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Comparative advantage of Num-mango industry in Vinh Long, Vietnam

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Abstract: The main objective of this study was comparative advantages analysis at social price of Num-mango in the export channels. The examination of the domestic resource cost per shadow exchange rate (DRC/SER) ratio provides insights into the comparative advantage of the trading system in the Num-mango industry. A comprehensive study was conducted, with a total of 317 observations, with a specific emphasis on the significant individuals in Vinh Long, Vietnam. The comparative advantage of the Num-mango commerce system was inferred from a DRC/SER ratio below one, which may be attributed to the existence of two distinct export channels. The DRC/SER in export channel 1 exhibited values of 0.55, 0.67, and 0.53 over the three seasons. In season 1, export channel 2 had a score of 0.42, which then was 0.79 in season 2. The value of export channel 2 had a consistent upward trend during season 3, reaching its highest point of 0.3. It is recommended that regulators and governments provide export-focused incentives that prioritize the maximum comparative advantage. This study examines the concept of comparative advantage within export supply chains, specifically in relation to a diverse selection of tropical fruits and vegetables. Furthermore, it provides empirical evidence that supports the applicability and reliability of the Ricardian model.

Keywords: comparative advantage; Num-mango; economic efficiency; industry

1. Introduction

The output of mangoes in Vietnam is ranked as the seventh highest in Asia and the thirteenth highest globally. Based on the findings presented in the 2019 edition of the FAO Statistical Yearbook for Asia and the Pacific, it can be seen that Vietnam holds the position of the third-largest mango grower within the Southeast Asian region. Following Thailand and Indonesia, Vietnam has the position of being the third-largest mango grower in Southeast Asia. The anticipated decline in the export value of fruits and vegetables in 2019 and 2020 may be attributed to the impact of the Covid-19 pandemic, which is projected to be lower compared to the peak levels seen in 2018. According to Khoi (2021), it is anticipated that the value of Vietnamese mango exports would see a significant expansion, maybe surpassing a twofold increase. It is anticipated that the current worth of $68 million will see a growth of over 100% and reach $279 million by the year 2020. Based on the forecasts provided by the Vietnam General Statistics Office, it is anticipated that mango farming would be extended to include all provinces in Vietnam by the year 2022. In the year 2019, a substantial domestic harvest of 815,200 tons was obtained from an extensive expanse specifically allocated for mango cultivation, spanning over 100,000 acres (GSO, 2020).

The Mekong Delta (MD) is a geographical location located in Vietnam, which has been shown to exhibit a significant proliferation of mango cultivation, as supported

by empirical evidence. This hyperlink represents about 62.2% of the nation's aggregate land dedicated to mango cultivation and 46.3% of the nation's total acreage allocated for mango production (GSO, 2020). The outcome of the inquiry was derived by aggregating the findings from many distinct estimates. Research has shown that cultivating mangoes may provide significant profits even on plots as small as 0.5 hectares, so becoming it a viable and attainable choice for farmers operating on a smaller scale. The integration of novel technology and the establishment of robust market connections might present difficulties for small-scale farmers, therefore impeding the development of a multifaceted network including producers and consumers (William, 2014). The findings of Peter's research conducted in 2020 and William's research conducted in 2014 indicate that the agriculture industry encounters challenges in effectively translating market demand, variety, quality, and food safety considerations into meaningful commercial advancements. Pilar et al. (2021) have identified many challenges within the fresh vegetable supply chain in Vietnam. The current situation may be attributed to several issues, such as inadequate cold storage infrastructure, limited consumer knowledge, inadequate market information distribution, communication gaps among businesses, and logistical complexities. The growth and prosperity of Vietnam's export industry is of utmost importance. According to the findings of Anh et al. (2020), the primary driving force for commodities processing is mostly attributed to export markets. Based on the findings of William (2014), it is evident that China has a significant share of sixty percent in the worldwide market for Chu-mango sales.

