© Universiti Tun Hussein Onn Malaysia Publisher's Office

JTMB

http://penerbit.uthm.edu.my/ojs/index.php/jtmb
ISSN : 2289-7224 e-ISSN : 2600-7967

Journal of Technology Management and Business

# Factors Influencing Blockchain-based Mobile Banking Adoption: Evidence from a Developing Country

**Mohammad Rokibul Kabir[1*], Md. Muntasir Hasan Khan[1], Md. Ibrahim[2]**

[1]East Delta University,
Noman Society East Nasirabad, Khulshi, Chattogram: 4209, BANGLADESH

[2]International Islamic University Chittagong,
Kumira, Sitakundo, BANGLADESH

*Corresponding Author

DOI: https://doi.org/10.30880/jtmb.2022.09.02.001
Received 06 July 2022, Accepted 17 August 2022, Available online 27 December 2022

**Abstract:** This study attempts to explain the factors influencing blockchain-based mobile banking acceptance in Bangladesh. Based on a technology acceptance framework termed UTAUT2 (unified theory of acceptance and use of technology 2), an enhanced model with a mediating variable is built for this research. Data were collected from the first-ever blockchain-based mobile banking stakeholders in Bangladesh called 'UPAY' by applying a structured questionnaire. Structural equation modeling was then processed using Smart-PLS. There are eight direct hypotheses and one mediating hypothesis in this research. The findings reveal that all of the direct hypotheses except the impact of social influence on the behavioural intention (BI) to use blockchain are statistically significant. The mediating role of BI in the connection between facilitating conditions (FC) and actual blockchain use is also supported. The combination of FC and BI contributes to 88.8% of the variation in blockchain usage behaviour for mobile banking adoption. The findings of this study can help banking regulators devise a strategy for engaging a significant number of banks to create a blockchain-based mobile banking platform.

**Keywords:** Blockchain use behaviour; Mobile banking, PLS-SEM, UPAY, UTAUT2

## 1. Introduction

Mobile phones have rolled into a vital tool for everyday life, opening the door for expanding banking services to serve the unbanked people through mobile banking (Amin et al. 2021; Kabir et al., 2020). Combining two of the most incredible technological advancements, the mobile phone and the internet, enables the banking sector to perform wireless banking operations (Barnes & Corbitt, 2003). The use of a smartphone to conduct monetary operations is known as mobile banking. Some financial companies, primarily banks, provide this service. From the previous research, the use of emerging digital technological innovations, such as telebanking, digital and mobile banking, and fintech has helped to provide new experiences (Harris & Wonglimpiyarat, 2019). In this connection, ease, accessibility, efficiency, profitability, efficacy and clarity of financial sector procedures have helped the industry solve some of the typical problems connected with enabling transactions across multiple sectors (Osmani et al., 2021). Still, there are some crucial factors in people's minds that created the need for more transparent mobile banking. If we could bring a new technology that is more transparent, it would get more popularity (Kabir, 2021). Blockchain technology (BT) can play an emerging role in this regard.

Blockchain is a decentralised, digital ledger that allows for safe business transactions, tracking and bitcoin transfers. Users can capture and share a broader understanding of a system's status across a decentralised system using this technology (peer-to-peer ledger system). Blockchain technology facilitates value transition and makes digital transactions more reliable than typical payment methods (Harris & Wonglimpiyarat, 2019). Blockchain is an up-and-

*Corresponding author: rokibul.k@eastdelta.edu.bd

coming and transformative technology since it reduces risk, eliminates fraud, and provides transparency in a scalable manner for a wide range of applications (Kabir & Islam, 2021). Moreover, it is a distributed ledger that contains data encryption blocks and links them together to build a sequential solitary for the information. Instead of being duplicated or transmitted, digital assets are dispersed, resulting in an irreversible record of the item. The asset is segregated, enabling complete real-time ingress and disclosure to the population. Blockchain's robust security features and the nature of a public ledger made it an excellent platform for almost any industry (Kabir et al., 2021). The fundamental goal is to let people who do not know each other communicate vital data safely, adulterate. Blocks, nodes, and miners are the three main ideas in the blockchain.

Blockchain-based applications are available to contribute for many sectors, including the development of digital payments that do not rely on a centrally controlled entity (Lee B. & Lee J., 2017). The fundamental concept is to incorporate exchanges into blocks and hold the entire exchange record on the blockchain-based platform. Due to the obvious immutability and transparency, each member can discern dual-spending, and the consensus protocol ensures that each dual-entry transaction is recorded (Puthal et al., 2018). The ownership of smart devices such as smartphones and smart watches is significantly greater than anytime, and mobile payment has emerged as a major payment method in a variety of fields (Xu et al., 2020). Hence, blockchain-based mobile banking is getting popular day by day for its secured and transparent procedure (Harris & Wonglimpiyarat, 2019). Therefore, it is a natural demand to support payment on mobile devices through transparent and secured services that made blockchain an obvious choice (Xu et al., 2020).

Financial innovations have ushered in a new era of finance industry innovation, with blockchain technology playing a pivotal role (Osmani et al., 2021). The banking industry is classified as a service industry, a tertiary industry that involves the conversion of material items, individuals, or information. For boosting the efficiency of the economic innovation system, banks compete by aggressively developing new technologies (Harris & Wonglimpiyarat, 2019). The rise of blockchain technology coincided with the financial services industries shifts to mobile payments, office less banking, and electronic exchange, threatening to disrupt international financial networks (Kawasmi et al., 2020). Kawasmi et al. (2020) also predict that this confluence from the traditional monetary institutions would give more suited offers for dusiverse emerging markets and assist both the global banks and financially excluded consumers. Blockchain will assist BTC in removing centralized potential vulnerabilities, which hackers can easily take advantage of. At the same period, doing data alteration is exceedingly unfeasible (Osmani et al., 2021).

Blockchain has just begun to transform, and it has become a hot topic in the financial services industries in the world. The main reason is that it is substantially less costly, and transactions are processed much faster (Ali et al., 2014). Financial institutions have been exploring methods to leverage the distributed ledger for clearing and JEIM settlement, money transfers and syndicated loans. Consequently, this will encourage banks to transfer funds more rapidly and correctly while decreasing transaction processing expenses (Osmani et al., 2021). Kabir et el. (2021) claimed that blockchain-based mobile banking systems are still in their infancy in Bangladesh; most businesses have yet to go through the analysis and implementation phases. Indeed, though mobile banking usage is increasing rapidly, it is encountered by numerous issues like safety and risk-free transactions, transaction's transparency. In this regard, blockchain can play an essential role as it is transparent, less time consuming, less costly, more reliable and more confidential (Amin et al., 2021). Blockchain can be utilised in financial firms to realize the goal of being Digital Bangladesh. On this backdrop, UCB Ltd. has recently started blockchain-based mobile banking app UPAY on March 2021. Hence, it is essential to explain the elements that lead to the adoption of BT. Thus, this study aims to explain the factors influencing the adoption of BT-based mobile banking with the extended “Unified Theory of Acceptance and Use of Technology 2” (UTAUT 2).

