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A Study on the Blockchain Acceptance Intention for Improving the Reliability of Student Submission Data and Efficiency of Administrative Processing, such as the College Entrance Screening Department

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Abstract

In this study, we explored the acceptance factors of Blockchain technology, a fourth industrial innovation technology, for efficient management of basic admission data such as school records that require transparency, security, efficiency, and reliability. Factors for accepting Blockchain technology were derived through in-depth interviews with university admissions officers, and a Delphi survey and stratification analysis (AHP) were conducted on a total of 42 people, including admissions officers, university professors, high school seniors' homeroom teachers, and admissions academy counseling experts. carried out. The in-depth interview consisted of an open-ended survey on four aspects, including behavioral affordance, constraints, effectiveness, and efficiency, based on Donald A. Norman, International Standards (ISO), and Nielsen's theory, and closed-ended questions from 42 admissions-related experts. The importance and priority of the factors derived through this study were analyzed. As a result, the importance of the top factors was in the following order: efficiency (0.414), effectiveness (0.309), behavioral affordance (0.154), and constraints (0.123). The sub-factors are: efficiency is 'reduction of admission management burden'(0.235), effectiveness is 'ensuring fairness in admissions'(0.284), behavioral affordance is 'unfairness of entrance exam results'(0.324), and constraint is 'ambiguity and distrust of the admission system'(0.314) showed the highest importance, respectively. The research results showed that the efficient aspect of "how much the burden of admission management is reduced" should be considered as the most important factor in accepting Blockchain technology into the university admissions system.

Keywords: *Blockchain Technology, Acceptance Factors, College Entrance Exams, AHP Anlaysis*

INTRODUCTION

Research Needs and Purpose

The key reason why the use of blockchain technology is preferred is to ensure reliability and transparency. Blockchain is a set of data that constitutes a consensus algorithm that is organized in units called 'blocks'. It is then encrypted over time and connected like a chain, with one block containing information from the previous block [1]. Blockchain is a distributed database, also called a distributed ledger structure, and is highly effective in preventing fraudulent transactions. All nodes in the blockchain network share a ledger, which is encrypted to increase transparency and ensure confidentiality of blockchain transactions. Additionally, adding new blocks requires full verification to resolve the risk of central server concentration [3]. The value of the block header is kept fixed and when a block is created, all transactions included in the block are reflected, and it is a technology that uses a pre-arranged key and algorithm to prove that the data has not been forged or altered [2].

Data safety is improved by recording school records and student entrance exam-related data on the blockchain, where data integrity is emphasized. By safely storing and transmitting sensitive admission-related data such as high school diplomas, transcripts, test scores, and personal information, which are problematic in college admissions, the risk of illegal activities such as data breaches and forgery can be reduced [10]. Additionally, Blockchain technology's provision of a transparent and tamper-proof ledger can simplify the verification process and reduce the administrative burden on universities [11].

The value of utilizing blockchain technology in the admissions system lies not only in strengthening the

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reliability of school records, but also in improving the efficiency of administrative processing [7-9]. Smart contracts can improve the efficiency of admissions administrative processing, such as solving the problem of lack of interaction by implementing a process that runs automatically when conditions are met [7] [10]. Additionally, data sharing and simplification enable transparent and safe data exchange through blockchain technology when students wish to safely share their information or transmit it to other educational institutions [4]. In particular, if blockchain technology is used in the admission of international students, it will be possible to effectively verify the authenticity of the qualifications and academic records of international students who have crossed the border.

Despite these advantages, there are many challenges that need to be addressed in introducing blockchain technology into the college admissions screening system, including technical, economic, and legal limitations [30]. 'Trilemma of blockchain technology' is a term that expresses the difficulty of introducing this technological reality. This means that it is difficult to optimize the three properties of 'Decentralization', 'Security', and 'Scalability' at the same time. The trilemma suggests that various research and development are needed to overcome the difficulties of technology introduction [12].

In this study, considering reality, we investigated the technology acceptance factors for blockchain use in the admissions screening system. The main factors are "Donald A. Norman's theory of affordances and constraints" [13][14][30], "Effectiveness evaluation factors for usability based on international standards(ISO)" [17], based on "Nielsen's Efficiency Theory"[18][19]. ISO, an international standards organization, explains it in terms of efficiency, effectiveness, and satisfaction, and according to researchers, user-friendly factors such as learnability, ease of memory, flexibility, convenience, operability, and safety are added [15]

As technology matures, develops, and standardizes in the future, the introduction of technology is expected to become more important in the university admission system. This study is expected to contribute to realizing a more efficient and safer entrance examination process in the realization stage when blockchain technology is introduced into the University admissions system.

