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Original scientific paper

TESTING READINESS OF ADOPTION OF BLOCKCHAIN TECHNOLOGY IN TRACKING THE AUTHENTICITY OF ORGANIC COFFEE

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Abstract. *This study aims to analyze the readiness for adopting blockchain technology in tracking the authenticity of organic coffee to provide added value to consumers and producers of coffee considering technological advances in the Supply Chain. This study combines the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM). An online questionnaire with eligible respondents is used to collect data which is then processed using Smart PLS 4.0 software. The data analysis method used is quantitative. The findings indicate that every explanatory variable has a positive impact on the dependent variable, suggesting that consumer adoption of blockchain technology depends on simplicity, advantage, and positive attitude toward technology use.*

Key words: *Blockchain, Organic Coffe Traceability, UTAUT, TAM*

1. INTRODUCTION

Coffee beverage receives a warm reception from various groups worldwide due to its unique and distinctive flavor. This beverage also appeals to the global community because of factors such as tradition, history, social connections, and economic benefits [1]. Coffee has become a popular and widely consumed beverage in the community, with caffeine estimated to be consumed weekly by 98% of individuals aged - 18 years [2]. Data from the National Sleep Foundation support this [3], which shows that approximately 75-98% of teenagers consume at least one caffeinated beverage daily, and 31% report consuming more than two drinks daily.

Organic production is a viable alternative to the market price volatility of conventional coffee for 70% of coffee producers [4]. Certified organic coffee has enabled producers to access

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improved and consistent product pricing. Besides the positive economic outcomes, producing organic coffee brings about notable social and environmental advancements for 67% of farmers. This includes significant improvements, such as 8% of farmers no longer requiring additional employment outside the coffee sector, indicating increased stability and income from organic coffee production. Furthermore, 17% of farmers have been able to access other resources for their families, leading to enhanced overall well-being. Moreover, the transition to organic practices has resulted in 42% of farmers mentioning the avoidance of toxic risks to their families and communities, as the elimination of agrochemical usage ensures a safer and healthier environment [4].

Despite coffee's increasing popularity and fame, the coffee industry still faces several problems. Here are some of the issues encountered in the coffee industry [5]:

1. Unfair coffee prices among actors in the coffee supply chain.
2. Farmers do not receive sufficient income from their coffee endeavors.
3. Unstable coffee prices.
4. Child labor in the coffee sector.
5. Deforestation for coffee farming land.
6. Climate change can damage coffee plants.

These problems significantly impact various aspects, including social ethics, coffee plant sustainability, farmer welfare, and national revenue from the coffee industry. However, technological advancements provide opportunities to address these problems, and there is even potential for solving them. One technology that has been implemented in the coffee industry is blockchain. With the transparency and traceability provided by blockchain technology, some of the problems as mentioned earlier can be addressed. For example, the use of child labor can be minimized by tracking each transaction and knowing the origin of coffee beans [6]. Additionally, farmers can receive fairer payments if they adhere to environmentally friendly practices. Distributing sales proceeds between coffee roasters and farmers can also be done transparently, thereby supporting fairness. If issues arise with coffee beans, their source can be identified [7]. The benefits of using blockchain technology in the coffee industry are still plentiful. They can provide incentives for researchers to study the design and implementation of record-keeping systems using blockchain technology in the coffee supply chain.

The success of the coffee industry in appealing to the global community, particularly among teenagers, is undoubtedly attributed to the satisfaction and acceptance of the technology it encompasses. This has intrigued researchers to comprehend and identify the readiness for implementing Blockchain technology in tracking the authenticity of organic coffee. The effectiveness of the information system can be observed through user statements affirming that the current information system is user-friendly and fulfills their needs. Typically, the methods frequently employed to evaluate a system are TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology). In this study, researchers utilize the UTAUT2 adoption theory to measure and determine the factors influencing users to accept and utilize blockchain technology. Analyzing the factors that impact the acceptance of blockchain technology in tracking the authenticity of organic coffee is the primary objective of this research. The expected outcomes aim to provide solutions and evaluations for future development utilizing UTAUT2.

2. LITERATURE REVIEW

2.1. Blockchain technology

Blockchain is one of the newest technologies in terms of security, traceability, and transparency. It may be used to handle agreements and physical assets as well as transactions involving both digital and physical assets. Blockchain is a distributed/decentralised database (decentralised database) that stores and retrieves data using independent nodes. The distributed ledger is connected to chunks of data sequentially via blockchain technology. Each block stores various information, including hashes and unique identifiers of the block itself. The hash identifies and connects this block to all previous and subsequent blocks. Therefore, blockchain is a collection of blocks that include linked/connected transaction data (chain) and are ordered by one another. Blockchain is a digital data storage system where each block must contain hashed data from the preceding block. Each block will reference the previous block, forming a chain.

This technology is believed to eliminate the mediators from all digital asset transfers and transactions. This is a by far more independent and safer medium. Financial institutions are considering the possibility of using this technology to guarantee transaction security [8]. Blockchain technology enables direct data sharing between a more significant number of network members without using middlemen. Each transaction is coded and added to an immutable chain of transactions dispersed over all ledgers (nodes), preventing the chain from changing. Each member in the network stores a copy of the information linked to each transaction in an independent digital ledger once it has been recorded. Every record in the network is time-stamped, encrypted, unchangeable, and connected to every other record [9].

Blockchain technology is a decentralised system, which is the technology's primary advantage. Collaborating with the third-party organisation or the central institution is unnecessary. It suggests that everyone involved in this blockchain makes the decisions and that the system functions without the need for an intermediary. It is imperative to secure the database whenever a system works with other organizations because there's a potential that the database could be hacked or end up in the wrong hands. The database security process may consume a great deal of time and resources. If blockchain technology is utilised, this issue can be avoided, as blockchain transactions require authorisation to enforce accordance with the limitations. It means that all of the transactions can be independently checked. Every action is documented on the blockchain, and the information included in each record is available to all users and cannot be changed or removed. This way the trustworthiness, immutability, and transparency of the blockchain are hereby demonstrated [10]. The primary focus is on the genuine and not worthless interactions between these anonymous individuals. The level of trust can be improved since more procedures and records can be shared [11].

