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## DYNAMICS AND ECONOMIC EFFICIENCY OF DIGITAL TRANSFORMATION OF VIETNAM'S COFFEE INDUSTRY

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**Abstract.** Coffee is Vietnam's main exported product. It accounts for approximately 90% of the country's annual exports. In the beginning of the 20<sup>th</sup> century, Vietnam was the second largest world exporter of coffee after Brazil. However, the quality was low, and the product lost out in price. The economic efficiency of production and processing was not high because of traditional technologies which were used, so the contribution to the country's economy was considerably lower than it could be with the use of digital innovations. Currently, there are no completed studies of reasons for the low efficiency of Vietnam's coffee production and processing, and of the analysis of innovative transformations' dynamics. Therefore, the purpose of the study is to reveal the role and advantages of innovative digital technologies in coffee production and determine their economic efficiency. The results of the study suggest that over the past two decades, the global "coffee" market industry has expanded significantly; the demand for coffee grew by 65%. That is the main driver of development and a source of income for more than 12 million farms (more than 25 million families) in producer countries. The manual coffee production used in Vietnam cannot compete with modern digital technologies of countries that are leaders in the coffee market (Brazil, India, Thailand, etc.). The experience in introduction of technologies with international certification according to product quality standards on the area of 125.785 hectares in 2017, in the provinces Daklak, Lam Dong, Gia Lai and Kon Tum showed an increase in productivity by 10–30%. In the structure of Vietnamese coffee exports, 95% is green coffee, so export income is three times lower than the cost of processed coffee beans. Thus, the application of innovative digital technologies of cultivation and processing is a vital factor in the Vietnamese coffee industry. The result of their introduction will be sustainable development of coffee production, competitiveness growth of Vietnamese coffee products in the world market.

**Key words:** Vietnam, coffee industry, productivity, cultivation, processing coffee bean, economic efficiency, application innovative digital technologies.

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## ДИНАМИКА И ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ ЦИФРОВОЙ ТРАНСФОРМАЦИИ КОФЕЙНОЙ ИНДУСТРИИ ВЬЕТНАМА

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**Аннотация.** Кофе – главный экспортируемый продукт Вьетнама, его объем составляет примерно 90 % от ежегодного экспорта страны. В начале XX в. Вьетнам был вторым крупнейшим мировым экспортером кофе после Бразилии, но из-за более низкого качества продукта он проигрывал в цене, экономическая эффективность производства и переработки недостаточно высока в связи с использованием традиционных технологий, поэтому вклад в экономику страны был значительно ниже возможного с применением цифровых инноваций. В настоящее время нет завершенных исследований причин низкой эффективности производства и переработки кофе во Вьетнаме, анализа динамики инновационных преобразований, поэтому цель нашего исследования – раскрыть роль и преимущества инновационно-цифровых технологий при производстве кофе в стране и определить их экономическую эффективность. Результаты исследования свидетельствуют, что за последние два десятилетия мировой «кофейный» сектор рынка значительно расширился, спрос на кофе вырос на 65 %, что является основным драйвером развития и источником дохода более чем для 12 млн ферм (более 25 млн семей) в странах-производителях. Применяемое во Вьетнаме ручное производство кофе не может конкурировать с современными цифровыми технологиями стран – лидеров кофейного рынка (Бразилия, Индия, Таиланд и т. д.). Опыт внедрения в 2017 г. в провинциях DakLak, LamDong, GiaLai и KonTum технологий с международной сертификацией по стандартам качества продукции на площади 125,785 га продемонстрировал рост производительности на 10–30 %. В структуре экспорта вьетнамского кофе 95 % составляет зеленый кофе, поэтому доход от экспорта в 3 раза ниже, чем стоимость обработанных кофейных зерен. Таким образом, жизненно важным фактором в кофейной индустрии Вьетнама является внедрение инновационно-цифровых технологий культивирования и переработки. Результатом их внедрения будет устойчивое развитие производства кофе, повышение конкурентоспособности вьетнамской кофейной продукции на мировом рынке.

**Ключевые слова:** Вьетнам, кофейная индустрия, производительность, культивирование, обработка кофейных зерен, экономическая эффективность, применение инновационно-цифровых технологий.