Research Problem

The current college admissions selection method is very complex, and this complexity requires thorough verification of the data submitted by students [16]. These complex selection methods increase information opacity and reduce the reliability of the entrance exam system. Additionally, problems with college admissions data include data inaccuracy, subjectivity of evaluation, bias (evaluation and results have a potential adverse impact on student groups in specific regions), opacity, invasion of privacy, and inconsistency.

In particular, the school records, which contain key information as basic data for admissions such as a student's academic background, attendance, behavior, and awards, have the following transparency and reliability problems.

First, records may be inconsistent depending on the subjectivity of teachers or administrators; second, the latest information may not be reflected due to recording delays; third, teachers' evaluations may be subjective, which may lead to inequality among students. Fourthly, some information must be kept secure due to privacy protection issues, and finally, information may be lost due to errors or technical problems in the computerized recording system [5-7]. In this study, the following research questions were set to explore factors related to the possibility of dissemination and acceptance of blockchain technology that can solve problems with admissions data such as school records.

1. What are the direct and indirect behavioral triggers or promotion factors that lead to the acceptance of blockchain technology in the admissions process?

2. What are the constraints when applying blockchain technology to the admissions system?

3. What is the ultimate goal for introducing blockchain technology into the admissions process?

4. What are the practical benefits of introducing blockchain technology into the admissions process?

5. What are the most important factors in research questions 1 to 4 ?.

THEORETICAL BACKGROUND

New Technology Acceptance Theory

The new technology acceptance theory is a theory that 'perceived convenience and perceived usefulness affect the intention to use' [20]. TAM (Technology Acceptance Model) was first introduced by Fred Davis in 1989 and later introduced by Venkatesh in 2000. It was expanded into the Unified Theory of Acceptance and Use of Technology (UTAUT). Both TAM and UTAUT are often chosen as research models to understand and predict user acceptance of various technologies, systems, or innovations. In the integrated technology acceptance theory proposed by Venkatesh et al. (2003), 'Performance Expectancy (PE)', 'Effort Expectancy (EE)', and 'Social Influence (SI)' are based on the similarity between the concepts of eight previous research theories. Four new integrated variables of 'facilitating conditions (FC)' were proposed [21].

To date, technology acceptance theory has been recognized as a simple yet highly explanatory model for explaining adopters' behavior in using new technologies. However, technology acceptance theory emphasizes only rational decision-making, and has the problem of lacking differentiation by expanding uncritically rather than considering the application field of the technology, cultural characteristics and variables, and characteristics of the accepted product or service. The phenomenon of rejection of crucial variables such as extended variables, utility, and ease of use in causal model validation is evident in technology acceptance models. Additionally, voluntary and involuntary situational factors, usability before and after adoption, cultural diversity, and emotional-social factors are not adequately considered. Particularly, there is a failure to explain why specific individuals or groups decide not to adopt the technology [23-26].

In order to complement these limitations of quantitative surveys, there is a need to diversify methodologies through qualitative research methodologies such as FGI (Focus Group Interview), in-depth interview FGI, and ethnography methods [22].

Affordance

Behavioral affordance refers to the ability to trigger or induce certain actions, and in the field of artificial intelligence, it is used to mean 'connecting different concepts to each other' [13]. Behavioral provocation is information that induces behavior inherent in the surrounding environment and is related to the possibility of a specific user's behavior, and the user and the environment have a complementary relationship [27]. It also means the possibility of linking uses, actions, and functions that are linked to a specific relationship between an object and a person or organism [13]. James J. Gibson defined behavioral provocation as the possibility of causing all objective actions that can occur, not limited to social experiences [14]. However, Donald A. Norman defined the concept of affordance as a fundamental property that determines how an object or interface is or should be used from the perspective of human-computer interaction [15]. And, "Perceived affordance induces (Afford or Suggest) a 'specific' behavior appropriate for the function of the object's use" [15]. Problems can arise if users have difficulty recognizing the intended behavior or function of an element due to unclear affordances. Clear affordances can improve usability, but excessive variation in affordance design across the system can lead to confusion [27].

