Migration Letters

Volume: 20, No: S7(2023), pp. 904-918

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)
www.migrationletters.com

Competitiveness and Policy Analysis of Num-Mango in Vinh Long, Vietnam

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Abstract

The influence of macroeconomic policy changes on the Num-mango supply chain is evaluated via the use of the policy analysis matrix. The study included the evaluation of 317 data points obtained from the primary participants and sponsors of the chain. Examples of global macroeconomic policies that have a substantial influence on the economic efficiency and competitiveness of export channels include safeguarding production prices, managing currency rates, and providing local cost subsidies. The results indicate that the domestic channel 4 (with a PRC value below one) exhibits competitiveness, whereas export channels 1, 2, and 3 (with PRC values below one, DRC values below one, and SBC values above one) possess both comparative and competitive advantages. The government demonstrates a preference for export channel 1, as shown by its emphasis on safeguarding production (NPCO 0.18 and EPC 0.16) and enhancing value via additional measures (SRP -0.22). The channel 4 is the second priority from government with subsidy policy of tradable inputs cost compared to the channels 2 and 3 (NPCI 0.63). The export channels 2 and 3 are promoted export by added value increase policy (EPC 0.69 and 0.58). When there is a 20% variation in the tradable cost, the ratio between sensitivity analysis's SBC to EPC to SRP also changes. Another notable element is that although the DRC and SBC see a 20% reduction in domestic costs, the EPC remains untouched by this change. A reduction of 20% in both domestic cost and tradable cost, coupled with a corresponding gain of 20% in the Free on Board (FOB) price, led to a notable enhancement in the SRP for export channels 1, 2, and 3. The suggested retail price is mostly influenced by domestic expenditures.

Keywords: *Num-mango, policy analysis matrix, export channel.*

1. INTRODUCTION

Mangoes rank as the fifth most widely eaten tropical fruit, behind bananas, pineapples, coconuts, and coconut water. The mango, scientifically known as Mangifera indica, is a well recognized and esteemed tropical fruit. Mango trees have historically thrived in a diverse range of tropical and subtropical nations owing to the conducive climatic conditions prevalent in those regions. Over one hundred diverse countries are actively engaged in the cultivation of mango trees for the purpose of harvesting their fruit. Mangoes have the distinction of being the most extensively traded tropical fruit globally,

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surpassing other prominent tropical fruits in both quantity and value by around 29%. Based on the findings of the Food and Agriculture Organization (FAO, 2021), mangoes, avocados, and pineapples are identified as the three predominant tropical fruits cultivated for commercial purposes. India's yearly mango production is estimated to be around 25.6 million tons, accounting for 45.9% of the total world production. Indonesia, the nation that secured the second position, contributed a total of 3.3 million tons, accounting for 5.9% of the whole quantity. Approximately 4.3% of the total, or to 2.4 million tons, is contributed by China and Mexico. A total of 4% of the sample population originates from Pakistan, Malawi, and Brazil, with an additional 3% originating from Thailand, Egypt, and Bangladesh, respectively. Nigeria and Vietnam have emerged as significant manufacturing suppliers, each holding a market share of 2%. Asia is responsible for the production and exportation of about 47.3% of the worldwide mango supply. In terms of total geographical area, Central America and the Caribbean rank second only to South America. It constitutes around 20.8% of the Earth's total land area. It is noteworthy to mention that the proportion of mango exports is around 8.2% of Africa's total mango production. During the specified time period, the United States accounted for about 25% of the global mango imports. According to expert projections, it is anticipated that China would surpass the United States as the second-largest global importer of mangoes by the year 2020. Due to the anticipated changes, it is projected that China's proportion of the worldwide market would see a significant increase, surging from 9.9% in 2016 to 22.2% by 2020. During the period spanning from 2016 to 2020, the European Union (EU) held the position as the third-largest global importer of mangoes, with a market share of nearly 20%. According to the Food and Agriculture Organization (FAO), the worldwide importation of mangoes in 2020 amounted to around 2.13 million metric tons.

Based on the current trajectory, it is projected that the production would surpass 58 million tons by the year 2024, and then reach its maximum point of 61 million tons in 2028. It is anticipated that the current level of production will reach a cumulative quantity of 9 million metric tons, representing a substantial growth in comparison to the projected figures for the year 2018. It is projected that by the year 2028, Asia would include over 68% of global output, representing a substantial increase from its already significant proportion in 2019. There has been a little decline in the percentage, with a fall from the reported figure of 71% in 2019 to the present rate of 69%. According to current projections, India, which is the largest producer in Asia, is projected to have a market share of 38% during the reference period. However, it is anticipated that this proportion would decrease to 35% by the year 2028. Mango trees are extensively cultivated in India for both commercial and non-commercial endeavors. Based on a study conducted by specialists in mango exportation, it is projected that the total volume of mango exports would reach 2.2 million metric tons by the year 2028. The forecast projects an annual increase in exports of 3%. It is anticipated that the ratio of exports to overall production would continue at a very modest level. Currently, it is evident that developed nations bear the responsibility for around 65% of total imports. The anticipated decline in this proportion is attributed to the growing interregional and intraregional economic linkages. According to the projections made by the Food and Agriculture Organization, it is anticipated that the exporters in the area would see an increase in their market share on a worldwide scale by the year 2020. It is anticipated that the market share will see a growth of around 62% by the conclusion of the current fiscal year. There is a potential correlation between the aforementioned occurrence and the remarkable ascent of Mexico as the leading global exporter.

