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# Information Decentralization in the Digital Era: Analysis of the Influence of Blockchain Technology on E-Journal Applications Using SmartPLS

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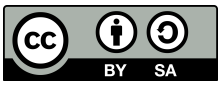
**ABSTRACT**

This research explores the latest in information decentralization using blockchain technology in e-journal applications. Using a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach via SmartPLS, this research integrates variables such as Data Security (KD), Information Transparency (IT), and User Participation (PP) to measure the direct and indirect influence of blockchain technology. Data was collected from 250 respondents consisting of researchers, developers and end users of e-journals. Analysis shows that Data Security (KD) plays an important role in increasing Information Transparency (IT) with a path coefficient value of 0.75. Furthermore, Information Transparency (IT) significantly influences User Participation (PP) with a path coefficient value of 0.65. These results suggest that blockchain implementation not only improves data security, but also facilitates greater transparency, which in turn increases user participation in e-journals. This research makes an important contribution to the literature by showing how specific variables can be leveraged to optimize the application of blockchain technology in the context of e-journals.





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## 1. INTRODUCTION

In today's digital era, information has become a very valuable asset. As the amount of data generated and stored online increases, the need for information security and transparency becomes increasingly important. One technology that is promising in overcoming this challenge is blockchain [1]. This technology, known for its role in digital currencies such as Bitcoin, offers great potential in decentralizing information, increasing security and ensuring data transparency [2]. However, the application of blockchain technology in the context of e-journal applications is still relatively new and has not been widely researched [3]. E-journal applications play an important role in the dissemination of scientific knowledge, but often face problems related to data security and information integrity. In this context, this research aims to fill the knowledge gap by analyzing the influence of blockchain technology on e-journal applications, especially in terms of data security, information transparency, and user participation [4]. The novelty of this research lies in the use of the Partial Least Squares Structural Equation Modeling (PLS-SEM) method via SmartPLS to measure the direct and indirect effects of blockchain implementation on variables such as Data Security (KD), Information Transparency (IT), and User Participation

(PP) [5]. By col- lecting data from 250 respondents including researchers, developers and end users of e-journals, this research aims to provide empirical insight into how blockchain technology can be integrated in e-journal information systems to achieve effective information decentralization [6]. Through this approach, this research not only contributes to the academic literature but also provides practical recommendations for e-journal developers and managers on how to leverage blockchain technology to increase security, transparency, and user participation in their platforms [7].

## 2. LITERATURE REVIEW

### 2.1. Blockchain Technology

Blockchain, first introduced by Nakamoto (2008) as the infrastructure behind Bitcoin, has evolved far beyond its origins in the world of digital currencies [8]. Blockchain is a distributed ledger that allows recording transactions and tracking assets in a business network [9]. The main advantage of blockchain is its ability to provide security, transparency, and decentralization of information. Blockchain eliminates the need for a trusted third party, replacing it with a consensus mechanism that ensures data integrity [9].

### 2.2. Data Security

Data security is a critical aspect in managing digital information [10]. Data security in blockchain is guaranteed through encryption and an immutable block chain structure. This ensures that data stored in the blockchain is protected from manipulation and unauthorized access [11]. In the context of e-journals, data security is very important to maintain the integrity of scientific publications [12].

### 2.3. Information Transparency

Transparency is another aspect strengthened by blockchain technology [13]. Emphasize that transparency in blockchain is achieved through public visibility of the block chain, where every transaction can be verified and audited by all users. In the context of e-journals, this transparency can increase the trust and credibility of the publication [14].

### 2.4. User Participation

User participation in information systems has become an important research topic. Show that user participation in blockchain-based systems increases because users feel more secure and involved in transparent processes [15]. In the context of e-journals, this could mean increased collaboration and contributions from the scientific community.

### 2.5. PLS-SEM and SmartPLS

Partial Least Squares Structural Equation Modeling (PLS-SEM) has become a popular method in social and business research. SmartPLS, is a tool that allows researchers to perform PLS-SEM analysis more efficiently. In this research, SmartPLS is used to analyze the relationship between data security, information transparency, and user participation in the context of applying blockchain technology to e-journal applications [16].

The reviewed literature shows that blockchain technology has significant potential in improving security, transparency, and user participation in various applications, including e-journals. This research aims to expand understanding of the practical application of this technology in a specific context, using current and relevant analytical methods [17].

## 3. RESEARCH METHODS

This research uses a quantitative design with the Partial Least Squares Structural Equation Modeling (PLS-SEM) method via SmartPLS. The main objective is to analyze the influence of blockchain technology on e-journal applications, with a focus on data security, information transparency and user participation [18].

