Environment and Social Psychology (2024) Volume 9 Issue 11
doi: 10.59429/esp.v9i11.3158

RESEARCH ARTICLE

An Analytical Study of Blockchain Technology on Consumers' Perceived Value and Loyalty Response in Retail Industry under SOR Theory

Yue Su[*], Poh-Chuin Teo[2], Haliyana Khalid[3],

Azman Hashem International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

*** Corresponding author:** StAlexFish@163.com

ABSTRACT

This study projects the SOR theoretical model to a retail industry scenario where blockchain technology is applied, setting blockchain technology as the independent variable, perceived value as the mediator variable, and loyalty response as the dependent variable. The questionnaires and scales were designed by combining relevant information and experts' suggestions. The questionnaire is distributed to obtain the initial data of this study, and a statistical model is established to explore the role of blockchain technology in retail industry on consumers' perceived value and loyalty response under the SOR theory. The results of hypothesis testing point out that there is a significant correlation between decentralization, non-counterfeiting, traceability function, public transparency, perceived quality value, perceived economic value, perceived emotional value and loyalty response, and its corresponding regression equation is 0.136+0.611*Decentralization Q1+0.034*Non-counterfeiting Q2+0.141* Traceability Function Q3+0.139*Public Transparency Q4+ 0.016*Perceived quality value Q5+0.089*Perceived economic value + 0.047*Perceived emotional value. This study comprehensively reveals the relationship between blockchain technology, consumer perceived value, and loyalty response, which is of great practical significance to the development of retail industry.

Keywords: SOR theory; blockchain technology; regression equation; perceived value

1. Introduction

Blockchain technology is a distributed database technology that ensures transparency, security and traceability of transactions. Blockchain technology, as an innovative technical means, is gradually penetrating into the retail industry [1-3]. By improving supply chain management, protecting consumer rights and interests, accelerating payments and settlements, improving customer loyalty management and enhancing anti-fraud and anti-money laundering capabilities, blockchain technology brings great potential and opportunities to the retail industry. However, the application of blockchain technology still faces some challenges, such as technology cost, standardization and regulation. In the future, blockchain technology will create more value and competitive advantages for the retail industry [4-7].

With the increasingly fierce market competition, customer-perceived value has gradually become an important strategy for enterprises to gain competitive advantage, increase market share and enhance

ARTICLE INFO
Received: Received: 11 October 2024 | Accepted: 21 November 2024 | Available online: 25 December 2024

CITATION
Su Y, Teo PC, Khalid H. An Analytical Study of Blockchain Technology on Consumers' Perceived Value and Loyalty Response in Retail Industry under SOR Theory. *Environment and Social Psychology*.2024; 9(11): 3158. doi: 10.59429/esp.v9i11.3158

profitability. Customer perceived value is a multidimensional concept, and its formation is affected by a variety of factors [8-11]. These factors include the characteristics of the product itself, the services provided by the enterprise, and the individual characteristics and psychological state of the customer [12-13]. Customer perception value significantly affects the choice and loyalty of consumers. When perceived value is high, consumers tend to choose the product card and repurchase it to form brand loyalty [14-16].

The application of blockchain in marketing activities has many benefits, enhancing trust, reducing costs, avoiding advertising fraud, etc., and more importantly, it is conducive for brands to gain consumers' trust and loyalty, enhance their marketing capabilities, and thus increase their economic returns. Literature [17] explores the impact of blockchain on corporate marketing activities. Blockchain facilitates creative loyalty strategies by combating fraud, enhancing transparency, protecting privacy and security. Literature [18] elaborated that the deployment of blockchain will disrupt the entire marketing industry, including the way of communicating with consumers, managing marketing campaigns, and so on. The characteristics of blockchain such as security and transparency are highlighted, thus facilitating the marketing effectiveness of the organization. Literature [19] suggests that blockchain can overcome many problems in the marketing industry and the importance of blockchain for the marketing industry. Blockchain based marketing is explored to provide marketers with the opportunity to understand the market conditions. Literature [20] describes the possibility of applying blockchain technology in the retail market. A questionnaire survey through a cross-sectional approach indicated that the retail industry needs technological transformation and industrial innovation to complete the blockchain system in order to enhance competitiveness. Literature [21] reveals that blockchain can be deployed in the retail supply chain to solve problems such as delays and product counterfeiting. The wide range of benefits that blockchain brings to the retail supply chain, including enhanced trust, cost reduction, etc., also analyzes the barriers to this and makes recommendations for its successful implementation.

Blockchain is essentially a shared database that stores data that is unforgeable, public, and transparent. Literature [22] constructed a retail-on-competition model to investigate the impact of blockchain on strategic pricing of competing retailers. The comparison reveals that only when consumers value privacy less and there is an increase in information transparency. Literature [23] states that the integration of blockchain technology can improve the efficiency of traditional retailing considering features such as effective information and interactive reflection. Implementation of blockchain technology in retail industry can reduce transaction costs, time costs, etc. Literature [24] reveals the impact of blockchain technology on the relationship between brands and consumers. The nature of blockchain technology is introduced through bibliometrics and highlights the unique features of blockchain technology on the communication aspect between brands and consumers. Literature [25] examined the impact of blockchain technology on the physical grocery industry and concluded through interviews that blockchain technology impacts the business processes of physical grocery retailing by providing token payments, secure payments, and security management. Literature [26] aims to understand the willingness to use blockchain in the retail supply chain. It shows that retail supply chain practitioners are looking forward to adopting blockchain technology, but perceived behavioral control does not enable the use of blockchain in retail.

Based on the knowledge of SOR theory, this paper sets blockchain technology in retail industry, consumers' perceived value, and loyalty response as stimulus variables, organism variables, and response variables, respectively, and corresponds to the independent variables, mediator variables, and dependent variables in the regression model, which ultimately realizes the construction of the SOR theoretical model. Combined with the research purpose and content of this paper, the questionnaire of this study is set as 16 questions and eight dimensions (decentralization, non-counterfeiting, retrospective function, openness and

transparency, perceived quality value, perceived economic value, perceived emotional value, and loyalty response), and the designed questionnaire is tested for reliability and validity. Based on the questionnaire to obtain the research data of this paper, mathematical and statistical methods are used to explore the interaction relationship between blockchain technology, consumer perceived value, and loyalty response in the retail industry.