According to statistical projections, it is anticipated that Asia's proportion of the worldwide market would see a decline from 35% in 2019 to 28% by the year 2028. Currently, Thailand has a significant position of dominance in its regional export market. Consequently, there has been an increased recognition of the necessity to monitor Thailand's export activities. It is anticipated that the exports of these commodities would have a growth rate that is much lower than the expansion of global trade in the

forthcoming year. There is a high probability that India's exports will continue to see significant growth in the next years. According to expert projections, it is anticipated that the global market share of mangoes in Asia will not be significantly impacted by the trend indicated before. According to expert projections, it is anticipated that India would account for around 12 percent of the global mango demand by the year 2028. According to projections, it is anticipated that by the year 2028, the average member of the Food and Agriculture Organization (FAO) would have consumed around 7.8 kilograms of mangoes during the span of their lifetime. Based on projections, it is anticipated that Asia would continue to maintain its status as the area with the most substantial per capita consumption, estimated at 10.7 kg. In contrast, it is projected that the average Latino individual would consume a total of 8.4 kg of food over their lifespan. According to the Food and Agriculture Organization, the average individual consumed less than one kilogram of mangoes in the year 2020. However, it is crucial to bear in mind that mangoes have seen an increase in popularity among Western societies. The export volume of mangoes had a significant surge from 2016 to 2020, culminating in a final value of $211 million over this time. The significant increase may be attributed to a compound annual growth rate of 60%. According to statistical data from 2017, there was a significant increase of 129% compared to the published figures of 2016. The Covid-19 epidemic may have had an influence on the export value of fruits and vegetables in both 2019 and 2020. It is anticipated that there would be a significant increase in the monetary worth of mango exports from 2016 to 2020. According to Khoi's (2021) prediction, the market is anticipated to reach a valuation of $650.0 million by the year 2030, assuming that the current growth rate remains constant.

Academic studies that primarily concentrate on the microeconomic activities of producers sometimes neglect to include macroeconomic factors such as marketing tactics and global trade dynamics. The interconnections between trade, macroeconomic policy, and production levels are intricate, necessitating a comprehensive comprehension of these links by political organizations, economists, and policymakers. Human beings has the capacity to exert influence on their societal structures via the establishment of norms and institutions that are most conducive to their collective well-being. The significance of macroeconomic policy should not be underestimated, but rather requires a comprehensive examination. The key focus of the institutional and regulatory assessment of the Num-mango value chain involves the thorough research and investigation of openly accessible rules and norms. This approach is used to assess the impact of regulations on the operational and financial components of the value chain. The primary objectives of the research are to (1) analyze the effects of macroeconomic policy actions and (2) provide feasible alternatives to these interventions. The primary objective is to enhance the value chain of Num-mango in order to increase their competitiveness. The use of an analysis matrix within the context of macroeconomic policy has the potential to enhance the evaluation of a marketing channel's financial performance comprehensively. The use of matrix analysis proves to be advantageous in the evaluation and measurement of a diverse array of economic factors. The use of market pricing is often utilized as a fundamental element in the analysis of domestic marketing channels, whereas social pricing is frequently applied in the examination of worldwide marketing channels. The data reported in this study provides support for the central premise of the PAM framework, which suggests that trade policies pertaining to tropical fruits and vegetables yield optimal outcomes when they effectively use the comparative advantages possessed by producers.

2. METHODOLOGY

2.1. Sampling technique

The data collection procedure occurs in several phases. A roundtable conversation was conducted among agricultural extension workers hailing from various provinces and districts in Vinh Long, Vietnam. The purpose of this debate was to collectively choose the specific mango village that would be the focus of their research. The participants were divided into four groups, each consisting of four individuals. Furthermore, prior to conducting the survey, six mango producers hailing from four distinct geographical regions convened in separate clusters to engage in discussions pertaining to crucial variables associated with mango cultivation. Ultimately, a pilot study was conducted, consisting of a sample of twenty people. The study of the Num-mango value chain was conducted by using a random sampling technique, which included the selection of 317 observations including important actors and advocates for the purpose of analysis. The sample observations of farmer actors consisted of 228 individuals, including 21 collectors, 15 wholesalers, 30 local merchants, 6 corporations, and 8 supermarkets/fruit stores. These individuals were interviewed in-depth for the purpose of the study. In addition, a total of eleven individuals from various sectors were included in the survey. These sectors included of five individuals involved in transportation, three individuals associated with agro-input dealing, one individual from a central market, and two individuals from import/export phytosanitary inspection organizations.