The inclusion of bilateral and global "Free Trade Agreement" as FTA negotiations forms an integral part of the Vietnamese government's overarching policy aimed at enhancing agricultural exports in the long run. Moreover, Vietnam has established Free Trade Agreements (FTAs) with thirteen countries, and is now engaged in negotiations for future FTAs with three other governments. Due to the increasing integration of Vietnam into global value chains, it is imperative for the country's exporters and manufacturers to enhance their efforts in attracting foreign investment. The mango industry has significant impacts from 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). If the increase in mango exports can be attributed to the establishment of the ASEAN Economic Community (AEC), it is probable that a Free Trade Agreement (FTA) will be put into effect among ASEAN member countries (Thang (2018); Brian et al. (2021)). It can be seen that Vietnam's free trade agreement (FTA) partners do not impose taxes on the exportation of fresh mangoes or products derived from mangoes. The impact of the decline in mango exports to countries that have Free Trade Agreements (FTAs) has great importance within the mango trading industry. Vietnam is now recognized as a significant importer of mangoes, aligning itself with prominent countries such as the United States, United Kingdom, Canada, and Malaysia. Hence, there exists a substantial potential for expansion in Vietnam's mango export industry. The substantial expansion in the value of Vietnamese mango exports in 2020 is anticipated to be primarily driven by the heightened demand seen in China and the United States. According to the Food and Agriculture Organization (FAO) in 2020, there has been a

significant increase in both imports and exports when comparing data from one year to the next. In contrast to the growth rate of exports at 5.2%, the rate of increase in imports was higher. Recent data indicates a significant surge in the global trade of mangoes, reaching an unprecedented peak. The projected trajectory for mango exports in the next decade indicates an average annual growth rate of 2.9%. The data used in this investigation was consolidated via the application of prediction algorithms. It is projected that by the year 2029, the continent of Asia would have generated a total of 72.8 million tons of mangoes, accounting for about 71.1% of the global mango production. According to the forecasts made by the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization (FAO) in 2020, there is anticipated growth in the yearly consumption of food. Specifically, the data suggests that the average food intake per individual is expected to rise from 9.8 kilograms in 2019 to 12.1 kilograms.

The increasing popularity of mangoes in both domestic and global markets is a positive development for mango producers in Vietnam. There has ample potential for expansion and advancement (William, 2014). In order to ensure the competitiveness of one's firm within the industry, it is necessary to devise and execute a comprehensive strategy that ensures the adherence to elevated benchmarks throughout all stages of manufacturing and distribution. The long-term viability of a supply chain is contingent upon the establishment of regulations that actively foster its expansion and sustainability (Peter, 2020).

Num-Mango in Vinh Long, Vietnam is different from other countries. Mango in other countries is one season/year. In Vinh Long, mango seasons are year-round. Farmer is active to choose farming season by off-season flower stimulation technique. This technique has been applied 3 recent years. Thus, the result of this study is a way to provide information about mango year-round in Vietnam. Thus, this study shows comparative advantage of Num-mango three seasons as an outstanding feature of this study. This also differ from the past studies on mango (efficiency of one season per year).

The primary aim of this study is to get a comprehensive understanding of the dynamic elements of Vietnam's mango export industry. This will be achieved by an examination of its many components, competitive strengths, and factors that contribute to its development. The findings of this research indicate that enhancing Vietnam's mango exports might potentially enhance the country's global competitiveness. It is imperative to acknowledge, nonetheless, that in assessing the feasibility of Vietnam's agricultural exports, domestic experts have seldom relied on global marketing research.

2. Literature review

Throughout the course of history, a perpetual struggle for supremacy has persisted between two clearly defined classifications of evaluative criteria. In the field of international commerce, researchers often use two main research strategies in their academic investigations. In the next section, we will proceed to create a set of fundamental principles derived from Ricardo's theoretical framework, which has significant recognition as a fundamental element within the field of conventional

economics. The second technique, often referred to as the Balassa method, was devised by Balassa in 1965. The foundation of this approach is based on the notion of comparative advantage. The majority of commercial endeavors are sustained by the pursuit of financial gain, the division of labor, the allocation of resources, and advancements in technology. Under some conditions, it might be advantageous to take into account technical intensity indicators, manufacturing input unit costs, and local and foreign output prices. According to Balassa's theoretical framework, variations in relative pricing and other factors not directly related to price levels have the potential to have an influence on economic activity. This method is based on the fundamental principle. Zawalinska (2002) integrates the economic cycle into her model. In accordance with Balassa's theory of revealed comparative advantage, an assessment of a nation's "export competitiveness" may be undertaken by analyzing its tangible export outcomes. The core of the user's text might perhaps be conveyed with a single phrase. The proposed strategic framework aims to enhance the nation's export capability in sectors where it has previously shown successful export performance via the implementation of a set of measures. When an organization formulates a strategic approach that confers upon it a superior position in the market, it attains a competitive advantage. This strategic approach has the potential to facilitate the company's accelerated expansion in comparison to its industry rivals. The competitive advantage of a corporation is significantly influenced by the public impression of the combined initiatives undertaken by the two businesses. This perspective is based on the assumption that collaborative endeavors of this kind consistently provide optimal outcomes. Within the realm of financial analysis, the concept of "competitive advantage", often referred to as "competitiveness", is used to assess the ability of a company or person to maintain profitability in the face of changing market dynamics. According to Porter (1990), the notion of rivalry within economic institutions is often oversimplified, despite its apparent relevance. The assessment of a country's international competitiveness may be determined by evaluating the extent to which its markets are open to global trade. This perspective posits that some individuals see conflict as a "zero-sum game", whereby the progress made by one nation is achieved at the detriment of another.