2. The Role of Blockchain Technology on Consumers' Perceived Value and Loyalty Responses

2.1. Definition of SOR theory and Impact mechanism

Figure 1 shows an example of SOR theory. The detailed SOR theoretical model is defined as follows:

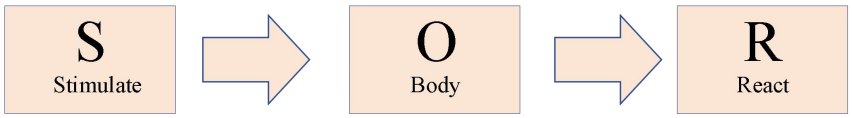


Figure 1 The SOR theory model.

2.1.1. Stimulus variable (S)

Stimulus variables (S) are stimulus attributes that elicit a response from the organism, and these attributes take many forms [27].

2.1.2. Organismal variables (O)

Organismic variables (O) refer to the characteristics of individuals themselves [28]. Individual characteristics can be physical or psychological.

2.1.3. Response variables (R)

Response variable (R) refers to the types and characteristics of responses that stimuli cause changes in behavior, and behavioral psychology divides user behavior into two kinds of behaviors: convergence and avoidance [29].

2.1.4. The impact mechanism of blockchain technology on consumers in retail industries

The block chain technology is applied to solve the problem of trust because of its openness, transparency and other characteristics, so that the identity certification of consumers is safer and more efficient, the payment of the transaction information is more transparent and non-arbitrary, and the digital copyright is protected, the product or service full process can be traced back. With the advent of 5G age and the promotion of blockchain technology, it provides a strong technical support for the retail economy and brings greater economic benefits. On the other hand, it has also broken the original trust construction mechanism, prompting retail companies to build new trust mechanisms to adapt to the new technical environment. The block chain technology is managed by more effective technical support to the platform, so as to build a more orderly and convenient retail economy, reduce the perception of consumers in the retail industry, improve the consumer's trust in the retail industry, and improve the willingness of consumers to participate in the retail price value [30].

The block chain technology is used to provide authentication, traceability service, information record and consumer file service for the retail industry because it has the safety, transparency and no control of the storage information, and provides technical support for consumer trading safety and information security, reducing the perception of consumers in the retail industry.

2.2. Constructing a theoretical model of SOR

Based on the previous research review of AR technology and SOR theory, this section constructs a research model of SOR theory, with the independent variable (S) as blockchain technology, the mediator variable (O) as the perceived value of consumers, and the dependent variable (R) as the loyalty response. It is introduced as follows:

2.2.1. Dependent variable (S: blockchain technology)

A blockchain is a distributed shared database that uses technologies such as distributed ledgers, asymmetric cryptography, consensus mechanisms, and smart contracts. On the one hand, blockchain technology can be applied to product traceability, so as to realize the whole process traceability of one thing and one code of products. On-chain information can build trust and sharing among brands, channel providers, retailers, consumers, regulatory authorities, and third-party testing agencies. On the other hand, the tamper-proof feature of blockchain technology ensures the authenticity of product information data after it is uploaded to the chain, and consumers can trust the authenticity and reliability of product information. To sum up, "decentralization", "non-forgery", "traceability function" and "openness and transparency" are selected as the measurement indicators of independent variable blockchain technology.

2.2.2. Mediating variable (O: perceived value)

Consumer perceived value refers to consumers' subjective perception of the process and outcome of an enterprise's interaction, including the comparison and trade-off between consumers' perceived gains and perceived losses. The mediating variable consumer perceived value consists of three measures, which are perceived quality value, perceived economic value, and perceived emotional value.

2.2.3. Dependent variable (R: loyalty response)

Loyalty response research originated in the measurement of customer behavior and considered multiple repeat purchases as a consumer loyalty response. Guided by this, corporate loyalty programs also strive to maximize the attraction of repeat purchases, such as measures that give different discounts based on the number of times customers spend, or the cumulative amount of spending. However, simply relying on attracting customers to repeat consumption does not gain truly loyal customers. Accordingly, scholars have proposed a variety of definitions of loyalty response, such as and that “loyalty response is accompanied by higher attitudinal orientation of repeated consumption behavior” at the same time. The loyalty response is resulting in repeated purchases of the same firm, brand, or family of brands without switching behavior, regardless of the influence of contextual and marketing forces”.

2.3. Research Questionnaire Design

2.3.1. Questionnaire design

According to the purpose and content of the study, the questionnaire of this study is set up with 16 questions and items, mainly including two parts. The first part investigates the user's basic situation, including the user's gender, age, occupation, and the use of the product.

The second part includes the measurement indicators of each variable in the model of this study, including the selection of “decentralization”, “unforgeable”, “traceability function”, “Openness and Transparency” and other measurement indicators.

A 5-level Likert scale was used to investigate the user's feelings, with a score of 1-10 expressing the respondent's recognition of the topic content, where 1-10 indicates very non-compliant, non-compliant, average, compliant, and very compliant, respectively.

2.3.2. Scale development

The scale is prepared as shown in Table 1, referring to the mature literature [31-33]. Deqing ma and so on the product quality of the product quality of the survey. Ava Hajian and others have proposed the various feelings of advertising of blockchain technology as a survey project. Zhang Rong et al., et al., investigated the information sensitivity of the discharges of blockchain applications. Based on the characteristics and factors of each variable, combining the SOR theory and blockchain technology to jointly develop a measurement scale suitable for this study as follows:

Q1: Is it possible to remove invalid information?

Q2: Can you improve the information reading experience?

Q3: Whether the authenticity of product information can be guaranteed?

Q4: Can you quickly remove false distracting information?

Q5: Is it possible to achieve personalized recommendation of information?

Q6: Is it possible to obtain the required information quickly?

Q7: Whether it can enhance consumers' right to know?

Q8: Has the intensity of reporting been strengthened?

Q9: Does the information itself provided have high quality value?

Q10: Can you convey good perceived quality value to users?

Q11: Does the information itself provided have high economic value?

Q12: Can it convey good perceived economic value to users?

Q13: Does the information itself provided have good perceived emotional value?

Q14: Is it able to convey good perceived emotional value to users?

Q15: Can it increase users' purchase intention?

Q16: Is it possible to maintain a good loyal response from users?

Due to the difficulty of direct perception value, this paper refer to the above research, and describes the perceived value from three levels of product quality, economy and emotion, to ensure the feasibility of the questionnaire.

Table 1 Scale preparation.