2.2. Literature Review

The government often use agricultural policy as a means to influence the agricultural market. The need of government involvement in the agricultural sector stems from its role in facilitating the provision of fundamental resources to industries and ensuring the availability of a sufficient workforce. According to Tsakok (1990), the implementation of higher income taxes and the provision of assistance to exporting firms will significantly enhance the nation's ability to generate foreign currency. The allocation of specific land for the sake of agricultural development has been undertaken by the government. Certain developing countries have chosen legislative strategies that prioritize generating revenue, often at the expense of providing enough resources to support the agricultural sector's growth and development. The fundamental concept behind this proposal is that the imposition of taxes on farmers will inevitably lead to a reduction in productivity within the agricultural industry. Advocates of this notion also suggest the allocation of surplus resources to the industrial sector, a well acknowledged catalyst for economic expansion. The pricing methodology had a substantial influence on the allocation and mitigation of agricultural surplus. The provision of incentives persisted even while output prices remained negative, despite the continuous use of small input price subsidies. The agricultural industry experienced a state of disadvantage as a result of several reasons, including the global trade system and the overall environmental conditions. The economic, trade, and budgetary challenges faced by several nations have been further exacerbated by agricultural issues, resulting in significant repercussions across all sectors. When governments became aware that they were unable to ensure the sustained prosperity of their industrial sectors only via reliance on agricultural production, they were compelled to reassess their strategies for economic advancement.

Government measures designed to enhance the agriculture industry may have significant and wide-ranging implications. In developing nations, the agriculture industry typically accounts for between 30 to 45 percent of the Gross Domestic Product (GDP). The World Bank's assessment in 2003 determined that the agriculture sector was confronted with a notable deficiency in labor force. Agriculture is seen as a strategic instrument by several governments in emerging nations due to its significant contribution to their economies. Government intervention in agricultural markets may take several forms, including trade policy, macroeconomic measures, and sector-specific efforts. These interventions are

anticipated to be implemented in a proactive and assertive manner. Pricing strategies have a substantial impact on the financial burdens experienced by individuals, households, and the agriculture sector. Producers, merchants, and consumers modify their behavior in accordance with variations in the cost of commodities and profits derived from production. According to Shultz (1978), price incentives exert influence on social welfare, income distribution, and economic progress. The use of agricultural policy analysis by policymakers serves the purpose of evaluating the anticipated and unanticipated ramifications of policy modifications on agricultural markets. Furthermore, it is important to do research in order to ascertain the potential ramifications of these market-specific responses on the overall viability of the development strategy. The presentation of data in a visual manner is used to emphasize the compromises that arise when considering different objectives and methodologies. Policymakers may use this data collection in order to engage in better informed discussions on the advantages of various methods. The establishment of pricing strategies and market research targets will be undertaken in consideration of resource allocation and a comprehensive examination of the prevailing issues. The evaluation of agricultural price policy is conducted within the framework of macroeconomic trade policy, including a wide range of macroeconomic data. Economic studies often include a diverse array of variables, which may encompass, but are not limited to, exchange rates, interest rates, export and import prices, as well as sector-specific factors such as manufacturing input and output costs. There are several categorizations that may be used to classify research, including but not limited to static, dynamic, partial, general, single market, multiple markets, sectorial, intersectoral, and macro.

The policy analysis matrix (PAM) approach is a state-of-the-art instrument used for the examination of outcomes stemming from governmental agriculture policies. In order for this technique to be effective, it is essential that researchers and data scientists create a baseline for their work. The comprehensive vertical system encompasses the whole of the production process, spanning from the first stage of seed planting to the procurement of raw materials, and culminating in the distribution of the completed items. Monke and Pearson conducted the first extensive investigation of the aforementioned system in 1989. The objective of this study is to examine the influence of governmental policies on the expansion of horticultural commodities, using Babiker's (2012) PAM technique as the analytical framework. According to the study conducted by Bushara et al. (2018), the agricultural sector has a vital role in stimulating economic growth in low-income nations. This element is widely acknowledged to contribute to around 30 to 50 percent of the GDP. The agricultural industry employs a larger workforce compared to any other sector of the economy. In recent years, notable transformations have taken place in the interplay between the industrial and agricultural sectors. There is a consensus among scholars that agriculture plays a crucial role in procuring the essential raw materials, people resources, and food required to support the growth and advancement of industrial enterprises. The agricultural industry plays a crucial role in driving economic development and yielding beneficial effects for both firms and the overall economy. Numerous governments often partake in substantial interventions within the agricultural market via the use of instruments particular to the sector, the implementation of macroeconomic policies, and the establishment of trade agreements. The objective of this study is to examine the impact of significant macroeconomic events on both the overall economy and the specific operations of individual enterprises and whole industries. Interest rates and currency exchange rates are only a few of instances of the concepts scrutinized by macroeconomists. Exports and imports are of paramount importance in the context of the global economy. The ratio of inputs to outputs has significant importance in the industrial sector. The following image demonstrates the interconnectedness of many phases within the supply chain, including manufacturing, processing, distribution, wholesale, and retail. There are many methods via which an individual's problem-solving and problem-recognition abilities might be enhanced. The significance of doing research on

agricultural policy lies in the need for politicians to consider the potential ramifications of their actions on agricultural markets, as well as to explore alternative courses of action.

