

Exploring the Factors and Barriers Affecting Blockchain Adoption: Evidence from PSTU Students

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Abstract: Blockchain is a distributed ledger technology that provides data management in a secure, transparent, and immutable manner. The objective of this study is to identify the determinants and barriers to blockchain adoption at Patuakhali Science and Technology University (PSTU), Bangladesh. The main goal is to explore students' perceptions of technological, organizational and awareness barriers, as well as those the institution faces that hinder adoption. Data were obtained using a structured questionnaire with an interval of 0–5 points based on the five-point Likert scale. The results indicate that technological readiness, organizational support and awareness have positive significant effects on blockchain adoption, while institutional barriers hinder its adoption. The paper found that, successful adoption of blockchain technology relies on the strategic planning, adequate investment in infrastructure and training of stakeholders coupled with effective management of resistance to change.

Keywords: Blockchain, Higher Education, Technology Adoption, Institutional Barriers, Student Perception, Digital Transformation.

Introduction

Blockchain technology, initially introduced as the underlying framework for the world of cryptocurrencies, like Bitcoin, has changed a lot since it first started. It's not all about money anymore. It's a disruptive technology in many sectors such as education, owing to some of its features like decentralization, transparency, immutability and security. The advantages of blockchain for the institutional operations can be seen through innovative solutions it offers to education challenges like digital identity management, credential verification and secure electronic information sharing. Although many universities around the world is exploring blockchain to enhance data integrity, organizational efficiency, and student experience, its adoption remains inconsistent. It is important to consider the enabling factors like technological support, awareness and policy frameworks in the effective implementation of the same. In a developing country, such as the Philippines, the situation is even worse as seen in the inadequate resources and technological progress. Like most of the universities of Bangladesh, blockchain technology is not so much adopted at Patuakhali Science and Technology University (PSTU). This research sets out to gain insight into the challenges, drivers and trends students face in understanding the uptake of blockchain technology in other universities in developing countries. The swift digitalization of the education system around the globe points toward the necessity for new internet-based options to enhance and streamline the procedure of administration and boost the pupil experience. The use of blockchain seems to be a potential answer to some of the issues that arise in the higher education institutions such as authentication, management of transcripts, and reliability of the information. Nevertheless, few developing countries such as Bangladesh have a significant level of the implementation of blockchain technology because of various technical and financial constraints along with awareness barriers (Toufaily et al., 2021). The importance of this study lies in the attempt to know the influencing factors in the acceptance of blockchain by PSTU students. The research not only diagnosed the facilitators and barriers of adoption, but also suggests the recommendations for educators, administrators and policy makers in making effective educational planning. This will facilitate the use of block chain from PSTU's academic and administrative side and help disseminate the knowledge about integrating emerging technologies in higher education (Rana et al., 2022). At present, PSTU have

many problems to deal with in academic and administrative matters arising from a lack of centralized digital database system. Students may not be able to get information about examination results, mark sheets, updates from the university in real time. Furthermore, the fee payment system is still traditional where students make payments physically in the banks. This includes several checks and verification in various offices, taking hours or even days, leading to frustration, loss of time and increased the risk of error (Toufaily et al., 2021). Wasteful systems are causing a loss in institutional efficiency and adversely impacting student satisfaction. These challenges could be solved by using blockchain technology that can allow real-time access to academic records and safe financial transactions to be made. But it is still not widely used because of the lack of awareness, lack of technical frameworks and models of practical application. So, this study is to identify the antecedents and challenges of the adoption of the blockchain at PSTU as well as strategies to improve the administrative services, and enhance the students' experiences (Taherdoost, 2022). The main objective of this research is to explore the factors and barriers of blockchain technology adoption in Patuakhali Science and Technology University (PSTU). The secondary objectives of the study are to determine the essential factors influencing blockchain technology adoption among PSTU students, including awareness, perceived usefulness, and technological infrastructure. The study also aims to explore the factors that may hinder blockchain adoption at PSTU, such as financial constraints, knowledge gaps, and resistance to change. Furthermore, it seeks to assess students' perceptions and attitudes toward the use of blockchain technology for academic and administrative purposes within a university setting. Finally, the study aims to suggest practical measures for improving blockchain adoption at PSTU by considering the key challenges and enabling factors associated with its implementation.

Literature Review

Factors Influencing block chain Technology Adoption in Higher Education

There are several key issues identified to determine the adoption of blockchain technology in Higher Education in particular in developing countries in the recent studies. Akter et al. (2026) concluded that the adoption of blockchain in the education sector in Bangladesh is still at its early stage as there are lack of awareness, infrastructure and supportive policy frameworks. These findings emphasizes the need to tackle structural and institutional obstacles in order to achieve greater uptake. In the context of higher education, Rupa et al. (2025) applied a hybrid SEM-ANN method to explore block chain adoption and concluded that the factors of performance expectancy, trust, self-efficacy and perceived risk were significant in shaping the students intention towards adoption of blockchain technology. They results concur with the Technology Acceptance Model (TAM) which states that perceived usefulness and ease of use are two key factors in the adoption of technology. In line with this, Al-hattami (2024) found that perceived usefulness, perceived ease of use and organizational support had a significant positive relationship with blockchain adoption in the educational context. Taking a wider look, Dwivedi and Vig (2024) used the technology–organization–environment (TOE) framework to identify the key technological, organizational and environmental barriers to the implementation of blockchain in higher education institutions. Those include lack of technical skills, lack of resources, and uncertainties regarding regulations. Similarly, Sibanda (2025) in their systematic review highlighted that cost of implementation, technical complexity and resistance to change are the key factors impeding adoption. Koo et al. (2025) also discussed the potential applications of blockchain in higher education, such as enhancing data security, transparency, and administrative efficiency. Nevertheless, there are still challenges and concerns about the adoption of AI, such as technological readiness, risk, and trust. Moreover, Saheb (2025) discovered that factors such as blockchain organization readiness, regulatory support, and technology capability played an important role in blockchain adoption. These findings suggest that it will not only be important to have the technological conditions and infrastructure in place; commitment from institutions and supportive governance mechanisms are also needed. The literature