2.2. Food traceability system

Most traceability standards define traceability as the capacity to follow a product's key characteristics from its point of origin (including its ingredients) to the last stage of the supply chain. Four concepts are covered by the various definitions of "traceability": product history information throughout the supply chain, backward follow-up of ingredients (tracing), forward follow-up of products (tracking), and consistency and clarity in terminology (e.g., "tracking" vs. "tracing") [12]. The food traceability is a logistics management component that is closely related to the food safety and quality. These quality assurance capabilities rely heavily on logistics operations. Consider the case of food recalls, which are frequently cited in the literature [13]. Even though a thorough collection of traceability information is required for this procedure, the success of the recall process is mostly dependent on the effectiveness of logistical operations and the level of integration between the various supply chain actors. [14]. On the other note, Bosona and Gebresenbet's work establishes a direct connection between the purpose of traceability and the conditions of applicability.

Based on the direction of information flow, forward traceability or tracking is differentiated from backward traceability or tracing [12]. The context of a product recall provides the greatest explanation for the distinction. With the ability to monitor, products can be identified using recall criteria and tracked from the start of the supply chain to the end. Secondly, the ability to trace means that the origin of a product and the relationship between its constituent components may be recognised.

Unique identifiers (or features) for each product need to be defined and bundled into a traceable resource unit to trace products and their constituents (TRU). There are three categories of TRUs [15]:

1. Batch unit products that go through identical processing stages, such as milk powder cans, have exact best-before dates and batch numbers.
2. Trade unit products that are transferred between actors in the supply chain, such as a box containing milk powder cans with the same batch number.
3. Logistic unit products that are grouped into logistics objects for transit or are being stored, such as a pallet of milk powder cans, may carry specific batch numbers.

Considering these categories, one batch unit might be identical to a trade union. Also, one batch unit can contain multiple logistic units could be one batch unit in the event that the production process followed the same steps and that the products were asigned the same batch number. Depending on the data being saved, the unit of tractability may be batch, trade, or logistic.

Traceability is impossible due to the quantity of specific information and the precision required. The qualities of the tracing steps rely on the aims and can be described by the system's depth, and accuracy [16]. Capacity refers to the amount of recorded information, profound to the capability of how far forward or backward tracing is feasible, and preciseness to the degree of confidence with which one TRU can be identified. Each component directly impacts the amount of data a system needs to be able to store and manage and needs to be selected in proportion to the system's goals.

2.3. Adoption of blockchain technology in tracking the authenticity of organic coffee

Developing a decentralized application (DApp) using the PyTeal library and Algorand blockchain platform for tracing coffee represents a notable leap forward in ensuring the quality of food products and building trust. By harnessing the transparency and immutability provided by blockchain technology, the DApp enables the comprehensive tracing of a coffee item's journey from the farm to the consumer's table. Customers can access real-time information regarding the food's origin, quality, and safety [17].

The design of coffee traceability comprises three layers involving multiple stakeholders. These layers represent the actual activities among stakeholders including the process of application as well as the activity of recording and viewing information on the blockchain. Every stakeholder can submit data through a dedicated web or mobile application and also use it to accesses information on the chain. This application interacts with the blockchain infrastructure to read and write information. The proposed design involves several distinct stakeholders. Farmers role is cultivating coffee plantations and product gathering. Coffee processors handle further steps processing and customization of green bean coffee to create the final product. Manufacturers have a crucial role with the goal to scale up production and produce a final product. The product certification is done by the appropriate national government agency, which serves as the regulatory body. Marketplaces, retailers, and cafes are at the end of the chain, purchasing the coffee product in a retail or wholesale fashion and providing it to the to individuals or organizations extracting traceability information about coffee products [18].

3. Research Method

A combined model based on two well-known frameworks, UTAUT2 and TAM, is used to analyze the blockchain's readiness to track organic coffee production. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a widely used model that explains and predicts individuals' technology acceptance and usage. The UTAUT2 model continues the UTAUT paradigm and investigates the acceptance and usage of technology in consumer contexts [19]. It takes into account various factors that influence technology adoption. UTAUT was expanded to UTAUT2 by adding hedonic motivation, price value, and habits. The UTAUT2 model consists of four key constructs:

1. Performance Expectancy relates to the level to which an individual believes using technology could enhance their performance and effectiveness in completing tasks.
2. Effort Expectancy: This construct refers to a particular technology's perceived simplicity of use. It assesses the degree to which an individual believes using the technology will be free from effort.
3. Social Influence: It encompasses the impact of social factors and norms on individuals' acceptance and general use of technology. It considers the Influence of others' social interactions, opinions, and recommendations.
4. Facilitating Conditions: This construct considers the necessary infrastructure, both technical and organizational, to support the usage of technology. It includes different factors including the availability of resources, training, and technical support.

UTAUT2 proposes that these four constructs, along with gender, age, experience, and willingness of use, collectively influence an individual's behavioral intention to use technology. The Technology Acceptance Model (TAM) is another broadly acknowledged framework used with the goal of understanding users' willingness to accept and adopt the technology [20]. By defining traits that potentially indicate an information system's success or failure and actions that show its flexibility to needs, the TAM model is used for the analysis of the adoption of information system technology within businesses. The benefits of information systems that remove user-perceived drawbacks constitute the basis of the TAM model [21]. It focuses on two key constructs:

1. Perceived Usefulness: It reflects how users acknowledge a specific technology could improve their productivity and performance to achieve particular goals or tasks.
2. Perceived Ease of Use: This construct assesses the extent to which users perceive technology as simple to use, requiring minimal effort and complexity.

According to TAM, these two constructs directly influence users' attitudes toward using technology, impacting their behavioral intention to adopt it. In analyzing the readiness of using blockchain in tracking organic coffee production, the combined model incorporating UTAUT2 and TAM would involve assessing the factors and constructs from both frameworks to determine users' acceptance and readiness to adopt blockchain technology for tracking organic coffee production in Serbia and Indonesia. The model would consider the performance expectancy, effort expectancy, social influence, facilitating conditions from UTAUT2, perceived usefulness and perceived ease of use from TAM. The analysis can provide insights into blockchain technology's potential adoption and acceptance in tracking organic coffee production by evaluating these factors.