In ex-ante assessments, Domestic Resource Costs (DRCs) are often used to determine if a competitive advantage exists or not. The theoretical framework proposed by Ricardo in 1817 may have a potential connection to the durability of this particular approach. The analysis of the DRC is a widely used statistical methodology used to assess and compare the relative worth of various items. When assessing the economic output of a nation, it is important to consider the utilization rates of different economic activities in proportion to the country's available resources. Given the substantial influence of these components on the economy, there is a tremendous impetus to promote their adoption. The quantity might serve as a foundation for computing the social cost of obtaining an extra unit of foreign currency. The term "Domestic Resource Cost" (DRC) pertains to the anticipated expenses linked to the production of net foreign currency (FX) by means of augmenting commodities exports or using domestic resources to decrease imports and foreign exchange demands. When doing an analysis, it is crucial to assess the potential advantages of a rise in net foreign exchange. The basic notion of comparative advantage discussed in this context has

deep roots in the broader phenomenon of globalization. From this perspective, one may argue that the notion of comparative advantage has significant significance. Prior to initiating the DRC analysis, it is essential to develop a foundational set of assumptions. Hence, inputs and outputs may be categorized as either "domestic" or "foreign" depending on their nation of origin. Theoretical frameworks are used to anticipate the concealed expenses linked to the inputs and outputs of a given system. The validity of this assumption relies on the presence of components that are priced at a similar level. The ability to sustain a consistent level of productivity is reliant on the government's rigorous compliance with rules and regulations. As a result, the present acts have an effect on both the financial worth and the exchange of goods.

Many research activities include a thorough review of DRC. The methods devised by Gorton et al. (2000) provide a discernible differentiation between companies that exhibit high levels of efficiency and those that display inefficiency in both production and management. The expeditious execution of focused strategies aimed at diminishing manufacturing expenses is vital. Hence, it can be proven that there exists a strong correlation between the DRC index and comparative advantage, a fundamental term within the realm of international trade analysis. This research seeks to do a complete examination of the advantages associated with the exportation of fruits and vegetables, using the DRC as a case study. Both educators and students have shown a profound inclination to gain extensive information pertaining to agriculture, with the aim of enhancing their ability to contribute effectively to the global society. Gao et al. (2012) conducted a thorough examination to evaluate the worldwide competitiveness of China's agriculture sector, with particular emphasis on the produce business. A comprehensive investigation was undertaken on the Chinese manufacturing sector, specifically targeting seven fundamental categories of fruit-bearing plants. Out of the seven fruit species examined, it is evident that only the pear exhibits a statistically significant competitive advantage within the worldwide market landscape. The study conducted by Jiang (2011) examined the competitive dynamics within the Chinese fresh vegetable export industry. The Chinese consumer occupies a prominent and significant role within this sector. The author of this study thoroughly examines the merits and drawbacks, and then formulates a theoretical framework grounded on this comprehensive analysis. This approach is used for the assessment of global competitiveness. The results of the study suggest that Chinese exporters of apples and pears could possess a competitive edge in global marketplaces as a result of their comparatively cheaper pricing strategies. Recent research has shown that China's ability to export perishable goods is comparatively less competitive when compared to other countries.

In a study conducted by Soetriono et al. (2019), it was found that the DRC of snake fruit in the metropolitan region of Pronojiwo was measured to be 0.20. The negative outcome is regarded as an indication of success rather than a failure. This discovery serves as evidence that the cultivation endeavors had positive results. In their 2008 study, Hu et al. put up the suggestion that China has the potential to enhance its export competitiveness within the fruit sector by prioritizing the development of citrus fruits, bananas, grapes, oranges, and pears. There have been previous investigations conducted on this particular occurrence. The study conducted by Li (2011) aimed to assess the worldwide competitiveness of Hebei Province in the apple

sector by analyzing statistical data from 1996 to 2010. As per the author's assertion, the apple industry in Hebei province exhibits a significant competitive edge inside the home market of China. The author's findings revealed that the United States lagged behind other countries in terms of advancements in this particular field. In their scholarly endeavor, Mao and Chen (2011) undertook a study investigation aimed at enhancing the understanding of the international competitive landscape in China's agricultural sector. The statistical data indicates that the fruit export sector in China exhibits notable differences when compared to the corresponding industries in other prominent nations globally. The exports of fresh and preserved fruits from China have a level of standardization that is comparable to that of other countries.