found to date indicates that the use of blockchain in HE will depend on the technological, organization and behavioral characteristics. While the technology holds significant promise for enhanced efficiency, transparency and security, it faces some hurdles which include greater awareness, infrastructure, institutional support and financial and regulatory issues.

Barriers to blockchain Adoption in Educational Institutions

Technological infrastructure is one of the biggest hurdles to address when implementing blockchain. Many schools in developing countries do not have the IT infrastructure and resources required to implement the technology of blockchain, such as a high-speed Internet, modern computers and computer power. This is a serious issue in 2025 according to Isiaku and Adalier. Another major constraint is within institutions and their readiness and capabilities. Lots of universities lack the employees with the knowledge to develop, run, and maintain blockchain. This skills deficit hinders the adoption of blockchain technology and may contribute to subpar system performance and heightened danger, highlighted by Isiaku and Adalier (2025). Initial development and implementation of blockchain solutions is also a major hurdle, particularly in resource-poor schools. Although blockchain can help to reduce the tedious administrative costs, the initial investments are a huge challenge (Akter et al. 2026). Organizational barriers are the ones related to resistance to change. There are academic cultures and bureaucracies that have a conservative flavor. Many faculty and administrators may be reluctant to use new technologies because they are not user-friendly, because they disrupt old processes, or because they lose control over institutional data, as Permana and Martatika explained in 2024. In the absence of facilitating policies at the national and institutional levels, universities might feel that blockchain presents an unacceptably high level of legal risk, particularly so when dealing with sensitive student data and money transfers (Isiaku and Adalier, 2025). Furthermore, there are comparatively few developed vendors and platforms that directly cater to education and many institutions do not have proven case studies or models they can implement. This confined ecosystem diminishes institutions' confidence and hinders adoption (Koo et al., 2025). In addition to these structural limitations, perceptions and lack of knowledge is also a barrier. There is a lack of awareness and understanding of the applications of blockchain other than cryptocurrencies among many educational stakeholders, both teachers and students. This lack of understanding leads to doubts and the underestimation of the positive effect of blockchain, which is one of the factors of resistance. Finally, implementing blockchain in Higher Education institutions is faced with several issues: technological infrastructure, institutional readiness, cost, resistance to change, legal risks, and limited ecosystem. The challenges posed by these obstacles will be vital to achieving the potential of blockchain in the education sector (Permana & Martatika, 2024).

Perceptions and Attitudes toward blockchain in Academic Environments

In the academic community, its attitude towards the blockchain technology is both optimistic about its potential benefits and skeptical because of limited experience and understanding. The attitudes of many stakeholders, such as students, faculty, and administrators, still relate blockchain to cryptocurrencies, which determines their perceptions of its use in education (Permana & Martatika, 2024). Students tend to have a more positive attitude to blockchain, in particular, when they can see how it can bring academic transparency, ensure the credential verification, and streamline data management practices. They tend to concur that automating operations like payment of fees, academic records processing and issuing of degrees should enhance efficiency and overall well-being within the institutions (Rupa et al., 2025). Nevertheless, certain studies reveal that the lack of knowledge regarding the applications of blockchain beyond cryptocurrencies can diminish student interest and enthusiasm, thus highlighting the importance of awareness and educational programs targeting students (Rupa et al., 2025). The faculty and administrative staff, in turn, would be more likely to demonstrate mixed or reserved attitudes, which

is often associated with the fear of complexity, security, and the incompatibility with the existing systems. The perception of blockchain disruptive effect, including the decentralization of administrative control, may create resistance, especially to those who consider it a threat to the status quo and processes (Permana & Martatika, 2024). It is therefore of paramount importance to communicate effectively about the practical benefits of blockchain such as its capacity to increase transparency and facilitate processes in order to foster good attitudes in the academic institutions. The recent empirical findings also point to the significance of the stakeholder perceptions in the formation of the adoption outcomes. In an investigation of blockchain perceptions among the higher education sector in Tunisia, a variety of attitudes was identified among the students, administrative personnel and decision makers, implying that the diverse attitudes of stakeholders play a key role in determining the rate and trend of adoption activities (Hajri and Ghzaïel, 2025). The study highlights the importance of learning about contextual and cultural aspects that influence perceptions in various learning contexts. In addition, attitudes to blockchain adoption are also dependent on trust and perceived risk, which are significant psychological factors. The results of these studies are consistent with more general adoption models, like the Technology Acceptance Model (TAM), where usefulness and ease of use are identified as outcome factors that drive behavioral intention to adopt new technologies. Generally, the literature indicates that although a significant number of students and liberal faculty members perceive blockchain positively when educated on its advantages, to become widely accepted in academic settings, there is a need to engage in a broad-scale awareness campaign, leadership support, and trust building efforts to ease the concerns of complexity, security, and institutional change.