3.1. Research limitations & hypothesis

The selected independent variables are:

1. Perceived Usefulness, by analogy with the Perceived Usefulness variable from the TAM model.
2. Perceived Security variable.
3. Effort Expectancy, by analogy with the Effort Expectancy variable from UTAUT2 model.
4. Price Value, by analogy with the Price Value variable from UTAUT2 model.
5. Facilitating Conditions, by analogy with the Facilitating Conditions variable from UTAUT2 model.
6. Perceived Risk variable
7. Social Influence, by analogy with the Social Influence variable from UTAUT2 model.

The selected dependent variable is:

1. Behavioral Intention to Use.

The study aimed to explore the readiness of coffee consumers to adopt an intelligent system that utilizes blockchain technology to trace the origin of organic coffee. The research drew upon the UTAUT2 and TAM models to examine consumers' readiness to use the system. The dependent variable, "Behavioural Intention to use" akin to Behavioral Intention in the UTAUT2 model, was chosen to predict users' behavior toward a system that has yet to be tested in the real-world conditions. By leveraging these models, the study aimed to gain insights into consumers' intentions and potential adoption of the blockchain-based tracking system for organic coffee.

The following hypotheses were put forward:

H1: Perceived Usefulness has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

H2: Perceived Security has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

H3: Effort Expectancy has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

H4: Price Value has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

H5: Facilitating conditions has affect on coffee eagerness willingness to use the system for blockchain-based coffee tracing.

H6: Perceived Risk has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

H7: Social Influence has affect on coffee consumers' eagerness to use the system for blockchain-based coffee tracing.

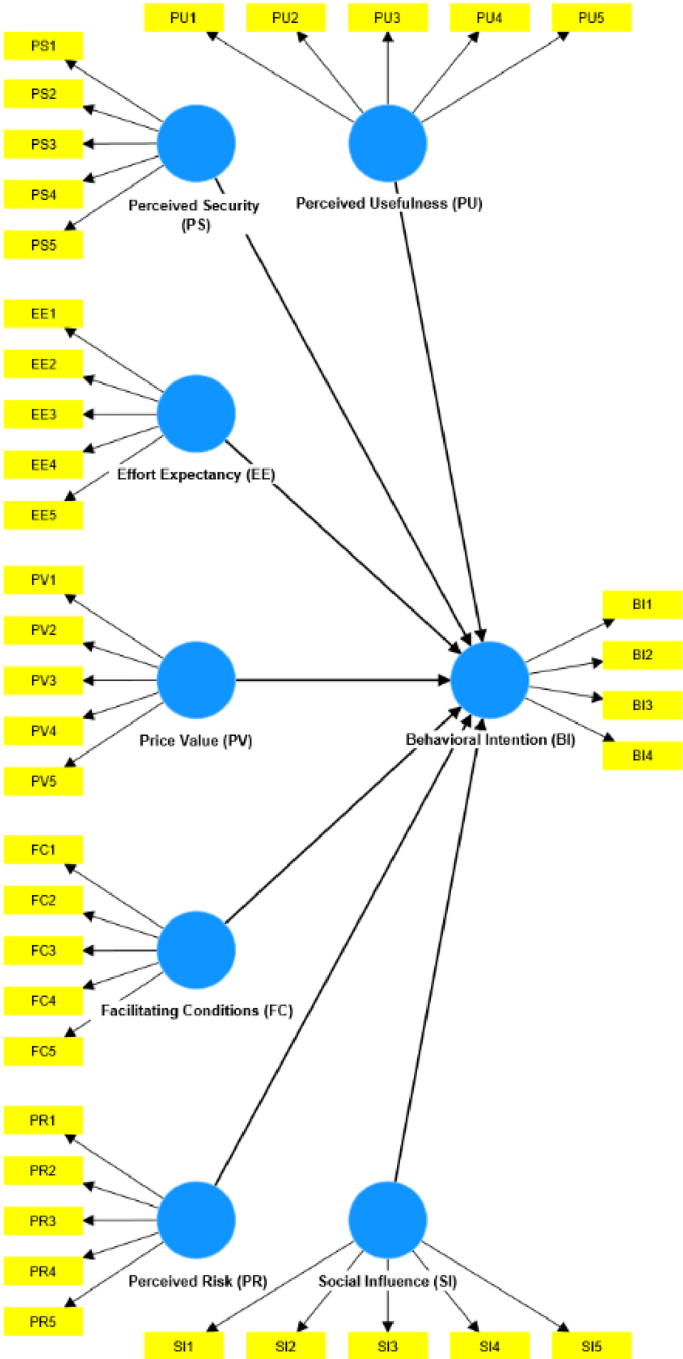

Fig. 1 Model for testing the readiness to use the system for tracking the origin of coffee

3.2. Questionnaire design

The research aims to gather information about Indonesian coffee consumers' readiness to use blockchain technology.

The willingness of costumer and coffee producers was studied using a questionnaire based on the UTAUT2 model and some elements of the TAM model. In the initial survey, costumer and coffee producers were informed about the proposed system and asked to complete a questionnaire.

The survey questions were designed based on predefined hypotheses and constructs. The respondents are required to rate the level of agreement with each statement using a Likert scale ranging from 1 to 5. A rating of 1 indicates complete disagreement with the information, while a rating of 5 indicates entire agreement. An example of a question and its corresponding Likert scale answer format is illustrated in the image below:

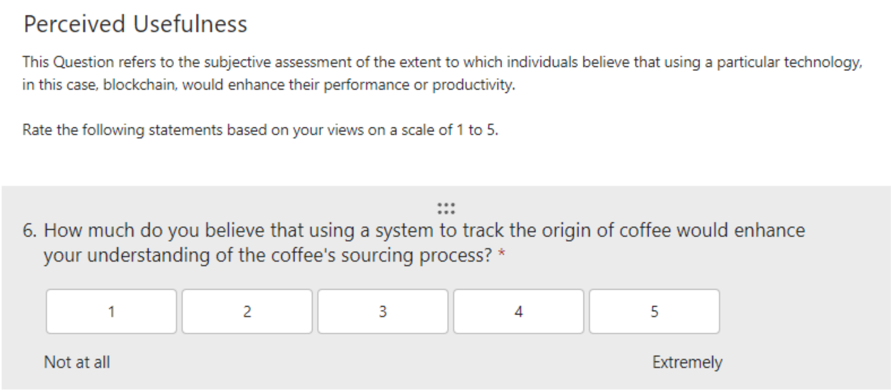

Fig. 2 Likert scale survey

4. Results and Discussions

In conducting data analysis on research variables, researchers processed descriptive analysis data using SmartPLS 4.0 in processing statistical data for hypothesis testing.