The Siamese orange cultivar in the Kanagarian Koto Tingg area of Indonesia has a noteworthy competitive advantage, as shown by a DRC value of 0.10. The observed phenomenon may be attributed to the presence of suitable agroclimatic conditions and the judicious application of a wide range of local resources. Several studies, including those conducted by Wei et al. (2010), Han et al. (2008), and Hui and Yin (2011), have investigated various techniques that organizations might use to achieve a competitive edge. Several strategies may be used to improve various aspects of export agreements, public education, product quality, inspection systems, and the implementation of innovative ideas. At the core of this undertaking lies the examination of the variables that impact China's capacity to engage in the exportation of agricultural commodities. In his study, Yang (2011) examines certain dimensions of China's fruit export industry by using the trade gravity model as a theoretical framework. The researcher dedicates a substantial chunk of his study to examining these issues. The objective of this research was to analyze the export patterns of 15 different types of Chinese citrus fruits between the years 1992 and 2010. The major approach used in this study was panel data analysis. A detailed analysis was conducted to examine the potential impacts of China's agricultural exports, taking into account many elements. Several significant factors that have an impact on the drivers stated above include the gross domestic product (GDP) of the importer, the agricultural production of China, the distance covered during transportation, a nation's participation in the Asia-Pacific Economic Cooperation (APEC), and bilateral real exchange rates. Khan et al. (2006) argue that it is imperative for the Pakistani government to place more emphasis on local sugarcane production as opposed to export goals, and allocate additional resources towards achieving self-sufficiency in sugarcane cultivation. Based on the results of the research, it can be seen that the coefficient of exports of domestic resources surpasses the established threshold of 1, which represents the minimum acceptable value. Hence, the potential risks and financial burdens linked to the exportation of sugarcane surpass the advantages. Despite the fact that the DRC incurs greater local production expenses in comparison to importing sugarcane, it has an atypically low import reliance ratio of 0.59. The use of import substitution in the food security policy of the DRC seems to be rather restricted. In spite of the prevalent historical inclination for indigenous sugarcane harvesting, the possibility of importing sugarcane is being contemplated. Liu et al. (2006) identified a range of factors that may have an impact on Chinese agricultural exports. The industry's decline may be attributed to several factors, including the erosion of competitive advantage resulting from elevated labor costs, subpar fruit quality, inadequate export infrastructure, restricted availability of

exportable species, and the imposition of international trade barriers on environmentally sustainable goods. According to the study conducted by Li et al. (2008), the influence of food security regulations on the export of Chinese fruits to the United States, Japan, and the European Union (EU) was comparatively less significant in comparison to tariffs, technical trade barriers, and requirements related to product conformity standards and certifications. The research done by Olayinka et al. (2014) demonstrates that the implementation of feeder and crown systems has a positive impact on agricultural productivity in Nigerian pineapple farms. Various methods of pineapple growth may provide notable benefits. The examination of the DCR indicated that the feeder approach exhibited more effectiveness in comparison to the crown strategy, as shown by a DCR value of 0.27 as opposed to 0.22 for the crown strategy.

3. Sampling technique

Data was obtained at various phases. The research was initiated by conducting a roundtable discussion with agricultural extension agents from various provinces and districts. The objective of this discourse was to collectively ascertain the specific mango village inside Vinh Long province in Vietnam that warrants further investigation. During the roundtable discussion, there were four distinct parties, each consisting of four individuals. Furthermore, before the creation of the survey instrument, four farmer discussion groups were organized at four different sites. Each group consisted of six persons and their purpose was to assess significant factors related to mango farming. Finally, a preliminary survey was performed, consisting of a sample size of 20 participants. A total of 317 observations were randomly picked from the Num mango value chain investigation, with a specific emphasis on the key players and sponsors. The sample observations of farmer actors in 2022 consisted of 20 collectors, 15 wholesalers, 30 local merchants, 6 companies, and 8 supermarkets/fruit outlets. The aforementioned findings were derived from data that was collected through comprehensive interviews. The overall number of participants consisted of two individuals specifically designated for import and export operations, three merchants involved in agro-inputs, one representative from the central market, and five participants involved in transportation-related activities.