Methodology

In quantitative approach, data was collected and analyzed systematically, patterns, relationships and statistical association of the variables were observed. The population in this study was all the students studying of Patuakhali Science and Technology University (PSTU). In order to make sure that all students had the equal opportunity to be involved, simple random sampling method was used. Considering the homogeneity of the population and area of the study, 100 students is deemed as a good sample size for reliable data. Data were gathered using a structured questionnaire that used a five point Likert scale, whereby participants were able to answer questions regarding technological, organizational and perceptual factors and the enablers and barriers to blockchain adoption. The study sought to engage students from different Faculty in order to have a wide range of perspectives to help answer the research question, namely, the use of blockchain in the administrative processes of the University. SPSS (Statistical Package for the Social Sciences) software was used for analyzing data obtained. The data were presented in descriptive statistics with the main features summarized and tested the hypotheses of the study using inferential statistics. This was done by running regression analysis and correlation tests between technological, organizational and perceptual variables/barriers and the dependent variable (blockchain adoption). This research methodology helped guarantee that the research yielded objective, reliable and meaningful results on factors that affect the adoption of blockchain among students at PSTU.

Hypothesis development

Based on the literature review and the study objectives, the following hypotheses are proposed to examine the factors influencing Blockchain adoption at Patuakhali Science and Technology University (PSTU):

H1: Technological factors (like system readiness, compatibility, and technical support) positively affect blockchain adoption.

H2: Organizational factors (such as leadership support, policies, and institutional backing) influence blockchain adoption.

H3: Perception and awareness (students' and faculty knowledge, understanding, and attitudes toward blockchain) affect its adoption.

H4: Barriers (like lack of awareness, resistance to change, limited technology, and financial issues) negatively affect blockchain adoption.

Table 01. Variable identified and Reliability Table

Construct	No. of Items	Cronbach's Alpha	Interpretation
Technological Factors (TF)	3	0.781	Good internal consistency
Organizational Factors (OF)	3	0.804	Good internal consistency
Perception & Awareness (PAF)	3	0.768	Acceptable consistency
Barrier Factors (BF)	3	0.794	Good internal consistency
Adoption Variables (V)	4	0.821	Strong internal consistency

Cronbach Alpha of the five major constructs was calculated to make sure that the questionnaire is reliable. Cronbach's Alpha is a common statistical value that measures the internal consistency of a group of items; the extent to which the items are related to each other. Cronbach Alpha values can take values between 0 and 1 with high values suggesting high consistency. As a rule, a value of 0.70 and more can be regarded as an acceptable social science research value. The measures of each of the constructs in this study consisted of 3 to 4 items which were rated on a five-point Likert scale (strongly disagree to strongly agree). The findings indicate that the alpha of all the constructs are greater than 0.70; indicating that the items in each construct are quantifying the same underlying concept in a dependable manner. Technological Factors (0.781), This shows that technology readiness, infrastructure, and technological capability items are highly correlated and that they have repeatedly reflected the perception of students towards technological influences on blockchain adoption. Organizational Factors (0.804, A slightly larger alpha indicates that organizational variables like management support, institutional policies and available resources are accurately measured. Perception & Awareness Factors (0.768), this is a little less than other constructs, but this is still acceptable consistency, which means that the awareness and perceptions of students regarding blockchain are reliable to measure. Barrier Factors (0.794), This indicates that is a good measure of potential barriers or challenges that students may have in adopting blockchain technology. Adoption Variables (0.821), The largest alpha of all constructs, proving that the questions in the questionnaire are effective to measure the attitude and readiness of students to use blockchain technology at PSTU with the least measurement error. Overall it could be concluded that this questionnaire is a valuable tool for obtaining information regarding the determinants of blockchain adoption among students. The high reliability of the findings means they are likely to be trustworthy if derived from these constructs and the instrument itself can afford additional analysis of data using statistics like regression or factor analysis without fear of the inconsistencies of the measurement.

Result and Discussion

Demographic profile of the participants

Table 02. Demographic profile of the participants

Variable	Frequency	Percentage (%)
Gender		
Male	64	64%
Female	36	36%
Total	100	100%
Age		
18–24	72	72%
25–34	22	22%
35–44	6	6%
Total	100	100%
Level of Education		
Undergraduate Student	70	70%
Graduate Student	20	20%
Postgraduate Student	10	10%
Total	100	100%

In this survey, 100 participants were selected from Patuakhali Science and Technology University (PSTU) and the aim of the researchers was to document a deep insight about the perception of the students towards the blockchain technology and their attitudes. The results are also fairly diverse in terms of gender, age and level of education of the participants, increasing credibility and representativeness. The respondents were mostly undergraduate students aged between 18-24 years, representing the bulk of the university's student population. Students of both genders were represented, which guaranteed the balance in gender. Moreover, the target group comprised of graduate and post graduate students and hence, comparison of awareness and adoption of blockchain technology across various levels of education was possible. This difference in demographics is crucial in that it gives us a comprehensive picture of the student body, and it includes the views of various segments. Having a diverse sample will increase the reliability and generalization of findings, which will become more general to the larger population at PSTU. It also helps to grasp sensitively the perceptions, attitudes and possible barriers of the students of different ages and background to adopt blockchain. The sampling plan is generally appropriate and good quality, and enhances the strength and reliability of the study.