## 2. Literature on Blockchain Technology (BT) and Its Application in Banking

Modern technological advancements have made it possible to tackle inconsistency concerns and a lack of transparency and effective financial management (Kabir et al., 2021). It is an emerging and effective technology for the banking and financial sectors (Kabir & Islam, 2021). Users of these sectors are gaining more motivation and trust for the transparency of BT. BT is known as the "Security Protocol," It focuses on providing protection and high security. As a result, BT seems to be a revolutionary manner of preserving and exchanging data that allows for privacy while also increasing trust (Kabir et al., 2021).

Blockchain technology is a compact way to record transactions securely. Thanks to blockchain, many significant operations such as recording, tracking, and transferring information can be performed, and scalability may be achieved quickly. Its adoption will help to improve the system's tracing and tracking capabilities (Kabir et al., 2021). Transaction sets are merged into slabs of records connected in a blockchain system using the hash (#) of the previous slab’s record. Hence, the blockchain network's essential security feature is used as a property of unchangeability (Khatoon, 2020). BT's expanding progress and confidence about it all over the world economy is a sign of change, ensuring that the commercial sector's concerns of transparency and accountability are met (Kabir et al., 2021).

Most institutions viewed this digital technology that underpins cryptocurrencies like Bitcoin, Ethereum, and other currencies with suspicion and skepticism (Attaran & Gunasekaran, 2019). Bitcoin (BTC) is a new FinTech created in 2009 by Satoshi Nakamoto as accessible decentralised virtual money. BT is peer-to-peer (P2P) money that will revolutionize the international payment method by crossing national borders. It is viewed as a competitive medium of exchange to the traditional banking system (Harris & Wonglimpiyarat 2019). Hence, BT based mobile banking can bring a revolutionary change if applied appropriately (Kabir & Islam, 2021)

BT has demonstrated a tremendous expansion of distributed ledger technology, with an annual growth of over 100% (Lee B. & Lee J., 2017). It will become a significant trend in the coming years, with the potential to change a range of sectors, notably banking (Harris & Wonglimpiyarat, 2019). Digitalisation trends have fundamentally revolutionized and restructured business procedures, entire companies, and even entire industries. BT is thought to be the most recent innovation in fields such as finance, where trust is paramount (Ali et al., 2020). Furthermore, globalization, digitalisation, and financial advancements all impact (Kabir et al., 2021). Blockchain is capable of being one of the most remarkable transformational technologies ever developed. Records management, banking activities, governmental record-keeping can benefit from Blockchain technology (Peters & Panayi, 2015). As BT helps to maintain a safe and reliable solution with quick and precise transactions, it may avert a repetition of the 2008 recession. The use of blockchain technology can improve efficiency and reduce the cost of running a blockchain financial system (Kawasmi et al., 2020).

Kawasmi et al. (2020) also declare that traditional banks could save between $3 and $11 billion yearly in the United States and the United Kingdom only by embracing blockchain, which will decrease the operational costs of loans and mortgages.

In the context of Bangladesh, only 13% of the population having a bank account and more than 95% having mobile phone. However, the use of BT is very recent in Bangladesh and Southeast Asia (Kabir et al., 2021). Many banks have already started their journey of BT. It is a matter of joy that UCB has raised the name of mobile banking by the UPAY apps, which is blockchain-based apps. Thus, to gain greater acceptability and confirm pellucidity and efficacy, it is vital to interpret the factors affecting blockchain-based mobile banking adoption.

## 3. Theoretical Framework

From numerous theoretical models, findings of facts and linkages have revealed that the advent and implementation of technology can be well explained by Unified Theory of Acceptance and Use of Technology (UTAUT) (Kabir, 2021). The expansion of the UTAUT model to the consumer perspective, emphasizing the hedonic value (intrinsic motivation) of online consumers, was necessary by the emergence of digital technology. This resulted in three new components to the initial UTAUT: hedonic motivation, price value, and habit. The new, improved version is known as UTAUT2 (Tamilmani et al., 2021). It is worth noting that employing an independent model explains somewhere around 17% and 53% of the users' behavioral intent. The UTAUT model surpassed the other individual models in this respect (Williams et al., 2015). UTAUT's supremacy is due to its capacity to evaluate multi-level manifestations (Isaac et al., 2019). According to Alam & Uddin (2019), multifaceted constructs must be identified for an adequate elaboration of technological innovation acceptance. UTAUT, which is based on a stringent examination and evaluation of eight theories (see Appendix I), can be used for multi-layer research (Venkatesh et al., 2003). Kabir et al. (2021) claimed that the Blockchain –based banking adoption can be well explained by UTAUT.

According to Andreas (2012), the modifications provided in UTAUT 2 demonstrated a significant improvement in the variation explained in behaviour intention (56%-74%) and technology utilization (40%-52%) compared to UTAUT. Venkatesh (2012) proposed a comprehensive theoretical framework for innovation that combines the fundamental themes of eight previous models. The UTAUT model illustrates four factors (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions) that determine technical purpose and implementation (Kabir et al., 2021). However, three new extension mechanisms were added to UTAUT2: new mediating, outer and inner methods. Researchers have implemented, integrated, and extended UTAUT 2 throughout a range of settings to better understand human-technology adoption and utilization. These can be divided into six groups, including 1) various types of people, 2) varying kinds of organisations, 3) multiple kinds of tech, 4) various work forms, 5) various times, and 6) multiple places (Tamilmani et al., 2021). Applying the integrated model UTAUT 2 to describe technology adoption and behavioural motive in company activities is a superior alternative (Kabir et al., 2021).

### 3.1 Research Framework and Hypotheses

The major components in the basic UTAUT model describing usage intention and foremost use of innovation are performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). Among the constructs, PE and EE are individual indicators, SI is a social-indicator factor, and FC is at the organisational level (Venkatesh, 2012). Another critical construct in UTAUT 2 is hedonic motivation (HM), identified as enjoyable or pleasurable acquirement from using an innovation. HM has demonstrated the crucial influence in explaining technology acceptability and usability (Andreas, 2012). Furthermore, it is claimed that trust in BT and its stakeholders can be a crucial factor for understanding why blockchain is being used in mobile banking (Queiroz & Wamba, 2019). Thus, based on the UTAUT 2, the extended conceptual model is proposed in Figure 1.

### 3.1.1 Performance Expectancy (PE) Hypothesis

The extent to which a person believes that adopting new technology could enhance one's performance is referred to as performance expectancy. It is reasonable to determine that the more users enhance their performance with technology, the greater their behavioral intention (BI) to use it (Somon, 2020). Perceived usefulness, extrinsic incentive, and job fit are three elements that influence performance expectancy (Andreas, 2012). Somon (2020) referred that the best indicators of using technology are performance expectation and behavioural motive. In this study, a person's willingness to adopt and utilise a new modern tech like blockchain-based mobile banking is connected to their assessment of the technology's benefits in their daily lives.

Furthermore, blockchain will use its redistributed position to maintain seamless operations in the face of unpredictability (Kabir et al., 2021). Blockchain has several advantages, and better performance expectancy is desired from the users' perspective. Consumers prefer that the blockchain technology that underpins mobile banking is helpful and advantageous in conducting transactions because of these future benefits (Yeong et al., 2019). Prior research found that individual's desire to use adopt a technology is heavily influenced by PE (Venkatesh et al., 2003). The effective implementation of blockchain-based banking in various countries supports this assumption. For example, Kabir et al. (2021) in their study showed that performance expectancy positively influences behavioural intention to adopt blockchain-based banking. Therefore, our first hypothesis is formed.