Variable	Item	Symbol
Decentralization	Remove the excess interference information	Q1
	Improve the information reading experience	Q2
Can’t be forged	Ensure the authenticity of product information	Q3
	Can quickly remove false interference information	Q4
Retrospective function	Can implement the personalized recommendation of information	Q5
	Ability to quickly get the information you need	Q6
Transparency	Empower the consumer	Q7
	The prosecution is strengthened	Q8
Perceived quality value	Providing information with high quality value	Q9
	Convey good perceived quality to users	Q10
Perceived economic value	Providing information with high economic value	Q11
	Delivering good perceived economic value to users	Q12

Table 1. (*Continued*)

Variable	Item	Symbol
Perceived emotional value	Providing information with high emotional value	Q13
	Convey good sense of emotional value to users	Q14
Loyalty response	Improve user purchase intention	Q15
	Users maintain a good loyalty response	Q16

2.3.3. Distribution and collection of questionnaires

Considering the characteristics of people with the experience of using blockchain technology, this survey was designed to be distributed online through the Internet. First, the survey of 450 consumers with retail consumption reached more than 100 times, and asked to fill in the experience of the block chain technology and explain the use of the experience. According to this, 300 people who experienced more than 10 times were selected. A total of 300 questionnaires were issued, 300 of the recovery questionnaires and 100.00% recovery. The effective sample recovery rate was 97.00%, and the effective sample recovery rate was 97.00%.

2.4 Mathematical and statistical theory

2.4.1 Reliability test based on Cronbach's coefficient method

Cronbach's a coefficient (Cronbach's a) is a statistic, the standardized α coefficient for this scale is:

$$\alpha = nr / \left[(n-1)r + 1 \right] \tag{1}$$

2.4.2. Validity test based on loading coefficients

For this questionnaire analysis, we chose to utilize the structural validity of the factor analysis scale to evaluate the validity. The sample observations are first standardized so that the mean of the variables is 0 and the variance is 1 to eliminate the effect of order of magnitude and scale. Let the standardized common factor variable be denoted as $F_1, F_2, \cdots, F_m \left(m < p \right)$ if it satisfies (1) $X = \left(x_1, x_2, \cdots, x_p \right)'$ is a measurable vector with mean vector $E\left(x \right) = 0$, covariance array $\operatorname{cov} X = \Sigma$, and Σ is equal to the correlation matrix R. (2) $F = \left(F_1, F_2, \cdots, F_m \right)' \left(m < p \right)$ is an unmeasurable vector with mean vector $E\left(F \right) = 0$, covariance array $\operatorname{cov}\left(F \right) = 1$, i.e., the components of vector F are independent. (3) $\varepsilon = \left(\varepsilon_1, \varepsilon_2, \cdots, \varepsilon_p \right)'$ and F are independent of each other, and the covariance array of $E\left(\varepsilon \right) = 0$, ε is diagonal Σ_ε, which means that the components of ε are also independent of each other, then model (3) is called a factorial model, and its matrix form is $X = AF + \varepsilon$.

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + \cdots + a_{1m}F_m + \varepsilon_1 \\ x_2 = a_{21}F_1 + a_{22}F_2 + \cdots + a_{2m}F_m + \varepsilon_2 \\ \cdots \\ x_p = a_{p1}F_1 + a_{p2}F_2 + \cdots + a_{pm}F_m + \varepsilon_p \end{cases} \tag{2}$$

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{21} & a_{22} & \cdots & a_{2m} \\ & \cdots & & \\ a_{p1} & a_{p2} & \cdots & a_{pm} \end{pmatrix} \tag{3}$$

2.4.3. Pearson's correlation coefficient

Pearson's correlation coefficient is a statistic that accurately reflects the closeness of the relationship between two variables, which is usually denoted by r, and has a value between -1 and 1 [34].

$$rxy = SxySxSy \tag{4}$$

In addition, the formulas for the calculation of the corresponding covariance and standard deviation are shown in equations (5), (6) and (7):

$$Sxy = i = 1nXi - XYi - Yn - 1 \tag{5}$$

$$Sx = Xi - X\,2n - 1 \tag{6}$$

$$Sy = Yi - Y2n - 1 \tag{7}$$

Figure 2 shows a schematic representation of the results of measuring the strength of the relationship between the variables, and the value of the correlation coefficient r is generally defined with its degree of correlation as shown in Table 2.

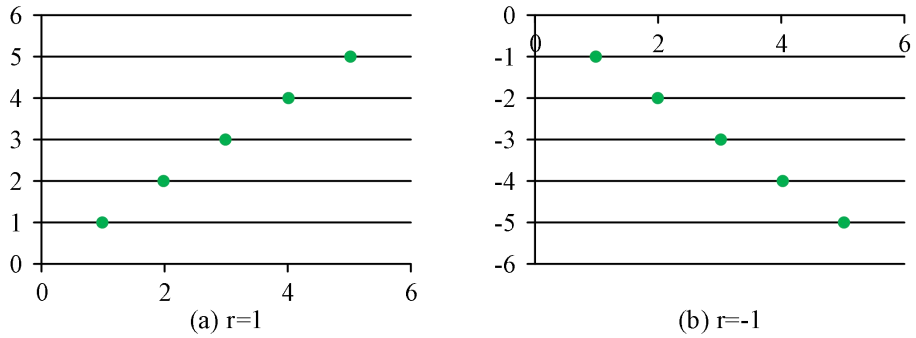


Figure 2. Scatter plot.