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## Introduction

The demand for coffee products global is on the rise, the fastest increasing sectors in nutrition and beverage exchange. Coffee is projected to compound growth at annual rates of 5.5% between 2019 and 2024 [Sachs et al., 2019]. Present, coffee is on target a prevalence drink global, even used in many other industries, by-products such as coffee grounds and husks can be used as fertilizer, animal feed, relate of biotechnology in industrial waste treatment [Murthy, Naidu, 2012], relating biotechnology and chemical technology to process coffee, pharmaceuticals, functional foods, cosmetics [Murthy, Naidu, 2012; Galanakis, 2017], related to produce hair care products, especially for oily skin [Choi, 2022], green coffee bean extract is related to construct safe and effective weight loss products [Onakpoya, Terry, Ernst, 2010], coffee is a zero waste product because coffee husks after processing are related to devise organic fertilizers, using more coffee connotes to protection the environment [Galanakis, 2017].

During the past two decades, the global coffee sector has expanded significantly as demand for coffee has grown by 65%, with increased consumption in emerging and producing countries being the main driver of growth millions farms around the world, source of income for more than 12 million farms worldwide, it provides direct employment to

more than 25 million families in producing countries. Coffee remains an export commodity with 70% of production exported [ICO, 2019]. The coffee industry contributes to the economy of both exporting and importing countries, contributing to socioeconomic development, creating jobs and income for people in coffee growing and processing areas, provides vital foreign exchange earnings [ICO, 2019]. Farmers deal many risks such as decreasing prices, rising costs, the spread of diseases on plants, fertilizer prices and other costs soar, lack of access to prime and insurance on attractive terms. For coffee growers, economic sustainability requires at a minimum that coffee production is economically viable in long term [Sachs et al., 2019].

The studies have exhibited that the demand for coffee in lifestyle is increasing; coffee is a product that worth economic rates not target to coffee growers even contributes to the economic development of coffee exporting countries. In spite of this, coffee growers are opposite difficulties decreasing coffee prices, increasing input costs (fertilizers, labor) leading worthless economic efficiency. Research to clarify the current situation of Vietnamese coffee to realize measure to relate technology to production intended to enhance economic efficiency and competitiveness with coffee from other countries. Technologies app to coffee growing and processing will have difficulties as prime in investment in equipment, the ability of

producers to relate technology. In fact, exhibited that quantity of coffee producing households lack prime to invest in production and have to loans (unsecured derive, vastly interest rate) accounting for 51.32% of the total [Nguyen, Nguyen, Nguyen, 2017]. When introducing digital technologies, managers and specialists of agricultural formations need additional professional knowledge to manage the technological process [Balashova et al., 2021].

### **Literature review**

The scientific basis for comprehensive assessment of economic efficiency all along relate digital technology to coffee cultivation and processing are currently underdeveloped and incomplete. In spite of, the general methodological basis for studying economic efficiency and digital technology related in agricultural production has been applied in experimental study by professors of Volgograd State Agrarian University, the experiments have used wireless networks, satellite systems (GPS, Glonass), sensor device and big data to grow crops, result revealed event analyzing the economic efficiency of relating digitalization elements, the charges of purchasing equipment and other production charges are compared with the level of charges reduction or yield increase compared to traditional technologies. The impact related of technology on agricultural: Reducing the load and simplifying the workflow for machine operators by automating technological operations, better management of agricultural technologies based on the information base, improving the conditions for optimizing the management of both individual production processes and the entire economy. The strengthening of growing technologies by means of digitalization will not only provide an economic effect, but will also allow controlling the environmental parameters of agricultural production [Balashova et al., 2021]. Technologies used in modern agriculture include: cyber physical systems, internet of things, cloud computing, big data, artificial intelligence, vertical and horizontal integration, cyber security, robots, vertical farms. The application of digital technologies to the agricultural sector significantly contributes to increase agricultural productivity and reliable food production [Arkhipov et al., 2019; Arıcıoğlu, Yılma, Gülнар, 2020].

Innovative agricultural production is essential to relate digital technology on target for economic efficiency over and above for the environment and sustainable development of agriculture. Access to modern innovative and digital technologies enables agricultural holdings to devise optimal soil and

agriculture technical and organizational-territorial conditions, which will increase productivity, labor productivity and reduce material and labor costs, while maintaining soil fertility and protecting the environment [Popova, Huynh, 2021; Arıcıoğlu, Yılma, Gülнар, 2020]. In their analysis of economic growth, economists emphasize the need to increase capital to invest in devices, that is, the amount of capital per worker is constantly increasing. Examples include the increase in capital equipment that replicated agricultural machinery and irrigation systems in agricultural production, technological changes that increased economic productivity in Europe, North America and Japan [Mladen, 2015]. The production potential is demonstrated by the concentration of management systems and divergent technological techniques, the availability of technologies that devise efficient coffee production [Paseto, Tulio, Patino, 2019; Almeida, Silberstein, 2017; Zanetti et al., 2021].

