examined by Jiang (2011). In this business, the Chinese client has a position of utmost importance and influence. In order to do this, the author constructs a theoretical framework that places emphasis on the systematic evaluation of the benefits and drawbacks. The aforementioned framework is used for the purpose of analyzing global competitiveness.

The results indicate that Chinese exporters of apples and pears may possess a competitive advantage in global markets due to their ability to provide more affordable prices. Recent research findings have shown that in terms of the exportation of perishable food items, China exhibits a somewhat lower level of competitiveness when compared to other countries.

According to the study conducted by Soetriono et al. (2019), the DRC value of snake fruit cultivated in the metropolitan area of Pronojiwo was determined to be 0.20. This result is considered suggestive of success since it is below one. This observation validates the efficacy of the cultivation endeavors. Hu et al. (2008) have reported that research findings suggest that China has the potential to enhance its export competitiveness in the fruit sectors with a strategic emphasis on the cultivation of citrus fruits, bananas, grapes, oranges, and pears. Previous research has examined this phenomena. In a study conducted by Li (2011), statistical data spanning from 1996 to 2010 was used to examine the level of international competitiveness within the apple industry in Hebei Province. The author acknowledges the substantial competitive advantage possessed by the Hebei apple industry inside the domestic Chinese market. According to the research conducted by the author, the United States has made comparatively less advancement in this field when compared to other nations. In order to get a deeper comprehension of the global competitive landscape inside China's agricultural industry, Mao and Chen (2011) undertook a research study for their scholarly publication. Based on the collected data, it seems that the Chinese fruit sector exhibits distinct features in comparison to the export industries of other prominent nations worldwide. The exports of fresh and dried fruit originating from China exhibit a lack of distinctiveness when compared to those from other nations.

The Siamese orange cultivar has a noteworthy comparative advantage (DRC 0.11) within the geographical region of Kanagarian Koto Tingg in Indonesia. The advantage may be attributed to the presence of favorable agroclimatic conditions and the judicious application of diverse local resources. Several studies have suggested different approaches to achieve a competitive advantage, such as improving the effectiveness of export agreements, raising public awareness, enhancing product quality, strengthening inspection protocols, and implementing novel procedures (Wei et al., 2010; Han et al., 2008; Hui and Yin, 2011). The current study aims to examine several variables that influence the export of agricultural products from China. Consequently, the study dedicates a significant amount of effort to examining these matters. Yang (2011) employs the trade gravity model as a theoretical framework to examine the distinctive features of China's fruit export sector. The objective of this study was to examine the patterns of exportation pertaining to fifteen distinct fruit varieties cultivated in China over the period spanning from 1992 to 2010. The research used panel data analysis as its primary methodological approach. A comprehensive analysis was conducted to examine the probable ramifications of Chinese agricultural exports, including several pertinent dimensions. Important determinants include the gross domestic product (GDP) of the importing country, agricultural production in China, trip time, participation in the Asia-Pacific Economic Cooperation (APEC), and bilateral real exchange rates. Based on the research conducted by Khan et al. (2006), it is advisable for the Pakistani government to allocate more resources towards attaining self-sufficiency in sugarcane production, rather than prioritizing objectives related to exportation. According to the study findings, the coefficient of exports of domestic resources is determined to be 1.31, above the established threshold of 1, which is considered the lowest acceptable value. Hence, the potential benefits of sugarcane exports are outweighed by the associated risks and costs. Despite the greater local production costs in the DRC compared to the cost of importing sugarcane, the DRC manages to maintain a very low import dependency ratio of 0.59. Import substitution seems to have a limited function in the DRC's broader policy aimed at achieving food security. While there is a preference for indigenous production, the option to import sugarcane is still being taken into consideration. According to Liu et al. (2006),