The use of blockchain technology has shortcomings if only the technical aspects are considered. Affordance is an important factor that considers how these technologies are actually applied to people and how they are used [28]. Affordances also include consideration of user interface and usability, and complex blockchain systems may be difficult for general users and may be less useful. However, when blockchain technology is used in an admissions system, the usability aspect of blockchain technology can be improved if the perception or sensory clues about how to interact are clear and intuitive. Therefore, when applying blockchain technology to the admissions system, not only technical aspects but also social and educational affordances must be considered, and this must be taken into consideration for the successful introduction of the technology [31].

Constraints

Constraints are factors that control or guide user behavior to help users use the product as intended and minimize misunderstandings. Donald A. Norman divided the usability of the system into four types: physical, logical, semantic, and cultural constraints [15]. These constraints appropriately guide user behavior and aid understanding [6]. When applying blockchain technology to the admissions system, the four limitations according to Donald Norman's usability principles are explained in detail as follows. Physical constraints are related to blockchain's high computing power requirements, which require adequate server capacity and network stability [30]. Logical constraints require consideration of the complex operating principles of blockchain and interface design to make the algorithm user-friendly [5]. The semantic constraint is that it must be clearly communicated to users how blockchain technology can be effectively applied to the admissions process [4]. Lastly, cultural constraints should be explained and provided so that they can be understood by applicants and stakeholders with diverse cultural backgrounds and education levels.

Considering these limitations, it is possible to effectively apply blockchain technology to the admissions process system, and as a result, an efficient user-centered system can be built. Blockchain technology offers many advantages such as transparency, security, and decentralization, but it also has limitations. To effectively implement blockchain in the admissions system, the limitations of technology implementation must be considered [6].

Effectiveness

Effectiveness refers to the degree of achievement of already set goals and the accuracy and completeness of the results according to the purpose. In other words, it refers to the ability to produce a desired result or produce a desired result [17]. Peter Drucker defined effectiveness as 'choosing the right goals and activities and adjusting them to fit the purpose to achieve the desired results.' When blockchain technology is applied to the admission management system, the standards of completeness and accuracy for achieving the required purpose refer to an evaluation of whether it is stable and reliable, such as the fairness of the selection process [32]. In addition, it is an evaluation of the completeness of the results for users of the college admissions system, such as admissions officials, test takers, teachers in charge of admissions, and parents, to use blockchain technology for the purpose of the admissions process. The goal of admissions officials, for example, confirming the transparency of the admission process, submitting required documents and verifying their authenticity, must be accurate and safe results.

In addition to performance and results, effectiveness can also be expressed directly or indirectly, such as satisfaction, support, sense of accomplishment, trust, and behavioral change. This includes creating a positive experience in system design and use when utilizing blockchain technology's admissions system [32].

Efficiency

Efficiency deals with the analysis of inputs and outputs of a system. Efficiency is an aspect of obtaining the maximum result within fixed resources by obtaining the maximum useful output at a specific input level and an aspect of using the minimum possible resources to obtain a specific result. It can be thought of as This refers to the optimization of resources such as time, money, energy, and materials, the productivity aspect of using resources more efficiently, and the cost aspect of achieving the desired results at the lowest possible cost.

Jakob Nielsen said that when designing a system, it should be designed so that tasks can be completed quickly with minimal effort after learning the system, including the user interface [33]. Here, efficiency refers to the degree of efficiency of resources consumed in actions to accurately achieve user needs, including physical time and effort required for learning and understanding [17] [33].

This means that when applying blockchain technology to admissions management systems, the required effort and resources must be optimized. This efficiency helps educational institutions' admissions officials and applicants perform their work more quickly and effectively [34].

RESEARCH METHODS AND MATERIALS

Investigation Target

In this study, in-depth interviews, Delphi surveys, and Analytic Hierarchy Process (AHP) were conducted targeting college admissions experts, including college admissions officers. The surveyed experts included 6 admissions officers (14.2%), 12 admissions academy counselors (28.6%), 12 university professors (28.6%), and 12 high school senior homeroom teachers (28.6%), totaling 42 participants. The survey period extended from the first week of July to the fourth week of August 2023, spanning a duration of 8 weeks. The demographic analysis results for the Delphi panel are presented in Table 1 below.