Table 2. The correlation of the Pearson correlation coefficient.

r range	Correlation degree
$0.8 < r \leq 1.0$	Strong correlation
$0.6 < r \leq 0.8$	Strong correlation
$0.4 < r \leq 0.6$	Medium correlation
$0.2 < r \leq 0.4$	Weak correlation
$0.0 < r \leq 0.2$	Extremely weak or unrelated

2.4.4. Multiple linear regression

Assume that there is a linear relationship between random variable Y and p independent variables $X_1, X_2, \cdots, X_p$, which can be expressed:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p \tag{8}$$

If its n observations are $\left(X_{i1}, X_{i2}, \cdots, X_{ip}, Y_i\right)$, $i = 1, 2, \cdots, n$, then these n observations can be written in the following form:

$$\begin{cases} y_1 = \beta_0 + \beta_1 X_{11} + \beta_2 X_{12} + \cdots + \beta_p X_{1p} + \varepsilon_1 \\ y_2 = \beta_0 + \beta_1 X_{21} + \beta_2 X_{22} + \cdots + \beta_p X_{2p} + \varepsilon_2 \\ \vdots \\ y_n = \beta_0 + \beta_1 X_{n1} + \beta_2 X_{n2} + \cdots + \beta_p X_{np} + \varepsilon_n \end{cases} \tag{9}$$

If the system of equations (8) is expressed in terms of a matrix, we have:

$$Y = X\beta + \varepsilon \tag{10}$$

Among them:

$$\begin{gathered} Y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}_{n\times 1}, X = \begin{pmatrix} 1 & x_{11} & \cdots & x_{1p} \\ 1 & x_{21} & \cdots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & \cdots & x_{np} \end{pmatrix}_{n\times(p+1)} \\ \beta = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_p \end{pmatrix}_{(p+1)\times 1}, \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}_{n\times 1} \end{gathered} \tag{11}$$

2.5. Empirical analysis of survey statistics

2.5.1. Sample descriptive statistics

Figure 3 shows the descriptive statistics of the sample, the position of the horizontal axis corresponding to the bubble chart indicates the number of people, while the size of the corresponding radius indicates the proportion. From the gender distribution of the sample, the number of males is 141 (48.45%) and the number of females is 150 (51.55%), with a small difference in the gender distribution ratio. From the age point of view, the number of consumers aged between 21 and 30 years old is the largest (number: 166, or 57.04%), and consumers aged 40 years old and above are the least (number: 24, or 8.25%). It can be seen that the survey sample is mostly young people, and in the distribution of education, the number of people with bachelor's degree is the largest (number: 118, accounting for: 40.55%). In terms of monthly income, most of the samples are concentrated in the range of less than 3,000 yuan per month (136 people, accounting for 46.74%), which is in line with the income characteristics of young people using blockchain technology platforms, especially the student group. In terms of the length of time of using blockchain technology platforms, the largest number of subjects have been using it for more than 3 years (144 people), accounting for 8.25% of the total. (144), accounting for 49.48% of the total number of people, while “less than 3 months” is less (16), accounting for only 5.50% of the total number of people, indicating that most of the subjects are familiar with the blockchain technology platform. In terms of the frequency of accessing the blockchain technology platform, the majority of the subjects chose to use it “4 to 8 times” per month, and the number of them was 127, accounting for 43.64% of the total number of subjects.

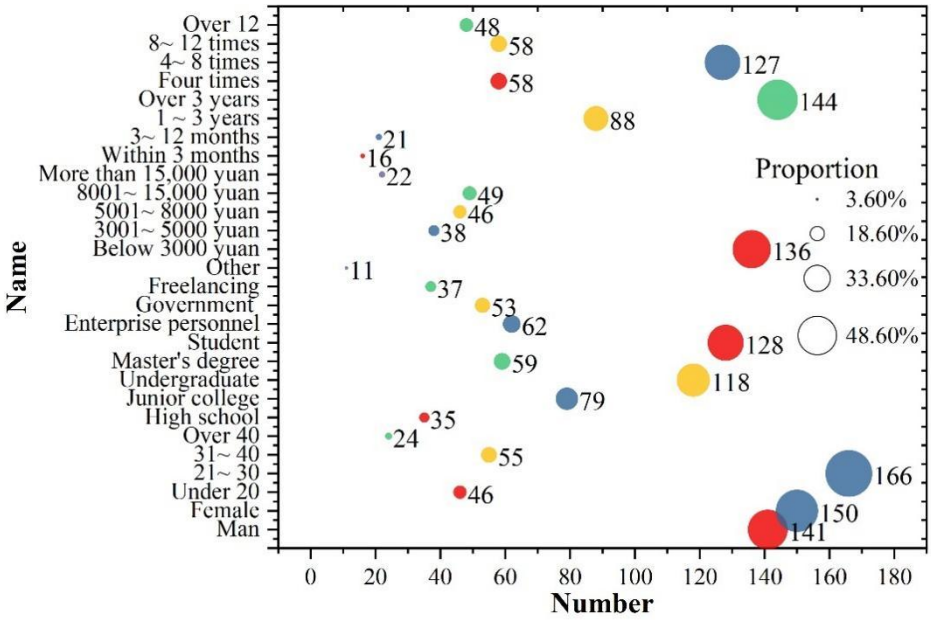


Figure 3. Descriptive statistical results of the sample.

Most of the respondents said they were impressed by the application of blockchain technology. "This feature is really amazing! I can just see the whole process that I bought from the production start." "I think the biggest benefit is that you can track and grasp the progress of the goods." "This feature has greatly improved my purchase experience." From the results of intuitive evaluation, it can also be seen that the blockchain technique fully strengthens the experience of the retail transaction process.

2.5.2. Analysis of the results of the reliability test

One also refers to the reliability as the Cronbach's a, which is generally tested by Cronbach's a and indicates consistency, reliability and stability of the results in the scale. The closer the value of Cronbach's a reliability coefficient is to 1 in a specific analysis, the more reliable the scale being measured is. The results are very credible and the results of the reliability test are shown in Table 3. The Cronbach's a of each variable can be seen through Table 2, where decentralization (Q1: 0.803), unfalsifiability (Q2: 0.818), traceability function (Q3: 0.769), openness and transparency (Q4: 0.883), perceived quality value (Q5: 0.793), perceived economic value (Q6: 0.797), perceived emotional value (Q7: 0.798), and loyalty response (Q8: 0.753). This shows that Cronbach's a are all greater than 0.7, so it is considered that the data obtained this time can be analyzed in the next step.

Table 3 Reliability test results.

Variable	Symbol	Term number	Cronbach's a
Decentralization	Q1	2	0.803
Can't be forged	Q2	2	0.818
Retrospective function	Q3	2	0.769
Transparency	Q4	2	0.883
Perceived quality value	Q5	2	0.793
Perceived economic value	Q6	2	0.797
Perceived emotional value	Q7	2	0.798
Loyalty response	Q8	2	0.753

2.5.3. Analysis of the results of the validity test

The degree of fit between the itemized test results and the content of the examination reflects the degree of validity. The aggregated reliability of the scale was determined by examining the standardized factor loadings of the 16 variables in the 8 dimensions, the average variance extracted (AVE) of each variable, and the combined reliability (CR). In this case, the variables are represented directly by the items. If a question item in the scale shows significance and the standardized loading coefficient value is greater than 0.7, it indicates a strong correlation. The AVE values corresponding to the eight factors of decentralization, non-counterfeiting, traceability function, openness and transparency, perceived quality value, perceived economic value, perceived emotional value, and loyalty response are all greater than 0.5 and the CR values are all higher than 0.7, implying that the present data has good convergent validity.