**H1:** PE will have a positive influence on BI.

### 3.1.2 Effort Expectancy (EE) Hypothesis

The level of easiness regarding using a particular technology is referred to as effort expectancy Somon (2020). In the beginning stages of behaviour, when process issues are challenging to overcome, effort expectancy constructions are likely to be more prominent, but expectancy considerations will eventually overshadow them (Andreas, 2012). According to the UTAUT2, consumers are more inclined to adopt technologies to help them achieve their goals (Kabir et al., 2021). Users of BT are eager to be using the technology if they feel it will be easy to use. Furthermore, Somon (2020) claimed that EE and PE are tightly linked. However, the former is more associated with efficiency prospects, while the latter is more associated with effectiveness prospects. Blockchain facilitates the implementation of "smart contracts," founded on specific regulations and requiring minor or no manual interference (Somon, 2020). Thus, our second hypothesis is formed as,

**H2:** EE positively impacts the BI.

### 3.1.3 Perceived Trust (PT) hypothesis

The "trust" indicator has a significant link with an individual's willingness to adopt blockchain. BT is a disseminated record utilised throughout the system to capture and monitor records using a consensus method for ensuring integrity (Kabir, 2021). The use of information technology will have a significant role in their perception of trust (Owusu Kwateng et al., 2019). Kabir et al. (2021) referred that the adoption of developing technologies, security and trust are key factors. The presumption is that a private system is built into the trust model that is being developed. The status of this technology impacts people's views toward it, which influences their willingness to use it. Recent studies also indicate the importance of trust in deciding whether or not to accept the use of blockchain technology. It is becoming more popular among digital banking sectors for its transparency and easy transactions with less time. Consequently, this will encourage banks to transfer funds more rapidly and correctly while decreasing transaction processing expenses (Osmani et al., 2021). According to Pavlou et al. (2003), trust is a critical element in framing the intention to accept technology for banking, and trust is reinforced by the perceived notion that security systems are incorporated into blockchain platforms. Trust in blockchain will alter the system of providing banking services in the coming days. It is believed that customers will be more interested to accept blockchain-based banking transactions if they have faith in the technology (Kabir & Islam, 2021). Hence our third hypothesis is formed.

**Hypothesis 3 (H3):** PT has a positive influence on BI.

### 3.1.4 Social Influence (SI) Hypothesis

The level to which a person expects that prominent people have faith that technology use is essential is referred to as social influence (Andreas, 2012). According to Owusu Kwateng et al. (2019), the value people place on the perception of close relationships when deciding whether or not to adopt a particular invention is referred to as social influence. An individual evaluates actual societal occurrences in influencing self-behaviour while deciding on them. Moreover, individuals are influenced by co-workers, family, and significant others, according to observations. Recent researches have demonstrated the significance of SI in technological acceptance. SI, for example, has a crucial part in explaining mobile banking adoption behaviour (Kabir et al., 2021). As a result, it is essential researching how such influences might affect the decision to adopt BT (Somon, 2020). Therefore, our fourth hypothesis is considered.

**H4:** SI has a positive impact on BI.

### 3.1.5 Hedonic Motivation (HM) Hypothesis

The pleasure derived from adopting technology is referred to as hedonic motivation (HM). In information system (IS) research, the idea of perceived enjoyment is thought to impact consumer adoption and use of tech. Hedonic motivation has been a vital component of innovation adoption and uses in the customer's perspective (Owusu Kwateng et al., 2019). Customer loyalty begins with psychological aspects of appraisal and choice that develop feelings and behaviour about new tech, eventually leading to affective and repetitive adoption habits (Pérez-Sánchez et al., 2021). Again, when consumers initially utilise technology, they are more interested in its uniqueness (Owusu Kwateng et al., 2019). Previous research showed that BT is a blessing for its transparency and uniqueness (Kabir et al., 2021). According to Jain et al. (2022), HM explains blockchain acceptance. As per the findings of Pieters et al. (2022), internal motivations, in the shape of HM, are important considerations in the organisational setting and play a significant role in influencing the acceptance of blockchain for e-commerce. Ali, Z., & Bano (2022) in their study showed that HM can positively influence mobile-banking payment systems acceptance intention. Thus, our fifth hypothesis is formed.

**H5:** HM has a positive impact on BI.

### 3.1.6 Facilitating Conditions (FC) Hypotheses

The measure to which a user perceives that the system's technical groundwork and organisation exist to facilitate its use is characterized as FC (Andreas, 2012). It has been noticed that professional and well-structured organisations' clients tend to encounter more difficulties in digesting new or complex information, impacting their ability to learn the latest technology (Owusu Kwateng et al., 2019). The transactions that happened by blockchain are recorded on the web. In terms of infrastructure expenses, this shows a massive non-barrier deployment. Furthermore, the blockchain system allows for the easy tracking of transactions, which benefits blockchain's members (Kabir et al., 2021). The globally connected structure of blockchain users' needs technological resources to facilitate its utilization; a shortage of resources will have a detrimental impact on the use of the technology (Somon, 2020).

On the other hand, FC is found to impact technology acceptance and use, which is consistent with the majority of previous research. According to the UTAUT paradigm, It is clear that the presence of FC impacts the intent to adopt technologies (Kabir et al., 2021). From the above discussion, our sixth and seventh hypotheses are considered.

**H6:** FC has a positive effect on BI

**H7:** FC has a positive impact on blockchain use behaviour.

### 3.1.7 Behavioural Intention (BI) and Blockchain Use Behavior (BUBR) Hypothesis

In order to forecast future behaviour, sociologists have examined behavioural intentions and user's conscious purpose. The connection between behavioural intention and use is explained by numerous frameworks, including UTAUT and UTAUT 2. Behaviour intention (BI) is the level to which a person is persuaded to adopt something latest is behavioural intention (BI) (Kabir et al., 2021). In forecasting behaviour, BI considers both internal and external elements (Liu, 2013). However, behavioural intention is linked to one's internal assessment. As a result, behavioural purpose comes before behavioural expectations. Consequently, BI has a direct impact on BUBR (Liu, 2013). Hence, our eighth hypothesis is formed.

**H8:** BI positively influences BUBR.

### 3.1.8 Mediating Hypothesis

Several studies examined the impact of facilitating conditions (FC) on technology adoption intention, and actual adoption. The measure to which a user perceives that the system's technical groundwork and organisation exists to facilitate its use is characterized as FC (Andreas, 2012). FC can be considered as a technology adoption impacting factor, both actively and passively. Nonetheless, it is undeniable that FC is a reliable predictor of actual usage (Kabir et al., 2021). Theoretically and experimentally, we propose that FC predicts using technology through existing literature (Andreas, 2012). We also contend that the BI has a significant impact on BUBR. It is hypothesized that FC, both conceptually and methodologically, predicts the intention to use technology (Qi, 2009; Rajan & Baral, 2015; Raza et al., 2018; Venkatesh et al., 2012). According to Kabir et al. (2021), BI has a significant impact on blockchain usage behavior (BUBR). Previous research reinforces our claim (Alam & Uddin, 2019; Rajan & Baral, 2015). According to prior findings, BUBR is impacted by FC and mediated by BI (Alam & Uddin, 2019; Dwivedi et al.,2019; Raza et al.,2018). Thus, we assume BI has a median role in influencing the relationship between FC and BUBR. Hence, our ninth hypothesis is developed.

