

THESIS

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Major: Supply Chain Management

**Gödöllő
2024**

**Hungarian University of Agriculture and Life
Science**

Szent István Campus

Supply Chain Management

The supply chain in eco-friendly coffee- Factors that motivate consumers to purchase eco-friendly coffee

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Introduction

The exact origins of coffee are unknown. However, popular legends assert that the beginning of coffee production and consumption dates back to Abyssinia, in present day Ethiopia.(Guilherme et al., 2020) Coffee was first introduced to Europe in Hungary when the Turks invaded Hungary at the Battle of Mohács in 1526. Within a year, coffee had reached Vienna by the same Turks who fought the Europeans at the Siege of Vienna (1529). Later in the 16th century, coffee was introduced on the island of Malta through slavery.

Currently, coffee remains a prominent global beverage, and an emerging trend in the coffee market is the increasing demand for specialty coffee. According to Statistics, the projected coffee revenue significantly increase year by year 2023-2028 (figure 1).Consumers actively seek distinctive, high-quality coffee experiences with diverse flavor profiles. Futhermore, climate change has led to many serious global issues that continues to progress, as several studies have shown (Kirchner et al., 2016, Takahashi, 2018). Sustainable consumption and production have been promoted to prevent and reduce environmental degradation and pollution (Bager et al., 2022).

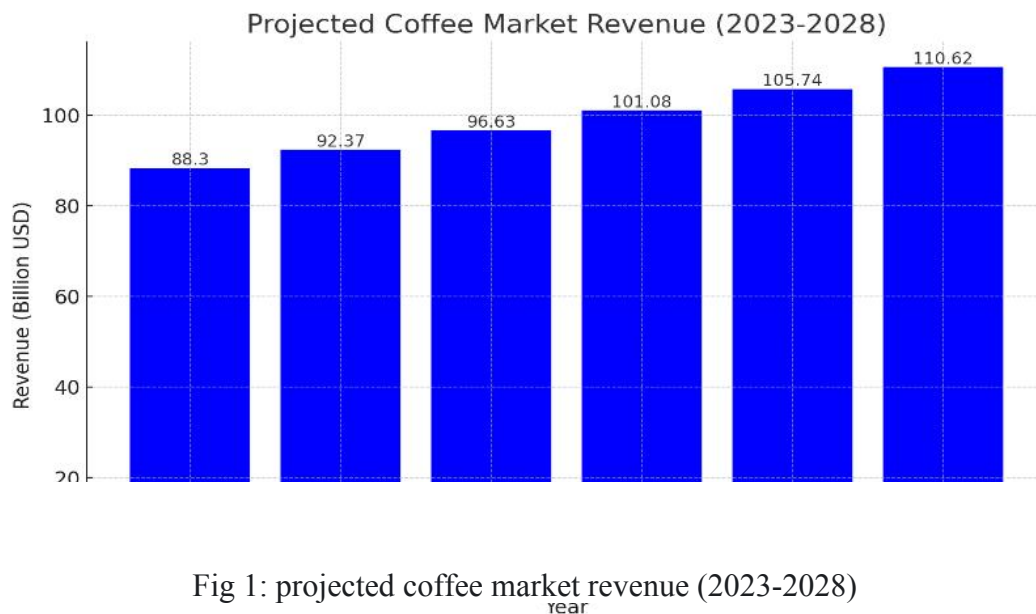


Fig 1: projected coffee market revenue (2023-2028)

Consumers are progressively aware of the environmental and social implications of coffee production. The concept of eco-friendly coffee, characterized by environmentally sustainable and socially responsible practices, began to evolve in the late 20th century. It encompasses shade-grown and organic coffee farming, fair trade principles, certifications like Bird-Friendly and Rainforest Alliance, and sustainability initiatives by coffee companies. Another noteworthy trend in the coffee market is the growing focus on sustainability and supply chain issues. Consumers seek out brands

that prioritize fair trade practices, sustainable farming, and support for coffee farmers' livelihoods. This trend has led to the adoption of certifications like Rainforest Alliance and Fairtrade, assuring consumers that their coffee purchases meet specific social and environmental standards. Hence, the key role of the supply chain in environmentally friendly coffee includes promoting sustainable cultivation and production, reducing environmental impact. Play an important role in meeting consumer demand and making the coffee supply chain sustainable and environmentally friendly.

Literature review

2.1 An overview of the eco-friendly coffee supply chain

The escalating demand for sustainable and eco-conscious commodities has invariably led industries to reevaluate and restructure their supply chains. Notably, the coffee sector, traditionally marred by environmental and ethical concerns, has witnessed profound transformations in its modus operandi to align with green paradigms. To provide a coherent understanding of the eco-friendly coffee supply chain, it is imperative to scrutinize its intricate stages: farmer production, processor, manufacturer, national government agency, market, and finally, the consumer. Drivers and barriers to sustainable supply chains

Information sharing lies at the core of most governance interventions within agro-food commodity supply-chains. However, actors have little information available to guide sustainable consumption decisions beyond simple labels (Simon L. Bager 2022). Customers can understand the origin of products through blockchain technology, and transparent information about quality and sustainability can influence consumer behavior, but the real value lies in digitizing the supply chain to improve efficiency, reduce costs, disputes, fraud, and improve product quality through the digitization of supply chains. Provenance and chain of custody data provide comprehensive insights.

to implement sustainable supply chain (SSC) innovations (Yana & João 2022), The study indicates that sustainable supply chain management (SSCM) in the coffee industry is primarily driven by factors such as social responsibility, economic enhancement, regulatory compliance (environmental, regional, international), and the adoption of innovative business models. Conversely, barriers include insufficient government support, process complexity, and communication gaps. Until nowadays many organisations in the agro-food industry are currently struggling

2.1.1 Farmer & NGO in coffee supply chain

The coffee supply chain begins with the cultivation of coffee, where progressive farmers increasingly adopt sustainable agricultural practices such as shade-grown cultivation. This approach mandates the growth of coffee under a canopy of trees, fostering biodiversity and soil conservation while playing a crucial role in carbon sequestration. Simultaneously, the shift towards organic farming gains momentum, prioritising the avoidance of synthetic inputs and advocating for natural fertilisers, crop rotation, and biological pest control.

While coffee sustainability standards, as acknowledged by Vanderhaegen et al. (2018), benefit the natural world and facilitate connections between farmers and global buyers (Reinecke et al., 2012; Taylor et al., 2005), challenges arise in the form of high

financial costs. Certified standards, such as Fairtrade (Parrish et al., 2005), can institutionalise local-global relations in places like Tanzania but may necessitate additional investments from farmers to transform price premiums into viable income (Giovannucci & Ponte, 2005; Kolk, 2013; Neilson, 2008). This financial burden often limits income opportunities for farmers, leading to dependence on external donors (van Rijsbergen et al., 2016; Vellema et al., 2015). Scholars, including Minten et al. (2018) and Ortiz-Miranda & Moragues-Faus (2015), have raised questions about the true efficacy of sustainability standards in fostering social and economic upgrades.

In the context of collaboration and sustainability within the coffee supply chain, previous research has predominantly focused on the engagement of global buyers and their involvement in joint projects (Bager & Lambin, 2020). This emphasis has sometimes overlooked the potential for collaboration and knowledge-sharing among farmers and NGOs. The prevailing notion, articulated by scholars like Bianco (2020) and Bitzer et al. (2013), often assumes that farmers and NGOs lack the resources to organize for sustainability, placing the responsibility on global buyers. Contrary to this perspective, farmers possess intimate knowledge of the land and its needs, maintaining deep connections with the natural world. This knowledge-sharing dynamic between farmers and NGOs, as evidenced by Adams & Ghaly (2007), Akenroye et al. (2021), and Kolk (2013), challenges the assumption that farmers are passive recipients of support.