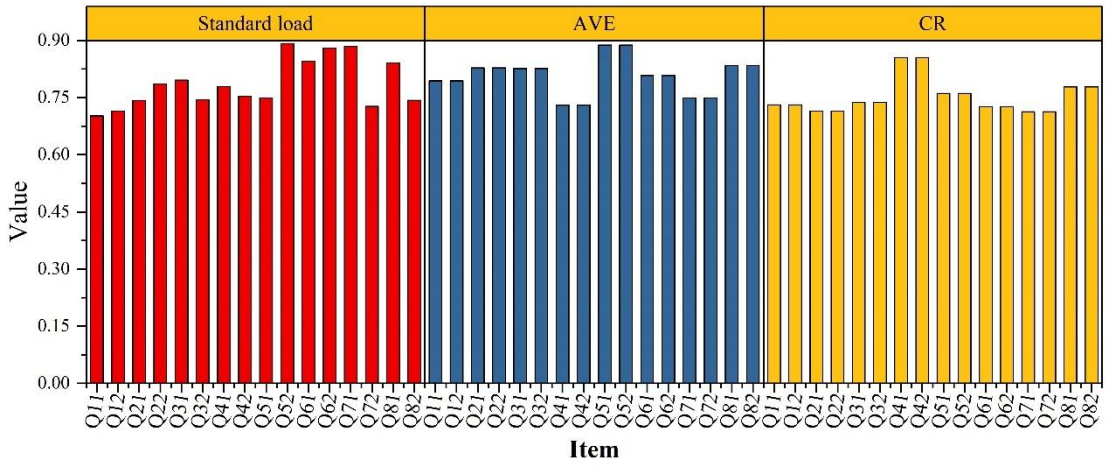


Figure 4. Validity test results.

2.5.4. Descriptive statistical analysis

As can be seen from **Figure 5**, The mean of all variables is greater than 2.5. It can be seen, the survey was more approved for the contents of the item, which provides an initial overview of the variable distribution of quantitative values, providing data support for the correlation analysis below.

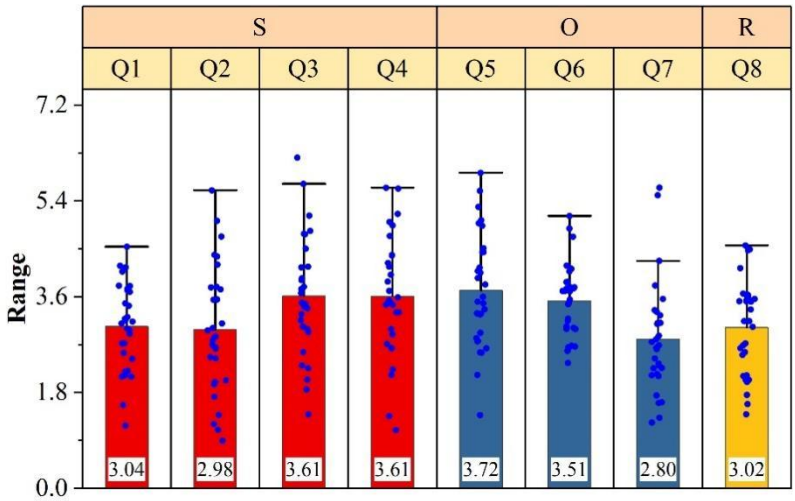


Figure 5. Descriptive statistical analysis results.

2.5.5. Correlation analysis

In this section, decentralization Q1, non-counterfeiting Q2, traceability function Q3, and public transparency Q4 are set as independent variables, perceived quality value Q5, perceived economic value Q6, and perceived emotional value Q7 are set as mediating variables, and loyalty response Q8 is set as the dependent variable, and Pearson's correlation coefficient is used to conduct a correlation analysis. According to the data in **Figure 6**, it can be seen that the Pearson correlation coefficients of decentralization Q1, unforgeability Q2, traceability function Q3, openness and transparency Q4, perceived quality value Q5, perceived economic value Q6, perceived emotional value Q7, and loyalty response Q8 are 0.004, -0.05, -0.011, 0.072, 0.03, 0.009, 0.047, respectively, which all satisfy Sig<0.05, that is, there is a significant correlation between the independent variables, mediator variables and dependent variables, and also indicates that the variables selected in this paper can be used in multiple linear regression analysis.