According to a study conducted by Soetriono et al. (2019), the cultivation of snake fruit in the Pronojiwo community offers comparative and competitive advantages due to its low DRC of 0.20 and PCR of 0.13. It is important to consider that the government has allocated limited financial resources towards the expansion of snake fruit cultivation. The Siamese orange citrus cultivar has a significant competitive edge (DRC 0.11; DRC refers to the disparity in relative prices) throughout the Kanagarian Koto Tingg area of Indonesia. The region's copious natural resources and temperate environment provide it with a competitive advantage in the international market. Romdhon (2018) suggests that citrus exporters might enhance their competitiveness in global markets by modernizing their transportation networks and establishing stronger connections with remote areas. América and José (2011) used the PAM approach to capitalize on Mexico's comparative advantage in guava production. The NPCO score of 0.66 indicates a deficiency in adequate legislative protection for guava cultivation, since it allows fertilizers and agrochemicals to be treated as commodities and sold without restrictions. The nominal nrotection coefficient on tradable inputs (NPCI) represents the value of a firm at 1 billion Indian Rupees.

According to Familusi et al. (2015), concerns over the availability of essential resources for tomato cultivation arose due to the absence of adequate governmental protective measures. The Democratic Republic of the Congo is outproduced by South Africa and Mozambique when it comes to tomato production. Consumers have a substantial indirect tax burden of 48.9% during the summer as a result of the implementation of manufacturing pricing restrictions. The cultivation of tomatoes during the fresh season incurs an implicit cost of around 24.2%, as shown by the negative NPCO data. Khan et al. (2006) conducted a study to investigate the productivity of sugarcane. The findings of the research indicate that it would be prudent for Pakistan to reassess its export objectives in view of its comparative disadvantage, as shown by the values of DRC 1.31 and SBC 0.50. When doing a comparative analysis between the SBC (1.50) and the DRC (0.59), it becomes evident which of the two has a greater number of benefits. The findings of this study indicate that the implementation of an import substitution strategy might potentially contribute to the attainment of economic self-sufficiency in the DRC. The use of the PAM facilitates a comprehensive examination of the two production systems, hence enabling the discovery of previously obscured similarities and differences.

According to the study conducted by Olayinka et al. (2014), it was shown that the Sucker technique (PCR 0.31) exhibited more competitiveness in the pineapple industry of Nigeria compared to the Crown method (PCR 0.4). This conclusion is drawn by considering the existence of a PCR value below one and the volatility of market prices. Cultivating pineapples from the crown may potentially provide higher economic returns compared to cultivating them from the ground, however this outcome is not always applicable. The use of the vacuum approach yields a DRC value of 0.22, indicating a high level of precision. Based on the Crown method, it can be seen that policy distortions result in an additional 16% of producer income being allocated to the public and government, as shown by the subsidy ratio to producers (SRP). This study, akin to the Sucker approach, has shown that policy distortions result in a transfer of 14% of producers' profits (SRP -0.14). The study conducted by Bushara et al. (2018) used PAM to investigate the cultivation and characteristics of onion, melons, mangos, and bananas. The NPCO of cantaloupe was observed to be 0.62, which is much lower than the bulk of NPCOs that had magnitudes greater than 1. Export incentives for certain commodities, such as scallions, mangoes, and avocados, are offered by the government. Nevertheless, the accessibility of melons in foreign markets is limited due to the imposition of export duties. The use of export subsidies is advised in order to achieve parity in manufacturing input costs in situations when the NPCI is below one. Bananas, mangoes, and onions are

characterized by their high EPC levels. The manufacture of these commodities has clear potential for further development. It is noteworthy to mention that the DRC levies a substantial tax on melons. The DRC has many comparative advantages in the cultivation and production of onion, melon, mango, and banana.

Therefore, it is important to conduct a comprehensive examination of agricultural policy in order to inform policymakers about the potential ramifications of upcoming policy modifications on agricultural markets and motivate them to consider viable alternatives. Monke and Pearson (1989) created a comprehensive framework including three distinct tiers, namely macroeconomic connections, marketing and trade dynamics, and microproduction aspects, with the aim of examining agricultural policy. Historical research has mostly emphasized the examination of microeconomic behaviors shown by producers, sometimes neglecting the analysis of marketing, trade, and macroeconomic connections. A comprehensive comprehension of the intricate relationship between regional and global economies is crucial for farmers, agricultural economists, and policymakers alike. This phenomenon contributes to the advancement of humanity by facilitating the emergence of more rational laws and social norms. The examination of the potential impact of quantitative trade constraints on economic activity, real effective exchange rates, and fertilizer response functions necessitates the use of agricultural policy analytic methods.