there are several possible factors that might have an impact on Chinese agricultural exports. The probable factors contributing to the collapse of the sector include the loss of competitive advantage resulting from labor expenses, substandard fruit quality, inadequate export infrastructure, limited availability of exportable species, and the imposition of international restrictions on environmentally sustainable trade. According to a research conducted by Li et al. (2008), the impact of food security regulations on Chinese fruit exports to the United States, Japan, and the European Union (EU) was shown to be comparatively less significant when compared to the influence of tariffs, technical trade barriers, and requirements related to product conformity standards and certifications. The feasibility of enhancing crop yield in Nigerian pineapple farms via the use of feeder and crown systems has been shown in a research done by Olayinka et al. (2014). The use of variable pineapple growing techniques potentially offers several advantages. The findings from the DCR analysis indicated that the feeder strategy had a higher level of effectiveness compared to the crown technique, as shown by a DCR of 0.27 in contrast to 0.22.

The key aims of this study are to examine the international competitiveness of the mango producing industry and to assess the various contributing aspects. However, it is important to acknowledge that Vietnamese scholars have seldom used overseas marketing research as a primary source for evaluating the feasibility of Vietnam's agricultural exports.

2.3 Empirical model

The concept of Domestic Resource Cost (DRC) was first introduced by Bruno in 1972. The calculation of the genuine opportunity cost associated with using a nation's entire domestic resources for the production or retention of a single foreign currency is conducted via a quantitative methodology known as the DRC. The determination of this cost involves the consideration of the opportunity cost associated with the use of domestic resources. According to Monke and Pearson (1989), the DRC serves as a significant resource for examining comparative advantages and evaluating the effectiveness of tactics used in the agricultural sector. The main objective of this scholarly investigation is to examine the advantages that agricultural enterprises get from competition. In a research conducted in 2002, lead by Funing and Xu, a group of academics investigated and analyzed the varying advantages associated with various regions in China for the cultivation of cereal crops. Bishnu (1983) conducted an analysis of the first economic consequences associated with the cultivation of tea in Nelap, using just locally accessible resources.

The computational methodology used for the determination of the DRC has several practical applications.

$$DRC_i = \frac{\sum_{j=k+1}^n a_{ij} V_j}{p_i^r - \sum_{j=1}^k b_{ij} p_j^r}$$

The variable V_j represents the opportunity costs associated with local production. This variable specifically represents the shadow price associated with domestic resources and non-tradable inputs. Furthermore, the variables denote the technical coefficients pertaining to non-tradable inputs and domestic resources. Here, the index j may take on any integer value ranging from $k+1$ to n . This range encompasses a broad spectrum of potential values. Gorton et al. (2000) established that the technical coefficient for traded inputs is represented by the symbol b_{ij} , where the value of j may range from one to k . Furthermore, the symbol P_i^r represents the price of traded inputs, often referred to as the border or reference price. In the context of the exchange, the variable denoted as P_j^r

serves as a symbolic representation of the maximum threshold or benchmark price that might potentially be attained.

$DRC/SER < 1$, the trade system has a comparative advantage (economic efficiency).

$DRC/SER > 1$, the trade system does not have a comparative advantage (economic efficiency).

The shadow exchange rate can be estimated through the following formula:

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

Whereas:

- SER: Shadow Exchange Rate
- OER: Official exchange rate (OER—Official Exchange Rate),
- FX premium is suggested 20% (0.2) by the World Bank applying for developing countries (Minh et al., 2016)

The opportunity cost: The examination of labor resource allocation within a competitive and productive labor market may be facilitated by using the idea of opportunity cost. The projected price is derived on an examination of the expenditures made by actual households. This study utilizes national land rental rates as a predictive tool for estimating future land costs for coffee cultivators. When doing a valuation of a property, it is important to include the costs related to using the building's internal assets. Lorenzo (2013) assumes constant efficiency through time and yearly depreciation when estimating the potential costs related to agricultural equipment.

CIF price: The phrase "Cost, Insurance, and Freight" (CIF) refers to the financial value or appraisal of imported goods.

FOB price: The "Free On Board" (FOB) approach does not include the costs associated with migration. The term "exports" refers to the commercial activity of selling goods and services that are produced or provided inside a country's borders to foreign markets.