Table 1. Dellphi panel demographic analysis result

Division		Effective Target	*Effective Ratio (%)*
Age Group	30s	11	26.2
	40s	11	26.2
	50s	16	38.1
	60s and above	4	9.5
Gender	Male	31	73.8
	Female	11	26.2
Counseling Experience	Yes	24	57.1
	No	24	57.1
Education	Undergraduate Student/Graduate	9	21.4
	Postgraduate or Above	32	76.2
	College Student/Graduate	1	2.4
Position and Job Function	Education Instructor	12	28.6
	Homeroom Teacher	12	28.6
	University Professor	12	28.6
	Admissions Officer	6	14.3
Professional Experience	Over 3 years ~ Less than 5 years	5	11.9
	Over 5 years ~ Less than 7 years	2	4.8
	Over 7 years ~ Less than 9 years	3	7.1
	9 years and above	32	76.2
Admissions Experience	Less than 1 year	3	7.1
	1 year and above ~ Less than 2 years	3	7.1
	2 years and above ~ Less than 3 years	6	14.3
	3 years and above ~ Less than 4 years	7	16.7
	4 years and above	23	54.8
Sum		42	100.0

Analysis Procedure

The analysis procedure is as follows: First, for the introduction of a blockchain-based admission system, we conducted in-depth interviews with experts in the field (six admissions officers) to derive acceptance factors based on the characteristics of blockchain technology. Second, the Delphi survey consisted of 7 survey items for demographic analysis and 20 survey items for validity verification. The Delphi panel comprised 42 members, including the 6 admissions officers who participated in the first round of in-depth interviews. The survey was conducted in the form of Likert 5-point scale questions to measure the reliability (generalizability coefficient) and validity (appropriateness level) of each survey item. To ensure the analytical effectiveness, validity stability, convergence, and reliability were analyzed to validate the evaluation model of acceptance factors derived from the analysis. IBM SPSS was used for reliability analysis, and Microsoft Excel was used for analyzing averages, standard deviations, validity (CVR), stability (coefficient of variation), convergence, and consensus [35]. Third, to assess the priority and importance of the derived acceptance factors for blockchain technology characteristics and the priority and importance of each sub-factor, Analytic Hierarchy Process (AHP) analysis was conducted. The survey questionnaire was structured in a paired comparison format to determine the importance and priority of each blockchain technology characteristic factor. Additionally, to ensure the reliability of the evaluation results, weights, priorities, and consistency ratios ($CR < 0.1$) of the top-level items and sub-evaluation factors for the acceptance factors of blockchain technology were evaluated using the Expert Choice program [36].

RESULTS AND DISCUSSION

Validity and Reliability of the Factors

Analysis of Delphi Survey Results: Upon analyzing the Delphi survey results, the mean(average) of the adopted factors, representing the importance within each domain, was consistently above 3.64. This signifies that the adopted items are deemed suitable acceptance factors for integrating blockchain technology into the college admissions system.

Content validity, which quantitatively analyzes the consensus of opinions on importance, was assessed using the Content Validity Ratio(CVR) proposed by Lawshe(1975). The CVR results for the 20 selected factors were all above 0.33(considering a threshold of 0.29 for 40 items), indicating positive convergence of opinions among the panel members and confirming content validity.

Stability, measured by the Coefficient of Variation (CV), evaluates the consistency of responses by comparing the standard deviation (SD) with the arithmetic mean. If the CV is below 0.5, the stability is considered sufficient, and additional surveys may not be necessary. The CV for all 20 adopted keywords was below 0.5, indicating no need for further investigation.

Convergence, reflecting the level of agreement among experts, is measured by the coefficient Q1(first quartile coefficient) and Q3(third quartile coefficient). A value below 0.5 indicates well-established expert consensus. All 20 factors exhibited convergence values below 0.5.

Consensus, indicating the degree of agreement among the panel, is measured by examining the coefficient Q1 and Q3. A value above 0.75 suggests a high level of agreement. All 20 factors demonstrated consensus values exceeding 0.75.

Reliability, assessing internal consistency, was measured using Cronbach's alpha. Most keyword reliabilities were above 0.6, ensuring sufficient internal consistency. However, the factors related to constraint learning and cost-benefit considerations of efficiency were excluded due to low Corrected Item-Total Correlation (CITC). The validity of the extracted factors and the validation results of the evaluation model are presented in Table 2 below.