While the literature recognises that NGOs play a role in helping farmers access markets and become independent business owners (Bacon, 2005; Parrish et al., 2005), there is a notable scarcity of evidence on how farmer-NGO collaboration contributes to the bottom-up addressing of sustainability challenges within the coffee supply chain. This gap in understanding highlights the need for further research to elucidate the mechanisms through which such collaborations enhance knowledge sharing and contribute to sustainable practices from the grassroots level upward.

2.1.2 Processor in eco-friendly coffee supply chain

In the field of environmentally friendly coffee processing, the study conducted by Jha et al. (2014) conducted an in-depth study of the implementation of water-saving technologies, such as the use of innovative processing techniques to significantly reduce water consumption during coffee production. This study highlights the critical role of sustainable water management practices in mitigating environmental impacts. Furthermore, the work of Murray et al. (2017) conducted a detailed study on how environmentally friendly processors contribute to social responsibility. By emphasizing fair trade principles and ethical sourcing, these processors support local communities, as discussed by Ponte and Gibbon (2005) in the context of sustainable and responsible supply chain practices. Together, these studies provide a comprehensive understanding of specific strategies and impacts related to environmentally friendly practices in the coffee processing industry.

2.1.3 Manufacturer

After processing steps, green coffee beans are shipped along the coffee supply chain to manufacturers or roasters. Murray and colleagues (2017) highlighted the current trend among roasting facilities to prioritize energy efficiency and integrate renewable energy into power operations. This involves sustainability requirements, addressing the ecological impact of coffee growing. Jha et al.'s (2014) insightful analysis of roasting process optimization, with a particular emphasis on waste reduction strategies, reflects the academic pursuit of operational efficiency.

Vanderhagen et al. (2018) and Reinecke et al. (2012) provide insights into the academic conversation about sustainable packaging strategies. The article highlights how contemporary roasters adhere to careful packaging procedures, using mostly recyclable or biodegradable materials. This is in line with the prevailing ethos of environmentally friendly packaging practices. Together, these academic perspectives highlight the complexities of energy-efficient roasting, waste reduction strategies, and sustainable packaging methods within the delicate landscape of the coffee supply chain.

2.1.4 National Government Agency

In the complex landscape of sustainable coffee supply chain management, national government agencies emerge as key entities with significant influence in shaping eco-friendly development trajectories. Their role is demonstrated through the establishment and enforcement of regulatory frameworks and certifications, such as widely recognized standards such as organic and fair trade labels. Scholars such as Murray highlight these measures. (2017) and van der Hagen et al. (2018), as an important tool to ensure and verify stakeholders' compliance with sustainable practices throughout the supply chain. To address the sustainability challenges outlined in the coffee supply chain governance strategy, as highlighted by Borrella et al. (2015) and Reynolds (2009) argue that national government agencies become key actors in pursuing upgrade opportunities through international market intervention. Furthermore, scholars emphasize product differentiation (Daviron & Ponte, 2005; Hernandez-Aguilera et al., 2018) as a strategic approach. Notably, the governance strategy covers a range of coffee sustainability standards, including third-party certification from NGOs such as Fairtrade, Organic, 4C, Utz, and Rainforest Alliance (Akoyi et al., 2020). This integrated approach integrates government regulatory efforts with broader strategies and reflects the multifaceted nature of sustainable coffee supply chain management.

2.1.5 retailers and markets in eco-friendly coffee supply chain management

In the eco-friendly coffee industry, markets and traders as intermediaries play a vital role in meeting the growing demand for sustainably sourced goods. When eco-friendly coffee sections are incorporated into actual retail spaces and labeled with

prestigious certifications like fair trade and organic, it's a carefully planned move to attract consumers who prefer sustainable options. Digital marketplace platforms complement this offline strategy by leveraging virtual environments to deliver engaging stories about ethical sourcing, production techniques and relevant certifications.

Academic literature as evidenced by research works such as Reynolds (2009) and Daviron & Ponte (2005) emphasizes the critical role played by merchants' sustainable marketing strategies. These strategies cover a wide range of activities, from emphasizing eco-friendly packaging methods to emphasizing fair trade ideals. This strategic focus is more than just a marketing gimmick; rather, it's a key component in making eco-friendly coffee products stand out in a crowded market.

Retailers in the coffee supply chain actively contribute to the larger sustainability story, going beyond the simple role of product distributors. They are positioned as key influencers to encourage environmentally friendly decisions because of their purposeful use of sustainable marketing techniques, which is in line with changing consumer attitudes. As consumers increasingly gravitate toward sustainable sourcing and ethical products, retailers are playing a transformative role in driving the eco-friendly coffee market forward through their strategic initiatives. They also contribute to the wider discussion of sustainable consumption and supply chain practices.

2.1.6 Consumer preferences

Consumers are at the end of the supply chain. In addition to pursuing quality, today's environmentally concerned customers also want to know whether the products they purchase support sustainable principles. Eco-certification is a key factor in determining customer preference for eco-friendly coffee. However, there is a growing demand for openness and traceability in the coffee production chain, so customers prefer more than just certification. Customers want to know everything about the origins, growing techniques and manufacturing procedures of the coffee they buy. This push for transparency highlights the need for customers to better understand a product and understand how it affects the environment and society. Furthermore, this change in customer preferences has a positive impact on market dynamics and merchant behavior beyond the point of sale. Retailers are introducing eco-friendly coffee into their products to satisfy the discerning tastes of environmentally conscious customers. Retailers seeking to adapt their products to changing consumer values must adopt sustainable marketing strategies that prioritize ethical sourcing and environmental responsibility. The uniqueness of this shift reveals a broader social awareness that consumers view their decisions as an important part of the group's efforts toward ethical and sustainable coffee use. As this trend continues, it will push the entire sustainable coffee supply chain in a more conscientious direction, and as knowledgeable customers make more and more choices, they will view their coffee preferences as a concrete manifestation of his faith..

2.1.7 Summation

Eco-friendly coffee supply chains reveal a transformative journey shaped by growing demand for sustainable commodities. This evolution is particularly noticeable in the coffee industry, which has historically been plagued by environmental and ethical issues. Each stage of the supply chain, from farmer production to consumer, presents unique challenges and opportunities. Progressive farmers adopt sustainable practices such as shade growing and organic farming while grappling with the financial burden associated with certification standards. Collaboration and knowledge sharing between farmers and NGOs challenge assumptions about resource constraints and highlight the complex dynamics of grassroots sustainable development. The processor stage focuses on water-saving technologies, emphasizing the role of sustainable water management. Manufacturers and roasters prioritize energy efficiency and sustainable packaging that complies with contemporary environmental standards. National government agencies exert influence through regulatory frameworks and certification to contribute to governance strategies for sustainable development.

Retailers and markets play a key role in meeting the growing demand for sustainably sourced products. Both physical and digital platforms strategically integrate eco-friendly coffee, emphasize certification and employ sustainable marketing strategies. These retailers actively contribute to the broader sustainability narrative, influence market dynamics and reflect society's shift towards ethical consumption. As the final link, consumers drive the entire supply chain, with changing preferences for transparency, traceability and eco-certification. This shift not only impacts purchasing decisions but also retailers' behavior, emphasizing the joint effort towards sustainable and ethical coffee consumption. The specificity of this trend highlights the broader social awareness to shift environmentally friendly coffee supply chains to a more responsible and environmentally friendly paradigm.

2.2 The importance of sustainability and environmentally friendly practices to the coffee supply chain

2.2.1 The definition of sustainability

In October 1987, Our Common Future, also known as the Brundtland Report, was published by the World Commission on Environment and Development. In that report, the term "sustainable development" was officially defined as: "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." Some notable aspects of this definition are that it is global in scope, timeless, reflects an ongoing process, and includes a moral responsibility for equity and justice.