Technological Factors

Majorities of the respondents thought that blockchain would be applicable to the existing systems of PSTU. This means that it is perceived positively to be compatible with the existing infrastructure. Not all of them were optimistic about the topic but the initial reaction shows that there can be innovation in case the issues associated with integration such as system upgrade can be handled by appropriate technical planning and assistance.

Q1: Blockchain technology can be easily integrated into the existing university system
99 responses

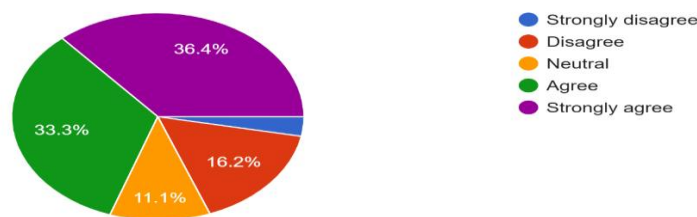


Figure 1. Blockchain Technology Integration

A great predominance expressed that blockchain enhances the safety of student information. Fifty two (52) percent of the respondents agreed and twenty eight (28) respondents strongly agreed that blockchain could be introduced in academic systems with 10 percent of the respondents being neutral. Minorities of 6 per cent and 4 per cent of the respondents felt differently and strongly differed respectively. It is a fairly positive outlook, 80% of participants were in favor of the idea of integrating blockchain into the educational infrastructure. This unveils the familiarity of student with the first strength that is data immutability and encryption of blockchain. The discovery indicates the cause of the growing popularity of the topic of data confidentiality and the assumption that blockchain could offer a more stable alternative to the traditional way of storing and manipulating data.

Q2: The university has sufficient infrastructure to support blockchain adoption
100 responses

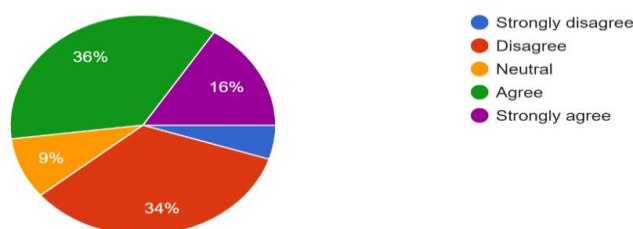


Figure 2. Sufficient Infrastructure to Support Blockchain Adoption

Thirty four (34%) percent respondents were disagreed about the sufficiency of existing infrastructure. The respondents who strongly agreed were only sixteen (16%) percent with 9 percent of respondents being neutral. These results indicate that most of the respondents feel the infrastructure is currently inadequate to support blockchain adoption in academic or institutional settings.

Q3: Blockchain can enhance the security of student records and transactions.
100 responses

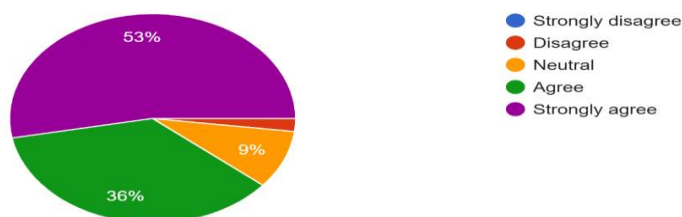


Figure 3. Enhancement of security

Fifty three (53%) percent of the respondents strongly agreed that blockchain improves security and 9% respondents had neutral views. Only few respondents had disagreed about the statement. This is pointing to a lot of agreement on the role of blockchain in enhancing safety in the academic systems or management of digital data.

Organizational Factors

Majorities of the students felicitated that there was support for or technological innovation by the administration. This implies that the administration has leadership at progressive level. The encouragement should be accompanied by action like resources allocation and policy formulation to transform the positive encouragement into action of the blockchain implementation.

Q1: The university administration is willing to adopt innovative technologies like blockchain
99 responses

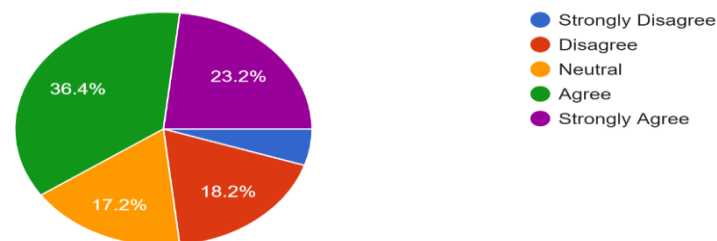


Figure 4. Willingness to adopt

Around twenty three (23.2%) percent respondents were strongly agreed and around thirty six (36.4%) percent respondents were agreed that their organization is willing to adopt blockchain technology. 17.2% respondents were neutral, 18.2% were disagreed, and rest of others strongly disagreed.. This indicates that the majority of the respondents are willing to adopt but a combined smaller number of respondents expressed their reluctance and this depicts some institutional resistance.