Tradable commodities: The terms "border pricing," "international prices," and "border prices" are synonymous and denote the monetary valuation at which a commodity may be traded across different countries. The pricing framework encompasses three key components: the farm gate price, transportation costs, and retail profit. An alternate approach to the development of shadow pricing is the use of transfer factors, which presents a feasible option. The transfer factor of a product refers to the extent to which the actual sales statistics deviate from the expected market price for that particular product.

Non-tradable commodities: The term "non-tradable" products refers to commodities that exhibit limited mobility across international borders. In product descriptions, it is common to see the use of specific terminology. In contrast to the conventional market framework that assigns value to commercial items and industrial inputs such as labor and land, social pricing systems evaluate the value of non-tradable commodities. Hence, the impact of domestic output on the economy's ability to accumulate or distribute foreign currency is negligible. The DRC often emerges as a topic of discussion in policy deliberations. In their investigation, Gorton et al. (2000) identified significant differences between successful and unsuccessful manufacturing. The study findings also highlight the need of implementing strategic measures to enhance productivity and identify certain domains that should be given precedence in legislative efforts.

3. RESULT AND DISCUSSION

There are three primary avenues via which the Tuong-mango trade is conducted:

Channel 1 Farmer \longrightarrow Cooperative \longrightarrow Export Enterprise

Channel 2 Farmer → Collector → Wholesaler
 Channel 3 Farmer → Wholesaler (Chinese market)

Distribution Channel 1: The United States, Russia, and Australia are considered to be prominent export markets because to their substantial dependence on imports of Tuong-mango. This firm is subject to stringent phytosanitary and sanitation standards. Airplanes are often seen in the context of global business. The Tuong-mango has been awarded a "A" grade in terms of its quality. First grade Tuong-mango is mostly obtained from cooperatives that adhere to legal regulations and using safe pesticide practices. Agricultural cooperatives use traceability codes and keep agricultural diaries as measures to ensure food safety. These cooperatives have obtained certifications such as VietGAP and GlobalGAP, further validating their adherence to international standards. The identification of the grade 1 Tuong-mango may be based on many discernible traits. The aforementioned qualities are possessed by the product in question, in addition to its visually pleasing appearance, relatively low weight of around 550 grams, secure packaging, smooth and unwrinkled surface, and vibrant yellow coloration. The aforementioned findings are consistent with those reported by Fernandez-Stark et al. (2011). In order to sustain their competitive edge and effectively meet the demands of importers along the supply chain, businesses are required to engage in ongoing innovation. This is due to the highly competitive nature of the export value chain.

Distribution Channels 2 and 3: Channels 2 and 3 have a global broadcasting reach. The distribution hub has the third position in terms of relevance within the distribution network. The primary objective of this system is to facilitate the process of exporting Channels 2 and 3. Channel 3 places a high level of significance on the Chinese market and allocates a substantial amount of resources towards accommodating their watching preferences. Commercial vehicles often use the designated trade checkpoints situated at the China-Vietnam border in order to facilitate the transportation of Tuong-mango, which are then distributed globally. The use of the third approach is anticipated for the purpose of harvesting Tuong-mango of inferior grade. The items in this category are classified based on many criteria. These criteria include traceability tags, a weight range of 450 to 800 grams, the inclusion of a packing bag, the ability to identify partial faults, the absence of creases, and the presence of brilliant colors. The expeditious delivery of recently harvested mangoes to the Chinese consumer market is contingent upon the pivotal role played by the distributor. Land vehicles are the primary mode of transportation for the bulk of mangoes, facilitating their delivery to the wholesale market and China. In order to maintain a consistent temperature for goods during long-distance transportation to destinations like as Danang, Hanoi, and China, heavy-duty vehicles are outfitted with refrigeration systems and electrical apparatus. The duration of travel from Ho Chi Minh City to Danang, located in the central region of Vietnam, often spans around 16 hours. In contrast, the journey from Ho Chi Minh City to Hanoi, situated in the northern part of the nation, normally encompasses a time frame ranging from 48 to 52 hours. The duration required to travel from China to the Vietnamese border ranges from sixty to seventy-two hours. The exclusive commercial deal with Channel 3 encompasses just China and Vietnam. Containers with a weight ranging from 25 to 30 tons, upon their entry into the Chinese market, are advised to provide a budget of around \$300 to \$350 for customs processing expenditures.