Studies on coffee production around the world (especially in Brazil) have concluded that digital innovation can help farmers make decisions, increase yields, increase efficiency and improve technology. Different technologies will produce different yields between regions and large-scale mechanized farms [UNIQUE forestry & land use, Global coffee platform, Coffee & climate, Conservation international et al., 2018; Paseto, Tulio, Patino, 2019; Almeida, Silberstein, 2017; Zanetti et al., 2021]. Smart technology being applied in coffee production researched by Kittichotsatsawat and other, the paper offers a critical review of research articles related to the use of big data in general agriculture and specifically in coffee operations. Big data combined with digital agriculture has promising potential in smart coffee farm operations, ultimately bringing greater profits for this sector. In the future, all data wireless sensor networks, cloud computing, Internet of Things, image processing, remote sensing, traceability technology, and blockchain will be used in the coffee supply. Those big data applications were used to increase the production and business management efficiency that serves the customer needs. The value data can also be applied and predicted all activities, including weather and climate change, land management, crops, soil, food availability and security, farmers' insurance, and finance in order to produce sustainable coffee growth [Kittichotsatsawat, Jangkrajarn, Tippayawong, 2021].

Studies have confirmed that relating technology in general agriculture and specifically in coffee production will allow improving productivity, superior product quality and privacy costs than traditional manual production. For Vietnamese coffee, no studies

to analyze the causes of reduce economic efficiency in cultivation and processing, interrelation between economic efficiency in production and technology; it is the gist for this research.

### **Material and methods**

The methodological significance and application value of the research in relate technology in cultivation and processing coffee, to afford economic efficiency, perfecting programs to support coffee development in accordance with Government's program on digital transformation of Vietnam's agricultural sector to 2030. The method of observing and interviewing growers and processors manually and with technology application, determining the level and timing of mechanization and technology relate in production. Descriptive and synthetic statistical methods are used to clarify the development status of Vietnamese coffee, analyze benefits and changes brought about by technology in the production. Data is collected through actual observations, interviews in 5 Central Highlands provinces (Daklak, LamDong, DakNong, GiaLai and KonTum), farmers, processing and trading enterprises, data from the International Coffee Organization (ICO), report of the Vietnam Coffee and Cocoa Association (VICOFA), data of the Ministry of Agriculture and Rural Development of Vietnam; General Department of Customs; Statistical Report on the socioeconomic situation of the Central Highlands provinces.

### **Results and discussion**

1. Output, productivity, product quality with application of technology in cultivation. Coffee is

cultivated in most of the 5 provinces in the Central Highlands of Vietnam. The coffee region in 2022 is as follows: DakLak – 213.400 hectares, LamDong – 175.400 hectares, DakNong – 137.000 hectares, GiaLai – 97.000 hectares, KonTum – 25.300 hectares. Thus, approximately 91.2% of the Vietnam's territory is coffee region. Vietnam's climate and soil are suitable for cultivation robust coffee (Robustas), approximately 90% of the area, 10% of the area planted with coffee and tea (Arabica). When cultivating farmers have to invest much money capital at begin, until three or four years after starting to harvest the first crop, farmers take care, fertilize and harvest every year until the coffee plants are old lasting 15 to 20 years. When coffee plants become aged and low productivity, cultivators replant, which means new investment and farmers will have no income for the next three or four years. Therefore, the total harvested area is less than the cultivated area.

From 2001 to 2007 Vietnam's coffee cultivated area decreased by 75.500 hectares approximately 13.53%, because the aged coffee plants can no longer be exploited, farmers cultivate manually so the cost was soared, productivity was depressed, sales rebate, not profitable, the cultivator didn't want to replant so truncate it to switch to other crops. Shortly after, sale coffee prices increased and coffee was replanted, from 2009 to 2021 Vietnam's coffee cultivated area increased by 203.391 hectares approximately 28.62%, output growth 42.68% to supply the world's coffee demand, simultaneously increase foreign currency revenue from exports (Table 1).