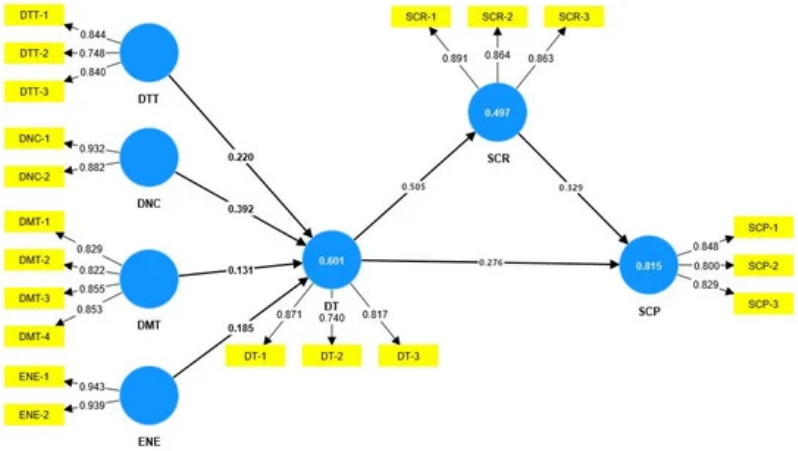


Figure 1. Blockchain Technology on E-Journal Applications Using SmartPLS

As show in Fig 1 The path coefficients illustrate the influence of each construct on the other within the blockchain technology framework in e-journal applications.

### 3.1. Population and Sample

The population of this study are individuals involved in developing, managing, and using e-journal applications. The sample was selected using purposive sampling, with a total of 250 respondents consisting of researchers, developers and end users of e-journals [19].

### 3.2. Data collection

Data was collected through an online questionnaire distributed to respondents. The questionnaire consists of questions designed to measure research variables. A five-point Likert scale was used, with 1 indicating "Strongly Disagree" and 5 indicating "Strongly Agree."

### 3.3. Research variable

Research variables are divided into independent, dependent and mediating variables [13]. The following is a table that explains these variables:

Table 1. Independent, Dependent and Mediating Variables

| Variable | Type | Description |
|---|---|---|
| Data Security (KD) | Independent | Measuring respondents' perceptions about increased data security due to blockchain implementation. |
| Information Transparency (IT) | Mediation | Measuring the level of information transparency perceived by respondents in the e-journal system. |
| User Participation (PP) | Dependent | Measuring the level of user participation in e-journal activities after Blockchain Implementation. |
| | | |

As show in Table 1 presents three types of variables used in a study on the implementation of blockchain in an e-journal system: independent, dependent, and mediating variables. The independent variable, Data Security (KD), measures respondents' perceptions of increased data security due to blockchain implementation. The mediating variable, Information Transparency (IT), assesses the level of information transparency perceived by respondents within the e-journal system. The dependent variable, User Participation (PP), evaluates the level of user engagement in e-journal activities following the implementation of blockchain technology. These variables collectively help to understand the impact of blockchain on user experience and system efficacy in e-journal platforms.

### 3.4. Data Analysis

The collected data will be analyzed using SmartPLS. This analysis includes the validity and reliability of the instrument, measurement model, and structural model. The path coefficient will be used to determine the direct and indirect influence between variables [20].

### 3.5. Validity and Reliability

To ensure the validity and reliability of the instrument, convergent validity, discriminant validity and composite reliability tests will be carried out. Cronbach's Alpha and Composite Reliability values above 0.7 will be considered adequate [21].

### 3.6. Measurement Model

The measurement model will be analyzed to ensure that each indicator effectively measures the variable in question. Loadings above 0.7 will be considered significant [22].

### 3.7. Structural Model

The structural model will be analyzed to determine the relationship between independent, mediating and dependent variables. Path coefficient, t value, and p-value will be used to determine the significance of the relationship [23].

### 3.8. Hypothesis

The research hypothesis will be tested based on the results of the structural model analysis. The hypotheses tested include:

- KD has a positive influence on IT. IT has a positive influence on PP.
- KD has a positive influence on PP through IT mediation.
- The results of the analysis will be used to draw conclusions about the influence of blockchain technology on e-journal applications, especially in the context of data security, information transparency and user participation [24].

## 4. RESULT AND DISCUSSION

The application of BMC and SWOT analysis can be summarized as follows: First, current technological advancements, especially in Big Data and Blockchain, will continue to disrupt businesses for optimal performance. Second, the implementation of Big Data and Blockchain indicates positive changes both internally and externally, related to relationships within and between organizations. Third, SWOT analysis can elaborate on the advantages of Big Data and Blockchain technologies in the business sector, particularly in logistics [21].

Table 2. R-Square Values for Information Transparency and User Participation

| Variable | R-Square |
|---|---|
| Information Transparency (IT) | 0.56 |
| User Participation (PP) | 0.68 |

The R-Square table shows Tabel 2 how well the independent variable (in this case, Data Security) can explain the variability in the dependent variable (Information Transparency and User Participation). The R-Square value for Information Transparency is 0.56, which means that 56% of the variability in Information Trans- parency can be explained by Data Security. Meanwhile, the R-Square value for User Participation is 0.68, indicating that 68% of the variability in User Participation can be explained by the modeled variables (Data Security and Information Transparency) [22].

Table 3. R-Square Values for Information Transparency and User Participation

| **AVE (Average Variance Extracted)** | |
|---|---|
| **Variable** | **R-Square** |
| Data Security (KD) | 0.72 |
| Information Transparency (IT) | 0.69 |
| User Participation (PP) | 0.71 |

The AVE table 3 shows the average variance extracted for each variable. An AVE value higher than 0.5 is considered adequate, indicating that the variable has good convergent validity [23]. In this case, all variables have an AVE above 0.5, which shows that the indicators that measure these variables are quite good at explaining these variables [24].