**H9:** BI mediates the relationship between FC and BUBR**.**

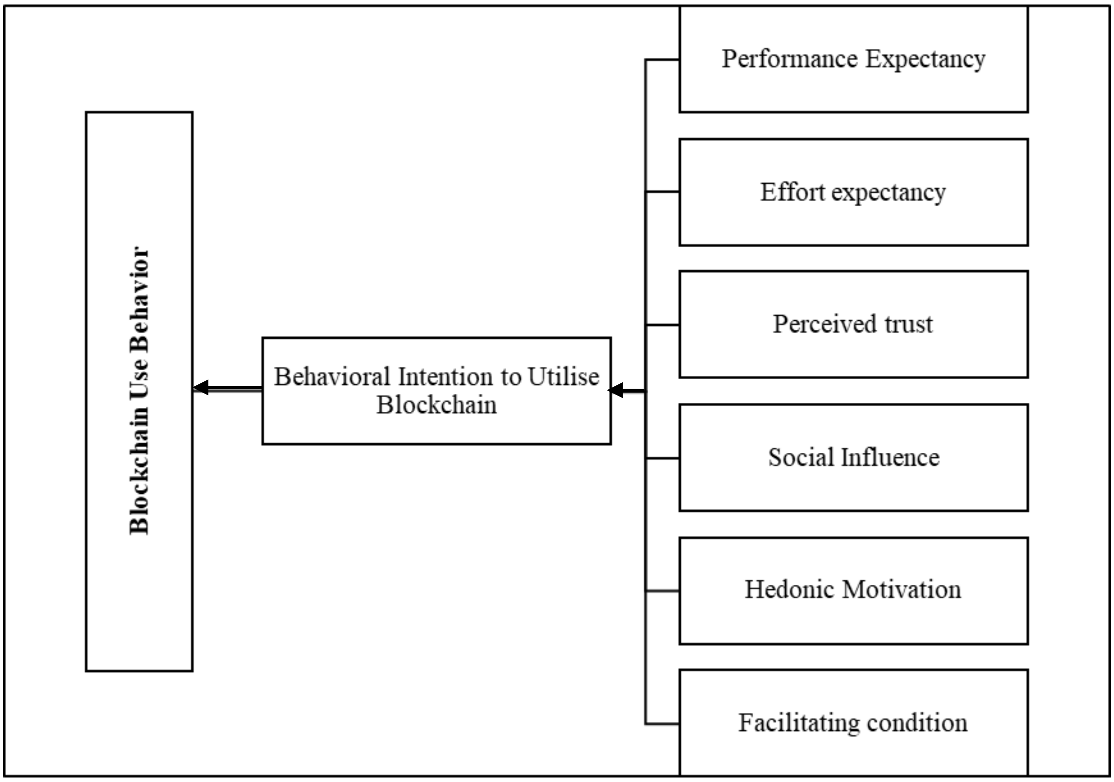


**Fig. 1 - Theoretical framework based on UTAUT 2**

## 4. Research Methodology

A survey questionnaire was used to collect data for attaining the research objectives. The survey was designed using the UTAUT2 framework, with changes to reflect the factors influencing blockchain-based m-banking adoption in Bangladesh (Weerakkody et al. 2013). As the survey technique of primary data gathering is used to represent people's attitudes, this questionnaire survey for understanding and describing an individual's choice to adopt blockchain technology can play an important role (Somon, 2020).

The analysis section of this study is divided into two segments. The measurement model (MM) is evaluated first. The MM segment ensures that the study is consistent, credible, and relevant. The influences of exogenous factors on BT BI and BUBR are then described using a structural equation model (SEM) (Kabir et al., 2021). Furthermore, this study flow is an excellent way to evaluate a model (Henseler et al., 2015). Firstly, factor loadings, Cronbach's alpha, composite reliability (CRI) and Dijkstra–rho are used to assess consistency and convergent validity. Secondly, cross-loadings, Fornell–Larcker criterion and heterotrait–monotrait (HTMT) ratio are used to test discriminative validity. The variance inflation factor (VIF) statistic is also used to verify the exclusion of multicollinearity. Finally, the SEM is verified using the coefficient of determination ($R^2$) and effect size ($f^2$) (Chin et al., 2003). The hypotheses are tested at 5% significance.

### 4.1 Reasons for Choosing PLS-SEM

SEM is the process of integrating latent components and structural interactions. PLS-SEM is a route model component that stores indicators and their connections with the constructs (Kabir et al., 2021). It is a proper analytical technique that is primarily linear and cross-sectional in structure. The measuring paradigm is evaluated based on internal consistency, convergent validity, and discriminate validity (Cepeda-Carrionet et al., 2019).

Researchers can use two core methods to create SEM: CB-SEM (covariance-based SEM) and PLS-SEM (Rigdon et al., 2017). However, deciding which model to use might be tricky (Kabir, 2021). The models are based on numerous factors, and the correct method must be chosen based on the strategy that best matches (Hair et al., 2017). PLS-SEM is used for its powerful predicting abilities, ability to cope with non-normal datasets, small sample size, and advanced processing (Cas et al., 2014). Identification of unexplained heterogeneity (UH) is a bonus of using PLS-SEM (Yuan, 2011). According to Hair et al. (2016?2017?), PLS-SEM structural model analysis is a "silver bullet" for determining cause and effect when used correctly. Compared to PLS-SEM, a few parameters are neglected while using CB-SEM to get reasonable goodness of fit. Consistency, validity, and reliability are usually tenacious when implementing PLS-

SEM (Rigdon et al., 2017). Furthermore, PLS-SEM outperforms CB-SEM in determining the variance described in a regression model (Rigdon et al., 2017).

CB-SEM offers excellent results in terms of verifying hypotheses that have already been proven. On the other side, PLS-SEM is a quantitative method employed both for confirmatory research and exploratory study (Sarstedt et al., 2014). In deciding between CB-SEM and PLS-SEM, scholars must consider that PLS-SEM is stronger than CB-SEM. PLS- SEM's strength makes it ideal for creating a structural model, as needed in this research (Wold, 1980).

Lastly, PLS-SEM may be applied for both determinative and contemplative modelling strategies, as per Ramayah et al. (2018). It may be used with minimal datasets, but CB-SEM is the best used with a reflective model and a significant sample size. As a result, based on the supporting literature, the PLS-SEM is assessed to create the needed framework for this research.