The notion of social pricing, first introduced by Monke and Pearson (1989), has promise as a viable approach for discerning regions of comparative advantage. The use of the DRC/SER ratio serves as a metric for comparative advantage in this study, since it enables the analysis of comparable levels of efficacy. Maximizing societal benefits may be achieved by minimizing the deadweight loss of resource allocation (DRC) to the greatest extent possible. There are five primary distribution channels for Tuong-mango products, each strategically tailored to cater to certain demographic segments.

Based on the data shown in Tables 1, 2, and 3, it can be seen that the revenue generated by Channels 1, 2, and 3 constantly surpasses both tradable and domestic expenses. The aforementioned conclusion demonstrates that during the examination of three agricultural seasons in Channels 1, 2, and 3, the distribution of scarce resources at prices determined by social factors yielded a favorable return on investment for the whole of society. As a result of this, the export system of Tuong-mango is capable of generating foreign currency via three distinct channels, namely channels 1, 2, and 3, over all three seasons. There is a widespread belief among individuals that the Tuong-mango export system is a very profitable industry that also upholds principles of equitable pricing.

Table 1. The comparative advantage of Tuong-mango in the export channel 1

<i>Unit: USD/ton</i>					
No.	Indicator costs	Season 1 (n=43)	Season 2 (n=49)	Season 3 (n=66)	Sig.
Official exchange rate in 2022 (USD 1 = 23.612 VND)					
1	Tradable inputs	644.05	699.60	539.11	<i>ns</i>
1.1	Root fertilizer	44.31	40.12	33.52	<i>ns</i>
1.2	Leaf fertilizer	5.00	6.40	4.06	<i>ns</i>
1.3	Paclobutrazol	6.81	7.20	7.47	<i>ns</i>
1.4	Herbicide	43.90 ^b	50.81 ^b	10.95 ^a	***
1.5	Pesticide	93.98	129.59	116.53	<i>ns</i>
1.6	Fungicide	313.48	376.03	284.48	<i>ns</i>
1.7	Fuel	4.15	4.61	7.12	<i>ns</i>
1.8	Wrapping bag	104.79	79.13	69.76	<i>ns</i>
1.9	Machine depreciation	27.64 ^a	5.71 ^b	5.22 ^b	**
2	Domestic factors	712.42	908.10	753.81	<i>ns</i>
2.1	Root fertilizer	98.82	89.48	74.77	<i>ns</i>
2.2	Leaf fertilizer	11.14	14.27	9.05	<i>ns</i>
2.3	Paclobutrazol	1.39	1.47	1.53	<i>ns</i>
2.4	Herbicide	8.98 ^b	10.39 ^b	2.24 ^a	***
2.5	Pesticide	19.21	26.49	23.82	<i>ns</i>
2.6	Fungicide	64.09	76.88	58.16	<i>ns</i>
2.7	Fuel	21.23	23.62	36.47	<i>ns</i>
2.8	Wrapping bag	21.83	16.48	14.53	<i>ns</i>
2.9	Machine depreciation	9.87 ^b	2.04 ^a	1.86 ^a	**
2.10	Transport	8.48	5.81	9.06	<i>ns</i>
2.11	Hired labor	136.53	135.71	118.24	<i>ns</i>
2.12	Family labor	148.55 ^a			**

			299.87 ^b	198.99 ^{ab}	
2.13	Land rent	162.29	205.58	205.09	<i>ns</i>
3	Marking cost of traders	5,066.00	5,066.00	5,066.00	<i>ns</i>
3.1	Cooperative	182.30	182.30	182.30	<i>ns</i>
3.2	Export enterprise	4,883.70	4,883.70	4,883.70	<i>ns</i>
4	Total Domestic = (2) +(3)	5,778.42	5,974.10	5,819.81	<i>ns</i>
5	Revenue	8,860.44	8,860.44	8,860.44	<i>ns</i>
6	Domestic resource cost	0.71	0.74	0.71	<i>ns</i>
7	Comparative advantage	0.59	0.62	0.59	<i>ns</i>