Three Dimensions of Sustainability(fig.2)

Although sustainability is linked to the environmental movement, the notion that it is only focused on the environment is a misconception. Sustainability is based on three dimensions:

Environmental sustainability occurs when humanity's rate of consumption does not exceed nature's rate of replenishment and when humanity's rate of generating pollution and emitting greenhouse gases does not exceed nature's rate of restoration.

Social sustainability is the ability of a society to uphold universal human rights and meet people's basic needs, such as healthcare, education, and transportation. Healthy communities ensure personal, labour, and cultural rights are respected and all people are protected from discrimination.

Economic sustainability is the ability of human communities around the world to maintain their independence and have access to the resources required to meet their needs, meaning that secure sources of livelihood are available to everyone.



Figure 2: Three Dimensions of Sustainability resource:

<https://agnext.colostate.edu/2023/01/10/what-is-sustainability/>

Sustainability is important for preserving our planet and natural resources like water and air. Building a sustainable future and cultivating sustainable ways of living will reduce pollution and protect habitats of plants and animals.

2.2.2 The definition of environmentally friendly practices

Environmentally friendly processes or eco-friendly processes (also known as eco-friendly, nature-friendly and green) are sustainability and marketing terms that refer to goods and services, laws, guidelines that are claimed to reduce, minimize or not reduce and policy. Cause harm to the ecosystem or environment.

The importance of sustainable and environmentally friendly practices in the coffee supply chain is critical, encompassing multiple benefits at environmental, social and economic levels.

First, from an environmental perspective, the coffee industry has historically faced challenges such as deforestation, chemical use, and habitat degradation. Adopting sustainable practices such as shade planting, organic farming and water-saving techniques can help protect biodiversity, soil health and reduce environmental impact. These initiatives play a key role in mitigating the ecological footprint of coffee production, protecting ecosystems and building resilience to climate change.

From a social perspective, sustainable practices in the coffee supply chain are closely linked to the well-being of farmers and local communities. Certifications like Fair Trade and Organic not only ensure farmers receive fair wages and humane working conditions, they also empower communities by fostering social responsibility. Farmer-NGO collaborations promote knowledge sharing, enhance agricultural practices, and contribute to community development. In addition, fair trade principles are emphasized during the processing and manufacturing stages, supporting local communities and consistent with responsible supply chain practices.

From an economic perspective, adopting environmentally friendly practices can enhance the resilience and longevity of the coffee industry. By promoting sustainability standards, the industry has gained recognition in global markets, attracting environmentally conscious consumers and investors. Additionally, an emphasis on energy efficiency, waste reduction and responsible packaging in the supply chain helps improve cost-effectiveness and long-term viability, thereby promoting economic stability for all stakeholders.

In conclusion, integrating sustainable and environmentally friendly practices in the coffee supply chain is more than just a response to contemporary environmental issues. It represents a strategic imperative to reconcile ecological responsibility with social equity and economic resilience, ensuring the coffee industry's lasting success while aligning with global efforts to achieve a more sustainable and ethical future.

2.2.3 Environmental Sustainability

Coffee forests are important natural resource environments that face sustainable development challenges in terms of governance, utilization and management. Increase farmers' awareness of the negative consequences of forest coffee by formulating recognized rules and regulations for forest coffee management, increasing the frequency of farmer propaganda visits, and raising farmers' awareness of the negative consequences of forest coffee. The results show that market information affects participation in collective action. Increasing access to market information on forest coffee prices and demand could increase farmers' participation in collective action. (Gemechu Ordofa Jara 2023)

2.2.4 Sustainability efficiency

Sustainability efficiency indicators reflect farmers' ability to increase desirable agricultural output, reduce nitrous oxide emissions from fertilizers, and create jobs for women. (Theodoros Skevas 2023). At the same time, the efficiency of the enterprise will be through its contribution to female employment opportunities. Female-friendly labels can also attract consumers to purchase. Unsustainable use of irrigation water is one of the most serious environmental problems in coffee growing. The results show that coffee farms using sprinkler systems are more efficient than those using micro-pot irrigation technology.

2.2.5 sustainable coffee production

A market approach to sustainable coffee production requires parallel commitments from governments and donor agencies to achieve equitable social participation and environmental protection (Edward Millard 2017)

2.3 Transparency and messaging in supply chain by blockchain

2.3.1 The role of transparency and messaging in selling eco-friendly coffee

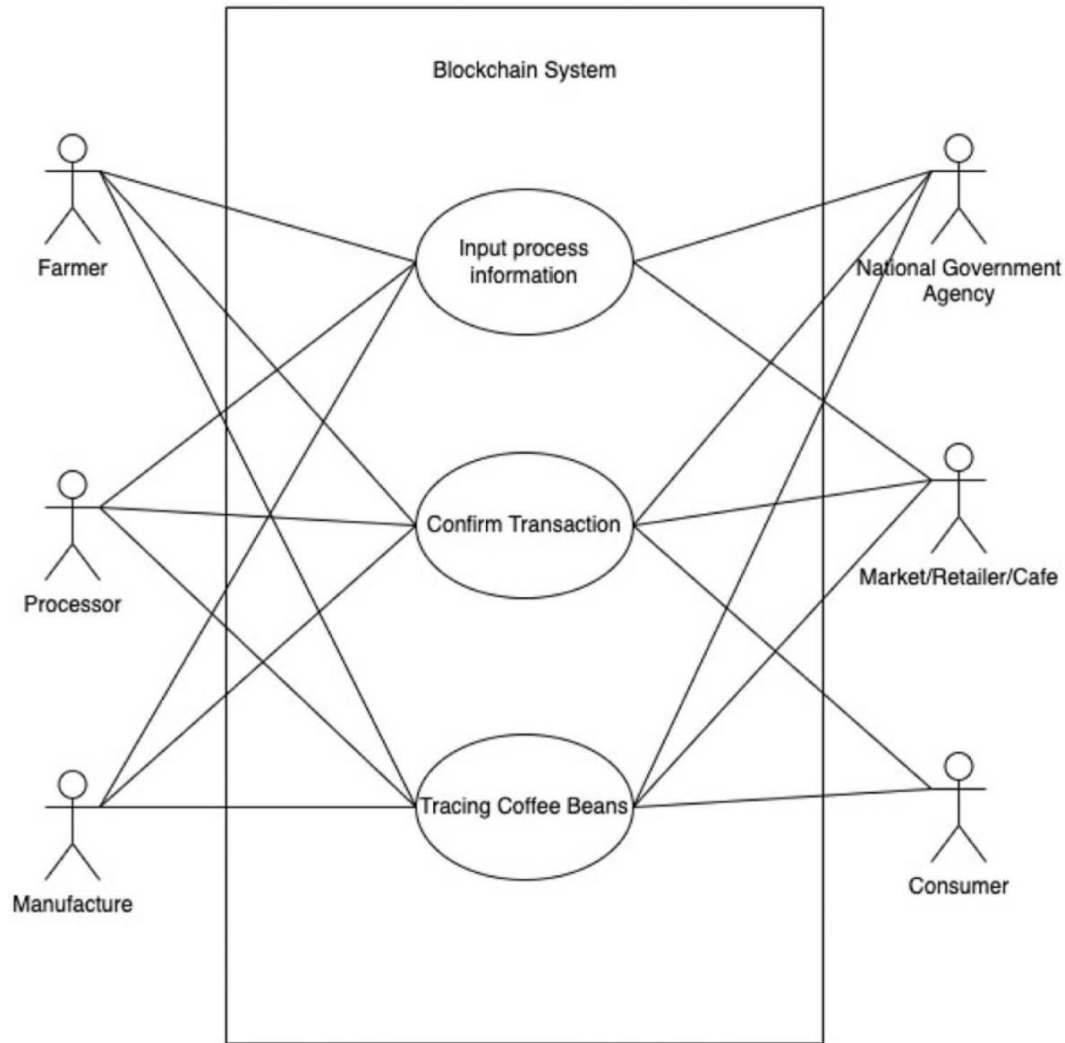


Figure.3: Blockchain System(Andry 2023)