Table 2. Key factors for acceptability summarized as a result of in-depth interviews & Delphi verification results

Upper Class	Lower Class	Detailed Explanation	Mean	SD	CVR	CV= SD/Mean	Convergence	Consensus	Reliability Cronbach's α
Affordance	Familiarity	User access to technology must be easy.	3.90	0.76	**0.33**	**0.19**	**0.50**	**0.75**	**0.63**
	Perceived Will to Experience	I think it is appropriate to apply the evaluation factors required for admission.	3.76	0.76	**0.33**	**0.20**	**0.50**	**0.75**	
	Popularity	I think public perception is appropriate for use.	3.88	0.80	**0.33**	**0.21**	**0.50**	**0.75**	
	Unfairness	It is a fair admission system free from biased or unfair evaluations, risks, and fraud.	3.83	0.88	**0.43**	**0.23**	**0.50**	**0.75**	
	Information risk	The distribution and encryption of admissions data makes it safe from hacking and other attacks.	3.79	0.95	**0.43**	**0.25**	**0.50**	**0.75**	
Constraints	Technology usability	There are technical limitations in processing speed and scalability.	3.64	0.82	**0.33**	**0.23**	**0.50**	**0.75**	**0.62**
	Interoperability	Cooperation for standardization between Blockchain networks and agreement on common standards are needed.	3.83	0.82	**0.43**	**0.21**	**0.50**	**0.75**	
	Legal regulations	There are issues with relevant regulations, such as data protection regulations (GDPR or CCPA) or local data protection laws.	3.90	0.79	**0.48**	**0.20**	**0.50**	**0.81**	
	Uncertainty	There is ambiguity and distrust in the evaluation of applicants due to changes in admission criteria.	3.79	0.95	**0.33**	**0.25**	**0.50**	**0.75**	
	Learnability	A large amount of learning is required to become accustomed to using the technology.	3.88	0.83	**0.38**	**0.21**	**0.50**	**0.75**	**Excluded**
Effectiveness	Privacy	Risk of data breach or unauthorized access is minimized.	3.83	0.88	**0.33**	**0.23**	**0.50**	**0.75**	**0.79**
	Prevention of illegal activities	Effective in preventing forgery and falsification of student records.	4.00	0.80	**0.57**	**0.20**	**0.00**	**0.81**	
	Transparency	The authenticity of a college admission applicant's qualifications can be confirmed through verified credentials recorded on the Blockchain.	4.07	0.75	**0.62**	**0.18**	**0.50**	**0.75**	
	Fairness Goal orientation	The goal of utilizing Blockchain technology is to ensure fairness in the admissions process.	4.07	0.75	**0.71**	**0.18**	**0.38**	**0.81**	
	Trustworthiness	Build trust between applicants and educational institutions by detecting irregularities or inconsistencies in the admissions process.	4.02	0.75	**0.57**	**0.19**	**0.00**	**0.81**	
Efficiency	Speed	Providing a distributed ledger eliminates delays in information sharing by updating data in real time.	3.79	0.81	**0.38**	**0.21**	**0.50**	**0.75**	**0.66**
	Error Prevention	Prevents human errors in automated validation checks and announcements of successful candidates.	4.14	0.72	**0.71**	**0.17**	**0.50**	**0.75**	
	Convenience	Verifiable credentials, portable Applicants provide immediate, tamper-proof proof of their grades and credentials.	4.24	0.66	**0.76**	**0.15**	**0.50**	**0.75**	

Upper Class	Lower Class	Detailed Explanation	Mean	SD	CVR	CV= SD/Mean	Convergence	Consensus	Reliability Cronbach's α
	Reduces administrative burden	Simplifies various aspects of the admissions system • Automation reduces manual tasks and minimizes time delays	4.05	0.88	**0.57**	**0.22**	**0.50**	**0.75**	
	Cost benefit	Costs are reduced (related to physical document storage, maintenance and retrieval, etc.).	3.88	0.80	**0.33**	**0.21**	**0.50**	**0.75**	**Excluded**

Importance and Priority Among Higher-Level Elements

The AHP analysis conducted with experts involved a survey where experts, when assessing the importance levels they perceived, marked the importance comparison between two items on a pairwise comparison questionnaire on a scale of 1 to 9. The sum of the importance of all top-level factors was normalized to 1.0. To ensure the reliability of the survey, the Consistency Ratio was evaluated, and a value below 0.1 was considered indicative of reliability [36].

The importance and priority of the derived four Blockchain technology acceptance factors were as follows: 'Efficiency (0.414)', ' Effectiveness (0.309)', 'Affordance (0.154)', and 'Constraint (0.123)'. Among the acceptance factors for Blockchain technology in the admissions system, Efficiency appeared to be the highest, while Constraint was relatively lower compared to other factors. The Consistency Ratio was 0.006(C.R.<0.1), confirming the reliability of the results, as it was below the threshold (Table 3).