Source: Field survey data in 2022

Note: Tradable input is CIF price, and Tradable output is FOB price. The numbers of the same row are followed by the different letters being significant at a 5% level via the statistical Duncan test. * Significant at 10% level, ** significant at 5% level, *** significant at 1% level, and *ns* is non-significant.

Table 1 presents the results pertaining to the outcomes of the domestic resource cost (DRC) and DRC/SER for the first export channel. In relation to the concept of DRC, it was observed that Seasons 1 and 3 exhibited a DRC value of 0.71, whilst Season 2 had a DRC value of 0.74. The statistical data indicates values below unity, indicating a high probability that the export company, particularly export channel 1, would yield a foreign currency value of one dollar while incurring projected domestic factor expenses of twenty-nine cents every season over a span of three years (years 1, 2, and 3). The cost associated with the production of Tuong-mango during seasons 1, 2, and 3 is found to be around 71%, 74%, and 71% correspondingly, in relation to the cost associated with importing the fruit. This comparison is based on the DRC indices. Maximizing the use of indigenous resources in a proficient way might provide economic benefits via the production and commercialization of Tuong-mango.

Table 2. The comparative advantage of Tuong-mango in the export channel 2

		<i>Unit: USD/ton</i>			
No.	Indicator costs	Season 1 (n=43)	Season 2 (n=49)	Season 3 (n=66)	Sig.
Official exchange rate in 2022 (USD 1 = 23.612 VND)					
1	Tradable inputs	408.51	412.50	318.71	<i>ns</i>
1.1	Root fertiliser	28.10	24.94	20.76	<i>ns</i>
1.2	Leaf fertiliser	3.17	3.98	2.56	<i>ns</i>
1.3	Paclobutrazol	4.32	4.38	4.62	<i>ns</i>
1.4	Herbicide	27.85 ^b	32.44 ^b	6.61 ^a	***
1.5	Pesticide	59.61	71.54	71.95	<i>ns</i>
1.6	Fungicide	198.84	221.18	159.82	<i>ns</i>
1.7	Fuel	2.63 ^a	2.53 ^a	4.40 ^b	*
1.8	Wrapping bag	66.47	47.83	44.92	<i>ns</i>

1.9	Machine depreciation	17.53 ^b	3.68 ^a	3.08 ^a	**
2	Domestic factors	451.88	542.53	454.21	<i>ns</i>
2.1	Root fertiliser	62.68	55.63	46.31	<i>ns</i>
2.2	Leaf fertiliser	7.07	8.88	5.70	<i>ns</i>
2.3	Paclobutrazol	0.88	0.90	0.94	<i>ns</i>
2.4	Herbicide	5.69 ^b	6.63 ^b	1.35 ^a	***
2.5	Pesticide	12.19	14.63	14.71	<i>ns</i>
2.6	Fungicide	40.65	45.22	32.67	<i>ns</i>
2.7	Fuel	13.47 ^a	12.95 ^a	22.51 ^b	*
2.8	Wrapping bag	13.85	9.96	9.36	<i>ns</i>
2.9	Machine depreciation	6.26 ^b	1.32 ^a	1.10 ^a	**
2.10	Transport	5.38	3.65	5.81	<i>ns</i>
2.11	Hired labour	86.60	84.51	74.87	<i>ns</i>
2.12	Family labour	94.23 ^a	170.01 ^b	110.89 ^{ab}	**
2.13	Land rent	102.94	128.24	127.98	<i>ns</i>
3	Marking cost of traders	335.40	335.40	335.40	<i>ns</i>
3.1	Collector	90.80	90.80	90.80	<i>ns</i>
3.2	Wholesaler	244.60	244.60	244.60	<i>ns</i>
4	Total Domestic = (2) +(3)	787.28	877.93	789.61	<i>ns</i>
5	Revenue	1,926.96	1,926.96	1,926.96	<i>ns</i>
6	Domestic resource cost	0.60	0.66	0.68	<i>ns</i>
7	Comparative advantage	0.50	0.55	0.57	<i>ns</i>