The design of traceability coffee consists of three layers of parallel processing between stakeholders. The layers represent the actual activity between stakeholders, the application process, and the blockchain records/views activity. Each stakeholder submits the data and views the information via an intermediary web/mobile application. The application writes and reads the information to/from blockchain infrastructure. The design is shown in Fig. 3. There are several defined stakeholders for the proposed design. The farmers, who cultivate and take care of coffee plantations. The coffee processors are responsible for further processing and customizing the green bean coffee into the final product. The manufacturers become the primary stakeholders in scaling up the production and packaging. The national government agency is the regulatory body responsible for product certification. The market/retailer/cafe is the general public buying the product in retail or wholesale fashion. The end consumer is the body or individual who will extract the traceability information of coffee products. The working details or records/view data could be further explained as follows:

- The farmers record farm data such as plant growth, used fertilizer, harvest date, and other information.
- The coffee processors record the coffee processing data such as processing method, fermentation process, and other information.
- The manufacturer records the manufacturer's information, including the packaging.
- The national government agency records certificate numbers and date-issued data.
- The market/retailer records the date of arrival in supply stock, product type, and transaction number data.
- The web/mobile application submitted the data to the blockchain from each stakeholder type.
- The end consumer views the traceability information via the web/mobile application.

2.3.2 Emphasis on the impact of information on consumer decision-making

The impact of information in blockchain on consumer decision-making in the eco-friendly coffee industry is transformative. Blockchain strengthens the connection between consumers and sustainable practices by providing transparency, ensuring the credibility of certifications and enabling direct participation. This in turn creates a consumer base that is not only more informed but also actively contributes to the promotion and support of environmental initiatives within the coffee supply chain.

2.3.3 The future of block chain in the coffee supply chain.

Blockchain is a technology mainly indicated as a solution for inter-organizational issues (Wang et al., 2019) and cannot be wrongly assumed as ‘a solution looking for a problem’ (Hughes et al., 2019). Furthermore, supply chain digitalization typically guides the establishment of common objectives among parties (Chang & Chen, 2020), and synchronized efforts from different groups of entities are essential for blockchain success (Nandi et al., 2020). So that in the future of blockchain in the coffee supply chain we can use blockchain to make each responsible stage more meticulous, optimize the supply chain, and improve operational efficiency by protecting the entire supply chain data, thereby making the coffee supply chain more elastic and transparent

2.4 The coffee marketing

2.4.1 The in-store marketing environment

The in-store marketing environment can be an important marketing tool in terms of its ability to influence consumers' purchase behavior and attract certain types of consumers. The results indicate that consumers exposed to different environments exhibit significant differences in their brand loyalty, promotion sensitivity, price sensitivity, and response to new brands. (Journal of Retailing, 2015)

2.4.2. The existing coffee marketing channel

The result of marketing costs, margin and benefit analysis imply that coffee collectors incurred the lowest cost he average coffee wholesaler retained significant annual total net benefit than producers and coffee collectors. (Dessalegn Gachena 2014) This implies that coffee trading is highly profitable at the wholesale level.

2.4.3. Differences between different marketing systems for the coffee economy

Domestic coffee prices are important macroeconomic variables in coffee producing countries.(Mauricio GArdenas,1993) It is means that a greater level of taxation which reflects the government's desire for (sectorial) redistribution

Materials and methods

3.1. Design

We conducted an experiment involving tasting and willingness to pay for environmentally friendly coffee. (Klaus G & Han-Seok 2024) We wanted to see how aware consumers are of eco-friendly coffee, and whether consumers who are aware of eco-friendly coffee react differently to those who are not aware of eco-friendly coffee, how aware consumers are of blockchain technology and traceable supply chains, and whether these responses are different in Will consumer habits change after learning about eco-friendly coffee for the first time? The questionnaire mentioned that testers' familiarity with environmentally friendly coffee was rated between 1 and 5. The specific questionnaire questions are shown in appendix.

3.2. Procedure

The study was conducted in Budapest by my colleagues and me. After participants receive the questionnaire, we will provide necessary instructions including When buying coffee, do you mean buying direct coffee from outside, or freeze-dried, capsule, or instant coffee? What is eco-friendly coffee? Then he told us that we can start the survey as soon as we are ready, and we hope that the survey time will be longer than 60 seconds. Therefore, 9 of the 109 questionnaires we received were shorter than 60 seconds. We considered them to be of no value and therefore deleted them from subsequent analysis.

3.3. Analysis

For make the data analysis, the following tables and charts reflect the basic information about the respondents' gender, age, education qualification and so on.

3.3.1. Gender of Respondents

Table 1. Sample Characters of Gender

Gender	Frequency	Valid Percent(%)
Male	49	49
Female	50	50

Prefer not to say	1	1
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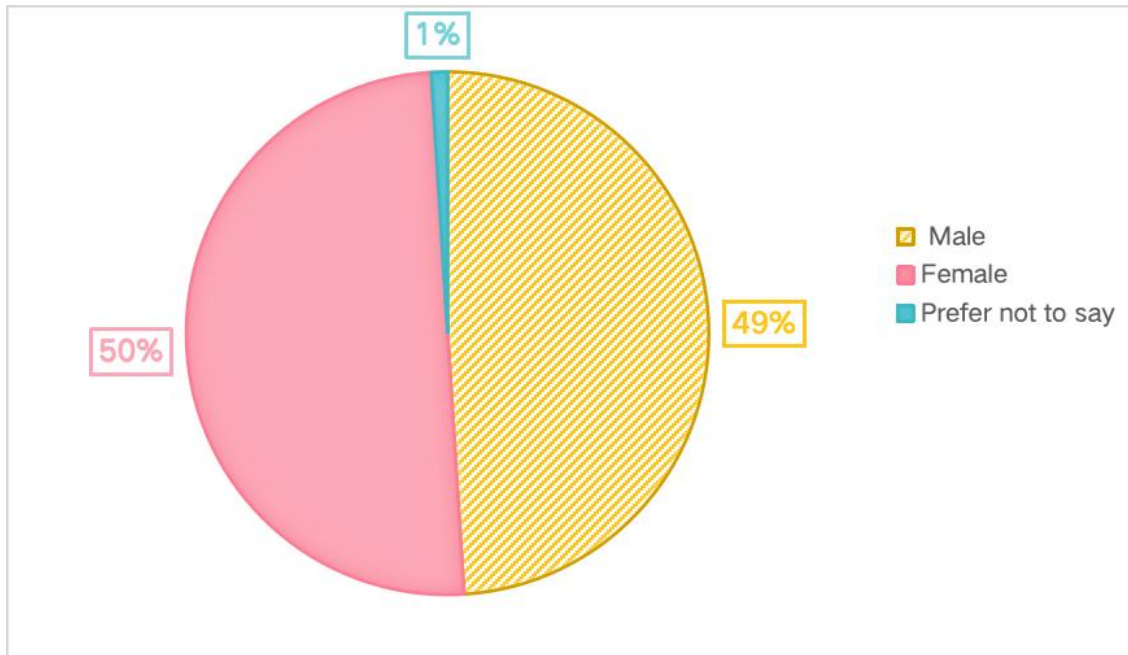


Figure 4. Sample Character of Gender (my own research)

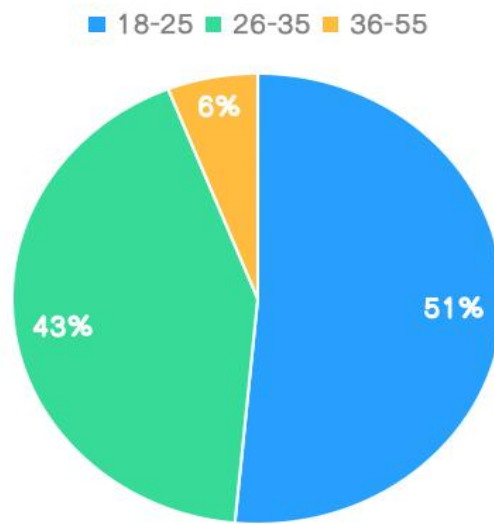
Interpretation: As can be seen from the graphs above, about 49 percent of the respondents were men, while 50 percent of the respondents were women, and 1 percent of interviewees don't want to show their gender.