## 4.2 Sample Size

For this study, UPAY users who understand blockchain-based mobile banking are taken as the respondents. As blockchain-based m-banking is a novel initiative in Bangladesh (initiated in March 2021), the number of people having proper knowledge on this issue is not many. Browne (1995) suggests that a common rule of thumb for approximating a measure is to use 30 or more ample sizes. In this case, the sample size needs to set at a "minimum five observations per parameter" (Martins et al., 2014). Moreover, PLS-SEM with 5000 bootstrap samples can explain the phenomena correctly as this technique can produce expected results even with a small sample size (Ramayah et al., 2018). With limited people available fulfilling both the criteria, the study's sample size is 58.

## 4.3 Data Collection Procedure

The core data of this research are collected from the UPAY (the first blockchain-based mobile banking in Bangladesh) platform users. When the topic area is relatively fresh, and second-hand data is insufficient to assess the research problem, collecting primary data is the best option. Because BT-based mobile banking is entirely a new phenomenon in Bangladesh, evaluating the variables influencing participant's intentions to utilise it is an enthusiastic topic to investigate with primary data. The data was gathered using a survey. The survey questionnaire was delivered digitally, allowing it to comply with the COVID-19 pandemic's safety and health criteria and complete the procedure appropriately. The survey was created using Google Forms and shared over online peer-to-peer technologies (Email) and social media platforms (WhatsApp, Facebook Messenger etc.). The survey began on July 15, 2021, and finished on July 25, 2021. Thus, the survey has an 11-day response time.

We confirmed that the respondents had given their well-versed accord and had the exclusive right to privacy. At the top of the questionnaire, we explained the objectives, welfares, limits of our study and also gave some initial ideas about blockchain. We also invited respondents to choose from various response choices as there are no correct or incorrect answers. We also suggested against writing the names of the participants.

## 4.4 Questionnaire

The questionnaire of the study is designed with a 5-point Likert scale. The scale is divided into levels of replies, with one representing "fully disagree" and five representing "fully agree". The questionnaire questions are included based on an extensive literature survey, as shown in table 1.

**Table 1 - Sources of the questionnaire**

| Construct | Items | Sources |
|---|---|---|
| Performance Expectancy (PE) | PE1 The use of blockchain technology in mobile banking facilitates the documentation of financial transactions.<br>PE2 The completion of mobile transactions can be swiftly done by blockchain technology.<br>PE3 My financial transaction productivity can be improved by using BT based mobile banking.<br>PE4 The use of blockchain technology improve the effectiveness of mobile banking. | (Alalwan et al., 2017), (Kabir et al., 2021), (Somon, 2020) |
| Effort Expectancy (EE) | EE1 Learning about using blockchain technology is simple.<br>EE2 It is easy to become familiar with blockchain technology application-based mobile banking.<br>EE3 Blockchain-based mobile banking allows for more efficient monetary operations.<br>EE4 M-banking facilitated by blockchain allows for easier monitoring with little effort. | (Somon, 2020), (Kabir et al., 2021) |
| Perceived Trust | PT1 I believe that blockchain-based m-banking is transparent and | (Alalwan et al. |

| | | |
|---|---|---|
| (PT) | reliable.<br>PT2 I am confident that all users will be able to complete blockchain transactions correctly.<br>PT3 I believe I can put my faith in blockchain-based mobile banking.<br>PT4 I have no doubts about the integrity of BT based mobile banking.<br>PT5 I would trust BT based m-banking to get its task done even if it is not supervised. | 2017), (Kabir, 2021), (Kabir et al., 2021) |
| Social Influence (SI) | SI1 People that matter to me believe that I should adopt blockchain technology.<br>SI2 Individuals who influence me advise me to use blockchain-based m-banking.<br>SI3 Persons whose viewpoints I respect want me to use blockchain technology form-banking.<br>SI4 Influential people's perception of my Blockchain-based m-banking activities is crucial for me. | (Somon, 2020) |
| Hedonic Motivation (HM) | HM1 M- banking transactions based on BT is pleasant to use.<br>HM2 Blockchain-based m-banking is enjoyable and exciting.<br>HM3 Using Blockchain for m-banking is an entertaining experience.<br>HM4 It is motivating to use such an innovation like BT on m-banking.<br>HM5 Using blockchain technology for mobile financial transactions is exciting. | (Mahomed 2017), (Alalwan et al. 2017) (Kabir, 2021) |
| Facilitating Conditions (FC) | FC1 I believe, m-banking (UPAY) has the requisite resources to utilise blockchain technologies.<br>FC2 In my opinion, m-banking (UPAY) provides the fundamental understanding to utilise blockchain technologies.<br>FC3 M-banking (UPAY) service provider ensures that a dedicated person (or team) can help with blockchain-related issues. | (Kabir et al., 2021), (Mahomed 2017) |
| Behavioural intention to utilise Blockchain (BI) | BI1 I intend to utilise blockchain technologies for mobile banking.<br>BI2 I think I should use all the trustworthy m-banking platform using blockchain technologies.<br>BI3 If provided the chance, I believe I would utilise blockchain technology for other financial transactions.<br>BI4 I believe I will continue to use blockchain technology in the future. | (Kabir et al., 2021), (Mahomed 2017) |
| Blockchain Use Behavior (BUBR) | BUBR1 I am a happy user of blockchain-based mobile banking finance.<br>BUBR2 I choose m-banking as it is based on blockchain.<br>BUBR3 For m-banking, I support blockchain-based financing transactions more than traditional banking.<br>BURB4 I prefer to use blockchain-based m-banking service for financial transactions. | (Kabir et al., 2021) |

## 4.5 Demographic Characteristics of the Respondents

The questionnaire was sent to a total of 65 potential respondents who were directly connected to the UPAY mobile banking services in the very first quarter after its launching. Since most of the people were still new to use this, the number of people targeted was less and they have been reached through the snowball technique. The number of usable returned questionnaire was 58 with a success rate of 89.23%. During the survey, 46.55% of the respondents (27) were connected from Chittagong, whereas 53.45% were from other divisions of Bangladesh (31 respondents). Number of females (17) and males (41) consist of 29.31% and 70.68% respectively showing a male dominated gender profile. The age-range of 18-30 includes 22 respondents (37.93%) while 31-42 years age group consists of 27.59% with 16 respondents mostly representing youth. The rest of the respondents of 20 (34.48%) consists of people of other age groups. Blockchain-based mobile app (UPAY) users for transactions consist of 48.28% with 28 participants, UPAY service providing shops include 21 respondents (36.20%) and the employees of UPAY consist of 15.52% with 9 participants.

# 5. Findings

## 5.1 Measurement Model

Confirmatory factor analysis was used to establish the suggested model's reliability and validity (Talukder et al., 2019). To verify the reliability of all constructs, the composite reliability index (CRI) and Dijkstra–rho are calculated. The CRI of each research construct is greater than .7, indicating that the parameters are applicable (Sarstedt et al., 2020). Similarly, a Cronbach alpha and $r_A$ above .7 establish each case's internal consistency and reliability (Dijkstra & Henseler, 2015). In this research, three estimations are utilised to determine convergent validity. The magnitude of the loading, the average variance extracted (AVE), and the significance of loadings were all evaluated. All external loadings should be .5 or above as long as the AVE is greater than .5 (Hair et al., 2016; Vinzi et al., 2010). Table 2 indicates that each outside loading is more than .5. For each scenario, the AVE is more than .5 as well. Thus, all of the necessary fitness criteria are met. The CRIs for all research constructs are larger than .7 and higher than the respective AVEs (See Table 2). Lastly, the significance of the loadings was determined using a bootstrap re-sampling technique (Sarstedt et al., 2020). Hence, the consistency and convergent validity of the model is verified.