4. Empirical model

The concept of DRC was first proposed by Bruno in 1972. The calculation of a country's opportunity cost in creating or retaining a certain foreign currency may be determined by the use of the DRC, which is a quantitative instrument. The determination of the cost associated with using domestic resources involves the consideration of the opportunity cost. The assessment of agricultural business strategies and competitive advantages may be conducted via the use of the DRC framework, as presented by Monke and Pearson (1989). The primary objective of this scholarly investigation is to enhance comprehension about the potential benefits of competition for agricultural enterprises. In 2002, a group of researchers led by Funing and Xu conducted an analysis on the various advantages offered by different regions in China for the cultivation of grain crops. In his study, Bishnu (1983) investigated the

first economic impacts of tea cultivation in the Nelap region, using only locally accessible resources.

The use of computer algorithms to calculate the DRC gives rise to many practical implications in real-world scenarios (Gorton et al., 2000).

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

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 a_{ij} 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_i^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:

$$SER = OER \times (1 + FX\ premium) \tag{2}$$

where as:
- 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: In the context of a dynamic and productive labor market, the concept of opportunity cost might be valuable when examining the distribution of human resources. The projected price was determined by an analysis of the factual expenses spent by the household. This study aims to forecast the future land expenses for mango growers by an examination of national land rental rates. When conducting a valuation of a property, it is crucial to take into account all relevant factors, including but not limited to energy bills and maintenance costs. In his study, Lorenzo (2013) makes the assumption of a consistent level of efficiency and annual depreciation in order to estimate the prospective expenses linked to agricultural equipment.

CIF price: The Cost, Insurance, and Freight (CIF) pricing encompasses the whole payment made for a certain product, including not only the purchase price but also any additional charges related to insurance and transportation. One prevalent approach for determining the worth of imported commodities is referred to as "cost, insurance, and freight" (CIF).

FOB price: In the context of Free On Board (FOB), it is important to note that the final price does not include transportation expenses. In the context of international commerce, the term "exports" refers to the commercial activities involved in

promoting and distributing products and services that are produced or provided inside a home market to other countries.

Tradable commodities: The following objects have the potential to be traded as commodities: The terms "border pricing", "international prices", and "border prices" are synonymous when referring to the monetary value at which items may be traded across international borders. The ultimate pricing of goods are determined by many key elements, including the farm-gate price, transportation expenditures, and retail markup. The use of transfer factors might be seen as a viable alternative to the implementation of shadow pricing. The measure of a product's "transfer factor" refers to the degree of deviation between the observed sales data and the anticipated market price.

Non- tradable commodities: The phrase "non-tradable" or "non-tradable products" is sometimes used to refer to things that are not readily transferred across international boundaries. Product descriptions often use specialized terminology commonly used within the respective industry. Social pricing systems are mechanisms that establish the worth of non-tradable commodities outside the conventional market structure, whereby monetary value is assigned to commercial items and industrial inputs such as labor and land. Hence, the influence of domestic manufacturing on the economy's capacity to engage in foreign saving or expenditure is minimal. The DRC is often a topic of discourse in policy discussions. Gorton et al. (2000) identified significant distinctions between successful and unsuccessful manufacturing methodologies in their study. The findings of the research also emphasize the need of selecting certain sectors as the focal point of legislative efforts and the necessity of implementing strategic approaches to enhance productivity.

5. Result and discussion

There are two main channels via which Num-mango is exported:

Channel 1: Farmer → Cooperative → Export Enterprise.

Channel 2: Farmer → Collector → Wholesaler (Chinese market).