3.3.2. Age of Respondents

Table 2. Sample Characters of Age

Age	Frequency	Valid Percent (%)
18-25 years old	52	51
26-35 years old	43	43
36-55 years old	6	6
Total	100	100

Figure 5. Sample Character of Ages (my own research)

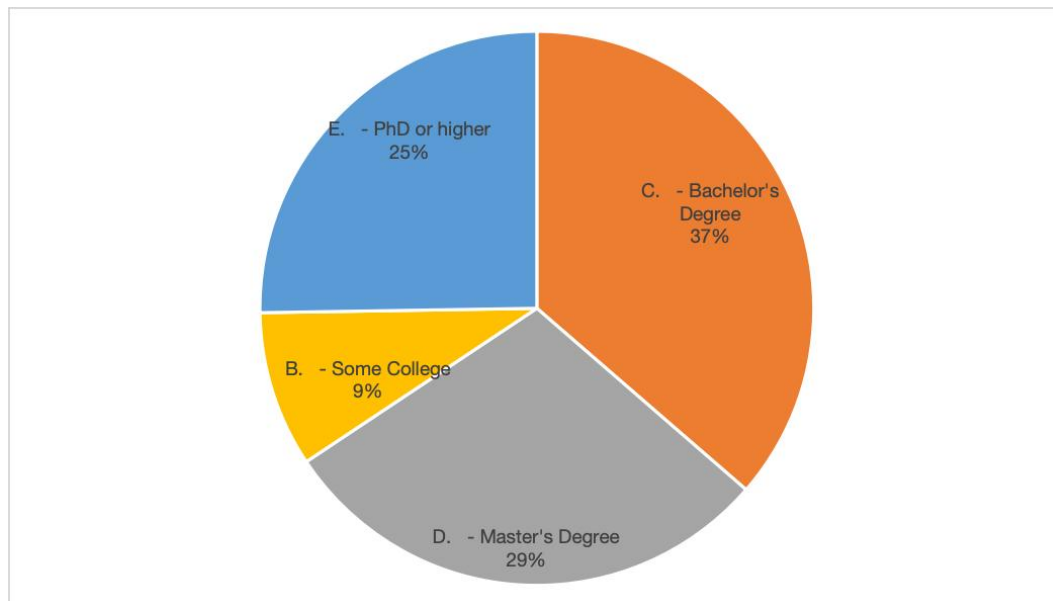


Interpretation: Most of the respondents were between the ages of 18-25 (51%), followed by those 26-35 years old (43%). The number of respondents age 35 - 55 (6%) was small, but the overall difference in 18-25 and 26-35 was not significant.

3.3.3. Education Qualification of respondents

Education qualification	Frequency	Valid Percent (%)
Some College	9	9
Bachelor's Degree	36	37
Master's Degree	29	29
PhD or higher	25	25

Table 3. Sample Characters of Education qualification



Tig 6. Sample Characters of Education qualification(my own research)

Interpretation: The overall educational level of the participants was high, most of the participants hold the bachelor's degree (37%), followed by the Master's degree (29%), the Phd or higher and some colleges were 25% and 9%, in all the educational qualifications are very evenly distributed.

3.3.4. Coffee consumption frequency

Table 4. Sample Characters of Coffee consumption frequency

Consumption frequency	Frequency	Valid Percent (%)
Daily	39	39
Weekly	21	21
Monthly	13	13
Rarely	22	22
Never	6	6

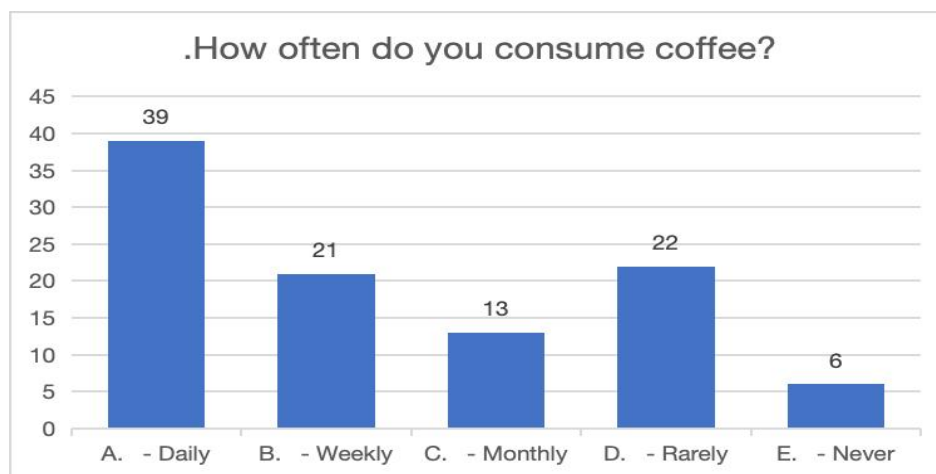


Figure 7. Sample Characters of Coffee consumption frequency (my own research)

Interpretation: This is consistent with the conclusion it made at the beginning. Coffee has become more and more popular. People consume coffee daily has 39% and weekly in 21%, and monthly and Rarely has 13% ,22%. In the responders only 9% People never consume coffee.

3.3.5. Familiarity with eco-friendly coffee

Table 5. Sample Characters of familiarity with eco-friendly coffee

Consumption frequency	Frequency	Valid Percent (%)
purchased eco-friendly	22	23

coffee		
never purchased eco-friendly coffee	28	29
Don't know if I purchased it or not	47	48
totally	100	100

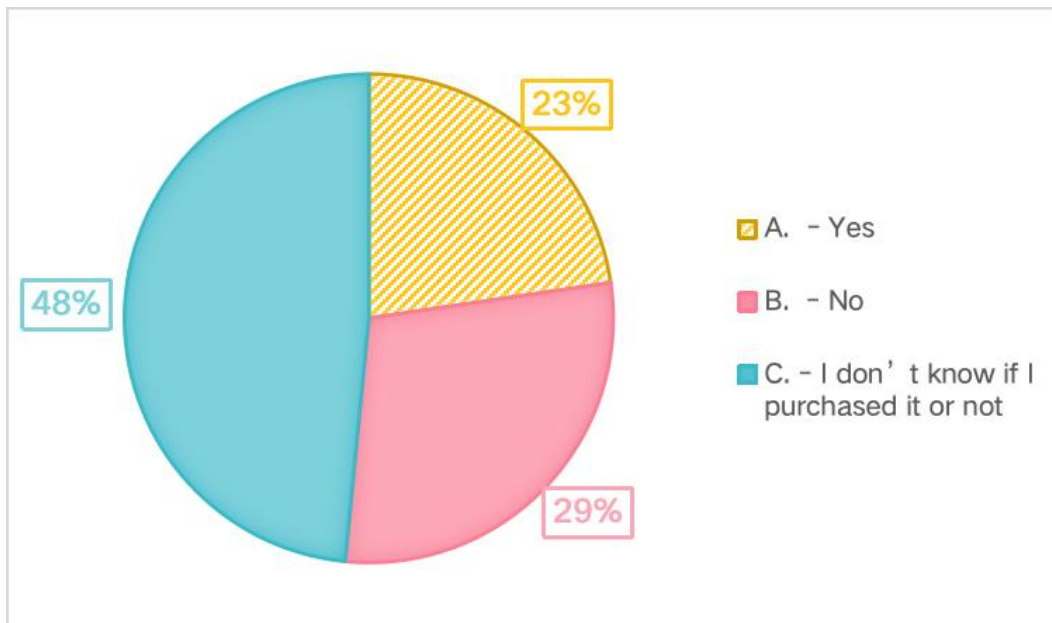


Fig 8. Sample Characters of Education qualification(my own research)

Interpretation: According to the chart, we can see that 23% of people are sure that they have bought environmentally friendly coffee, 29% are sure that they have not bought it, and the remaining 48% do not know whether they have bought it or not. This shows that People's awareness of eco-friendly coffee is very low. Nearly half of the respondents do not understand or understand what eco-friendly coffee is.