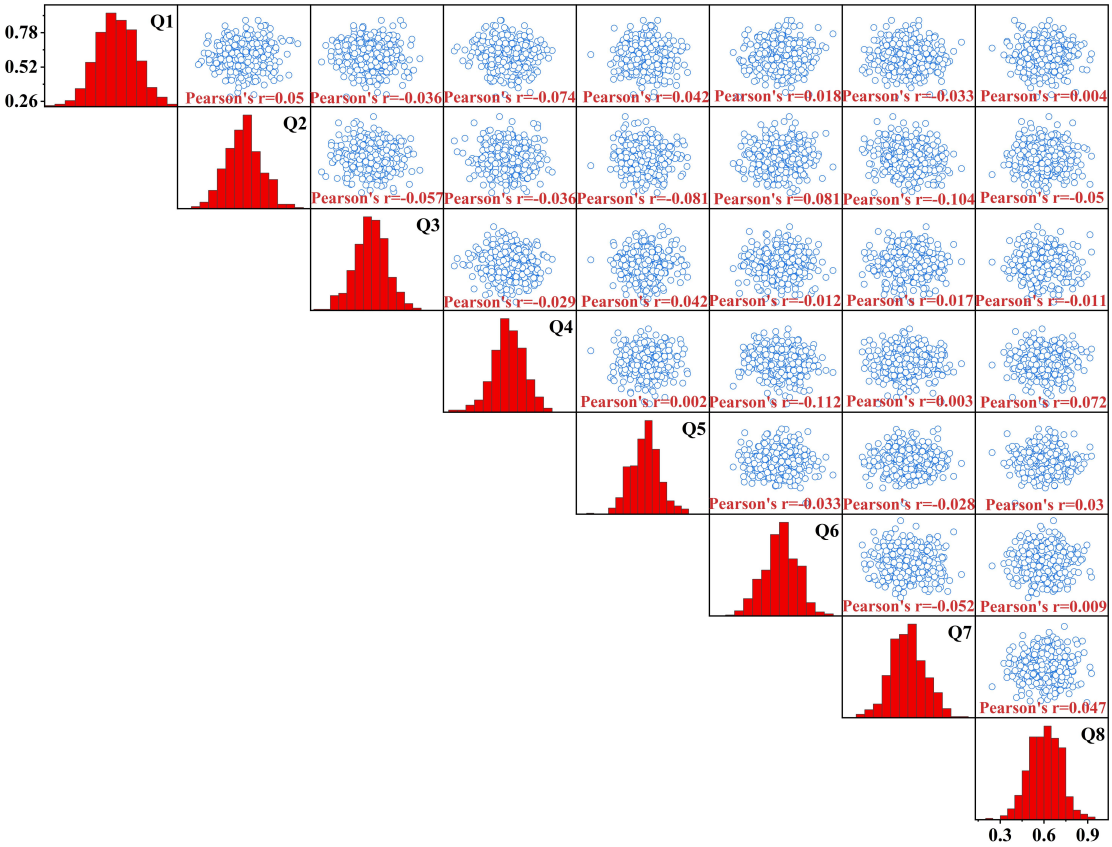
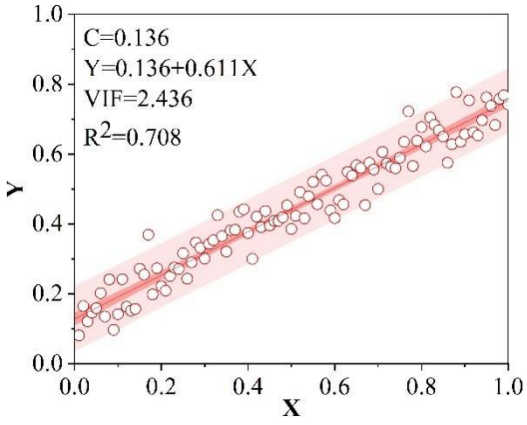


Figure 6 Correlation analysis results.

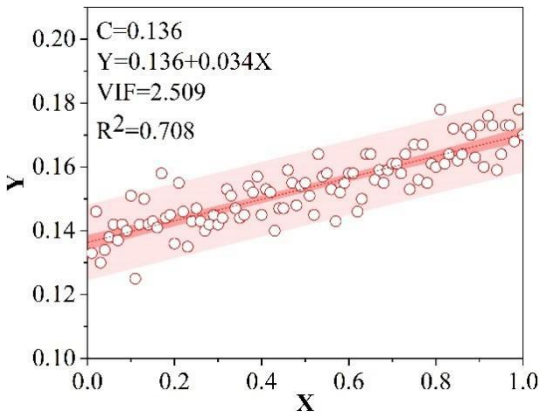
2.5.6. Regression analysis

The variable settings are the same as in subsection 2.5.5, and based on the calculation formula in subsection 2.4.4, we explore the role of blockchain technology in the retail industry on consumers' perceived value and loyalty response under the SOR theory, and the results of the regression analysis are shown in Fig. 7, with the results of (a) to (g) as, decentralization, non-counterfeiting, traceability function, public transparency, perceived quality value, perceived economic value, and perceived emotional value, respectively. From the figure, it can be seen that the loyalty response Q8=0.136+0.611*Decentralization Q1+0.034*Nonfalsifiable Q2+0.141*Traceability Function Q3+0.139*Open and Transparent Q4+0.016*Perceived Quality Value Q5+0.089*Perceived Economic Value+0.047*Perceived Emotional Value, and in addition it can be seen that the VIF is less than 10, which indicates that the model does not

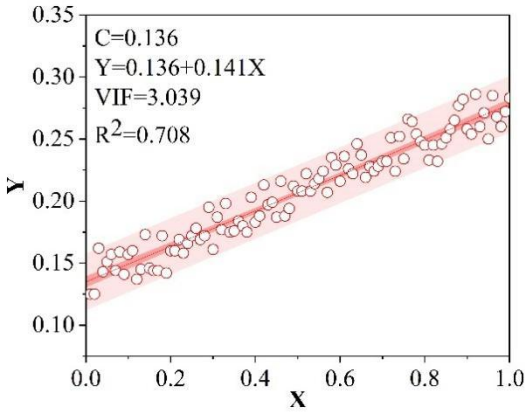
have multicollinearity.The value of R^2 coefficient is 0.708, which yields that the explanatory ability of the independent variables and the mediator variable on the dependent variable is 70.80%.Through the multiple linear regression analysis, it perfectly interprets the role of blockchain technology in retail industry under the theory of SOR on the consumer's perceived value and loyalty response.