Until the coffee plants were first crops in 1982 to the 2010s, almost all farmers cultivate manually as soil preparation, nursery, planting holes, irrigation, fertilization, and harvesting with experience. As a

*Table 1*

**Coffee area, production and productivity from 2001 to 2021 in Vietnam**

<b>Year</b>	<b>Cultivated area, hectare</b>	<b>Harvested area, hectare</b>	<b>Output, ton</b>	<b>Productivity, ton/hectare</b>
2001	565,400	473,600	840,600	1.78
2003	509,937	480,478	755,113	1.57
2005	497,400	483,600	752,100	1.56
2007	488,900	478,500	915,800	1.87
2009	507,200	501,100	1,057,500	2.08
2011	586,000	543,800	1,276,400	2.35
2013	637,000	581,300	1,381,100	2.38
2015	645,217	597,349	1,445,045	2.42
2017	664,633	606,938	1,529,733	2.52
2019	688,300	622,222	1,680,000	2.70
2021	710,591	653,192	1,845,033	2.83

*Note.* Source: [Vietnam Coffee ..., 2021].

result, the low efficiency, the efficiency from 2001 to 2009 increased by 0.3 tons/hectare, approximately 14.42%. In 2010 and 2011 Nestlé Vietnam supported 27 million new seedlings and techniques to replant an area of 20.000 hectares, about 3.4% of the total area. Moreover, in 2013 Western institute of Agro-Forestry science and technology originally researched and officially put into application an economical irrigation system; this is a semi-automatic irrigation system for the area's coffee plants. Before there was an economical irrigation system cultivators used a sprinkler to flood the roots. That isn't technically correct and wastes electricity and water for irrigation. For coffee, irrigation water greatly affects crop productivity. After 6 years of applying irrigation techniques to save harvest, it has improved significantly increased from 2.35 tons/hectare in 2011 to 2.52 tons/hectare in 2017.

In 2017, DakLak applied technology to coffee cultivate, there were 30,000 households associated with businesses to produce coffee with international certifications on product quality standards, the total area applied over 64.170 hectares, approximately 30.07% of the area [DakLak Statistical Office, 2021; 2022], in 2019 coffee cultivators in LamDong, GiaLai and KonTum started apply technology for production and were internationally certified for product quality standards. LamDong mainly grows Arabic coffee, which is the preferred coffee and has higher economic value than other types. From 2019 to now, the coffee production area with technology application is 24.578 hectares, approximately 14.01% of the area [LamDong Statistical Office, 2019; 2021], GiaLai has an application area of 10.045 hectares and 5 hectares of experimental areas put FARMS software to manage data directly, supported by Nestle company, farmer Nguyen Duc Hue, approximately 10.36% of the total coffee area [GiaLai Portal, 2019; 2021], KonTum is 6.657 hectares, approximately 26.3% of the coffee area [KonTum Statistical Office, 2021]. In DakNong from 2020, coffee cultivators just started using technology in production, an area of 20.335 hectares, approximately 14.8% of the area [DakNong Statistical Office, 2021]. The technology used mainly for irrigation and crop care and automation in fertilizing, the drip irrigation technology of Netafim Corporation – Israel, the practical benefit of the drip irrigation system is low demands for water, so save water for irrigation, reduce chemical leaching into the environment, limit soil erosion, reduce operating costs, make soil moisture uniform and always reach the optimum level for plants, make the fresh root zone is spongy, increasing the respiration

capacity of the roots, thus increasing the efficiency of the plant's water and nutrient absorption.

According to estimated coffee cultivators, thanks to the application of technology productivity is 10–30% higher than before, the selling price for businesses is higher cause the product quality certification according to the standards of the monitoring process monitoring the origin of coffee named “UTZ CERTIFIED Good Inside”, reducing the amount of fertilizer and watering labor for the plants. According to experimental estimates of 5 hectares of coffee in GiaLai, in 2019, the average productivity is 4.5 tons – 5 tons of kernels/hectare, traditional production average productivity is 2.5 tons/hectare – 3 tons/hectare, the profit is about 200 million VND/year. The application of technology to coffee cultivation and processing in Vietnam isn't much, the total area of 125.785 hectares approximately 17.70%, the results of application technology in coffee production can be seen clearly: increase productivity and product quality, reduce labor expenses, reduce fertilizer costs. Studies on coffee production around the world, especially in Brazil have concluded that digital innovation can assist cultivators in decision relating, increase productivity, and improve efficiency [ICO, 2019; Zanetti et al., 2021; Paseto, Tulio, Patino, 2019; Almeida, Silberstein, 2017].