3.3.6. Familiarity with eco-friendly coffee labels



Fig 9: The different eco-friendly coffee label(my own research)

We tried to show these eco- friendly logos to the respondents and asked them to rate them from 1 (never heard) to 5 (very familiar). Finally, we got the following figure.



According to the directions of upper left, upper right, lower left and lower right, the charts are fairtrade, rainforest, birdfriendly and 4C respectively. From this we can see that the average consumer does not understand environmental protection labels. Even for the most common rainforest, only 7.7% of people familiar it, and the ignorance rate is as high as 68.1%, 58.2%, 68.1%, 69.2%

3.3.7. Familiar with the concept of Blockchain in supply chain transparency

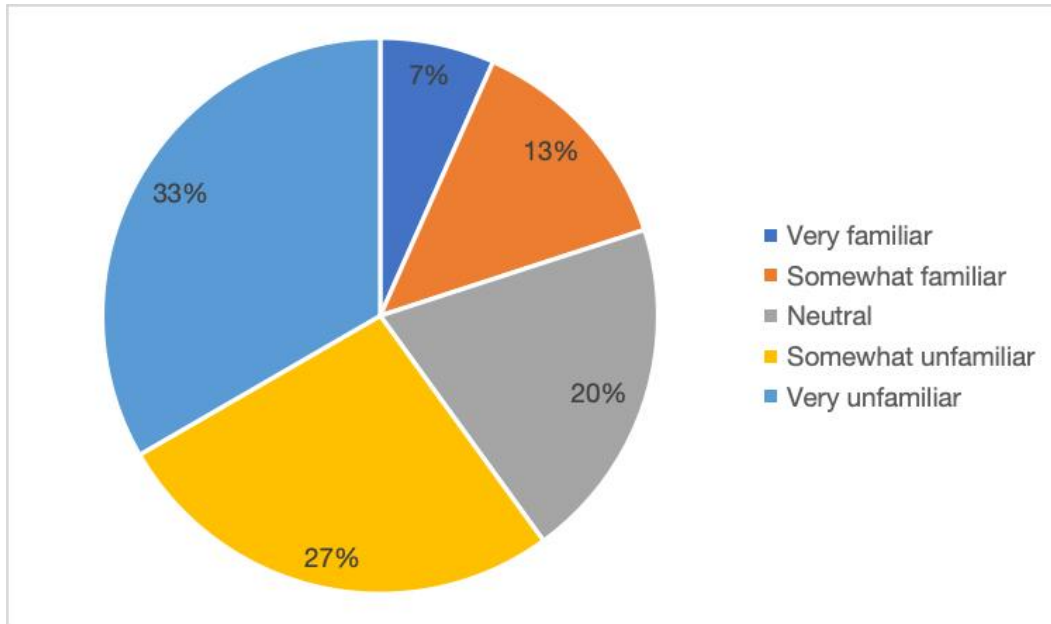


Fig 11:Familiar with the concept of Blockchain in supply chain transparency(my own research)

It is very obvious that people do not understand blockchain and traceability in the supply chain. Nearly 60% of the respondents did unfamiliar it, and only 7% of the respondents chose to familiar.

3.3.8. Traceability plays a role in promoting customers to buy eco-friendly coffee

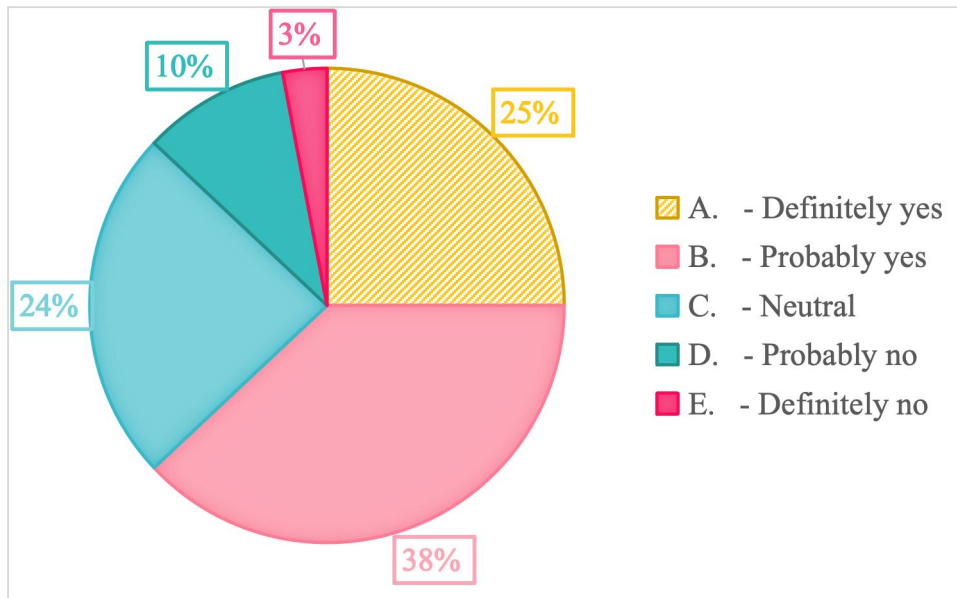


Fig 12:Traceability plays a role in promoting customers to buy eco-friendly coffee(my own research)

When people understand the significance of traceability for coffee, 72% of the respondents choose to support or strongly support it. From this, we can conclude that the respondents have expectations for food transparency and traceability.

3.4. Relationship Analysis

3.4.1 The age and gender with Willingness to pay premium

1. What is your age? * Are you willing to pay a premium for eco-friendly coffee? Crosstabulation

		Are you willing to pay a premium for eco-friendly coffee?						
		- Definitely yes	- Probably yes	- Neutral	- Probably no	- Definitely no	Total	
1. What is your age?	- 18-25	Count	6 _a	17 _a	13 _a	12 _a	3 _a	51
		% within 1. What is your age?	11.8%	33.3%	25.5%	23.5%	5.9%	100.0%
		% within Are you willing to pay a premium for eco-friendly coffee?	66.7%	51.5%	41.9%	60.0%	42.9%	51.0%
	- 26-35	Count	3 _a	15 _a	14 _a	7 _a	4 _a	43
		% within 1. What is your age?	7.0%	34.9%	32.6%	16.3%	9.3%	100.0%
		% within Are you willing to pay a premium for eco-friendly coffee?	33.3%	45.5%	45.2%	35.0%	57.1%	43.0%
- 36-55	Count	0 _a	1 _a	4 _a	1 _a	0 _a	6	
	% within 1. What is your age?	0.0%	16.7%	66.7%	16.7%	0.0%	100.0%	
	% within Are you willing to pay a premium for eco-friendly coffee?	0.0%	3.0%	12.9%	5.0%	0.0%	6.0%	

Table 6: The age with Willingness to pay premium (my own research)

From this we can conclude that each subscripted letter represents a subset of “Are you willing to pay a premium for eco-friendly coffee?” Categories whose column proportions are not significantly different from each other at the 0.05 level. Younger respondents, especially those aged 18-25, are more likely than older groups to be explicitly willing to pay a premium for eco-friendly coffee. The proportion of respondents willing to pay a premium generally declines with age, as evidenced by the declining proportion of “definitely yes” responses across all age groups. Age appears to have a significant impact on respondents' willingness to pay a premium for eco-friendly coffee, with younger people more likely to do so.