Table 3. Dellphi panel demographic analysis result

Higher-Level Elements	Importance	Priority	Consistency Ratio (CI/RI)
Affordance	0.154	3	**0.006**
Constraints	0.123	4	
Effectiveness	0.309	2	
Efficiency	**0.414**	**1**	

Importance and Priority Among Sub-Elements

Firstly, the relative importance of sub-factors within the Behavioral Inducement (Affordance) factor is as follows: 'Bias and Unfairness in Evaluation Results (0.324)', 'Fair Application of Evaluation Factors Required for Admission Assessment (0.226)', 'Security Assurance from Hacking through Dispersion and Encryption (0.211)', 'Public Perception Suitable for Use (0.150)', and 'User Accessibility to Technology (0.089)'. Among the sub-factors of Behavioral Inducement, the importance of 'Bias and Unfairness in Evaluation Results' was the highest, while 'User Accessibility to Technology' appeared to be the least important compared to other factors. The Consistency Ratio was 0.009(C.R.<0.1), confirming the reliability of the results.

Next, the relative importance of sub-factors within the Constraints factor is as follows: 'Ambiguity and Distrust in Applicant Evaluation due to Changes in Admission Criteria(0.314)', 'Issues with Relevant Regulations such as Data Protection Regulations(GDPR or CCPA) or Local Data Protection Laws(0.201)', 'Significant Learning Required to Familiarize with the Use of Technology(0.195)', 'Issues with Collaboration and Agreement on Common Standards for Standardization across blockchain Networks(0.190)', and 'Technical Limits in Processing Speed and Scalability(0.099)'. Among the Constraints factors, the importance of 'Ambiguity and Distrust in Applicant Evaluation due to Changes in Admission Criteria' was the highest. In contrast, 'Technical Limits in Processing Speed and Scalability' appeared to be relatively the lowest. The Consistency Ratio was 0.014(C.R.<0.1), confirming the reliability of the results.

Next, the relative importance of sub-factors within the Effectiveness factor is as follows: 'Ensuring Fairness in

Admission Assessments (0.284)', 'Prevention of Forgery and Tampering in School Records (0.241)', 'Detection of Admissions Fraud or Inconsistencies (0.231)', 'Verification of Admission Applicant Qualifications through Blockchain-Verified Credentials (0.146)', and 'Minimization of Risks of Data Breach or Unauthorized Access (0.097)'. Among the Effectiveness factors, 'Ensuring Fairness in Admission Assessments' appeared to be the highest. In contrast, 'Minimization of Risks of Data Breach or Unauthorized Access' was relatively the lowest. The Consistency Ratio was 0.003(C.R.<0.1), confirming the reliability of the results.

Finally, the relative importance of sub-factors within the Efficiency factor is as follows: 'Simplification and Automation of the Admission System, Minimizing Time Delays (0.284)', 'Real-time Provision of Verifiable Credentials, Prevention of Tampering with Applicant Grades (0.241)', 'Anti-fraud Effects in Admission Assessments (0.231)', 'Prevention of Human Errors (0.146)', and 'Cost Savings (0.097)'. Among the Efficiency factors, 'Simplification and Automation of the Admission System, Minimizing Time Delays' appeared to be the most important. In contrast, 'Cost Savings' was relatively the least important. The Consistency Ratio was 0.008(C.R.<0.1), confirming the reliability of the results. The analysis results of the importance and priority among sub-elements are presented in the table below (Table 4).