2. Production expenses with the application of technology to coffee cultivate. Coffee production costs include expenses of plant varieties, shaping, weeding, watering, fertilizers, pesticides, depreciation of machinery and equipment, harvesting costs, and labor costs. According the Central Highlands Seed Center cost of plant varieties isn't soar, from 400.000 VND/kg to 500.000 VND/kg (1.000 RUP/kg to 1.250 RUP/kg). Present, many businesses and cooperatives associated with farmers will support seeds and seeding techniques for cultivators. According to the research of P.L. Nguyen and H.D. Nguyen [Nguyen, Nguyen, 2020] when conducting a study to evaluate the economic efficiency of coffee production applying economical irrigation technology in the Central Highlands, a case study in CumGar district In DakLak province. When applying modern economical drip irrigation technology, it can reduce approximately 85.37% of labor, equivalent to 35 labors/hectare/year, the total investment expense for the drip irrigation model combined with fertilizer application water for coffee is 54 million VND/hectare (135.000 RUP/hectare), the minimum useful life is 10 years, so the annual depreciation is 5.4 million VND/hectare (13.500 RUP/hectare), reducing the cost of irrigation water/hectare by 54.80%, expense of fertilizers and pesticides at

2.368 million VND/hectare helping to protect the environment, the labor cost was reduced by 3.306 million VND/hectare approximately 30.06%. With the current national coffee area of 710.591 hectares, the expense savings for coffee production is numerous, while reducing the burden of hiring labors in the condition of low agricultural sector, toxic chemicals from herbicides and pesticides into the environment (Table 2).

Coffee cultivators worldwide largely by smallholders, they are struggling to cover expenses inputs [ICO, 2019; Salengke et al., 2019]. Application technology in coffee cultivation helps farmers save on irrigation, fertilizer and labor expenses. According to coffee cultivators, the expense of harvesting coffee is quite numerous because coffee harvesting in Vietnam is completely manual, labor shortage due to less labor in rural areas because urbanization process. Therefore, hiring labor is very difficult, the harvest season of Vietnamese coffee is from October to January next year for coffee Robustas, coffee Arabica are usually harvested from September. By November every year, the labor cost soar, at the present time the labor price for coffee harvesting ranges from 1.300 VND/kg to 1.700 VND/kg (3.25 RUP/kg – 4.25 RUP/kg, the average cost of harvesting 1 hectare ranges from 3.697.000 VND/hectare – 4.811.000 VND/hectare (9.243 RUP/hectare – 12.028 RUP/hectare). The expense of harvesting is also a big expense in many countries. Harvesting without machines labor accounts approximately 50% of total expenses in most production systems (except for Brazil). In high

expense areas 25–50% of cultivators are unable to cover the full expense of production [ICO, 2019]. Solutions for expenses, technological innovations to enhance market transparency by collecting and assessing production costs and living income standards and through upgrading existing market information systems, this strategy should inform the sourcing practices of the coffee industry and empower producers with the goal of more equitable distribution of the value created in the industry [ICO, 2019; Paseto et al., 2018; Salengke et al., 2019].

3. Export prices with the application technologies in production coffee. The sale prices are important in measuring the economic efficiency of coffee production. Currently, about a third of global coffee production is linked to one or more sustainability certifications, and volume of coffee produced in compliance with sustainability standards is growing rapidly [ICO, 2020]. International spot market prices: ICO group indices for Colombian coffee, other coffees, Brazilian natural coffees and Robustas based on ex-factory quotes reported in major markets, while dealers and large roasters determine the sale prices, market power of buyers can lead to unfavorable contract terms for farmers [ICO, 2019]. Cultivators regular received price information from purchasers (roasters, cooperatives, middlemen), which puts cultivators at a price disadvantage [Sachs et al., 2020; Lewin, Giovannucci, Varangis, 2004]. In Vietnam, green coffee is purchased by FDI coffee production and processing enterprises (approximately for more than 50%), domestic production and processing companies,

Table 2

Coffee production cost according to 2019 survey data (VND/hectare)