Distribution Channel 1: The viewership of Num-mango is mostly concentrated in developed nations such as Australia, Japan, and South Korea. Stringent hygienic and phytosanitary regulations are meticulously upheld at the upper echelon of the market. The majority of exports are generally conducted via the mode of air transportation. The Num-mango scale must be assigned a minimum value of 1. The majority of Chu-mango falling under the highest quality classification is sourced from cooperatives that have successfully obtained VietGAP or GlobalGAP food safety certifications. The aforementioned cooperatives diligently maintain comprehensive agricultural documentation and use traceability codes to ensure compliance with rigorous pesticide control rules. Mangoes in the first grade exhibit many external characteristics, including visually appealing packaging and labeling, a minimum weight of 300 grams, a securely sealed bag, the absence of any defects or creases, a vibrant yellow skin, and the absence of abscission layers. Approximately 23% of the entire volume consisted of mangoes classified as grade 1. Hence, the market share of Num-mango in Channel 1 accounts for just 3.4% of the whole market. The individuals involved in the channel exhibit a consistent and noteworthy degree of involvement,

often collaborating with one another. The findings of this study are consistent with the findings reported by Fernandez-Stark et al. (2011). In light of the intense competition prevalent in the export industry, it is essential to ensure the provision of superior goods and efficient collaboration among crucial stakeholders in order to meet the requirements and benchmarks set by importers at each stage of the export value chain.

Distribution Channel 2: The primary Channel 2 consists mostly of export to Chinese market. Commercial border crossings between Vietnam and China often use large trucks for the transportation of Num-mango. The Num-mango seen on Channel 2 has characteristics often associated with products of inferior grade. It is recommended that the product possess a distinct identity, exhibit a weight ranging from 250 to 300 grams, include a packaging bag, exhibit minimal imperfections, be devoid of wrinkles, and showcase a vibrant color. The company operates inside the Chinese market, offering fresh mangoes alongside its primary role as a distributor. Trucks are used for the purpose of transporting mangoes to China and the wholesale market. When considering itineraries that include locations such as Dang Nang, Ha Noi, or China, it is essential to ensure that the refrigeration system of large vehicles is outfitted with an electronic microprocessor. Considerable variability exists in the duration of cargo shipments originating from the Vinh Long region and destined for other locations within Vietnam. Ho Chi Minh City, located in the southern region of Vietnam, is a prominent urban center. The duration of journey to this destination typically spans around three hours. The projected duration of travel to the central Vietnamese city of Da Nang ranges from 16 to 18 h. The duration of travel to Ha Noi, situated in the northern region of Vietnam, typically ranges from 48 to 52 h. The journey to the border crossing between China and Vietnam often requires a duration of around sixty to seventy-two hours. Business initiatives conducted via Channel 2 are only limited to the countries of China and Vietnam. In the context of domestic transactions inside China, it is anticipated that customs costs applicable to containers weighing between 25 and 30 tons would vary between 260 and 350 USD.

The concept of social pricing was first introduced by Monke and Pearson in 1989. This particular technique has promise as a valuable tool for identifying competitive advantages. The use of the DRC/SER ratio enables the comparison of effectiveness levels at comparable magnitudes, hence providing as a quantitative measure of relative superiority within the specific study framework. Maximizing societal benefits necessitates the minimization of deadweight loss in resource allocation. In order to expand its market penetration, Num-mango employs a multi-channel approach, whereby its products are distributed via five distinct channels (two export channels, and three domestic channels).

The data shown in **Tables 1** and **2** clearly demonstrate that the combined revenue generated via Channels 1 and 2 consistently exceeds the fixed costs spent by the firm, both domestically and internationally. An examination of three distinct agricultural periods in Channels 1 and 2 reveals that the aforementioned discovery indicates that the distribution of limited resources at prices influenced by societal variables yielded a favorable return on investment for the whole community. The export mechanism of Num-mango is capable of providing a consistent flow of foreign money throughout the whole year, particularly due to the use of channels 1 and 2. There exists a prevalent

misconception about the Num-mango export system, whereby it is often believed to be very profitable and in compliance with ethical pricing standards.

Table 1. Comparative advantage of Num-mango in the distribution channel 1 (Unit: USD/ton).