4.1. Descriptive analysis

Before the researchers tested the validity, reliability, and hypothesis testing, the researchers conducted a descriptive analysis of all the constructs or variables used in this study, namely Perceived Usefulness, Perceived Security, Effort Expectancy, Price Value, Facilitation Conditions, Perceived Risk, and Social Intention to Behavioral Intention to Use. The purpose of descriptive analysis is to explain the constructs or variables used during the research. Each construct has several indicators used by researchers. Referring to Table 1, the researcher analyzed the demographics of the respondents based on their age, gender, status, education, and country of origin of the respondents. The frequency analysis results based on respondents' data can be seen in Table 1.

Table 1 Demographic data of respondents

A Variables	Values	Frequency	Percentage
Age	Less than 20	7	2%
	From 20 to 25	241	70%
	From 25 to 35	81	23%
	More than 35	16	15%
Gender	Male	147	43%
	Female	198	57%
Status	Worker	68	20%
	Student	275	80%
	Unemployed	2	1%
	Retiree	0	0%
Education	Elementary Education	3	1%
	Highschol Education	90	26%
	Bachelor Studies	226	66%
	Master Studies	17	5%
	Postgraduate Studies	9	3%
Country of Residence	Serbia	243	70%
	Indonesia	101	30%
	Other	1	0.01%

Table 1 shows that there were a total of 345 respondents from 243 people (70%) in Serbia and 101 people (30%) in Indonesia, with 7 people (2%) aged less than 20, 241 people (70%) aged from the 20 to 25 years, 81 people (23%) aged from 25 to 35 years, and 16 people (15%) aged more than 35 years. 147 people (43%) were men, and 198 (57%) were women. In addition, 68 people (20%) are workers, 275 people (80%) are students, and 2 people (1%) are unemployed. Then the last education of the respondents was 3 people (1%) from elementary education, 90 people (26%) from highschool education, 226 people (66%) from bachelor studies, 17 people (5%) from master studies, and 9 people (3%) from postgraduate studies.

4.2. Outer model

Three main criteria that are used are convergent validity, discriminant validity, and composite reliability. Following are the statistical results in the outer model test using the SmartPLS 4.0 application in Figure 3.

The value of the loading factor of each indicator on the constructed variable can define the measure of the outer model by conducting convergent validity. An indicator in the outer model measurement can be considered valid if each indicator produces a loading factor with a value of > 0.70 according to predetermined criteria. The value of the loading factor of each indicator on the construct from the outer loading processing results of the initial model and the modified model with SmartPLS 4.0, is shown in the Table 2.