Table 4. Importance and Priority Among sub-elements

Higher-Level Elements (Importance/Priority)	Sub-elements	Detailed Explanation	Factor Importance	Priority	Consistency Ratio (CI/RI)
Affordance	Familiarity	User access to technology must be easy.	0.089	5	**0.009**
	Perceived Will to Experience	I think it is appropriate to apply the evaluation factors required for admission.	0.226	2	
	Popularity	I think public perception is appropriate for use.	0.150	4	
	Unfairness	**It is a fair admission system free from biased or unfair evaluations, risks, and fraud.**	**0.324**	**1**	
	Information risk	The distribution and encryption of admissions data makes it safe from hacking and other attacks.	0.211	3	
Constraints	Technology usability	There are technical limitations in processing speed and scalability.	0.099	5	**0.014**
	Interoperability	Cooperation for standardization between Blockchain networks and agreement on common standards are needed.	0.190	4	
	Legal regulations	There are issues with relevant regulations, such as data protection regulations (GDPR or CCPA) or local data protection laws.	0.201	2	
	Uncertainty	**There is ambiguity and distrust in the evaluation of applicants due to changes in admission criteria.**	**0.314**	**1**	
	Learnability	A large amount of learning is required to become accustomed to using the technology.	0.195	3	
Effectiveness	Privacy	Risk of data breach or unauthorized access is minimized.	0.097	5	**0.003**
	Prevention of illegal activities	Effective in preventing forgery and falsification of student records.	0.241	2	
	Transparency	The authenticity of a college admission applicant's qualifications can be confirmed through verified credentials recorded on the Blockchain.	0.146	4	
	Fairness Goal orientation	**The goal of utilizing Blockchain technology is to ensure fairness in the admissions process.**	**0.284**	**1**	

Higher-Level Elements (Importance/Priority)	Sub-elements	Detailed Explanation	Factor Importance	Priority	Consistency Ratio (CI/RI)
	Trustworthiness	Build trust between applicants and educational institutions by detecting irregularities or inconsistencies in the admissions process.	0.231	3	
Efficiency	Speed	Providing a distributed ledger eliminates delays in information sharing by updating data in real time.	0.233	3	**0.008**
	Error Prevention	Prevents human errors in automated validation checks and announcements of successful candidates.	0.162	4	
	Convenience	Verifiable credentials, portable Applicants provide immediate, tamper-proof proof of their grades and credentials.	0.230	2	
	Reduces administrative burden	**Simplifies various aspects of the admissions system • Automation reduces manual tasks and minimizes time delays**	**0.235**	**1**	
	Cost benefit	Costs are reduced (related to physical document storage, maintenance and retrieval, etc.).	0.141	5	

CONCLUSIONS

This study integrated the opinions of admissions officers and admissions experts to derive the acceptance factors for the use of blockchain technology in the college admissions system. Additionally, stratified analysis(AHP) was conducted targeting admissions experts to assess the relative importance and priority of acceptance factors for blockchain technology. The comprehensive opinions of admissions experts suggest the following:

Firstly, in the aspect of 'Efficiency' the reduction of administrative burden is considered the most crucial factor for the acceptance of blockchain technology in the university admissions system. This highlights the importance of administrative aspects in managing the burden of admissions.

Secondly, in terms of 'Effectiveness' ensuring the fairness of the admissions process is identified as a goal for adopting blockchain technology. This indicates that the transparency and immutability inherent in blockchain technology can contribute to securing fairness in the admissions process.

Thirdly, in the context of 'Affordance' the perception that evaluation results are biased or unfair can potentially promote the acceptance of blockchain technology. This suggests that factors such as the diverse use of technology for achieving a fair admission system, expectations for an admission system free from misconduct and corruption, the desire to implement a system without interference in admission policies, the possibility of practical collective action, and the users' awareness of achieving fairness can be factors promoting acceptance.

Fourthly, in the 'Constraints' aspect, the major factor is the uncertainty caused by changes in admission criteria and the ambiguity and mistrust in the evaluation of applicants. The experts also identified technical limitations, interactivity, legal appropriateness of technical applications, and the learning curve as additional constraint factors. This indicates that scalability and availability, characteristics of blockchain technology, can address the complexity and uncertainty issues in the admissions system.

This study's research is limited to admissions experts, and the perspectives of other experts, such as those in technical fields other than education, are excluded, so there is a risk of groupthink that may be influenced by dominant opinions within the group. Additionally, there are limitations to the study, including the lack of diversity and the failure to consider alternatives. In other words, there are limitations in generalizing the research results to the opinions of all college admissions experts. In addition, in the case of domestic companies, the use of blockchain technology is still at an early stage, and there are few experts within the company with abundant knowledge related to blockchain, and there is also a shortage of SI experts with experience building actual blockchain systems, so more specialized Empirical research in this field is somewhat lacking.

In future research, it is necessary to reflect the diverse opinions of a large group of experts who can objectively analyze, and introduce realistic internal and external factors and technologies necessary for technology adoption in industries such as logistics and distribution, which are expected to rapidly introduce blockchain technology. Additional research on the effects appears to be necessary. It is believed that more comprehensive empirical analysis research is needed.

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