Source: Field survey data in 2022

Note: Tradable input is CIF price, and Tradable output is FOB price. The numbers of the same row are followed by the different letters being significant at a 5% level via the statistical Duncan test. * Significant at 10% level, ** significant at 5% level, *** significant at 1% level, and *ns* is non-significant.

The findings shown in Table 2 indicate that the DRC/SER ratios pertaining to export channel 2 are below 1. The numerical values 0.50, 0.55, and 0.57 correspond to the first three seasons, in sequential order. Furthermore, the magnitudes of the DRC/SER values are comparatively less than the magnitudes of the DRC values. This serves as an illustrative example showcasing the potential efficacy of using home resources to enhance societal well-being on a broader scale. Consequently, export channel 2 demonstrates a notable competitive edge, prompting recommendations for enhancing the existing input-output linkages and pricing strategies.

Table 3. The comparative advantage of Tuong-mango in the export channel 3

Unit: USD/ton

No.	Indicator costs	Season 1 (n=43)	Season 2 (n=49)	Season 3 (n=66)	Sig.
Official exchange rate in 2022 (USD 1 = 23.612 VND)					
1	Tradable inputs	408.51	412.50	318.71	<i>ns</i>
1.1	Root fertiliser	28.10	24.94	20.76	<i>ns</i>
1.2	Leaf fertiliser	3.17	3.98	2.56	<i>ns</i>
1.3	Paclobutrazol	4.32	4.38	4.62	<i>ns</i>
1.4	Herbicide	27.85 ^b	32.44 ^b	6.61 ^a	***
1.5	Pesticide	59.61	71.54	71.95	<i>ns</i>
1.6	Fungicide	198.84	221.18	159.82	<i>ns</i>
1.7	Fuel	2.63 ^a	2.53 ^a	4.40 ^b	*
1.8	Wrapping bag	66.47	47.83	44.92	<i>ns</i>
1.9	Machine depreciation	17.53 ^b	3.68 ^a	3.08 ^a	**
2	Domestic factors	451.88	542.53	454.21	<i>ns</i>
2.1	Root fertiliser	62.68	55.63	46.31	<i>ns</i>
2.2	Leaf fertiliser	7.07	8.88	5.70	<i>ns</i>
2.3	Paclobutrazol	0.88	0.90	0.94	<i>ns</i>
2.4	Herbicide	5.69 ^b	6.63 ^a	1.35 ^a	***
2.5	Pesticide	12.19	14.63	14.71	<i>ns</i>
2.6	Fungicide	40.65	45.22	32.67	<i>ns</i>
2.7	Fuel	13.47 ^a	12.95 ^a	22.51 ^b	*
2.8	Wrapping bag	13.85	9.96	9.36	<i>ns</i>
2.9	Machine depreciation	6.26 ^b	1.32 ^a	1.10 ^a	**
2.10	Transport	5.38	3.65	5.81	<i>ns</i>
2.11	Hired labour	86.60	84.51	74.87	<i>ns</i>
2.12	Family labour	94.23 ^a	170.01 ^b	110.89 ^{ab}	**
2.13	Land rent	102.94	128.24	127.98	<i>ns</i>
3	Marking cost of traders	244.60	244.60	244.60	<i>ns</i>
3.1	Wholesaler (China)	244.60	244.60	244.60	<i>ns</i>
4	Total Domestic = (2) +(3)	696.48	787.13	698.81	<i>ns</i>

5	Revenue	1,778.52	1,778.52	1,778.52	<i>ns</i>
6	Domestic resource cost	0.62	0.69	0.88	<i>ns</i>
7	Comparative advantage	0.51	0.57	0.74	<i>ns</i>