Expenses	Economical Irrigation (2)	Traditional Irrigation (1)	Compare (1-2)
1. Fertilizers and plant protection chemicals			
Green manure	796.000	907.000	+111.000
Microbiological manure	10.839.000	12.283.000	+1.444.000
Inorganic manure	26.161.000	29.058.000	+2.897.000
Foliar fertilizer	6.319.000	4.219.000	-2.100.000
Pesticides	72.000	84.000	+12.000
Herbicide	41.000	45.000	+4.000
2. Irrigation water expenses	1.294.000	2.863.000	+1.569.000
3. Labor	7.689.000	10.995.000	+3.306.000
4. Other expenses	3.760.000	2.115.000	-1.645.000
5. Depreciation	7.200.000	5.125.000	-2.075.000
6. Family labor, days	93	162	69
Of those: watering labor, days	6	41	35

Note. Source: [Nguyen, 2020].

coffee export companies, and coffee cooperatives. The sales price of coffee is determined by purchases, farmers have little capital money, so they have to borrow to produce after harvesting will repay the debt, so they're commonly forced to price.

From the data in Table 3, the average export price of Vietnam's coffee ranges from \$1520/ton to \$2.235/ton, output also fluctuates up and down over the years depending on market demand. The export price depends on each enterprise and each market, even though it's the same type of coffee. For example, Robustas coffee has the selling price on the 10 largest import markets of Vietnam, Germany is the country with the largest import volume but the price is only \$2.127/ton, Japan and China are countries imports less output but have higher import prices, respectively is \$2.591/ton and \$2.941/ton [Vietnam Coffee ... , 2022], export value income in foreign currency from 2 billion USD to more than 3.5 billion USD per year for Vietnam, that's a great source of income for economic and social development.

In fact, roasted coffee products have sales price nearly 3 times higher than green coffee beans, roasted and ground coffee costs \$6,386/ton while green coffee is \$2,138/ton (see Fig. 1). Actually, Vietnam's coffee exported output ranks second in the world, but 95% is unprocessed coffee beans, so the export value is low compared to other countries (see Fig. 2). Therefore, in order to increase the production value of coffee products, enterprises need to invest in technology to process coffee before exporting.

In spite of, also exports Robust coffee beans like VietNam, but the export priced of Brazil is always soars than, because Brazilian coffee has wide application technology from cultivation, processing

to product consumption, while the application of technology to production in Vietnam is narrow (see Fig. 3). Studies conducted in Brazil have shown that mechanical harvesting improves coffee's quality than manual harvesting, because separation of ripe and green pods are economically feasible [Paseto et al., 2018], meanwhile Vietnam's current manual harvesting reduces coffee's quality.

Finally, The growth of e-commerce has evolved up opportunities to find new markets and sell directly to consumers, marketing is important method for coffee small businesses and some certain producers to promote their brands, whether on the basis of the social responsibility, coffee quality or price [Sachs et al., 2019]. Technological innovations provide better access to finance and markets, operate producer exports closer to consumers [ICO, 2019; Paseto et al., 2018; Salengke et al., 2019], Brazil's market access is better than Vietnam, they have built excellence coffee supply chain in the global market because of the relating technology in cultivation precocious.

### Conclusion

Research results suggest that, technology has an impact on productivity, product quality, production expenses and product sales price, means that technology has a positive effect on the economic efficiency of coffee production. In practice, coffee cultivators cooperate with enterprises. Applying technology to production has helped them increase output, increase productivity, improve product quality and reduce production expenses, increase income, but the application area is narrow compared to the total

*Table 3*

**Export volume, export price and export value of Vietnamese coffee**

Year	Export Volume, ton	Export Price, USD/ton	Export Value, USD
2010	1.217.868	1.520	1.851.357.772
2011	1.256.396	2.191	2.752.423.409
2012	1.732.156	2.120	3.672.823.086
2013	1.300.145	2.090	2.717.513.153
2014	1.690.564	2.104	3.556.887.418
2015	1.341.169	1.992	2.671.334.044
2016	1.780.328	1.873	3.334.249.370
2017	1.566.176	2.235	3.500.447.003
2018	1.876.967	1.884	3.536.402.485
2019	1.657.568	1.727	2.862.301.005
2020	1.565.280	1.733	2.741.048.091
2021	1.561.903	1.967	3.072.579.551

*Note.* Source: [Vietnam Coffee ... , 2022].

coffee cultivated area of Vietnam. The current situation with Vietnamese coffee is the need to improve coffee productivity and quality while saving production costs, raising sales prices to improve economic efficiency in coffee cultivation and processing, specifically, increasing competitiveness with other coffee products on the global market. Vietnamese coffee needs to apply digital technology into coffee production in Vietnam. Nevertheless, the majority of coffee cultivators are small households and lack capital

money for production, the government should consider having appropriate capital support policies for the development of Vietnam's coffee industry.