2.3. Empirical model

The Policy Analysis Matrix (PAM) is an all-encompassing analytical framework used to evaluate the impacts of policy modifications on various stakeholders throughout the whole of a commodity's supply chain, including producers, consumers, and the overall economy. The policy analyst is faced with the decision of assessing the degree of government intervention and price manipulation, as well as evaluating the effectiveness of alternative policies, in order to facilitate successful and seamless dissemination of information. The primary aim of this research is to assess the feasibility of several approaches in the fields of agronomy, production, and distribution of commodities.

The objective of this research is to examine the effects of government regulation on agricultural markets and pricing at the local level. The main aim of this research is to assess the effectiveness of pharmaceuticals based on PAM. Monke and Pearson conducted the first investigation of the incident under consideration in 1989, and their findings were subsequently complemented by Masters and Winter-Nelson in 1995. The three primary constituents of a PAM chart are earnings, cash inflow, and cash outflow. One of these groups examines the comprehensive financial advantage, which includes both inflows and outflows of cash. The presentation and discussion revolve on indicators that are derived from pricing data. The use of this technique in calculating societal costs leads to the development of novel indicators. The formula for the third row, pertaining to a policy intervention, may be derived by excluding the corresponding values from the two previous rows. The evaluation of a country's global competitiveness may be conducted by using a framework that takes into account policy results, economic effectiveness based on comparative advantage, and the extent of protection provided to agricultural areas (Gonzales et al., 1993). Table 1 displays the Purchase Attitude Measures (PAMs) pertaining to the different advertising channels. The calculation of revenue entails dividing the amount of goods sold by the unit price, which is located in the first column of the table consisting of three rows and four columns. The second column enumerates the many forms of non-cash payments that may be used for the purchase of imported goods. The third column reflects domestic expenditures, such as the leasing of natural resources and the remuneration of workers. The determination of net profit involves the subtraction of revenues from the fourth column, including both domestic and exportable input costs, in order to get the ultimate value.

Table 1. Policy Analysis Matrix (PAM)

Items	Revenues	Costs		Profit
		Tradable Inputs	Domestic Factors	
Market Prices	A	B	C	D
Social Prices	E	F	G	H
Policy effects	I	J	K	L

Source: Monke and Pearson, 1989

The price of PAM is influenced by several entities involved in the Tuong-mango value chain, including farmers, wholesalers, and retailers. The comprehensive cost of PAM include not just the financial resources used to marketing efforts, but also encompasses expenditures related to personnel, tools, and physical infrastructure. There are two main classifications of expenditure: market pricing and social pricing. The first segment of these expenses may be attributed to commodities and inputs that are procured from local sources and are readily available in the market. The objective of this research is to distinguish between local input costs and their international equivalents. The comprehensive cost encompasses all components, ranging from the underground structures and aboveground vegetation to various chemical substances such as insecticides, fungicides, herbicides, paclobutrazol, and other inputs. The allocation of resources is determined by the proportion of total domestic demand that a certain product satisfies. Land leases, power rates, packaging fees, transportation fees, contractual labor pay, equipment depreciation, and packaged product pricing represent a subset of the diverse range of domestic expenditures linked to agricultural marketing. In the context of market pricing, it is a customary approach to exclude specific opportunity costs when determining domestic factor costs. The aforementioned expenses include factors such as the devaluation of equipment, the use of familial labor, and the payment for land usage. The calculation of the shadow exchange rate (SER) may be performed by using either the Cost, Insurance, and Freight (CIF) value of tradable inputs or the Free on Board (FOB) value of traded commodities.

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

SER = OER * (1+ 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 foundation of the opportunity cost hypothesis lies in the notion of a labor market that is both competitive and open. In this context, the notion of cost pertaining to the manufacturing and transaction of goods is juxtaposed with the tangible expenditures incurred by households. The current land leasing expenditures being borne by the coffee farmers in the nation serve as a reliable signal for projecting future land prices. It is important to thoroughly evaluate the financial implications associated with the upkeep of the property's internal resources. Lorenzo (2013) used a methodology that included the estimation of expenses in the immediate future. This assessment encompasses an examination of both the potential for steady production and the ongoing depreciation of agricultural equipment.

Output transfers: I = A – E

Input transfers: J = B – F

Factor transfers: K = C – G

Market profits (Actual Profitability): D = A – B – C

Social profits (Economical Profitability): H = E – F – G

Net profit transfers: L = D – H = I – J – K

D > 0, the domestic channel at market price generates profit under the current policy and market conditions and is competitive.

H > 0, the export channel at social price would be able to make a profit even without benefiting from a subsidy or being constrained by taxes, and is said to have a comparative advantage.

Relative competitiveness indicators:

Private cost ratio (PCR): C/(A – B)

PCR > 1, it means that the domestic channel utilizes a greater value of domestic factors than the value added, and is not profitable.