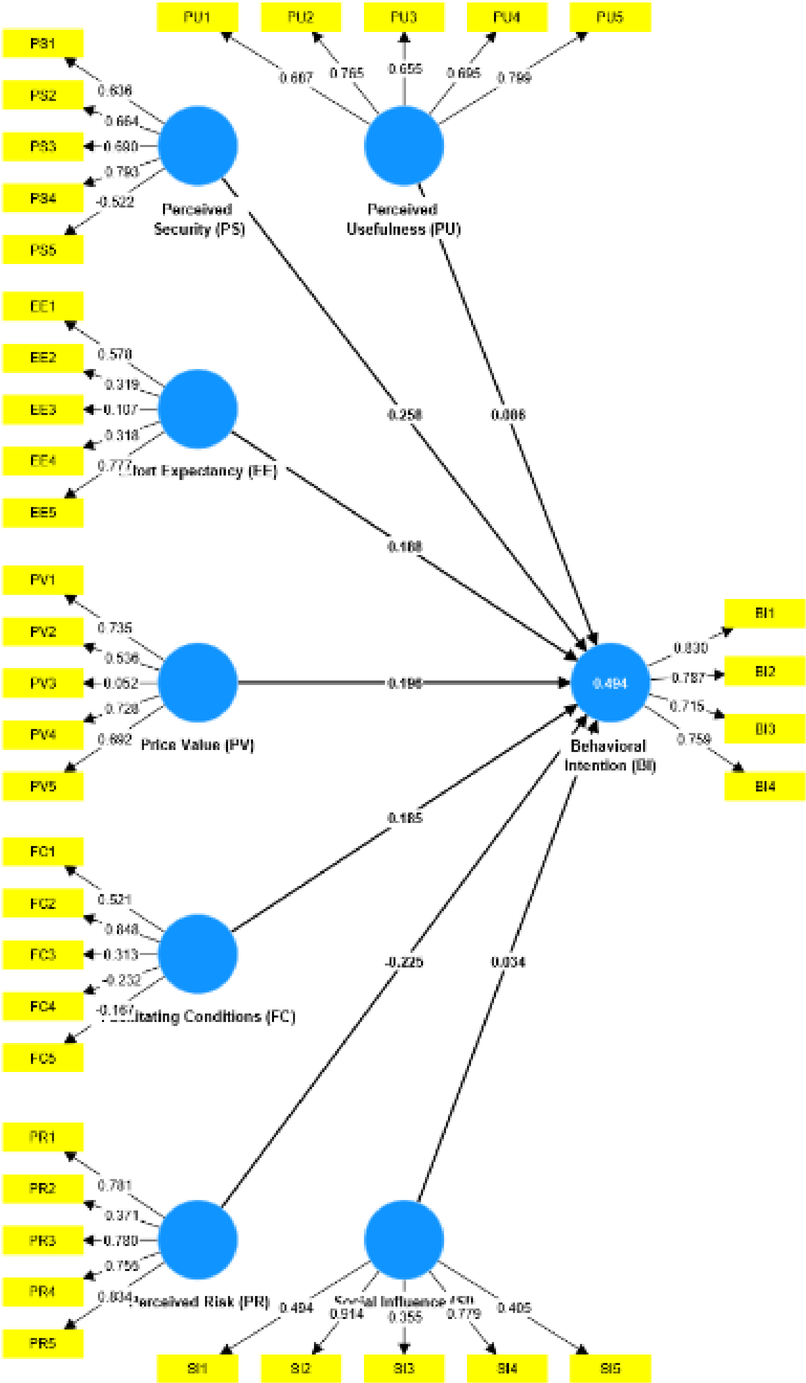

Fig. 3 Initial model measurement

Table 2. Outer loadings test results

Indicator	Initial Model	Modified Model
B1	0.830	0.830
B2	0.830	0.830
B3	0.715	0.715
B4	0.759	0.759
EE1	0.578	-
EE2	0.319	-
EE3	0.107	-
EE4	0.318	-
EE5	0.777	0.777
FC1	0.521	-
FC2	0.848	0.848
FC3	0.313	-
FC4	-0.232	-
FC5	-0.167	-
PR1	0.781	0.781
PR2	0.371	-
PR3	0.780	0.780
PR4	0.755	0.755
PR5	0.834	0.834
PS1	0.636	-
PS2	0.664	-
PS3	0.690	-
PS4	0.793	0.793
PS5	-0.522	-
PU1	0.687	-
PU2	0.765	0.765
PU3	0.655	-
PU4	0.695	-
PU5	0.799	0.799
PV1	0.735	0.735
PV2	0.536	-
PV3	0.052	-
PV4	0.728	0.728
PV5	0.692	-
SI1	0.494	-
SI2	0.914	0.914
SI3	0.355	-
SI4	0.779	0.779
SI5	0.405	-

Based on Table 2, each research variable in the initial model and the modified model shows differences in the loading factor values of the indicators. In the initial model, several indicators were found that had factor loading values < 0.70, which indicated that the indicators were invalid, so it was necessary to remove these indicators from the model, namely the indicators PU1, PU3, PU4, PS1, PS2, PS3, PS5, EE1, EE2, EE3, EE4, PV2, PV3, PV5, FC1, FC3, FC4, FC5, PR2, SI1, SI3, SI5. After the indicators were removed from the model, the outer model was tested again, which resulted in a loading factor value in the modified model. The adjusted model data reveals that all loading factor values of the indicators for each variable have a value > 0.70, indicating that all construct indicators are valid and nothing else is provided.

4.3. Convergent validity

For validity measurement, three criteria are used in the study: knowing the value of the loading factor on each indicator and AVE. The results of data processing are shown in Figure 4.

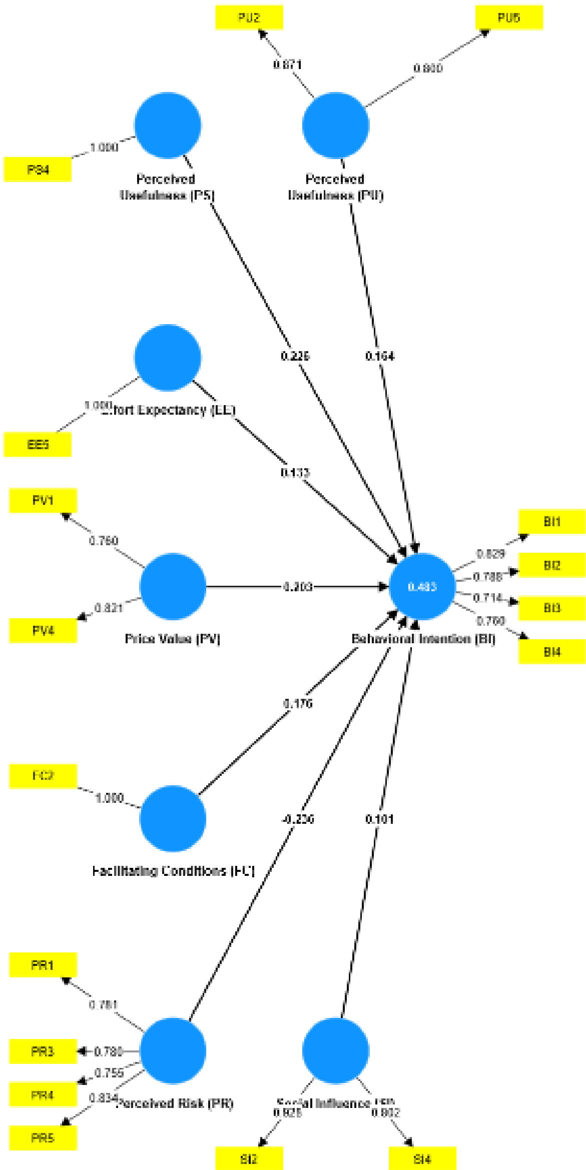

Fig. 4 Convergent validity

4.4. Discriminant validity

Based on the results in Table 3, all cross-loading values for every indicator of corresponding latent variable have the maximum cross-loading value compared to the cross-loading value associated with other latent variables. This indicates that each latent variable or construct has demonstrated excellent discriminant validity.

Table 3. Discriminant validity

	BI	EE	FC	PR	PS	PU	PV	SI
BI	0.774							
EE	0.249	1						
FC	0.508	0.15	1					
PR	0.28	0.09	0.29	0.788				
PS	0.434	0.13	0.415	0.03	1			
PU	0.361	0.06	0.231	0.053	0.18	0.84		
PV	0.473	0.27	0.376	0.003	0.27	0.37	0.79	
SI	0.419	0.17	0.364	0.03	0.26	0.45	0.46	0.87

4.5. Validity and Reliability Test (AVE, Cronbach Alpha, Composite Reliability)

Table 4. AVE Test Results, Cronbach Alpha, Composite Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
BI	0.776	0.779	0.856	0.599
PR	0.797	0.812	0.867	0.621
PU	0.774	0.789	0.823	0.699
PV	0.702	0.706	0.769	0.625
SI	0.786	0.793	0.858	0.752

Considering the data from Table 4, it can be stated that all constructs or variables meet valid criteria. This is evidenced by the AVE value > 0.50 according to the recommended criteria. Based on the Cronbach Alpha Test on display referred to in Table 4, it can be concluded that all variables or components are reliable. Evidenced by the Cronbach Alpha value according to the recommended cut of value, which is > 0.70. Based on the Composite Reliability Test in Table 4, it can be stated that each variable or construct meets the reliability criteria. Evidenced by the Composite Reliability value according to the recommended cut of value, which is > 0.70.