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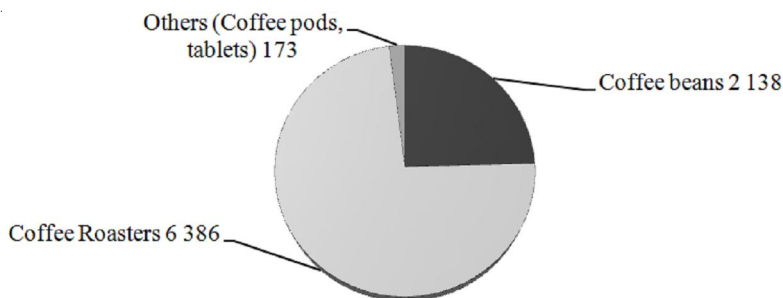


Fig. 1. Export price of Vietnamese coffee in July 2022, USD/ton

Note. Source: [Vietnam Coffee ..., 2022].

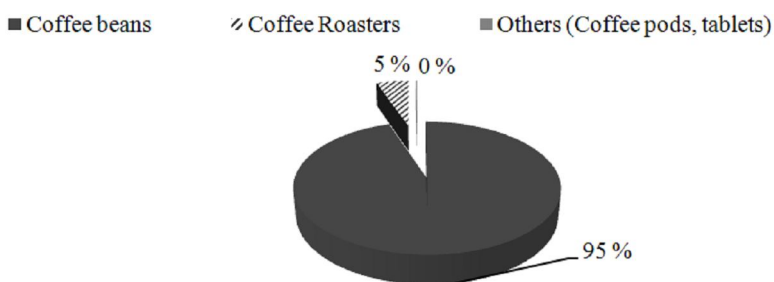


Fig. 2. Export volume of Vietnamese coffee in July 2022

Note. Source: [Vietnam Coffee and Cocoa Association, 2022].

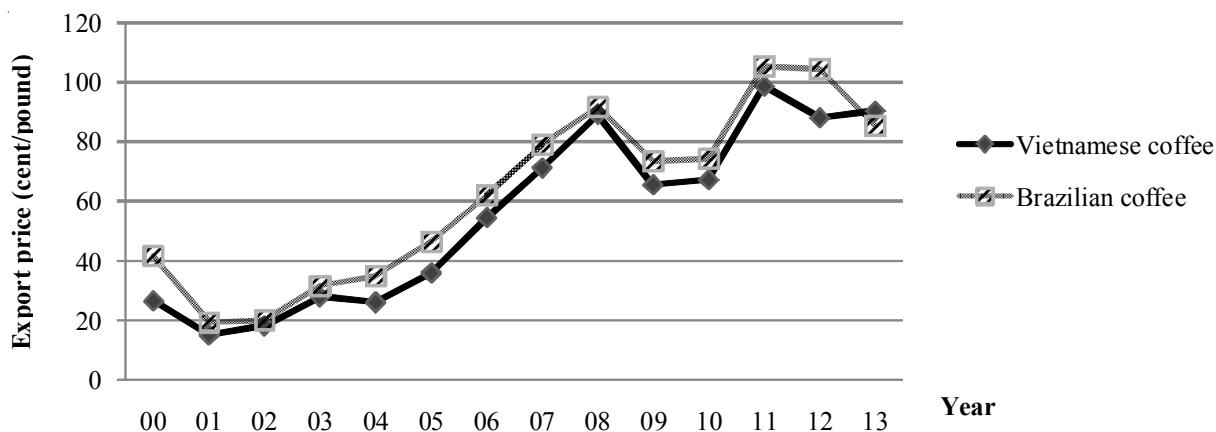


Fig. 3. Coffee export prices according to the ICO of Vietnam and Brazil

Note. Source: [International Coffee Organization, 2021].



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