PCR < 1, the system is profitable.

Domestic Resource Cost (DRC): DRC = G/E – F

DRC = 1, the export channel is not conducive and foreign currency savings is not equal to domestic production (products produced beneficial neutrality).

DRC < 1, the value of domestic resources for smaller production value net foreign savings (products with a competitive advantage on the international market), vice versa.

DRC > 1, the value of domestic resources for greater production value net foreign savings (product no competitive advantage on the international market).

DRC/SER < 1, the product has a comparative advantage.

DRC/SER > 1, the product does not have a comparative advantage.

Social benefit-cost (SBC): SBC = E/(F+G)

SBC > 1, the export channel is an efficient business channel,

SBC < 1, the export channel is not profitable for the exporting business.

Nominal protection coefficient on tradable outputs (NPCO): NPCO = A/E

NPCO > 1, it indicates that the domestic channel at market price is benefiting from protection.

NPCO < 1, it indicates that the policy intervention occurs for incentive of the export channel at social price.

Nominal protection coefficient on tradable inputs (NPCI): NPCI = B/F

NPCI > 1, it indicates that the domestic channel at market price is paying higher than for tradable input cost (promotion for the export channel at social price).

NPCI < 1, it indicates that the domestic channel at market price is benefiting from protection by subsidization of tradable inputs cost.

Effective protection coefficient (EPC): EPC = (A – B)/(E – F)

EPC > 1, the domestic channel at market price is a protection with higher added value than the export channel.

EPC < 1, the domestic channel at market price receive lower added value than the export channel at social price (incentive to export activities).

Subsidy ratio to producers (SRP): L/E

SRP > 0, indicate the overall transfer profit from the export channel to the domestic channel, and limited export.

SRP < 0, it indicates overall transfer profit from the domestic channel to the export channel, and export incentive.

3. RESULT AND DISCUSSION

The Num-mango distribution system optimizes the efficiency of delivering agricultural goods to customers by targeting both domestic and global markets. Channel 4 mostly prioritizes catering to local clientele, whereas channels 1, 2, and 3 exhibit a greater emphasis on supporting international commerce.

Channel 1 Farmer → Cooperative → Export Enterprise

Channel 2 Farmer → Collector → Wholesaler (China)

Channel 3 Farmer → Collector → Wholesaler → Supermarket

The use of Value Chain Analysis (VCA) and the Policy Analysis Matrix (PAM), as described by Lorenzo (2013), enables the distinction between competitive advantage and comparative advantage within the context of policy planning. The strategic approach centers on evaluating the level of competition inside the company's domestic market. This confers a significant competitive edge to the firm in the market. Social pricing is a commonly used approach for examining export routes that exhibit vertical integration and economic interconnection. This remark might perhaps be linked to the economic idea of comparative advantage. Limited study has been conducted about the use of marketing channels by various agricultural systems. The objective of the PAM study is to investigate and get a deeper understanding of these channels in order to address the existing gap. Engaging in agricultural activities, engaging in trade with exporters and processors, and selling products to wholesalers are all feasible strategies for distribution. The valuation of Channel 4 may be ascertained by assessing the market value of the company's production at the period of evaluation. The main objective of this research is to assess the pricing methods used by Channel 4 in comparison to other export channels. The objective of this research is to ascertain the parallels and distinctions between Channel 4's social pricing approach and those used by other marketing channels.

Table 2. Policy analysis matrix for the Num-mango marketing channels 1, 2, 3 and 4

Unit: USD/ton

Channels	Revenue	Cost		Net profit
		Tradable Inputs	Domestic Factors	
The channel 1 at social price, the channel 4 at market price				
Market price	1,516.90±0	222.1±231.62	375.12±136.09	919.68±351.49
Social price	8,629.44±0	501.05±522.54	5,308.94±598.97	2,819.45±1037.31
Policy effects	-7,112.54±0	-278.95±290.92	-4,933.82±491.47	-1,899.77±713.40
The channel 2 at social price, the channel 4 at market price				
Market price	1,516.90±0	222.10±231.62	375.12±136.09	919.68±351.49
Social price	2,247.96±0	351.80±366.89	807.44±420.55	1,088.72±728.32

Policy effects	-731.06±0	-129.70±135.27	-432.32±316.34	-169.04±411.22
The channel 3 at social price, the channel 4 at market price				
Market price	1,516.90±0	222.10±231.62	375.12±136.09	919.68±351.49
Social price	2,567.70±0	351.80±366.89	1,332.34±420.55	883.56±728.32
Policy effects	-1,050.80±0	-129.70±135.27	-957.22±316.34	36.12±411.22

Source: Field survey data in 2022

Note: Tradable input is CIF price, Tradable output is FOB price

The data necessary for the computation of market and social pricing-based economic indicators for marketing channels 1, 2, and 3 is shown in Table 2. The findings indicate that the market price values of economic indicators in channels 1, 2, and 3 are same due to their reliance on the real marketing channel of Num-mango eaten in the Vietnamese market via domestic market pricing (marketing channel 4). The competitiveness of the Num-mango production system is shown by its positive market profitability value of 919.68 USD/ton, which takes into account the current level of technology, input and output prices, and policy transfers. It is prudent to undertake preparations for prospective expansions in production capacity. Moreover, it can be shown that channels 1-3 exhibit a positive social profitability, so suggesting that the allocation of limited societal resources in an effective manner results in overall societal advantages. Exporters of Num-mangoes have the potential to derive advantages by using channels 1, 2, and 3 as a means to enhance the visibility and marketability of their goods. In the realm of marketing, Num-mango often employs strategies that are advantageous both for commercial enterprises and the surrounding community.