Source: Field survey data in 2022

*Note: Tradable input is CIF price, and Tradable output is FOB price. The numbers of the same row are followed by the different letters being significant at a 5% level via the statistical Duncan test. * Significant at 10% level, ** significant at 5% level, *** significant at 1% level, and ns is non-significant.*

Table 3 presents the results of the comparative advantage study conducted on Export Channel 3, focusing specifically on the DRC/SER ratio. Based on the results, it was observed that the DRC/SER values for all three distinct Tuong-mango cultivars were found to be below unity. The values for Seasons 1 and 2 were recorded in the following order: 0.51, 0.57, and 0.74, respectively. Channel 3 may effectively circumvent the expenditure of one dollar on foreign exchange by using domestic resources that possess equivalent values of fifty-nine cents, forty-three cents, and twenty-six cents for seasons one, two, and three, respectively. This study also illustrates the optimal use of limited domestic resources over a wide range of product categories. Consequently, Tuong-mango's third channel exhibits a distinct competitive edge in comparison to its competitors with regards to its proficiency in export-oriented production.

The claim that each of the three potential export routes has a distinct edge over the other two is indeed accurate. Conversely, notable distinctions exist between them with regard to the DRC/SER ratio and agricultural seasons. In comparison to Channels 2 and 3, Channel 1 exhibits a competitive advantage that is somewhat lesser in scale than that of the aforementioned channels. The first agricultural season has the highest level of comparative advantage when compared to the subsequent second and third agricultural seasons. The primary finding demonstrates the economic efficiency and competitive advantage provided by the export production system for Tuong-mango. Hence, it is recommended that policymakers and governments use incentive-driven approaches to enhance the standard of products, diminish tariff and non-tariff barriers, and leverage the competitive edge provided by environmentally advantageous and geographically favorable soil and water resources. These endeavors are vital in order to facilitate the progress of the economy and cultivate sustainable development over an extended period.

4. CONCLUSION

The use of the DRC/SER ratio within the framework of societal pricing might potentially serve as a valuable instrument for assessing and comparing the different export pathways. This study offers valuable insights into the many advantages and disadvantages associated with each transportation route, therefore contributing to the assessment of the economic feasibility of the Tuong-mango trade. One may argue that Channel 2, of the three currently accessible export channels, has the greatest significant edge over its two counterparts. When the ratio of the DRC/SER is less than one, it can be seen that export channel 1 exhibits the lowest comparative advantage among various trade activities. Furthermore, it is evident that season 1 had the highest level of comparative advantage in comparison to its subsequent counterparts, seasons 2 and 3, which emulated its approach.

Utilizing DRC studies is a valuable method for evaluating the impact of international trade on the economies of local regions. This study examines the benefits associated with the integration of social price comparisons across multiple sales channels. CIF, which is an acronym for "cost, insurance, and freight," is a common price framework for acquiring inputs. In contrast, outputs are frequently traded utilizing the FOB, or "free on board,"

method. The abbreviation "CIF" depicts the three constituent elements of a transaction in sequential order: pricing, insurance, and transportation. The term "net profit" refers to the amount of money remaining after deducting various expenses, such as production costs, advertising costs, lost business opportunities, and real estate fees, from the company's total revenue. Other examples of costs include advertising expenditures and wasted business opportunities. A different way of understanding the concept of "net profit" involves the quantity of funds remaining after deducting necessary expenses and investments. This research provides actual evidence to substantiate Ricardo's methodology in analyzing the competitive dynamics of export supply chains. This study concentrates predominantly on analyzing the competitive dynamics of the tropical produce industry within the context of international trade. As globalization and liberalization accelerate in the modern era, nations engage in trade and prioritize the production of products and provision of services that maximize their comparative advantages. In order to increase the competitiveness of governments on the global market, it is necessary to implement programs that reduce the production costs of various commodities. In the context of international business, it is demonstrated that Ricardo's theory of optimal value is compatible with the findings of this study, which provide empirical evidence from the real world.

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