4.6. Inner model

The testing of the inner or structural model is carried out to know the relationship between the construct, R square, and the significance value of the research model. The following is a form of the structural model that has been tested using the Bootstrapping Test to determine the value of the R-square and T-statistics, which can be seen in Figure 5.

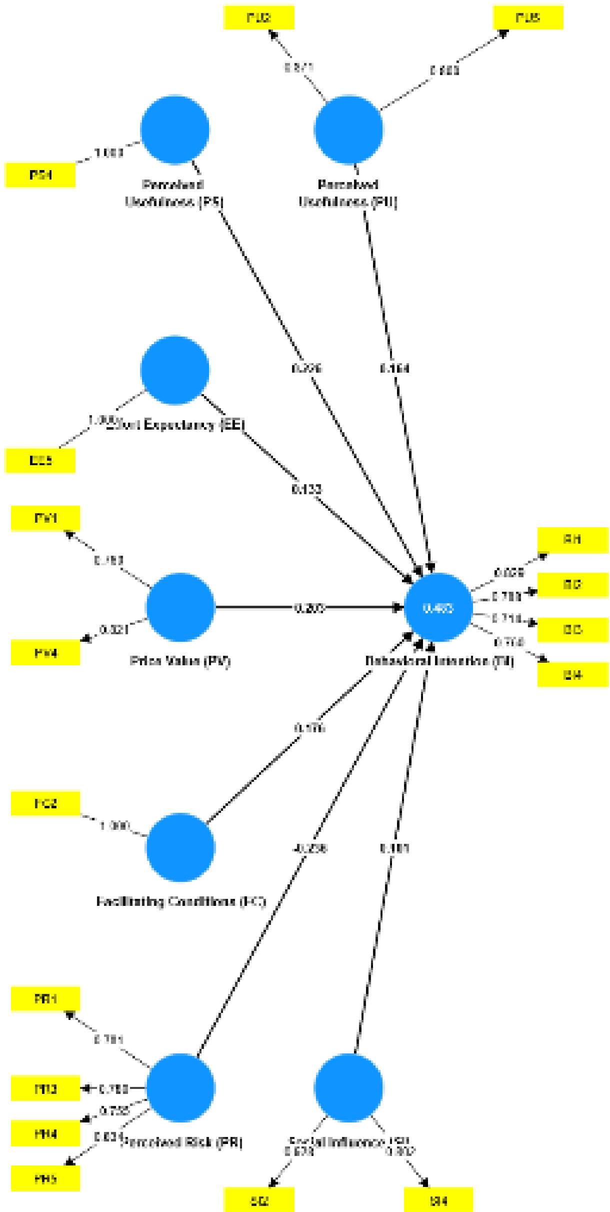

Fig. 5 Bootstrapping structural models

While testing the hypothesis for each research variable, researchers used SmartPLS 4.0 with a structural model through bootstrapping. By using a bootstrapping procedure that can show how much an independent variable can influence the dependent variable, the following is counclude from the Table 5 data showing the R-square test results.

Table 5. R-Square Test Results

	R-square	R-square adjusted
BI	0.483	0.473

The results show that the value of the Adjusted R-square dependent variable Behavioral Intention to Use is 0.473. This shows that the variable Behavioral Intention to Use can be influenced by the independent variables Perceived Usefulness, Perceived Security, Effort Expectancy, Price Value, Facilitating Conditions, Perceived Risk, and Social Influence on behavioral intention to use by 47.3%, and other variables outside the model influence the remaining 52.7%.

4.7. Hypothesis Test

This study has three hypotheses, namely Perceived Usefulness (H1), Perceived Security (H2), Effort Expectancy (H3), Price Value (H4), Facilitating Conditions (H5), Perceived Risk (H6), and Social Influence (H7) on behavioral intention to use. In testing the hypothesis, the value generated by the t-Statistics through the Bootstrapping test will be the basis for determining whether the formulated hypothesis is accepted or rejected. Table 6 shows the results of the statistics.

Table 6. T-Statistic Test Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Conclusion
PU -> BI	0.164	0.167	0.054	3.029	0.002	H1 is accepted
PS -> BI	0.226	0.226	0.046	4.911	0.000	H2 is accepted
EE -> BI	0.133	0.131	0.046	2.919	0.004	H3 is accepted
PV -> BI	0.203	0.204	0.053	3.812	0.000	H4 is accepted
FC -> BI	0.176	0.173	0.055	3.208	0.001	H5 is accepted
PR -> BI	-0.236	-0.241	0.041	5.753	0.000	H6 is accepted
SI -> BI	0.101	0.102	0.052	1.977	0.042	H7 is accepted

The results of the test regarding hypothesis are following:

1. The test results on the first hypothesis regarding the relationship between Perceived Usefulness and Behavioral Intention to Use show that the t-statistic results are worth 3.029, and the p-values are 0.002. The resulting t-statistic value > t-table value is 1.96 (3.029 > 1.96), and the resulting p-values are < 0.05 (0.002 < 0.05). This shows that Perceived ease of use significantly effects an attitude toward using, which means it is in accordance with the first hypothesis, namely, Perceived Usefulness affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the first hypothesis (H1) is supported.
2. The test results on the second hypothesis regarding the connection between Perceived Security and Behavioral Intention show that the t-statistic results have a value of 4.911 and the results of p-values have a value of 0,000. The resulting t-statistic value > t-table value is 1.96 (4.911 > 1.96) and the resulting p-values are < 0.05 (0.000 < 0.05). This shows that Perceived Security is significant for Behavioral Intention, which means it is in accordance with the second hypothesis, namely Perceived Security affects coffee

consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the second hypothesis (H2) is supported.