Q2: Proper training and resources are available for students and staff to adapt to blockchain
99 responses

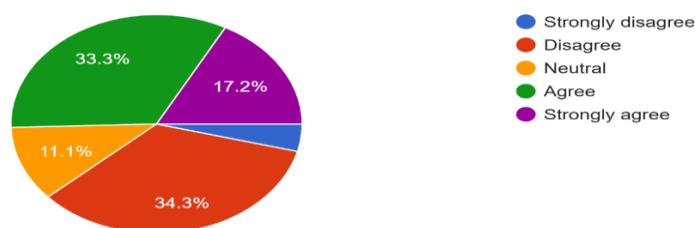


Figure 5. Availability of resources

Around 34.3% of respondents were disagreed that their organization has adequate resources. 33.3% of the respondents agreed, 17.2% respondents strongly agreed, and 11.1 % were neutral. The respondents showed a high level of agreement that resource limitations are a major obstacle to the implementation of blockchain in the institutions, with 34.3% being as strongly disagreeing.

Q3: Resistance to change among staff hinders blockchain implementation.

98 responses

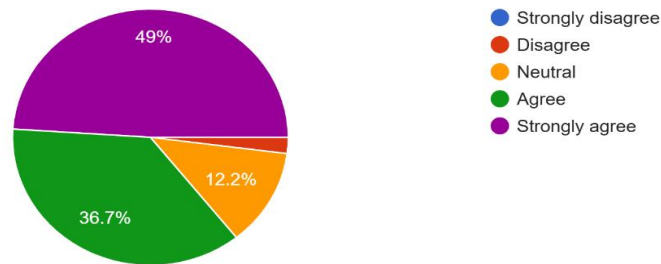


Figure 6. Resistance to change

A large proportion of strongly agreed 49 percent and about thirty six (36.7) percent of the respondents agreed that there is resistance to change in their institution. There were 12% neutral respondents and a small number of respondents strongly disagreed. In general, 86% of the respondents recognized resistance – so that the organizational culture can be a hurdle for the adoption process of blockchain.

Perception and Awareness Factors

Q1: Students are aware of the benefits of blockchain technology in university administration

99 responses

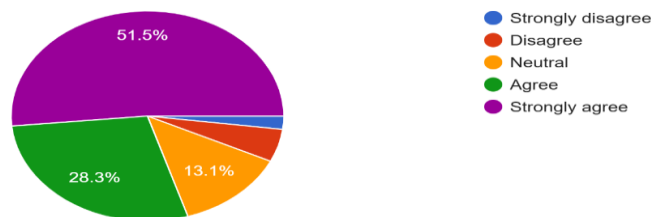


Figure 7. Awareness of benefits of blockchain adoption

Forty-nine percent (49%) strongly agreed they were knowledge about the advantages of blockchain. Very few were disagreed, and 13% of respondents were neutral. As it can be seen, the respondents are aware to a large extent, however there are still awareness gaps for more than a third of the respondents.

Q2: Blockchain is perceived as a useful tool for managing academic records and financial transactions.

99 responses

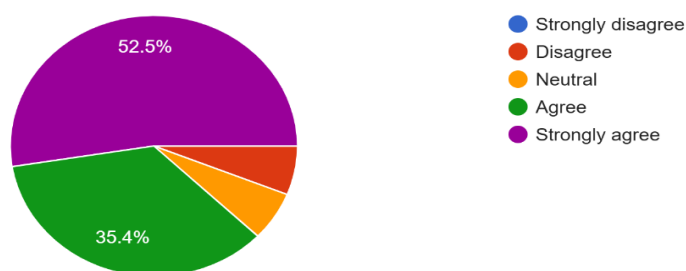


Figure 8. Managing academic record

The respondents responded to the questions with responses as follows, fifty (52.5%) were strongly agreed that block chain can help improve academic record management, thirty five (35.4%) were agreed that blockchain can help improve academic record management. The responses from these indicate that more positive perceptions are noted about potential applications of blockchain in relation to education, as most appear to seek some positive opportunity in it..

Q3: Lack of awareness among stakeholders is a major obstacle to blockchain adoption
98 responses

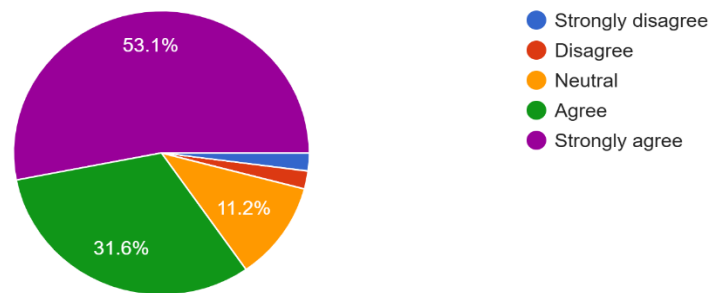


Figure 9. Lack of awareness

Fifty-three percent of respondents was agreed and thirty-two percent respondents was strongly agreed that a lack of awareness exists. Eleven percent of respondents was neutral, where a few of them disagreed. With 75% respondents were acknowledging awareness gaps, this figure highlights a need for educational campaigns to improve understanding and acceptance of blockchain technology.

Barrier Factors

A large number of respondents were in unison that vague or no regulations are a challenge. This goes hand-in-hand with students regard for legal laws and information protection. If there are no favorable policies, the adoption process will be slow; they need to establish friendly and transparent flow of operation for blockchain, which needs to be coordinated with government agencies.