What is your gender? * Are you willing to pay a premium for eco-friendly coffee? Crosstabulation

		Are you willing to pay a premium for eco-friendly coffee?						
		- Definitely yes	- Probably yes	- Neutral	- Probably no	- Definitely no	Total	
What is your gender?	- Male	Count	3 _a	16 _a	13 _a	12 _a	5 _a	49
		% within What is your gender?	6.1%	32.7%	26.5%	24.5%	10.2%	100.0%
		% within Are you willing to pay a premium for eco-friendly coffee?	33.3%	48.5%	41.9%	60.0%	71.4%	49.0%
	- Female	Count	6 _a	16 _a	18 _a	8 _a	2 _a	50
		% within What is your gender?	12.0%	32.0%	36.0%	16.0%	4.0%	100.0%
		% within Are you willing to pay a premium for eco-friendly coffee?	66.7%	48.5%	58.1%	40.0%	28.6%	50.0%

- Prefer not to say	Count	0a	1a	0a	0a	0a	1
	% within What is your gender?	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	% within Are you willing to pay a premium for eco-friendly coffee?	0.0%	3.0%	0.0%	0.0%	0.0%	1.0%

Table 7: The gender with Willingness to pay premium (my own research)

Each subscript letter indicates whether you would be willing to pay a premium for eco-friendly coffee? Categories whose column proportions are not significantly different from each other at the 0.05 level. Female respondents are more willing to pay a premium for eco-friendly coffee than male respondents. The majority of female respondents who are willing to pay a premium fall into the "definitely willing" category, while the highest proportion of male respondents are willing to pay a premium. Willingness to pay a premium falls into the "could be" category. Gender appears to have a significant impact on respondents' willingness to pay a premium for eco-friendly coffee. Female respondents were more likely than male respondents to express a clear willingness to pay a premium. This finding suggests that marketing strategies for environmentally friendly coffee can be tailored differently to different genders, potentially placing a greater emphasis on the environmental aspects of female consumers.

3.4.2 Education level relationship with Likelihood of buying eco coffee

Education level relationship with Likelihood of buying eco coffee

		What is your educational level?	Would transparent supply chain information increase your likelihood of buying eco-friendly coffee?
Spearman's rho	What is your educational level?	Correlation Coefficient	1.000
		Sig. (2-tailed)	.259**
		N	100
	Would transparent supply chain information increase your likelihood of buying eco-friendly coffee?	Correlation Coefficient	.259**
		Sig. (2-tailed)	1.000
		N	100

** . Correlation is significant at the 0.01 level (2-tailed).

Table 8: Education level relationship with Likelihood of buying eco coffee (my own research)

As can be seen from the table below, education level and likelihood of purchasing ecological coffee are very important because Sig. (2-tailed)=0.009 < 0.01, and since the correlation coefficient=0.259 is positive, there is a positive correlation. There is a positive correlation of 0.259 between the education level of the respondents and the likelihood of purchasing transparent and environmentally friendly coffee supply chain information. This correlation is statistically significant at the 0.01 level (2-tailed), indicating that it is unlikely to occur by chance. Furthermore, the higher the education level, the more likely people are to purchase environmentally friendly coffee. The results show that there is a significant positive relationship between the education level of the respondents and their likelihood to purchase environmentally friendly coffee with transparent supply chain information. This finding highlights the potential importance of education in influencing consumer attitudes and behaviors toward environmentally sustainable products, such as eco-friendly coffee.

3.4.3 Labels and influence of friends relationship with likelihood of buying coffee

Table 8: Labels and influence of friends relationship with likelihood of buying coffee(my own research)

		Are you willing to pay a premium for eco-friendly coffee?	Do you think eco-labels like "Fair Trade" or "Rainforest Alliance" influence your purchasing decisions?
Are you willing to pay a premium for eco-friendly coffee?	Pearson Correlation	1	.254*
	Sig. (2-tailed)		.011
	N	100	100
Do you think eco-labels like "Fair Trade" or "Rainforest Alliance" influence your purchasing decisions?	Pearson Correlation	.254*	1
	Sig. (2-tailed)	.011	
	N	100	100

*. Correlation is significant at the 0.05 level (2-tailed).

As you can see from the table below, there is a relationship between the influence of tags and friends and the likelihood of buying coffee because of Sig. (2-tailed)=0.011<0.05, and since Correlation Coefficient=0.254 is a positive number, there is a positive correlation. Furthermore, the more respondents are willing to pay a premium for eco-friendly coffee, the greater the impact of eco-labels on their purchasing decisions. The results show that individuals who are willing to pay a premium for eco-friendly coffee are more likely to believe that eco-labels such as "Fair Trade" or "Rainforest Alliance" will influence their purchasing decisions. This finding implies that consumers who value environmentally friendly products are also influenced by ecolabels when making purchase choices. Therefore, coffee producers and marketers may

benefit from emphasizing environmental attributes and leveraging recognized ecolabels to attract this segment of consumers.

3.4.4 Familiarity with block chain in supply chain relationship with purchase of eco coffee

Correlations

		6.How familiar are you with the concept of Blockchain in supply chain transparency?	Have you ever purchased eco-friendly coffee?
6.How familiar are you with the concept of Blockchain in supply chain transparency?	Pearson Correlation	1	.276**
	Sig. (2-tailed)		.006
	N	109	100
Have you ever purchased eco-friendly coffee?	Pearson Correlation	.276**	1
	Sig. (2-tailed)	.006	
	N	100	100

** . Correlation is significant at the 0.01 level (2-tailed).

Table 9: Familiarity with block chain in supply chain relationship with purchase of eco coffee(my own research)

The correlation coefficient between “blockchain in supply chain transparency” and “purchasing of environmentally friendly coffee” is 0.276. This positive correlation indicates a weak to moderate linear relationship between the two variables. The correlation is statistically significant at the 0.01 level (2-tailed), which means it is unlikely to have occurred by chance. From the interpretation of the results, there appears to be a weak to moderate positive relationship between awareness or interest in blockchain technology for supply chain transparency and the likelihood of purchasing from the ecosystem. The results show that individuals who are more familiar with blockchain concepts in terms of supply chain transparency are more likely to purchase eco-friendly coffee. This finding suggests that awareness or understanding of blockchain technology, particularly its application in ensuring supply chain transparency, may have a positive impact on consumers’ decisions to purchase environmentally friendly products such as coffee.

Therefore, businesses and organizations aiming to promote environmentally friendly products, especially those leveraging transparent supply chains facilitated by blockchain technology, may benefit from educating consumers about these concepts. Increased awareness and understanding of how blockchain can improve supply chain transparency may increase consumer trust and preference for environmentally friendly products.

3.4.5.what’s consumer think the most effective way to promote the consumption of eco-friendly coffee

\$The most effective way Frequencies

		Responses		Percent of Cases
		N	Percent	
a	What do you think is the most effective way to promote the consumption of eco-friendly coffee?: - Advertising	39	24.2%	46.4%
	What do you think is the most effective way to promote the consumption of eco-friendly coffee?: - Customer education	31	19.3%	36.9%
	What do you think is the most effective way to promote the consumption of eco-friendly coffee?: - Price incentives	63	39.1%	75.0%
	What do you think is the most effective way to promote the consumption of eco-friendly coffee?: - Government policies	28	17.4%	33.3%
Total		161	100.0%	191.7%

a. Dichotomy group tabulated at value 1.