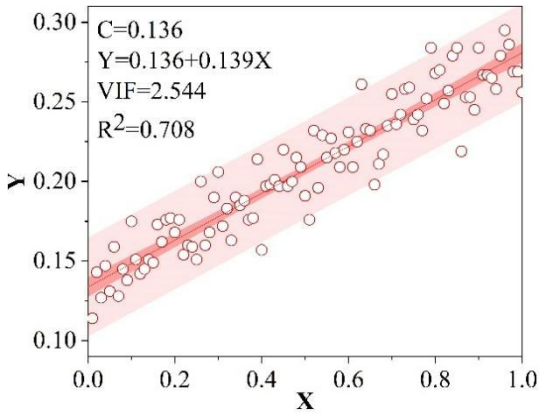
(a) Decentralization



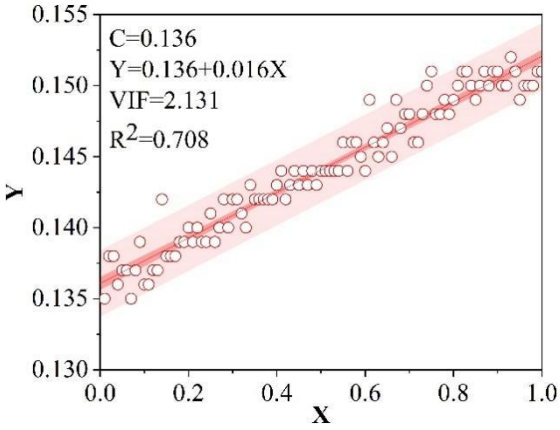
(b) Can't be forged



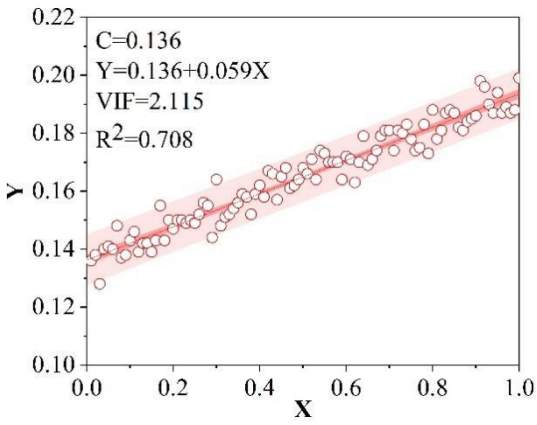
(c) Retrospective function



(d) Transparency

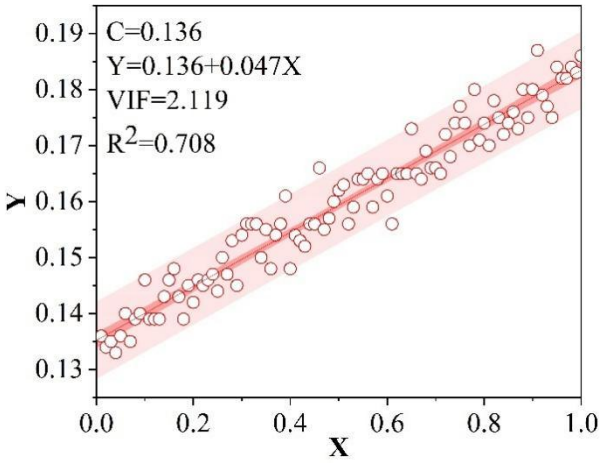


(e) Perceived quality value



(f) Perceived economic value

Figure 7. (*Continued*)



(g) Loyalty response

Figure 7. Regression analysis results.

In this study, the sample size is relatively small, and the sample is mainly derived from the consumers who use an online retail platform, and the sample diversity is less abundant. At the same time, although the validity test is done, the validity of the data remains to be further tested. These problems can be further optimized in the later study. In this paper, the degree of intervention of the block chain technology and the degree of involvement of the chain technology in the process of the block chain technology are not more accurate because of the limited degree of pencil force. The question of the question can be focused on the latter.

3. Conclusion

The influence of block chain technology application to the elimination of the cost is already a lot of mature results. Abderahman Rejeb and others stressed the effective integration of blockchain technology in supply chain, and clarified the great impact of blockchain technology on traceability and definition strategy [35]. Irem Nur Ecemis et al demonstrated the tracking function of block chain technology in special commodity trading, which ensures the safety and efficiency of transactions [36]. In addition to the above articles, this paper focuses on building blockchain technology to enhance the perception of consumers and promote the transmission model of retail consumption behavior.

With the help of questionnaires and statistical models, this project investigates the role of blockchain technology on consumers' perceived value and loyalty response in retail industry under SOR theory. It can be seen that the questionnaire and scale items designed in this project meet the requirements of the reliability test standard, and the order of the mean value of each variable is as follows: perceived quality value Q5 (3.75) > openness and transparency Q4 (3.61) > traceability function Q3 (3.61) > perceived economic value Q6 (3.51) > decentralization Q1 (3.04) > loyalty response Q8 (3.02) > not to be counterfeit Q2 (2.98) > perceived emotional value Q7 (2.80). Also qualitatively analyzing the correlation between the variables, there is a significant correlation between the independent variable and the mediator variable on the dependent variable, while the regression equation about loyalty response is 0.136+0.611*Decentralization Q1+0.034*Unfalsifiable Q2+0.141*Traceability Function Q3+0.139*Openness and Transparency Q4+0.016*Perceived Quality Value Q5+0.089*Perceived Economic value + 0.047* Perceived emotional value. The more perfect the retail industry blockchain technology is, the more it can enhance the consumer perceived value and loyalty response, and the retail industry blockchain technology has an obvious

promotion effect on the consumer perceived value and loyalty response, forming a situation of common development of the retail industry blockchain technology, consumer perceived value and loyalty response.

Although Chinese retail companies have not widely used blockchain technology, its technical support for retail economy has not yet been fully revealed. But the strong technical support of blockchain technology is recognized by consumers, and the results show this. First, retail enterprises should explore the relationship between the various economic I behaviors in the block chain technology and retail economy, and reduce the perception of consumers in the process of economic behavior according to different requirements design algorithms of different types of retail products. Second, enterprises should actively establish the block chain alliance with manufacturers, logistics companies, distributors, etc., and deepen the cooperation of the retail economy's various participation parties, and therefore according to the service functions of consumer demand.

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where is current research on blockchain technology?—a systematic review. PloS one, 11(10), e0163477.
2. Ahram, T., Sargolzaei, A., Sargolzaei, S., Daniels, J., & Amaba, B. (2017, June). Blockchain technology innovations. In 2017 IEEE technology & engineering management conference (TEMSCON) (pp. 137-141). IEEE.
3. Golosova, J., & Romanovs, A. (2018, November). The advantages and disadvantages of the blockchain technology. In 2018 IEEE 6th workshop on advances in information, electronic and electrical engineering (AIEEE) (pp. 1-6). IEEE.
4. Sarmah, S. S. (2018). Understanding blockchain technology. Computer Science and Engineering, 8(2), 23-29.
5. Guo, H., & Yu, X. (2022). A survey on blockchain technology and its security. Blockchain: research and applications, 3(2), 100067.
6. Gad, A. G., Mosa, D. T., Abualigah, L., & Abohany, A. A. (2022). Emerging trends in blockchain technology and applications: A review and outlook. Journal of King Saud University-Computer and Information Sciences, 34(9), 6719-6742.
7. Belotti, M., Božić, N., Pujolle, G., & Secci, S. (2019). A vademecum on blockchain technologies: When, which, and how. IEEE Communications Surveys & Tutorials, 21(4), 3796-3838.
8. Aulia, S. A., Sukati, I., & Sulaiman, Z. (2016). A review: Customer perceived value and its Dimension. Asian Journal of Social Sciences and Management Studies, 3(2), 150-162.
9. [9] Javed, F., & Cheema, S. (2017). Customer satisfaction and customer perceived value and its impact on customer loyalty: the mediational role of customer relationship management. Journal of Internet Banking and Commerce, 22(S8).
10. Marbach, J., Lages, C. R., & Nunan, D. (2016). Who are you and what do you value? Investigating the role of personality traits and customer-perceived value in online customer engagement. Journal of Marketing Management, 32(5-6), 502-525.
11. Ilyas, G. B., Munir, A. R., Tamsah, H., Mustafa, H., & Yusriadi, Y. (2021). The influence of digital marketing and customer perceived value through customer satisfaction on customer loyalty. Pt. 2 J. Legal Ethical & Regul. Isses, 24, 1.
12. Liu, P., Li, M., Dai, D., & Guo, L. (2021). The effects of social commerce environmental characteristics on customers' purchase intentions: The chain mediating effect of customer-to-customer interaction and customer-perceived value. Electronic Commerce Research and Applications, 48, 101073.
13. Tran, T. B. H., & Vu, A. D. (2021). From customer value co-creation behaviour to customer perceived value. Journal of Marketing Management, 37(9-10), 993-1026.
14. Suryadi, N., Suryana, Y., Komaladewi, R., & Sari, D. (2018). Consumer, customer and perceived value: Past and present. Academy of Strategic Management Journal, 17(4), 1-9.
15. Wang, L., Luo, X. R., & Lee, F. (2019). Unveiling the interplay between blockchain and loyalty program participation: A qualitative approach based on Bubichain. International Journal of Information Management, 49, 397-410.