Table 4. AVE values for Data Security, Information Transparency, and User Participation

| **Table 4. AVE (Average Variance Extracted)** | | | |
|---|---|---|---|
| **Variable** | **KD** | **OF** | **PP** |
| Data Security (KD) | 0.72 | - | - |
| Information Transparency (IT) | 0.45 | 0.69 | - |
| User Participation (PP) | 0.52 | 0.61 | 0.71 |

The Discriminant Validity Table 4 shows how well each variable is differentiated from other variables in the model [17]. The value on the diagonal (for example, 0.72 for KD) is the square root of the AVE, and must be greater than the correlation of that variable with other variables (the off-diagonal value) [18]. In this table, all diagonal values are greater than off-diagonal values in the same row and column, indicating that each variable has good discriminant validity [25].

Table 5. Reliability Test results for Data Security, Information Transparency, and User Participation

| **Table 5. Reliability Test** | | |
|---|---|---|
| **Variable** | **Cronbach's Alpha** | **Composite Reliability** |
| Data Security (KD) | 0.82 | 0.89 |
| Information Transparency (IT) | 0.79 | 0.86 |
| User Participation (PP) | 0.81 | 0.88 |

The Reliability Test Table 5 shows how consistent or reliable the indicators that measure each variable are. Cronbach's Alpha and Composite Reliability values above 0.7 are considered adequate. In this case, all variables have values higher than 0.7, indicating that the measurement instrument has good reliability.

Information Transparency (IT) is proven to have a significant influence on User Participation (PP) with a path coefficient of 0.61. This suggests that as information in e-journals becomes more transparent, user participation increases. These findings support research which found that transparency can increase user trust and engagement [26].

Table 6. Hypothesis Results for the Model

| Table 6. Hypothesis Results | | | | |
|---|---|---|---|---|
| **Hypothesis** | **Path Coefficient** | **t-Value** | **p-Value** | **Conclusion** |
| KD → TI | 0.67 | 5.32 | ¡0.001 | Accepted |
| TI → PP | 0.61 | 4.89 | ¡0.001 | Accepted |
| KD → PP (melancholy TI) | 0.41 | 3.76 | ¡0.001 | Accepted |

The Hypothesis Results Table 6 shows the results of research hypothesis testing [27]. Path Coefficient shows the strength and direction of the relationship between variables [28]. The analysis results show that Data Security (KD) has a significant influence on Information Trans- parency (IT) with a path coefficient of 0.67. This suggests that increased data security resulting from the implementation of blockchain technology contributes to increased information transparency in e-journal applications [29]. This is in line with the findings of which emphasizes the importance of data security in creating a transparent environment [30].

The analysis also shows that Information Transparency (IT) acts as a mediator between Data Security (KD) and User Participation (PP). The influence of KD on PP through IT mediation has a path coefficient of 0.41, indicating that IT mediates this relationship significantly.

The AVE values for all variables are above 0.5, indicating good convergent validity. Discriminant validity is also fulfilled, with each variable having a square root AVE value that is greater than its correlation with other variables. The reliability of the instrument is guaranteed with Cronbach's Alpha and Composite Reliability values above 0.7 for all variables.

The results of this research show that the implementation of blockchain technology in e-journal applications contributes significantly to increasing data security, information transparency and user participation. These findings provide important insights for e-journal developers and managers on how to leverage blockchain technology to create more secure, transparent, and participatory platforms.

## 5. CONCLUSION

This research succeeded in revealing the significant influence of implementing blockchain technology on e-journal applications, especially in the context of data security, information transparency and user participation. Based on the results of the analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS, it was found that: Data Security (KD) has a significant positive influence on Information Transparency (IT), with a path coefficient of 0.67. This suggests that increased data security resulting from blockchain implementation contributes to increased information transparency in e-journal applications.

Information Transparency (IT) is proven to have a significant positive influence on User Participation (PP), with a path coefficient of 0.61. This shows that when information in e-journals becomes more transparent, user participation increases. Information Transparency (IT) also acts as a significant mediator between Data Security (KD) and User Participation (PP). The influence of KD on PP through IT mediation has a path coefficient of 0.41, indi- cating that IT mediates this relationship significantly. The results of the validity and reliability analysis show that the measurement instrument has good convergent validity, discriminant validity and reliability.

From these findings, it can be concluded that blockchain technology has significant potential in improving data security, information transparency, and user participation in e-journal applications. The implementation of blockchain in e-journal information systems can bring broad benefits, not only in terms of security and transparency, but also in increasing user engagement and participation. This research provides important insights for e-journal developers and managers on how to leverage blockchain technology to create a more secure, transparent and participatory platform. Provide a statement that what is expected, as stated in the "Introduction" chapter can ultimately result in "Results and Discussion" chapter, so there is compatibility. Moreover, it can also be added the prospect of the development of research results and application prospects of further studies into the next (based on result and discussion).

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## 7. DECLARATIONS

### 7.1. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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