3. The test results on the third hypothesis related to the connection between Effort Expectancy and Behavioral Intention show that the t-statistic results have a value of 2.919 and the results of p-values have a value of 0.004. The resulting t-statistic value > t-table value is 1.96 (2.919 > 1.96) and the resulting p-values are <0.05 (0.004 <0.05). This shows that Effort Expectancy is significant to Behavioral Intention, which means it is in accordance with the third hypothesis, namely Effort Expectancy affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the third hypothesis (H3) is supported.
4. The test results on the third hypothesis regarding the connection between Price Value and Behavioral Intention show that the t-statistic results are worth 3,812 and the p-values are 0.000. The resulting t-statistic value > t-table value is 1.96 (3.812 > 1.96) and the resulting p-values are < 0.05 (0.000 < 0.05). This shows that Effort Expectancy is significant to Behavioral Intention, which means it is in accordance with the third hypothesis, namely Price Value affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the fourth hypothesis (H4) is supported.
5. The test results on the third hypothesis related to the connection between Facilitation Conditions and Behavioral Intention show that the t-statistic results are worth 3.208 and the p-values are 0.001. The resulting t-statistic value > t-table value is 1.96 (3.208 > 1.96) and the resulting p-values are < 0.05 (0.001 < 0.05). This shows that Effort Expectancy is significant to Behavioral Intention, which means it is in accordance with the third hypothesis, namely Facilitation Condition affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the fifth hypothesis (H5) is supported.
6. The test results on the third hypothesis related to the connection between Perceived Risk and Behavioral Intention show that the t-statistic results have a value of 5.753 and the results of p-values have a value of 0,000. The resulting t-statistic value > t-table value is 1.96 (5.753 > 1.96) and the resulting p-values are < 0.05 (0.000 < 0.05). This shows that Effort Expectancy is significant to Behavioral Intention, which means it is in accordance with the third hypothesis, namely Perceived Risk affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the sixth hypothesis (H6) is supported.
7. The test results on the third hypothesis regarding the connection between Social Intention and Behavioral Intention show that the t-statistic results have a value of 1.947 and the results of p-values have a value of 0.042. The resulting t-statistic value > t-table value is 1.96 (1.977 > 1.96) and the resulting p-values are < 0.05 (0.042 < 0.05). This shows that Effort Expectancy is significant to Behavioral Intention, which means that it is in accordance with the third hypothesis, namely Social Intention affects coffee consumer willingness to use the system for blockchain-based coffee tracking. Conclusion is that the seventh hypothesis (H7) is supported.

4.8. Discussion

This research was conducted with the aim of analyzing the extent of consumer readiness to operate blockchain technology to trace organic coffee from producer to producer. This study analyzes the readiness of using blockchain technology in tracking organic coffee through a model called TAM. The variables used in conducting this specific research are Perceived Usefulness, Perceived Security, Effort Expectancy, Price Value, Facilitating Conditions, Perceived Risk, and Social Influence on behavioral intention to use. In processing the data, researchers used the help of SmartPLS 4.0 software to find out whether each variable has indicators that can be declared valid, which means it meets predetermined criteria.

4.8.1. Effect of Perceived Usefulness on Behavioral Intention in using blockchain technology to track organic coffee

The output data processing results show an influence between perceived Usefulness and Behavioral Intention in using blockchain technology to track organic coffee. Therefore, we can accept the first hypothesis (H1). Several factors make respondents have a positive attitude towards using blockchain technology, including blockchain can provide benefits such as increasing Security, transparency, and reliability in tracking organic coffee. Respondents tend to have a high perception of the Usefulness of this technology. Thus, respondents chose to operate this technology, especially in tracking organic coffee. Respondents' answers that agreed with the statements given in the questionnaire illustrated that there was a positive impact in applying blockchain technology, which could support the respondents' readiness as consumers to increase value added in the field of tracking organic coffee. This shows that the higher use of blockchain technology due to the ease of operation and access makes consumers more tending to have a stronger intention to use the technology and causes a higher positive attitude received from the application of blockchain applications by respondents.

4.8.2. Perceived Security influence on Behavioral Intention in using blockchain technology to track organic coffee

In this context, the output results of data processing indicate an influence between perceived Security and Behavioral Intention in using blockchain technology to track organic coffee. This influence suggests that when people perceive the safety of using blockchain technology to track organic coffee, they tend to have a higher level of intention to use the technology. There are several reasons why this conclusion was obtained and the second hypothesis (H2) was accepted. First, trust in Security: blockchain technology has been recognized as a secure and decentralized technology. High-security perceptions of this technology can affect user behavior in adopting and using this technology. If users feel that blockchain technology can provide a sufficient level of Security for tracking organic copies, it is more probable that they intend to use it. Second, the belief in transparency: one of the advantages of blockchain technology is its ability to provide high transparency. In the context of tracking organic coffee, blockchain technology can assure that information about the origin of organic coffee is verifiable and cannot be manipulated. This perception of transparency can give consumers a sense of trust, which in turn can influence their intention to use the technology. Third, personal data security: In using blockchain technology to track organic copies, users may need to provide some of their personal information. Perceptions of Security related to privacy and personal data protection are important factors that can influence user intentions. If users believe blockchain technology can provide adequate protection to their personal data, they will be more inclined to use it.

4.8.3. Effect of Effort Expectancy on Behavioral Intention in using blockchain technology to track organic coffee

In this context, the output results of data processing show an influence between effort expectancy and Behavioral Intention in using blockchain technology to track organic coffee. These results conclude that the third hypothesis (H3) is accepted. Following are some of the reasons why using these results we conclude that there is a connection between effort expectancy and behavioral intention. Accorind to TAM, it is stated that factors such as user perceptions of ease of use and benefits derived from technology will influence their behavioral intention in adopting the technology. In this case, effort expectancy is a factor that describes the user's perception of how easy or difficult it is to use blockchain technology. If users expect that using blockchain technology to track organic coffee requires reasonable effort, they will likely have a higher intention to adopt it. Then, the rationale: If users believe that using blockchain technology will provide significant benefits, such as increased transparency and authenticity in tracking organic copies, they may be more likely to show a solid intention to use it. However, if they feel that using the technology requires too much effort, their intention to use it may decrease. Thus, the conclusion is that the third hypothesis (H3) is accepted, which means there is a significant influence between effort expectancy and behavioral intention in using blockchain technology to track organic coffee. This suggests that users tend to have a stronger intention to use blockchain technology if they positively perceive the required effort.