Table 2 presents the distribution of earnings and profits based on market and social pricing. Channel 3 is now seeing advantageous cash inflows. The evidence presented suggests that Channel 3 has the potential to achieve financial sustainability without relying on any kind of public financing. In order to promote export activity via channels 1 and 2, it is important to consider the impact of government policy intervention on the profitability of the firm and production system via channel 4. This intervention may result in a reduction in profitability, leading to a negative transfer of revenue and profit between market and social prices. Consequently, Channel 4 generates a financial gain at the prevailing market price, but Channels 1 and 2 accrue monetary benefits at the societal price. In order to promote the export of goods, governmental rules provide financial support for certifications such as VietGAP and GlobalGAP, with the implementation of traceability codes, training initiatives, and commercial marketing strategies.

Table 3 presents statistical data pertaining to both mango production and exports, for the purpose of facilitating a comparative analysis. Considering the time value of money, the findings indicate that the present value of the PCR value is 0.36, which is below unity. According to the data, Channel 4 necessitates 0.64 domestic resource units in order to produce 1 unit of value added. This implies that Channel 4 has a competitive edge over its Vietnamese counterparts in terms of import substitution, since it operates independently without relying on government financial assistance. In addition, it is observed that the DRC coefficients exhibit values below one in relation to social prices. Specifically, channel 1 demonstrates a coefficient of 0.66, channel 2 exhibits a coefficient of 0.60, and channel 3 displays a coefficient of 0.69. These findings indicate that Num-mango production and export possess competitiveness and a comparative advantage across the three channels, considering the prevailing technologies, output values, input costs, and policy transfers. Based on the SBC ratios pertaining to channels 1, 2, and 3, it is seen that the potential savings in foreign currency might be 1.52, 2.48, and 1.72 times more than

the cost incurred in exporting mangoes at prevailing market values. Specifically, the second and third export channels generate much more revenue from external sources compared to the first channel.

Table 3. Synoptic view of PAM indicators in the Num-mango marketing channels

Indicators	Channel 1	Channel 2	Channel 3
PCR	0.36±0.47	0.36±0.47	0.36±0.47
DRC	0.66±0.13	0.60±1.19	0.69±0.63
SBC	1.52±0.21	2.48±1.07	1.72±0.50
NPCO	0.18±0.00	0.68±0.00	0.59±0.00
NPCI	0.44±0.00	0.63±0.00	0.63±0.00
EPC	0.16±0.02	0.69±0.05	0.58±0.02
SRP	-0.22±0.08	-0.08±0.18	0.01±0.16

Source: Field survey data in 2022

Channels 1, 2, and 3 have distinct NPCO values of 0.18, 0.68, and 0.59, respectively. The output price approach promotes production and commerce in Channels 1, 2, and 3 due to their NPCOs being less than 1. This analysis indicates that export channels 1, 2, and 3 yield a higher monetary value, namely 92%, 32%, and 41% respectively, when compared to the domestic channel 4. Additionally, it is important to note that this higher value is achieved at a social cost.

Channels 1, 2, and 3 exhibit NPCI values below unity, whereas Channel 4 has a positive impact due to the inclusion of marketable inputs, which incur costs of 66% in Channel 1 and 37% in Channels 2 and 3, respectively, based on prevailing market prices. The data further shows that channels 1, 2, and 3 have EPC coefficients that are all below one, with magnitudes of 0.16, 0.69, and 0.58, correspondingly. This observation illustrates that inputs are subject to a greater tax rate compared to outputs, and further suggests that the added societal value provided by Channel 4 is comparatively smaller than that of Channel 1. The provision of monetary incentives is seen in the case of exports facilitated by Methods 1, 2, and 3. Table 3 illustrates the shift of net profit from channel 4 at market price to channel 1 at social price, as seen by the negative SRP values associated with channels 1 and 2, which indicates the burden on taxpayers. This illustrates that Channels 1 and 2 get export incentives of 16% and 8% respectively, due to disparities in tax policies. Channel 4's net revenue from the government is less than one percent of Channel 3's, making it an insignificant proportion..