**Table 2 - Validity and reliability scores**

| | Loadings | Significance | Cronbach's Alpha | Dijkstra–Henseler's Rho($r_A$) | CRI | AVE |
|---|---|---|---|---|---|---|
| BI1 | 0.882 | 0.000 | 0.910 | 0.913 | 0.937 | 0.895 |
| BI2 | 0.896 | 0.000 | | | | |
| BI3 | 0.884 | 0.000 | | | | |
| BI4 | 0.888 | 0.000 | | | | |
| BUBR | 0.713 | 0.000 | 0.793 | 0.833 | 0.878 | 0.709 |
| BUBR | 0.873 | 0.000 | | | | |
| BUBR | 0.926 | 0.000 | | | | |
| EE1 | 0.828 | 0.000 | 0.804 | 0.824 | 0.872 | 0.631 |
| EE2 | 0.680 | 0.000 | | | | |
| EE3 | 0.828 | 0.000 | | | | |
| EE4 | 0.831 | 0.000 | | | | |
| FC1 | 0.745 | 0.000 | 0.814 | 0.878 | 0.888 | 0.727 |
| FC2 | 0.867 | 0.000 | | | | |
| FC3 | 0.935 | 0.000 | | | | |
| HM1 | 0.839 | 0.000 | 0.786 | 0.793 | 0.875 | 0.699 |
| HM2 | 0.810 | 0.000 | | | | |
| HM3 | 0.859 | 0.000 | | | | |
| PE1 | 0.932 | 0.000 | 0.914 | 0.917 | 0.946 | 0.854 |
| PE2 | 0.926 | 0.000 | | | | |
| PE3 | 0.914 | 0.000 | | | | |
| PT1 | 0.500 | 0.000 | 0.877 | 0.928 | 0.913 | 0.686 |
| PT2 | 0.912 | 0.000 | | | | |
| PT3 | 0.915 | 0.000 | | | | |
| PT4 | 0.840 | 0.000 | | | | |
| PT5 | 0.900 | 0.000 | | | | |
| SI1 | 0.903 | 0.000 | 0.832 | 0.855 | 0.900 | 0.751 |
| SI2 | 0.767 | 0.000 | | | | |
| SI3 | 0.922 | 0.000 | | | | |

### 5.1.1 Cross Loadings

Discriminant validity (DV) is required to verify reliable measurement models. It refers to the extent to which one set differs from other sets based on scientific standards. In this case, two regularly used DV tests are usually evaluated.

The first strategy is to assess cross-loading. To be exact, Outside factor loading in a construct must score higher than the cross-loadings on different constructs (Sarstedt et al., 2020). Table 3 ensures that the cross-loading needs are fulfilled.

**Table 3 - Cross loadings**

| | BI | BUBR | EE | FC | HM | PE | PT | SI |
|---|---|---|---|---|---|---|---|---|
| BI1 | 0.882 | 0.731 | 0.657 | 0.450 | 0.656 | 0.667 | 0.591 | 0.681 |
| BI2 | 0.896 | 0.764 | 0.635 | 0.540 | 0.711 | 0.839 | 0.520 | 0.716 |
| BI3 | 0.884 | 0.873 | 0.597 | 0.529 | 0.733 | 0.772 | 0.368 | 0.663 |
| BI4 | 0.888 | 0.826 | 0.616 | 0.451 | 0.787 | 0.769 | 0.539 | 0.678 |
| BUBR1 | 0.521 | 0.713 | 0.310 | 0.685 | 0.450 | 0.434 | 0.324 | 0.322 |
| BUBR2 | 0.884 | 0.893 | 0.597 | 0.529 | 0.733 | 0.772 | 0.368 | 0.663 |
| BUBR3 | 0.888 | 0.926 | 0.616 | 0.451 | 0.787 | 0.769 | 0.539 | 0.678 |
| EE1 | 0.693 | 0.610 | 0.828 | 0.413 | 0.650 | 0.594 | 0.373 | 0.506 |
| EE2 | 0.487 | 0.398 | 0.680 | 0.064 | 0.360 | 0.351 | 0.314 | 0.439 |
| EE3 | 0.502 | 0.459 | 0.828 | 0.444 | 0.548 | 0.492 | 0.155 | 0.311 |
| EE4 | 0.507 | 0.474 | 0.831 | 0.252 | 0.471 | 0.463 | 0.080 | 0.388 |
| FC1 | 0.285 | 0.369 | 0.218 | 0.745 | 0.177 | 0.260 | 0.063 | 0.010 |
| FC2 | 0.484 | 0.576 | 0.301 | 0.867 | 0.412 | 0.423 | 0.208 | 0.228 |
| FC3 | 0.587 | 0.623 | 0.424 | 0.935 | 0.491 | 0.550 | 0.334 | 0.271 |
| HM1 | 0.704 | 0.624 | 0.632 | 0.449 | 0.839 | 0.648 | 0.488 | 0.482 |
| HM2 | 0.597 | 0.591 | 0.434 | 0.298 | 0.810 | 0.445 | 0.247 | 0.417 |
| HM3 | 0.735 | 0.779 | 0.560 | 0.377 | 0.859 | 0.565 | 0.459 | 0.510 |
| PE1 | 0.845 | 0.742 | 0.617 | 0.549 | 0.675 | 0.932 | 0.418 | 0.675 |
| PE2 | 0.768 | 0.706 | 0.553 | 0.441 | 0.601 | 0.926 | 0.263 | 0.731 |
| PE3 | 0.768 | 0.784 | 0.520 | 0.403 | 0.568 | 0.914 | 0.399 | 0.676 |
| PT1 | 0.198 | 0.122 | 0.016 | -0.034 | 0.123 | 0.054 | 0.491 | 0.152 |
| PT2 | 0.519 | 0.465 | 0.262 | 0.259 | 0.415 | 0.352 | 0.912 | 0.408 |
| PT3 | 0.561 | 0.475 | 0.344 | 0.279 | 0.520 | 0.447 | 0.915 | 0.420 |
| PT4 | 0.448 | 0.360 | 0.290 | 0.120 | 0.403 | 0.332 | 0.840 | 0.390 |
| PT5 | 0.517 | 0.498 | 0.239 | 0.323 | 0.433 | 0.313 | 0.900 | 0.390 |
| SI1 | 0.742 | 0.625 | 0.541 | 0.356 | 0.543 | 0.755 | 0.440 | 0.903 |
| SI2 | 0.553 | 0.495 | 0.259 | 0.031 | 0.370 | 0.513 | 0.247 | 0.767 |
| SI3 | 0.691 | 0.645 | 0.532 | 0.161 | 0.536 | 0.657 | 0.440 | 0.922 |

## 5.1.2 Fornell–Larcker Condition and HTMT Ratio

Fornell–Larcker criterion is the second DV test (Sarstedt et al., 2020). The results of the research suggest that there is an appropriate level of DV (Table 4). Henseler et al. (2015) established an HTMT (Heterotrait–monotrait) ratio with a cutoff point of .90 to quantify DV in the resolution. HTMT is a complete and accurate scale of discriminant validity (Henseler et al., 2015; Kabir et al., 2021). Hence, the discriminant validity of the study is ensured with appropriate level of HTMTs (Table 5).