4.8.4. Effect of Price Value on Behavioral Intention in using blockchain technology to track organic coffee

Based on the output data processing which shows an influence between Price Value on Behavioral Intention, and using blockchain technology to track organic coffee, it can be stated that the H4 hypothesis is accepted. This indicates that price value significantly influences behavioral intention in using blockchain technology to track organic coffee. Some of the reasons why this is the case could include such as fair price value: If the price value offered for the use of blockchain technology in tracking organic coffee is considered reasonable or commensurate with the benefits provided, users are more inclined to have a higher level of intention to adopt the technology. If users feel that the costs incurred are worth the benefits received, then they will be more likely to be encouraged to use the technology. Then, trust in quality. Using blockchain technology to track organic coffee can give consumers confidence in the quality and authenticity of the product. Suppose users believe that this technology can ensure transparency and legitimacy of information about the source and quality of the organic coffee they buy. In that case, they will be more likely to adopt the technology. In this case, price value becomes important because users will see it as an investment to get a quality product. In addition, the long-term benefits of using blockchain technology to track organic coffee can provide long-term benefits, such as strengthening supply chains, increasing Security, and increasing consumer confidence. If users understand these benefits and see them as an investment for the future, they are more willing to pay a higher price to use the technology. All of the factors above can contribute to the influence of Price Value on Behavioral Intention in using blockchain technology to track organic coffee. The data processing results show a significant correlation between the two variables. Therefore, the fourth hypothesis (H4) is accepted.

4.8.5. Effect of Facilitating Conditions on Behavioral Intention in using blockchain technology to track organic coffee

Considering the results of the data processing output which shows the effect of the Facilitation condition on Behavioral Intention, it can be stated that the H5 hypothesis can be accepted. In the research or data processing carried out, the results show a relationship or influence between the facilitation conditions provided (Facilitation conditions) and behavioral intentions (Behavioral Intention) in using blockchain technology to track organic coffee. In other words, when facilitation condition factors, such as the availability of adequate technological infrastructure, good accessibility, adequate training, ease of use, and support from related parties, are met, then this positively affects the intention or desire of individuals or groups to uses blockchain technology to track organic coffee. By obtaining these results, the conclusion that can be drawn is that the fifth hypothesis (H5) is accepted. This hypothesis states that there is a relationship between Facilitation conditions and Behavioral Intention in the context of using blockchain technology to track organic copies.

4.8.6. Effect of Perceived Risk on Behavioral Intention in using blockchain technology to track organic coffee

The output results of data processing show that there is an influence between Perceived Risk and Behavioral Intention in using blockchain technology to track organic coffee. In this context, it is stated that the H6 hypothesis can be accepted. In essence, these results suggest that individuals' perceived risk associated with using blockchain technology to track organic coffee has an influence on their behavioral intention to use the technology. In this case, the perception of risk could include concerns about data security, uncertainty regarding the reliability of technology, or even potential financial loss. Data processing and analysis found that the higher is the degree of risk perceived by individuals regarding the use of blockchain technology, the lower is the degree of their behavioral intention to use the technology to track organic coffee. In other words, risk perception influences an individual’s intention to adopt blockchain technology in this specific context. This conclusion can provide important insights for researchers, business people, or practitioners interested in applying blockchain technology in the agriculture or tracking organic products through the supply chain. By understanding that perceived risk affects individual intentions, interested parties can take steps to reduce perceived risk and increase the acceptance of blockchain technology for tracking organic coffee.

4.8.7. Effect of Social Intention on Behavioral Intention in using blockchain technology to track organic coffee

Based on the output data processing results which show an influence between social intention on Behavioral Intention, as well as the use of blockchain technology to track organic coffee, it is stated that the H7 hypothesis can be accepted. First, it is important to understand the meaning of the two mentioned constructs. Social intention refers to a person’s intention to act following social norms and values that exist in society. Meanwhile, Behavioral Intention relates to a persons intention to act according to a certain behavior. In this context, the use of blockchain technology to track organic coffee is a behavior that is being researched. By observing the processing of the resulting data, if there is a significant influence between social intention and behavioral intention in using blockchain technology to track organic coffee, it can be stated that a person's social intention, which includes factors such as awareness of the importance of organic coffee, concern for the environment, shopping ethics, and social justice, can be factors influencing ones intention to use blockchain technology to track organic coffee. For example, suppose a person has a high social intention to support organic and sustainable products, and is aware of the importance of tracing the organic coffee footprint from farmer to consumer. In that case, the individual will likely have a strong behavioral intention to use blockchain technology to trace coffee. organic. These results suggest that social factors are important in shaping individual intentions to use blockchain technology to track organic coffee. Therefore, the conclusion that the seventh hypothesis (H7) is accepted is reasonable considering the results of the data processing output.

5. Conclusion

The purpose of this research is to analyze the influence of independent variables namely Perceived Usefulness, Perceived Security, Effort Expectancy, Price Value, Performance expectancy, Facilitating Conditions, Perceived Risk, and Social Influence on the dependent variable, namely Readiness of consumers and producers to operate Blockchain technology through the TAM and UTAUT method. Based on the research that has been carried out, the results show that there is an influence between Perceived Usefulness, Perceived Security, Effort Expectancy, Price Value, Facilitating Conditions, Perceived Risk, and Social Influence on behavioral intention to use. The influence between variables can be proven by testing the hypothesis, which shows that positive value directions support H1, H2, H3, H4, H5, H6, and H7. This means that consumers will find using blockchain technology to track organic coffee easy. They also believe that using blockchain makes performance faster, more efficient and can increase the productivity of coffee making. In addition, consumers can feel that blockchain technology is a good solution and is not burdened in the use or operation of the supply chain in making organic coffee. This impacts their decision to use blockchain in their activities, especially those related to the coffee supply chain sector and they recommend using blockchain to others. This proves that, to date, consumers are better prepared to use blockchain to track organic coffee. Future research could include testing readiness of other stakeholders and developing a prototype of the proposed system.

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