Table 4. Sensitivity analysis of the Num-mango marketing channels

Indicators	Increase 20%			Decrease 20%		
	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3
DRC	0.66	0.60	0.69			
FOB price	0.54±0.10	0.40±0.45	0.53±0.35	0.84±0.19	0.16±5.58	0.91±5.05
Tradable cost	0.67±0.15	0.46±4.20	0.98±2.99	0.65±0.11	0.47±0.49	0.63±0.39
Domestic cost	0.79±0.15	0.72±1.43	0.83±0.76	0.53±0.10	0.48±0.95	0.55±0.51
Exchange rate	0.83±0.16	0.75±1.49	0.63±0.39	0.55±0.11	0.50±0.99	0.98±2.99
SBC	1.52	2.48	1.72			

FOB price	1.83±0.25	2.97±1.28	2.06±0.60	1.22±0.17	1.98±0.86	1.37±0.40
Tradable cost	1.50±0.22	2.37±1.06	1.66±0.50	1.54±0.20	2.59±1.08	1.77±0.49
Domestic cost	1.28±0.17	2.14±0.90	1.47±0.41	1.87±0.27	2.93±1.32	2.07±0.63
Exchange rate	1.23±0.16	2.07±0.86	1.77±0.49	1.80±0.26	2.84±1.27	1.66±0.50
EPC	0.16	0.69	0.58			
FOB price	0.13±0.02	0.55±0.03	0.47±0.04	0.20±0.03	0.84±0.89	0.76±0.44
Tradable cost	0.16±0.02	0.71±0.57	0.63±0.20	0.16±0.02	0.65±0.04	0.56±0.05
Domestic cost	0.16±0.02	0.69±0.05	0.58±0.02	0.16±0.02	0.69±0.05	0.58±0.02
Exchange rate	0.20±0.02	0.92±0.24	0.58±0.01	0.13±0.02	0.54±0.08	0.57±0.13
SRP	-0.22	-0.08	0.01			
FOB price	-0.35±0.07	-0.23±0.15	-0.15±0.13	-0.03±0.10	0.16±0.23	0.27±0.20
Tradable cost	-0.21±0.09	-0.04±0.21	0.04±0.18	-0.23±0.07	-0.11±0.16	-0.01±0.14
Domestic cost	-0.10±0.01	0.00±0.22	0.12±0.19	-0.34±0.07	-0.15±0.15	-0.09±0.13
Exchange rate	-0.03±0.10	0.14±0.22	0.00±0.15	-0.34±0.07	-0.22±0.16	0.02±0.17

Source: Field survey data in 2022

Akter et al. (2003) argue that the PAM failed to adequately consider the potential for future modifications to policy indices. In order to assess the influence of alterations in FOB prices, tradable costs, domestic costs, and currency rates on competitiveness and policy indicators, it is necessary to do a sensitivity analysis at a significance threshold of 20% (Yao, 1997; Monhanty et al., 2003).

Table 4 presents a comprehensive overview of the DRC, SBC, SRP, and EPC scenarios, whereby each scenario entails a 20% adjustment to the FOB price, tradable cost, domestic cost, and exchange rate in comparison to the baseline scenario. Based on the available data, it can be shown that variations of 20% in FOB price, tradable cost, domestic cost, and exchange rate have a noteworthy influence on DRC. Conversely, for SBC, the primary factors of significance are FOB price, domestic cost, and exchange rate. The comparative advantage (DRC), benefit-cost ratio (SBC), effective protection coefficient (EPC), and subsidy ratio to producers (SRP) of export channels 1, 2, and 3 exhibit notable improvements when the FOB price experiences a 20% rise and the exchange rate undergoes a 20% reduction. A change of 20% in the tradable cost results in a corresponding movement in the proportions of DRC, SBC, EPC, and SRP. An other noteworthy observation is that although the EEPC is unchanged by a 20% decrease in domestic prices, both the DRC and the SBC experience advantageous outcomes as a result. The effect of SRP is estimated to be 20%. This increase in domestic costs benefits all three export channels, namely channels 1, 2, and 3.

4. CONCLUSION

The economic efficacy and competitiveness of export channels are significantly influenced by macroeconomic policies, including measures such as protection of production prices, exchange rate management, and local cost subsidization. Based on the available data, it can be inferred that domestic channel 4 exhibits competitiveness, whereas export channels 1, 2, and 3 possess competitive advantages in overseas markets. In a more particular context, the government is implementing restrictions such as value addition and output protection that exhibit a preference for export channel 1. The government's policy assigns a lesser priority to Channel 4 in comparison to Channels 2 and 3, and furthermore exposes it to an input cost subsidy plan. The prioritization of the second and third export channels is a key aspect of the added value development strategy. The findings of the sensitivity analysis indicate that a 20% alteration in the tradable cost has little impact on the SBC , EPC , and SRP. The adjustments resulting from a 20% reduction in domestic prices are beneficial for DRC and SBC, but EPC remains unchanged. The rise in the Free on Board (FOB) price by 20% and the reduction in domestic and tradable expenditures by 20% have a substantial impact on the increase in the suggested retail price (SRP) for export channels 1, 2, and 3.

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