**Table 4 - Fornell–Larcker condition**

| | BI | BUBER | EE | FC | HM | PE | PT | SI |
|---|---|---|---|---|---|---|---|---|
| BI | 0.947 | | | | | | | |
| BUBER | 0.932 | 0.842 | | | | | | |
| EE | 0.704 | 0.624 | 0.794 | | | | | |
| FC | 0.555 | 0.633 | 0.384 | 0.853 | | | | |
| HM | 0.816 | 0.800 | 0.654 | 0.452 | 0.836 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PE | 0.860 | 0.805 | 0.611 | 0.505 | 0.667 | 0.924 | | |
| PT | 0.567 | 0.494 | 0.304 | 0.262 | 0.486 | 0.392 | 0.828 | |
| SI | 0.771 | 0.684 | 0.527 | 0.227 | 0.565 | 0.750 | 0.443 | 0.867 |

**Table 5 - HTMT ratio**

| | BI | BUBER | EE | FC | HM | PE | PT | SI |
|---|---|---|---|---|---|---|---|---|
| BI | | | | | | | | |
| BUBER | 0.878 | | | | | | | |
| EE | 0.808 | 0.741 | | | | | | |
| FC | 0.615 | 0.801 | 0.443 | | | | | |
| HM | 0.855 | 0.881 | 0.796 | 0.521 | | | | |
| PE | 0.839 | 0.820 | 0.696 | 0.554 | 0.777 | | | |
| PT | 0.616 | 0.556 | 0.349 | 0.296 | 0.546 | 0.416 | | |
| SI | 0.879 | 0.805 | 0.616 | 0.301 | 0.687 | 0.851 | 0.494 | |

## 5.2 Structural Model

After verifying reliability and validity, the SEM was put to the test. The multicollinearity of the system was investigated with variance inflation factor (VIF) (Sarstedt et al., 2020). We examined whether VIFs are less than 3.3 to claim no collinearity (Henseler et al., 2015). After that, a bootstrapping technique with 5000 samples was used to assess the weight values. Since all the weights are significant and VIFs are less than 3.3, the absence of multicollinearity is assured.

### 5.2.1 Coefficient of Determination ($R^2$)

$R^2$ is a measurement that demonstrates the ability to forecast. The cumulative influence of the independent constructs on the dependent construct is expressed by $R^2$. (Chin, 1998) suggested three alternative $R^2$ value ranges: weak (.02 - .13), moderate (.13 - .26), and considerable (more than .26).

**Table 5 - Non-collinearity variance inflation factor (VIF) test**

| | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values | VIF |
|---|---|---|---|---|
| BI1 <- BI | 0.882 | 30.189 | 0.000 | 2.970 |
| BI2 <- BI | 0.896 | 32.495 | 0.000 | 3.142 |
| BI3 <- BI | 0.884 | 24.594 | 0.000 | 2.707 |
| BI4 <- BI | 0.888 | 25.807 | 0.000 | 2.718 |
| BUBR1 <- BUBR | 0.713 | 5.475 | 0.000 | 1.486 |
| BUBR2 <- BUBR | 0.873 | 23.281 | 0.000 | 2.124 |
| BUBR3 <- BUBR | 0.926 | 42.125 | 0.000 | 2.684 |
| EE1 <- EE | 0.828 | 21.930 | 0.000 | 1.608 |
| EE2 <- EE | 0.680 | 7.606 | 0.000 | 1.303 |
| EE3 <- EE | 0.828 | 14.869 | 0.000 | 2.184 |
| EE4 <- EE | 0.831 | 15.995 | 0.000 | 2.222 |
| FC1 <- FC | 0.745 | 4.661 | 0.000 | 1.686 |
| FC2 <- FC | 0.867 | 14.285 | 0.000 | 1.991 |
| FC3 <- FC | 0.935 | 33.126 | 0.000 | 2.711 |
| HM1 <- HM | 0.839 | 22.580 | 0.000 | 1.616 |
| HM2 <- HM | 0.810 | 14.162 | 0.000 | 1.616 |
| HM3 <- HM | 0.859 | 18.224 | 0.000 | 1.700 |
| PE1 <- PE | 0.932 | 53.731 | 0.000 | 3.314 |

| | | | | |
|---|---|---|---|---|
| PE2 <- PE | 0.926 | 38.566 | 0.000 | 3.364 |
| PE3 <- PE | 0.914 | 30.574 | 0.000 | 2.930 |
| PT1 <- PT | 0.491 | 3.723 | 0.000 | 1.311 |
| PT2 <- PT | 0.912 | 30.076 | 0.000 | 3.699 |
| PT3 <- PT | 0.915 | 32.109 | 0.000 | 3.590 |
| PT4 <- PT | 0.840 | 16.828 | 0.000 | 2.649 |
| PT5 <- PT | 0.900 | 24.633 | 0.000 | 3.224 |
| SI1 <- SI | 0.903 | 42.941 | 0.000 | 2.625 |
| SI2 <- SI | 0.767 | 9.829 | 0.000 | 1.525 |
| SI3 <- SI | 0.922 | 49.896 | 0.000 | 2.964 |

**Table - 6 Structural Equation Modeling (SEM) results**

| | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values | Hypothesis Decision | $R^2$ | $f^2$ |
|---|---|---|---|---|---|---|
| BI -> BUBR | 0.840 | 15.110 | 0.000 | Accepted | 0.888 | 4.354 |
| FC -> BUBR | 0.166 | 2.463 | 0.014 | Accepted | | 0.171 |
| FC -> BI | 0.143 | 2.090 | 0.037 | Accepted | 0.905 | 0.280 |
| EE -> BI | 0.122 | 1.961 | 0.050 | Accepted | | 0.150 |
| HM -> BI | 0.270 | 3.767 | 0.000 | Accepted | | 0.309 |
| PE -> BI | 0.306 | 3.172 | 0.002 | Accepted | | 0.278 |
| PT -> BI | 0.139 | 2.681 | 0.007 | Accepted | | 0210 |
| SI -> BI | 0.230 | 2.521 | 0.012 | Accepted | | 0.204 |

The bootstrapping method was used to determine the relevance of the predicted structural coefficients. The $R^2$ test, which represents the observed variation in the internal construct, is used to assess the model's predictive power (Kabir et al., 2021). The $R^2$ value in Table 6 demonstrates that PE, EE, SI, PT, HM, and FC can explain 90.5% of BI changes. Lastly, the combination of FC and BI contributes to 88.8% of the variation in blockchain usage behaviour (BUBR) for mobile banking adoption.

### 5.2.2 Effect Size ($f^2$) of the Main Effect Model

The change in $R^2$ caused by removing a specific exogenous construct from the estimated regression is measured by effect size. The $f^2$ value explains if the element left out significantly affects the endogenous construct (Sarstedt et al., 2020). Based on values of 0.350, 0.150, and 0.020, the $f^2$ scores are divided into three categories: large, moderate, and small. According to Chin et al. (2003), if the other factors are adequate, it is permissible to accept a small $f^2$.