No.	Indicator costs	Season 1 (n = 90)	Season 2 (n = 67)	Season 3 (n = 71)	Sig.
	Official exchange rate in 2022 (USD 1 = 23,231 VND)				
1	Tradable inputs	499.60[ab]	612.03[b]	398.15[a]	*
1.1	Root fertiliser	38.29	49.10	35.56	ns
1.2	Leaf fertiliser	10.40[ab]	12.48[b]	8.33[a]	*
1.3	Paclobutrazol	0.92	1.48	0.20	ns
1.4	Herbicide	13.90[b]	3.35[a]	1.00[a]	***
1.5	Pesticide	48.57	69.78	54.31	ns
1.6	Fungicide	352.30[ab]	407.65[b]	246.39[a]	*
1.7	Fuel	1.30	2.05	1.54	ns
1.8	Wrapping bag	19.91	26.86	38.90	ns
1.9	Machine depreciation	14.01	39.28	11.91	ns
2	Domestic factors	749.24[b]	751.41[b]	545.84[a]	*
2.1	Root fertiliser	85.40	109.50	79.31	ns
2.2	Leaf fertiliser	23.21[ab]	27.83[b]	18.59[a]	*
2.3	Paclobutrazol	0.19	0.30	0.04	ns
2.4	Herbicide	2.84[b]	0.69[a]	0.20[a]	***
2.5	Pesticide	9.93	14.27	11.10	ns
2.6	Fungicide	72.02[ab]	83.34[b]	50.37[a]	*
2.7	Fuel	6.63	10.51	7.90	ns
2.8	Wrapping bag	4.15	5.60	8.10	ns
2.9	Machine depreciation	5.00	14.03	4.25	ns
2.10	Transport	1.45[a]	6.80[b]	2.37[ab]	ns
2.11	Hired labour	64.89	60.81	32.21	ns
2.12	Family labour	347.01[b]	278.06[ab]	194.98[a]	**
2.13	Land rent	126.51	139.68	136.41	ns
3	Marking cost of traders	5889.50	5889.50	5889.50	ns
3.1	Cooperative	170.80	170.80	170.80	ns
3.2	Export enterprise	4451.60	4451.60	4451.60	ns
4	Total Domestic = (2) + (3)	5371.64[b]	5373.81[b]	5168.24[a]	*
5	Revenue	8629.44	8629.44	8629.44	ns
6	Domestic resource cost	0.67[ab]	0.69[b]	0.63[a]	**
7	Comparative advantage	0.55[ab]	0.57[b]	0.53[a]	**

Source: Field survey data in 2022.
Note: Tradable input is CIF price, Tradable output is FOB price. The numbers of a same row are followed by the different letters being significant at 5% level via statistical Ducan test. * Significant at 10% level, ** significant at 5% level, *** significant at 1% level, and ns is non-significant.

The findings of the study pertaining to export channel 1 are shown in **Table 1**. The table displays the coefficients pertaining to DRC/SER. The first season yielded a value of 0.67, the season 2 yielded a value of 0.69, and the season 3

yielded a value of 0.63. The DRC values for all three seasons were found to be below 1. Based on statistical data, it is projected that the export operations of channel 1 will generate a foreign currency value of 1USD each episode in seasons 1, 2, and 3, while incurring around 0.33USD, 0.31USD, and 0.37USD in domestic factor costs, respectively. It is noteworthy to mention that the expenses related to the production of Num-mango in seasons 1, 2, and 3 correspond to 67%, 69%, and 63% of the expenses involved with importing the fruit from the DRC, respectively. From an economic perspective, the manufacture and exportation of Num-mango demonstrates adept use of resources created within the immediate vicinity.

Table 2. Comparative advantage of Num-mango in the distribution channel 2 (Unit: USD/ton).

No.	Indicator costs	Season 1 (n = 90)	Season 2 (n = 67)	Season 3 (n = 71)	Sig.
	Official exchange rate in 2022 (USD 1 = VND 23,231)				
1	Tradable inputs	350.78[ab]	429.73[b]	279.55[a]	*
1.1	Root fertiliser	26.88	34.47	24.97	ns
1.2	Leaf fertiliser	7.31[ab]	8.76[b]	5.85[a]	*
1.3	Paclobutrazol	0.64	1.04	0.14	ns
1.4	Herbicide	9.76[b]	2.35[a]	0.70[a]	***
1.5	Pesticide	34.11	48.99	38.13	ns
1.6	Fungicide	247.36[ab]	286.22[b]	173.00[a]	*
1.7	Fuel	0.91	1.44	1.08	ns
1.8	Wrapping bag	13.98	18.86	27.31	ns
1.9	Machine depreciation	9.84	27.58	8.36	ns
2	Domestic factors	526.06[b]	527.59[b]	383.25[a]	*
2.1	Root fertiliser	59.96	76.89	55.68	ns
2.2	Leaf fertiliser	16.29[ab]	19.54[b]	13.05[a]	*
2.3	Paclobutrazol	0.13	0.21	0.03	ns
2.4	Herbicide	2.00[b]	0.48[a]	0.14[a]	***
2.5	Pesticide	6.97	10.02	7.80	ns
2.6	Fungicide	50.57[ab]	58.52[b]	35.37[a]	*
2.7	Fuel	4.66	7.38	5.54	ns
2.8	Wrapping bag	2.91	3.93	5.69	ns
2.9	Machine depreciation	3.51	9.85	2.99	ns
2.10	Transport	1.02[a]	4.77[b]	1.66[ab]	*
2.11	Hired labour	45.56	42.70	22.62	ns
2.12	Family labour	243.65[b]	195.24[ab]	136.90[a]	**
2.13	Land rent	88.83	98.07	95.77	ns
3	Marking cost of traders	727.57	726.60	726.60	ns
3.1	Collector	90.80	90.80	90.80	ns
3.2	Wholesaler	234.60	234.60	234.60	ns
4	Total Domestic = (2) + (3)	851.46[b]	852.99[b]	708.65[a]	*
5	Revenue	2,247.96	2,247.96	2,247.96	ns
6	Domestic resource cost	0.51[a]	0.94[b]	0.39[a]	**
7	Comparative advantage	0.42[a]	0.79[b]	0.32[a]	**