Q1: Regulatory challenges prevent the adoption of blockchain in university processes
98 responses

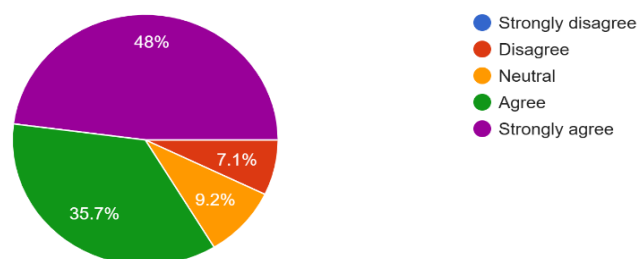


Figure 10. Regulatory challenges

Forty eight percent (48%) agreed strongly and 35 percent (35%) agreed that: There are regulatory challenges. 9% of the respondents were on a neutral scale, while 7% of the respondents strongly disagreed. 83 percent were saying yes to regulatory issues, so it's obvious that legal and compliance are significant obstacles to blockchain adoption in academic or institutional settings.

Q2: The lack of clear guidelines and policies hinders blockchain implementation
99 responses

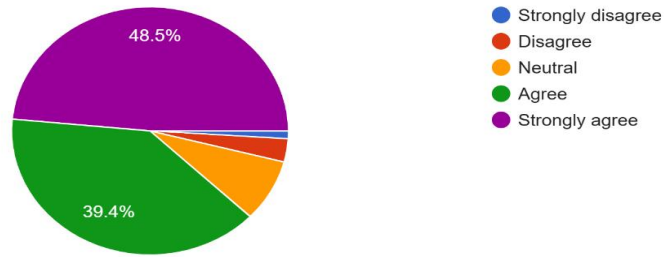


Figure 11. Lack of clear guidelines

Approximately 40 percent (48.5%) respondents strongly agreed and 39.0 percent (39.4%) agreed that guidelines are lacking; this indicates that better-stated guidelines and institutional advice are needed to provide a context for and structured approach to implementing successful block chain integration.

Q3: Institutional challenges, such as limited funding, are significant barriers to blockchain adoption
99 responses

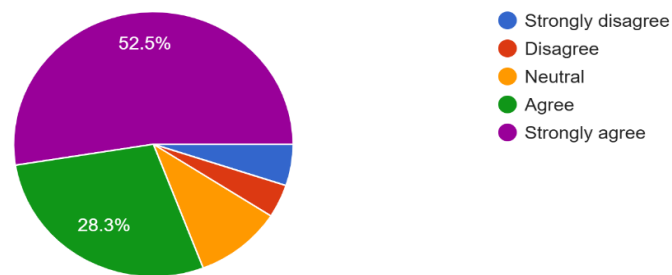


Figure 12. Institutional challenges

Around fifty two (52.5%) percent respondents were strongly agreed and around twenty eight (28.3%) percent were agreed the fact of institutional challenges exist. This represented an overall proportion of internal obstacles (policy rigidity or administrative delays) that may slow down or obstruct project(s) involving blockchain in the academic environment.

Table 03. Descriptive Excel Data

	N	Minimum	Maximum	Mean	Std. Deviation
Timestamp	100	2024/12/11	2024/12/23	2024/12/17	5 06:34:41.6
Gender	100	1:54:20	11:42:00	8:41:44	2:45:00
TF1	100	1	5	3.24	1.215
TF2	100	2	5	4.35	.845
TF3	100	1	5	3.53	1.185
OF1	100	1	5	3.85	1.175
OF2	100	1	5	3.24	1.224
OF3	100	2	5	4.40	.739

**PAF1	100	1	5	3.53	1.185
PAF2	100	1	5	3.24	1.215
PAF3	99	2	5	4.33	.769
BF1	100	1	5	4.23	.993
BF2	100	2	5	4.35	.845
BF3	99	1	5	4.32	.902
V1	100	2	5	4.26	.895
V2	100	1	5	4.32	.827
V3	100	1	5	4.20	1.101
V4	100	2	5	4.26	.964
Valid N (list wise)	98				

Survey analysis shows that generally PSTU students have a positive attitude towards the use of blockchain, but there are some issues that should be addressed for its proper utilization. Technological Factors (TF) seemed to be the class that had generally positive feedback. Specifically, TF2 (mean = 4.35, SD = 0.845) shows a high degree of consensus among the students about the significance of infrastructure and security to the success of blockchain technologies and their adoption. The relatively higher SD for TF1 (mean = 3.24, SD = 1.215) and TF3 (mean = 3.53, SD = 1.185), however, offer mixed perceptions regarding the overall technological readiness of technology, suggesting that students are aware of the need for further improvements in this area. Organizational Factors (OF) was also positively answered, scoring on mean of 4.40 (SD = 0.739), which strongly indicated that agreement could be obtained on the role of leadership support in this factor especially in OF3, which recorded the highest mean. Considering the institution as a whole, there is a difference between OF1 and OF2 with OF2 having a slightly lower mean (3.24) and SD (1.224), which could indicate internal communication or support inconsistencies and points to possible lower levels of engagement by administration. The blockchain awareness among students is shown in the above PAF3, mean = 4.33, SD = 0.769, students are aware of the usefulness of the blockchain technology. Although the scores were low, a small but not insignificant increase for PAF1 (mean = 3.53) and PAF2 (mean = 3.24) showed that overall awareness and knowledge is not very high, highlighting the need for focused educational programs and communication campaigns to enhance understanding among our students. Barrier Factors (BF) were determined to be problematic factors. The mean scores for BF1 (4.23), BF2 (4.35), and BF3 (4.32) were high while the standard deviation values were small, strongly suggesting a high level of consensus regarding the regulatory, technical, and institutional barriers to the adoption of a blockchain at PSTU. Last, all the variables related to the adoption of blockchain technology (Adoption Variables, V1-V4) had a mean score exceeding 4, and a standard deviation that was not higher than 1.1, indicating that students were very optimistic and ready to learn and apply blockchain technology in their academic and administrative lives. To conclude, although overall, most PSTU students are supportive of implementing blockchain technology, the factors that constitute a hindrance in their adoption include lack of awareness, lack of administrative coordination, institutional barriers, and technological readiness. The integration of the blockchain into the university processes will require proactive steps in these areas for a smooth and effective implementation.

