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Using Linear Regression to Investigate the Relationship Between User Experience and UX Components in Cryptocurrency Wallets

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ABSTRACT

This study investigated the relationship between User Experience (UX) and UX components in cryptocurrency wallets. A user evaluation experiment was conducted on two selected cryptocurrency wallets, CoinUS and D'CENT, using 32 individuals with no prior experience. Participants were asked to perform tasks such as creating and restoring a cryptocurrency wallet and receiving and sending cryptocurrency. After each task, participants evaluated the overall UX and UX components, including usability, affect, sociability, social value, economic value, and trust, on a 101-point scale. Linear regression analysis was used to determine the relationship between UX and UX components. The results show that usability and trust are the key independent variables that affect UX, better usability leads to better UX, and a higher level of trust in the service offered also contributes to better UX.

Keywords: Cryptocurrency wallet, UX model, Linear regression, Blockchain service, Blockchain based service, Usability, Trust, Regression models

INTRODUCTION

Blockchain technology has emerged as a promising solution for various services. It is a distributed database that utilizes a peer-to-peer network for secure and transparent transactions between participants (Daniel, 2017). Blockchain services offer a combination of both traditional non-blockchain functions and innovative blockchain functions. While non-blockchain functions are familiar to users, the new elements introduced by blockchain technology may negatively impact the user experience (UX) (Jang & Han, 2022).

The UX of a blockchain service encompasses all aspects of a user's interaction with the service, including usability, emotion, sociability, social value, economic value, and trust (Jang & Han, 2022). A fundamental component of blockchain services is the cryptocurrency wallet, which enables users to manage cryptocurrencies, such as Bitcoin and Ethereum. To provide a seamless user experience, it is crucial that the UX of a cryptocurrency wallet is well-designed (Jang et al., 2020).

However, the current research on the UX of cryptocurrency wallets is limited to identifying usability issues, and few studies have explored the relationship between UX and UX components. This study aims to address this gap by using a linear regression model to investigate the relationship between the UX and UX components of cryptocurrency wallets. The results of this analysis provide insights into the importance of different UX elements in providing effective cryptocurrency wallet services.

METHOD

A user evaluation experiment was conducted on two selected cryptocurrency wallets, CoinUS and D'CENT. The participants were 32 individuals (24 males and 8 females) having an average age of 25 years, who had no prior experience using a cryptocurrency wallet and did not have any physical or cognitive difficulties in using the service. Before the experiment, the participants were given a definition of the blockchain and cryptocurrency wallets, and the characteristics of each were explained to them.

Half of the participants used CoinUs first, whereas the other half began with D'CENT. The tasks performed in the experiment included creating a cryptocurrency wallet, receiving cryptocurrency, sending cryptocurrency to oneself, restoring the wallet, and sending cryptocurrency to others. Ravencoin, which has a small fee, was used in the tasks. The participants evaluated the overall UX and its components—usability, affect, sociability, social value, economic value, and trust—on a 101-point scale after performing each task (see Table 1). Due to the procedure for using a cryptocurrency wallet, creating the cryptocurrency wallet was done as the first step, and the other tasks were performed randomly.

All possible regression models were used to analyze the relationship between the UX and UX components. All possible regression creates models using all combinations of independent variables to explain the dependent variable and select the optimal model. The optimal model was selected based on Mallows's Cp and predicted residual error sum of squares (PRESS) (Myers, 1990). Mallows's Cp is a measure of how close the model is to a complete model, in which a value that is closer to the number of parameters indicates a less biased

Table 1. Questionnaire for UX and UX elements.

Elements	Descriptions
UX	I am satisfied overall with the service.
Usability	I can use the service conveniently.
Affect	I am satisfied with the various emotional experiences of the service.
Sociability	I am satisfied with the social experience of using of the service.
Social value	I can improve the various social experiences through the decentralized nature of the blockchain service.
Economic value	I can obtain temporal and monetary benefits from the blockchain service.
Trust	I can trust the blockchain service.

model (Gilmour, 1996). PRESS measures the difference between fitted and observed values, where a lower value indicates a better model (Myers, 1990).

RESULTS

The results of the regression analysis were the top three models having the lowest PRESS values (see Table 2). The Mallows's Cp values of these models were smaller than the number of parameters; thus, the model with the lowest PRESS was selected as the optimal model. The optimal model, which included usability and trust as independent variables, showed an adjusted R^2 value of 70.78%. The coefficients of the regression model were statistically significant, and the variance inflation factor (VIF) was below 10, indicating the absence of multicollinearity (Table 3).

Table 2. Top three models with the lowest PRESS.

Independent variables	Number of parameters	Mallows's Cp	PRESS	Adj R^2
Usability, Trust	3	1.09	41068.14	70.78%
Usability, Economic Value, Trust	4	1.17	41131.30	70.87%
Usability, Sociability, Trust	4	2.12	41234.74	70.78%

Table 3. Coefficients of the optimal model.

Parameter	Coefficient	SE Coefficient	T-value	P-value	VIF
Intercept	9.27	2.25	4.12	0.000	-
Usability	0.64	0.03	19.72	0.000	1.36
Trust	0.23	0.03	6.69	0.000	1.36

DISCUSSION

A linear regression model was used to analyze the relationship between the UX and the UX components in cryptocurrency wallet services. The model showed that usability and trust were the key independent variables affecting UX. The model confirmed that better usability leads to a better UX, and a higher level of trust in the service also contributes to a better UX. These findings are in line with previous studies that explored the impact of usability and trust on UX (Jang & Han, 2022; Shin, Bianco, 2020).

The results of the regression model also indicated that usability had a greater impact on UX than did trust. These findings provide valuable insights for service providers for formulating an efficient design strategy for cryptocurrency wallets. Service providers can prioritize improving usability when the usability score is low, and they can focus on enhancing trust when usability is high.

Cryptocurrency wallets are complex and difficult to interact with and lack information and guidance (Kwon et al., 2021). To address these challenges,

it is crucial to understand users' perspectives and experiences when using cryptocurrency wallets. Service providers can leverage the design of similar services, such as banking, to enhance the usability of cryptocurrency wallets. However, it is important to note that interactions in blockchain services are different from those in traditional services; therefore, the design needs to be improved to make it more user friendly than banking services.

CONCLUSION

This study presented a linear regression model that can represent the relationship between UX and UX elements in cryptocurrency wallet services. The results of this model will be useful for service providers in establishing an effective UX design strategy for their cryptocurrency wallets. This model highlights the importance of certain UX factors that affect the overall UX of a cryptocurrency wallet. Future studies should explore the reasons for this observation and the steps required to improve each relevant UX factor. With all possible regressions, the impact of other UX factors on other blockchain services could also be analyzed.

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