Source: Field survey data in 2022.
Note: Tradable input is CIF price, Tradable output is FOB price. The numbers of a same row follows by the different letters being significant at 5% level via statistical Ducan test. * Significant at 10% level, ** significant at 5% level, *** significant at 1% level, and ns is non-significant.

The findings of the comparative advantage analysis using channel 2's DRC/SER ratio may be seen in **Table 2**. According to the data, the DRC/SER values for each of the three Num-mango harvest seasons were found to be below 1. Specifically, the numbers 0.42, 0.79, and 0.32 were identified as the corresponding values. In Seasons 1, 2, and 3 of Channel 2 may potentially achieve a cost savings of $1 in foreign currency by using local resources valued at 0.58 USD, 0.21 USD, and 0.68 USD, respectively. This outcome illustrates the significance of allocating scarce domestic resources towards these particular items.

The assertion that there are two export channels that provide a competitive edge is accurate. However, it is essential to acknowledge that there are significant disparities in the DRC/SER ratio and the harvest seasons linked to each export route. In relation to the concept of comparative advantage, it is evident that agricultural season 3 exhibited superior performance compared to seasons 1 and 2. In the context of export channel 2, the comparative benefits shown by the second and third growth seasons surpass those of the first season. Based on the provided context, it can be noticed that the second agricultural season of export channel 1 exhibited a higher level of comparative advantage compared to the second agricultural season of export channel 2, as shown by the DRC/SER ratio of 0.57. The primary objective of the Num-mango production system is to enhance its economic efficiency within the framework of international commerce, therefore attaining a competitive edge on a global level. The adoption of incentive policies targeting product quality enhancement, elimination of border and non-tariff barriers, and effective utilization of comparative advantage is imperative for policymakers and governments. This is due to the substantial influence exerted by favorable climatic, soil, and water conditions in fostering sustainable development and economic progress.

6. Conclusion

Using societal pricing approaches, the DRC/SER ratio is applied to measure economic efficiency of Num-mango export channels. The responses to this inquiry provide insightful information. Season 3 offers the most comparative advantage compared to the two seasons 1 and 3, while Season 1 offers the second-most comparative advantage. Despite this, Season 2 is frequently considered to have the least favorable degree of comparative advantage due to its subpar execution. A comprehensive examination of the DRC/SER reveals that the economic efficiency value of all trade operation conducted through the two export channels are less than one.

The DRC method is utilized to assess the domestic economic effects of the global trade system. This study aims to investigate and evaluate the social pricing benefits associated with various distribution modes. In a social pricing system, input transactions typically use the Cost, Insurance, and Freight (CIF) pricing structure, while output transactions typically use the Free on Board (FOB) pricing structure. "CIF" is frequently used in international trade to refer to the phrase "cost, insurance, and freight". The term "net profit" refers to the residual monetary value remaining after deducting production fees, advertising costs, forgone sales opportunities, and

land expenses from total revenue. According to this alternative definition, the term "net profit" refers to the amount of money remaining after deducting all expenses and allowances. The Ricardian model is frequently utilized to evaluate the relative competitiveness of export supply chains. This study's findings provide empirical support that is consistent with the model's fundamental principles. In this context, the global distribution of tropical products is of particular importance. Globalization and liberalization have ushered in an era characterized by nations' active participation in international trade and a heightened emphasis on the research and development of products that capitalize on their respective comparative advantages. To remain competitive on the global market, nations must reduce the costs associated with producing products for international trade. This research provides empirical support for the Ricardian model and the concept of optimal value in international trade.

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