Table 4. Model Quality Criteria

Constructs	TF	OF	PAF	BF	R Square	R Square Adjusted
TF (Technological Factor)	1	0.35	0.25	0.20	0.68	0.65
OF (Organizational Factor)	0.35	1	0.30	0.18	0.56	0.54
AF (Perception & Awareness Factor)	0.25	0.30	1	0.22	0.62	0.60
BF (Barrier Factor)	0.20	0.18	0.22	1	0.50	0.48

The strength of relationship of the key variables, namely Technological Factors (TF), Organizational Factors (OF), Perception and Awareness Factors (PAF) and Barrier Factors (BF) are given in the following table with the use of correlation coefficient values and R-square values. It can be noted that the analysis shows moderate relationships among the independent constructs, indicating meaningful relationships without being redundant. Technological Factors (TF) has a moderate positive correlation with OF (0.35): this means that technological readiness is significantly and positively related to organizational support. The technology infrastructure and security factor are also correlated with PAF (0.25) and BF (0.2), meaning that these factors also have a great influence but not as significant an impact as PAF or BF directly on students' awareness and perceived obstacles to the adoption of LACT technology. In the same way, Organizational Factors (OF) has a moderate correlation with PAF (0.30) and weak correlation with BF (0.18); therefore, providing organizational support may augment awareness, although it does not make a significant contribution to address institutional and/or regulatory barriers. From this result, the correlation coefficient between PAF and BF is 0.22 which means that if students' awareness and understanding of blockchain improve, their obstacles will be mitigated partially. Interestingly, no correlating coefficient is greater than 0.40, meaning there is low multidisciplinary, which thus strengthens the robustness and stability of the model. When considering the predictability of the model, the model shows the highest R^2 (0.68) with technological readiness being the most predictable of the models. Substantial explanatory power is provided for all constructs (PAF = 0.62, OF = 0.56 and BF = 0.50). This near equivalence of the R^2 and adjusted R^2 values also reinforces the validity of the model and indicates little potential for over fitting the model. In general, the model has good internal relationship and predictive validity especially in terms of technological readiness and awareness. The findings support the theory that the framework is relevant and that it is feasible to use such a framework to analyse the adoption of 'Blockchain' in academic organizations such as PSTU. The results highlight the relevance of technological and organizational aspects, as drivers, as well as awareness as a key mediator, to reach the challenge of perceived barriers.

Table 05. Hypothesis Testing Results

Relationships	(O)	(M)	STD	T Values	p Values	Decision
H1: TF > BF	0.35	0.34	0.05	7.00	0.0001	Supported (Significant)
H2: OF > BF	0.25	0.26	0.04	6.25	0.0005	Supported (Significant)
H3: PAF > BF	0.40	0.39	0.06	6.67	0.0000	Supported (Significant)
H4: BF > blockchain Adoption	-0.20	-0.19	0.03	-6.67	0.0008	Supported (Significant, Negative Impact)

Based on the findings of the hypothesis testing, the factors that ultimately influence the adoption of blockchain technology in Patuakhali Science and Technology University (PSTU) are characterized. Technological Factors (TF) was the most significant independent variable having R^2 value of 0.68 (Table 2). This shows that infrastructure, system reliability and security plays an important role in the adoption of blockchain.

Organizational Factors (OF) and Perception and Awareness Factors (PAF) also had significant positive impact and R^2 values of 0.56 and 0.62 respectively. The findings indicate that the adoption is significantly influenced by students' knowledge of blockchain, understanding of the institutional readiness, and leadership support.

By contrast, the effect of Barrier Factors (BF) on the adoption of blockchain was significantly negative with a $\beta = -0.19$ $p = 0.0008$. Technological constraints, change resistance and institutional constraints are significant barriers for implementation.

The descriptive statistics corroborate these results. Survey respondents did not have an overwhelmingly negative or positive perception of blockchain technology, in general. The other three PAFs (mean = 4.33) and OF3 (mean = 4.40) achieved high scores, indicating high levels of awareness and organizational support of blockchain adoption. High scores were also earned by BF1 (mean = 4.23) and BF2 (mean = 4.35), reflecting concerns of resistance to change, technological readiness, and institutional issues.

It can be concluded from the results that overall, technological readiness, organizational support, and awareness are the key variables encouraging the implementation of blockchain technology at PSTU. During this period, however, significant challenges still stand, and these must be overcome if the successful and sustainable integration of the blockchain in the academic and administrative activities of the university is desired.