16. Zutshi, A., Grilo, A., & Nodehi, T. (2021). The value proposition of blockchain technologies and its impact on Digital Platforms. Computers & industrial engineering, 155, 107187.
17. Rejeb, A., Keogh, J. G., & Treiblmaier, H. (2020). How blockchain technology can benefit marketing: Six pending research areas. Frontiers in blockchain, 3, 3.
18. Madhani, P. M. (2022). Effective marketing strategy with blockchain implementation: Enhancing customer value propositions. IUP Journal of Business Strategy, 19(1), 7-35.
19. Doshi, P., & Sandhane, R. (2022, October). Enhancing marketing capabilities using blockchain. In AIP Conference Proceedings (Vol. 2519, No. 1). AIP Publishing.
20. Sharif, K. I. M., Hassan, M. G., Miraz, M. H., Zulkifly, E., Udin, Z. M., & Omar, M. (2021). Factors affecting blockchain in fruit retail market: an unveiling myth of blockchain. In Intelligent Manufacturing and Mechatronics: Proceedings of SympoSIMM 2020 (pp. 1095-1106). Springer Singapore.
21. Madhani, P. M. (2022). Blockchain Deployment in the Retail Supply Chain: Enhancing Competitive Advantage. International Journal of Applied Management Sciences and Engineering (IJAMSE), 9(1), 1-23.
22. Zhang, Z., Ren, D., Lan, Y., & Yang, S. (2022). Price competition and blockchain adoption in retailing markets. European Journal of Operational Research, 300(2), 647-660.
23. Yin, S., & Wang, Y. (2023). Establishment and Cluster Analysis of Performance Evaluation Index System for New Retail Enterprises Driven by Blockchain Technology. Journal of Service Science and Management, 16(5), 535-566.
24. Boukis, A. (2020). Exploring the implications of blockchain technology for brand–consumer relationships: a future research agenda. Journal of Product & Brand Management, 29(3), 307-320.
25. Nuseir, M. T. (2021). Potential impacts of blockchain technology on business practices of bricks and mortar (B&M) grocery stores. Business Process Management Journal, 27(4), 1256-1274.
26. Mukherjee, S., Baral, M. M., Lavanya, B. L., Nagariya, R., Singh Patel, B., & Chittipaka, V. (2023). Intentions to adopt the blockchain: investigation of the retail supply chain. Management Decision, 61(5), 1320-1351.
27. Ayse Sengoz,Muhittin Cavusoglu,Uzeyir Kement & Sinan Baran Bayar. (2024). Unveiling the symphony of experience: Exploring flow, inspiration, and revisit intentions among music festival attendees within the SOR model. Journal of Retailing and Consumer Services104043-104043.
28. Lei Yang,Xiaolong Yuan & Xiaowen Yang. (2024). Study of the influencing mechanism of user interaction behavior of short video e-commerce live-streaming from the perspective of SOR theory and interactive ritual chains. Current Psychology(prepublish),1-13.
29. Jie Gao,Wenjing Jia & Jun Yin. (2024). Exploring Smartphone User Interface Experience-Sharing Behavior: Design Perception and Motivation-Driven Mechanisms through the SOR Model. Sustainability(15),6670-6670.
30. Mohan Divya,Kumar Nishant & Upreti Kamal. (2022). Blockchain Adoption for Provenance and Traceability in the Retail Food Supply Chain: A Consumer Perspective. International Journal of E-Business Research (IJEBR)(2),1-17.
31. Deqing Ma,Kaifu Li,Jinsong Hu & Xue Wang. (2024). How to leverage blockchain to react to consumer reference effects and develop a distribution strategy in online retailing?. Transportation Research Part E103579-.
32. Ava Hajian,Russell Sadeghi,Victor R. Prybutok & Chang E. Koh. (2024). Increasing trust and value of mobile advertising in retailing: A survey design, machine learning approach, and blockchain in the trust path. Journal of Retailing and Consumer Services103794-.
33. [33]Zhang Rong,Xia Zhiwei & Liu Bin. (2022). Optimal Pricing Decisions for Dual-Channel Supply Chain: Blockchain Adoption and Consumer Sensitivity. Complexity
34. Kojiro Shojima. (2024). Maximal Pearson's correlation coefficient between Likert items from the viewpoint of Hitchcock's transportation problem. Behaviormetrika(prepublish),1-24.
35. Abderahman Rejeb,Karim Rejeb,Steve Simske & John G. Keogh. (2023). Exploring Blockchain Research in Supply Chain Management: A Latent Dirichlet Allocation-Driven Systematic Review. Information(10),557-.
36. [36]Irem Nur Ecemis,Fatih Ekinci,Koray Acici,Mehmet Serdar Guzel,Ihsan Tolga Medeni & Tunc Asuroglu. (2024). Exploring Blockchain for Nuclear Material Tracking: A Scoping Review and Innovative Model Proposal. Energies(12),3028-3028.