Table 10: Familiarity with block chain in supply chain relationship with purchase of eco coffee(my own research)

In this data set:

- 39 respondents chose advertising, accounting for 24.2% of effective cases.
- 31 respondents chose customer education, accounting for 19.3% of effective cases.
- 63 respondents chose price incentives, accounting for 39.1% of valid cases.
- 28 respondents chose government policies, accounting for 17.4% of the valid cases.

The data provides insights into respondents' preferences for strategies to promote environmentally friendly coffee consumption. The majority of respondents appeared to favor price incentives, followed by advertising, customer education and government policy.

Result

The analysis of various factors influencing consumer attitudes and behaviors towards environmentally friendly coffee consumption reveals a nuanced landscape of preferences and influences. First, age emerges as an important determinant, with younger respondents, especially those aged 18-25, showing a higher willingness to pay a premium for eco-friendly coffee compared to older age groups. For example, 66.7% of respondents aged 18-25 clearly expressed their willingness to pay a premium for environmentally friendly coffee, while only 33.3% of respondents aged 26-35 were willing to pay a premium. This suggests that the younger demographic may be a key target market for eco-friendly coffee initiatives. Gender also plays a crucial role, with female respondents showing a greater willingness to pay a premium for eco-friendly coffee compared to male respondents. Among them, 66.7% of female respondents clearly expressed their willingness to pay a premium, while only 33.3% of male respondents expressed their willingness to pay a premium. Understanding and catering to these gender-based preferences can inform targeted marketing strategies aimed at attracting female consumers to choose environmentally friendly coffee. Additionally, there is a positive relationship between the education level of respondents and their likelihood of purchasing environmentally friendly coffee, suggesting that the higher the level of education, the more likely people are to choose environmentally sustainable options. This highlights the importance of education in developing consumer awareness and appreciation for environmentally friendly practices. Furthermore, the influence of eco-labels such as “Fairtrade” or “Rainforest Alliance” is more pronounced among consumers who are willing to pay a premium for eco-friendly coffee, suggesting that such labels play a crucial role in influencing purchasing decisions. This emphasizes the importance of transparent and ethical labeling practices in guiding consumers to choose sustainable products. Furthermore, familiarity with blockchain technology in terms of supply chain transparency is positively associated with the likelihood of purchasing eco-friendly coffee, emphasizing the impact of technological awareness on consumer behavior. This suggests that innovations in supply chain transparency can enhance consumer trust and confidence in environmentally friendly coffee products. Finally, respondents rated price incentives as the most effective strategy for promoting environmentally friendly coffee consumption, followed by advertising, customer education, and government policy. This preference for price incentives is reflected in the survey results, with 39.1% of respondents believing price incentives are the most effective way to promote environmentally friendly coffee consumption. Tailoring promotional strategies using these preferences can increase the effectiveness of eco-friendly coffee marketing campaigns.

Conclusion

The analysis highlights several key insights about consumer attitudes and behaviours towards eco-friendly coffee consumption. It reveals a demographic skew towards young people, particularly 18-25 year olds, who show a clear willingness to pay a premium for environmentally sustainable coffee, making them a key target demographic for eco-coffee initiatives. Gender differences were significant, with females more inclined to invest in eco-coffee compared to males, suggesting the need for a gender-specific marketing approach. Additionally, there was a positive correlation between level of tertiary education and the likelihood of purchasing eco-coffee, highlighting the key role of education in developing consumer awareness and appreciation of sustainable practices. Eco-labels such as "Fairtrade" or "Rainforest Alliance" have considerable influence on purchasing decisions, especially for consumers who prioritise environmentally friendly products. In addition, the analysis highlights the importance of technological literacy, with familiarity with blockchain technology being positively correlated with eco-friendly coffee purchasing behaviour, demonstrating the potential of technological innovation to increase consumer trust in sustainable coffee products. Notably, price incentives emerged as the most effective promotional strategy, followed by advertising, customer education and government policy, implying that a multifaceted approach is required when marketing eco-friendly coffee.

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Appendices

Appendices 1:Survey

Eco-frenidly coffee factors

Dear Participant,

We invite you to participate in a research study aimed at understanding Eco-frenidly coffee factors in Supply Chain. Your insights will be invaluable in helping us gain a clearer perspective on this topic. Rest assured that all your responses will be kept confidential and will be used solely for research purposes.

Thank you for your time and consideration.

01* What is your age?

- Below 18
- 18-25
- 26-35
- 36-55
- Above 55

02*What is your gender?

- Male
- Female
- Non-binary
- Prefer not to say

03*What is your educational level?

- High School or below
- Some College
- Bachelor's Degree

- Master's Degree

- PhD or higher

04*How often do you consume coffee?

- Daily

- Weekly

- Monthly

- Rarely

- Never

05*Have you ever purchased eco-friendly coffee?

- Yes

- No

- I don't know if I purchased it or not

06*How familiar are you with the concept of Blockchain in supply chain transparency?

- Very familiar

- Somewhat familiar

- Neutral

- Somewhat unfamiliar

- Very unfamiliar

07*Would transparent supply chain information increase your likelihood of buying eco-friendly coffee?

- Definitely yes

- Probably yes

- Neutral

- Probably no

- Definitely no

08*How familiar are you with each certified program?

Never heard1 Never heardvery familiar 5very familiar



09*If your friends all bought eco-friendly coffee in a public place, would you buy it?

-YES

-NO

10*Do you think eco-labels like "Fair Trade" or "Rainforest Alliance" influence your purchasing decisions?

- Strongly agree

- Agree

- Neutral

- Disagree

- Strongly disagree

11*Do you think businesses should prioritize sustainable supply chain management?

- Strongly agree

- Agree

- Neutral

- Disagree
- Strongly disagree

12*What do you consider as the biggest barrier to implementing sustainable supply chains in the coffee industry?

- Insufficient government support
- Process complexity
- Communication gaps
- Others:_____

13*How important is social responsibility for you in your choice of coffee?

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

14 Are you willing to pay a premium for eco-friendly coffee?

- Definitely yes
- Probably yes
- Neutral
- Probably no
- Definitely no

15 What do you think is the most effective way to promote the consumption of eco-friendly coffee?

- Advertising
- Customer education
- Price incentives
- Government policies
- Other (please specify) _____

Thank you for your participation.We wish you a pleasure day.

Appendices 2:Declaration**DECLARATION****on authenticity and public access of final essay/thesis/master's thesis/portfolio¹**

Student's name: _____ Chengfang Tao _____

Student's Neptun ID: _____ HAZCHK _____

Title of the document: The supply chain in eco-friendly coffee- Factors that motivate consumers to purchase eco-friendly coffee

Year of publication: _____ 2024 _____

Department: Faculty of Economics and Social Sciences

I declare that the submitted final essay/thesis/master's thesis/portfolio² is my own, original individual creation. Any parts taken from another author's work are clearly marked, and listed in the table of contents.

If the statements above are not true, I acknowledge that the Final examination board excludes me from participation in the final exam, and I am only allowed to take final exam if I submit another final essay/thesis/master's thesis/portfolio.

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Budapest



 Student's signature

Appendices 3: STATEMENT ON CONSULTATION PRACTICES

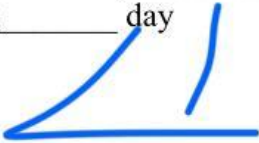
STATEMENT ON CONSULTATION PRACTICES

As a supervisor of **Chengfang Tao**
 (Student's name) **HAZCHK** (Student's NEPTUN
 ID), I here declare that the final essay/thesis/master's
 thesis/portfolio has been reviewed by me, the student was
 informed about the requirements of literary sources
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I recommend/don't recommend the final essay/thesis/master's
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The document contains state secrets or professional secrets:
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