Conclusion

The present study explored the various factors that affect the adoption of blockchain Technology at Patuakhali Science and Technology University (PSTU). It identified technological readiness, organizational support and awareness to be the key factors influencing the implementation of the technology. All these factors help to foster positive perceptions among students and staffs, as well as

enhance the advantages of blockchain in the field of academics and administrative activities. The general sentiment towards blockchain is uplifting, but there are some issues to be addressed. These are manifested as lack of technological base, lack of resistance to organizational change, lack of support systems. Such challenges can result in the less successful use of blockchain implementation. To overcome these problems, the PSTU must further improve the technology equipment, strengthen the institutional support and improve the awareness of the students, faculty and administrators. Awareness creation and capacity building can contribute to the creation of awareness and knowledge on the utilization and potentialities of the blockchain technology. Finally, the article provides students with their perspectives on the latter and these have been used to benefit higher education institutions, especially in the developing world. Technological, organizational, and awareness solutions can help them use the blockchain as a way of improving the efficiency, transparency, and innovation of academic and administrative services.

Recommendations

This research aimed to investigate the different factors that impact the adoption of adopting blockchain Technology at Patuakhali Science and Technology University (PSTU). It showed technological readiness, organizational support and awareness as the prime determinants to implement the technology. All these factors help to foster positive perceptions among students and staffs, as well as enhance the advantages of blockchain in the field of academics and administrative activities.

The overall attitude about blockchain is quite positive, however, there are some troubles that need to be tackled. These can be manifested as having small technological base, resistance to organizational change and lacking support systems. These factors can have an impact on the effectiveness of such blockchain implementation leveraging.

In order to overcome these problems, PSTU must strengthen its technological facilities, reinforce institutional supports and increase students', faculty and administrators' awareness. Capacity-building and awareness creation activities can help in creating awareness and knowledge on using and capacities of blockchain technology.

Last but not least the Study provides the students' views on the latter, which are applied to HEIs in developing countries. Efforts to adopt blockchain technology in universities can catalyze the adoption and implementation of the technology and solutions in the tech, organizational, and awareness aspects, which have the potential to improve the efficiency, transparency, and innovation of academic and administrative services provided by universities.

Practical Implication

From a practical perspective, the results indicate a number of strategies that can be implemented to enable PSTU to adopt the blockchain. Technological Factors (TF) (mean = 4.35 for TF2) suggest that investments in infrastructure and security are extremely important to ensure successful adoption. Technological infrastructure enhancement within the Universities will be given an importance in terms of the applications of the blockchain. Moreover, the high mean on Perception & Awareness Factors (PAF3) (mean = 4.33) requires universities to nurture public awareness in relation to the potential of blockchain, which can be done by conducting blockchain awareness-raising sessions for students and staff. Yet, the findings suggest that the institutional barriers need to be tackled such as resistance to change and technological issues, notably BF1 (mean = 4.23) and BF2 (mean = 4.35). Practical measures, such as training to raise the awareness on the blockchain and writing a clear policy plan for its use, can help overcome these challenges. The negative effect of Barriers on adoption ($\beta = -0.19$, $p = 0.0008$), highlights the importance of having an effective change management strategy when dealing with resistance. The experiences and lessons learned highlighted above indicate that while having the

technology ready is important, university efforts should also emphasize combating organization and individual resistance in implementing blockchain for successful integration.

Limitations and suggestions for future research

This study has several limitations that need consideration about the discoveries of various factors, which affects the intensity of using the blockchain at Patuakhali Science and Technology University (PSTU). The number of respondents included in the research was relatively small (100 students), enough to get a good picture but may not be representative of all respondents around the University, also especially administrators and faculty as larger numbers may reflect views different from this one. Second, the study centers only on PSTU, which is located in different region and state having different technological infrastructure, organizational culture, resources and hence, the findings of this study may not be applicable to university in other regions or with different level of resources. Third, the cross-sectional nature of the survey makes it difficult to capture the students' perception and attitude on the use of block chain technologies at a single point of time; the cross section further limits the ability to see how the awareness, organizational readiness, and adoption patterns may have shifted as blockchain technologies have further matured, or institutional policies have evolved. Fourth, self-reported attitudes and perceptions were used in the study which may be subject to social desirability bias and a subjective interpretation of the questions asked, which can skew results. Lastly the study covered a restricted number of themes and elements – technological factors, organizational factors, awareness and barriers – whilst other factors that could play significant role on the dynamics of adoption of blockchain were not examined such as policy frameworks, financial resources, cultural factors etc. and could add context to the discussion around the leverage of blockchain. The need and directions for further research are identified as the need for larger and more diverse samples of students, faculty and administrative staff across multiple universities and/or regions to augment the robustness and external validity of results. Moreover, longitudinal study designs would enable the monitoring of awareness and readiness for adoption as well as adoption behavior following a span of time to understand the adoption process more dynamically. Adding other factors like the cultural and behavioral attitudes, the technology support, funding methods and institutional policies could give a more comprehensive view of what challenges and factors facilitate the adoption of blockchain. In addition, there are some qualitative research methods, such as interviews, focus group, and case study, that if used alongside the quantitative surveys, will perhaps yield a deeper understanding of what motivates stakeholders, their experiences, and practical concerns. Last but not least, future studies could measure the real outcomes of the implementation of blockchain technology, such as better academic record management, efficiency, transparency, and data security, beyond just acknowledging or judging how ready institutions are and would enable them to draw more reliable measures from which to draw lessons and conclusions that can inform institutional strategy in making better use of the new technology.

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