As per Cohen (1988), the effects of HM, SI, PE FC, EE, and PT on BI are moderate. BI has a large impact on BUBR, whereas FC has a moderate effect.

### 5.2.3 Results of Direct Hypotheses

At a 5% level of significance, all direct hypotheses were supported (see Table 6). Both individual-level hypotheses are supported; however, PE (Beta = .306 and $p < .05$) has a greater positive impact on BI than EE (Beta = .122 & $p < .05$). Thus, hypothesis 1 and hypothesis 2 are supported. The additional variable included in this research with UTAUT2 called PT positively impacts BI (Beta = 0.139 and $p < 0.05$), supporting hypothesis 3. Furthermore, hypothesis 4, the single social-level hypothesis, is supported, implying that SI has a considerable impact on BI with a beta of .230 and $p < .05$. HM has a significant impact on BI at the 5% significance level (Beta = .270 and $p < .05$), supporting hypothesis 5. At the 95% confidence level, the organisational level factor FC has a significant influence on both BI (Beta = .143 and $p < .05$) and BUBR (Beta = .166 and $p < .05$), ensuring the acceptance of hypotheses 6 and 7. Ultimately, it is discovered that the desire to utilise blockchain-based m-banking (BI) has a strong and significant influence on blockchain adoption (BUBR) (Beta = .840 and $p < .05$). Thus, hypothesis 8 is also accepted.

### 5.2.4 Result of Mediating Hypothesis

To illustrate mediating power, the PLS-SEM approach of bootstrapping is widely used. Sarstedt et al. (2020) argued that bootstrapping has the advantage of dealing with a smaller dataset. Bootstrapping through Preacher and Hayes' protocol is suitable (Geisser, 1974). Table 7 shows that the intention to use blockchain-based mobile banking (BI) mediates the relation between facilitating conditions (FC) and blockchain use behaviour, indicating that hypothesis 9 is supported. Partial mediation (PM) exists as both the direct (FC -> BUBR) and indirect (FC -> BI -> BUBR) effects are considerable. According to Hale and Ojeda (2018), the observations in Table 7 indicate that BI has a complimentary partial mediating effect on the FC-BUBR relationship.

**Table 7 - Results of indirect hypothesis**

| | Original Sample (O) | statistics (\|O/STDEV\|) | P Values | Hypothesis Decision |
|---|---|---|---|---|
| FC -> BI -> BUBR | 0.120 | 2.199 | 0.028 | Accepted |
| FC -> BUBR | 0.166 | 2.463 | 0.014 | Accepted |

## 5.3 Predictive relevance ($Q^2$)

The Stone–Geisser $Q^2$ values and the degree of $R^2$ should be evaluated as a predictive accuracy parameter (Geisser, 1974). The blindfolding approach was used to assess the $Q^2$ of cross-validated redundancy and communality. A $Q^2$ value greater than zero in SEM indicates that a variable has explanatory power (Sarstedt et al., 2020). It is satisfactory if the communality is greater than 0.4. Moreover, Gratz and Gravetter (1999) recommended that communality scores of less than 0.2 be avoided. The $Q^2$ scores in Table 8 and Table 9 were computed using a blindfolding approach, and every $Q^2$ value satisfied the required threshold (Sarstedt et al., 2020).

**Table 8 - Construct cross-validated communality**

| | SO | SSE | Q² (=1-SSE/SSO) |
|---|---|---|---|
| **BI** | 232.000 | 86.582 | 0.627 |
| **BUBER** | 174.000 | 100.418 | 0.423 |
| **EE** | 232.000 | 136.064 | 0.414 |
| **FC** | 174.000 | 94.370 | 0.458 |
| **HM** | 174.000 | 107.826 | 0.380 |
| **PE** | 174.000 | 58.703 | 0.663 |
| **PT** | 290.000 | 132.096 | 0.544 |
| **SI** | 174.000 | 89.552 | 0.485 |

**Table 9 - Construct cross-validated redundancy**

| | SO | SSE | Q² (=1-SSE/SSO) |
|---|---|---|---|
| **BI** | 232.000 | 75.457 | 0.675 |
| **BUBER** | 174.000 | 69.940 | 0.598 |
| **EE** | 232.000 | 232.000 | |
| **FC** | 174.000 | 174.000 | |
| **HM** | 174.000 | 174.000 | |
| **PE** | 174.000 | 174.000 | |
| **PT** | 290.000 | 290.000 | |
| **SI** | 174.000 | 174.000 | |

## 6. Discussions and Conclusion

We live in the age of empowered users who demand greater transparency in the deals they make. It is not easy to prosper in today's technological development and knowledge world without using contemporary technologies (Cui et al., 2015). BT's potentials are varied and substantial, encompassing features such as tracking, identification, safe trading, and transaction disbursement promptly (Queiroz & Wamba, 2019). However, regrettably, the banking system in Bangladesh is afflicted by scams and dishonesty, necessitating the accountability and recovery of people' trust.

Previously many researchers have reached the acceptability of BT in banking sectors in other countries, but they did not work with the blockchain-based m-banking (Kawasmi et al., 2020). Hence, this study attempted to develop a structural model (SEM) to explain why blockchain adoption is necessary for better financial traceability. SEM was used to verify and evaluate the research hypothesis. The model's stability was supported by the results of the core SEM evaluation. This research model was proposed and evaluated in compliance with the UTAUT 2 principles (Venkatesh, 2012; Venkatesh et al., 2011). All the direct factors have predicted their dependent variable, according to the results. Previously technology acceptance, similar patterns were reported in various parts of the world, particularly BT development and usage (Francisco & Swanson, 2018; Talukder et al., 2019). The findings accepted the hypotheses, indicating that when BT's PE, EE, PT, HM, SI and FC prevail, users' excitement and desire to use blockchain for m-banking grows, and vice versa (Riffai et al., 2012).

The study's findings show that the conceptual framework used in this research is suitable. The six factors studied in this research were PE, EE, SI, HM, PT, and FC. PE and EE refer to the individual-level characteristics that influence the BI of the UPAY users. FC is a factor at the organisational level that depicts the core of institutional preparedness for affecting users' willingness to utilise novel technologies such as blockchain. SI is a societal level variable that has a significant influence on regression models.

Furthermore, the PT variable primarily predicts consumers' behavioural responses to BT adoption based on their trust in the technology. Finally, HM represents that BT is entertaining and enjoyable to use for mobile banking. The $R^2$ for BI is 90.5%, and for BUBR, 88.8% values of both are considered significant (Aberson, 2019).

This study shows that PE has a favourable impact on consumers' intentions to use blockchain since they feel it will increase their efficiency. As a result, mobile banking service providers are recommended to guarantee organisational support by educating executors and upgrading the BT platform's infrastructural framework. Adequate training and structural soundness are likely to have a big impact on users, giving them more confidence in their capacity to accomplish essential jobs promptly and with less money. With a value of .270, HM is likewise a significant predictor variable, which means BT is more fun to use than traditional mobile banking. SI has a significant predictive variable with a coefficient of .230.

On the other hand, FC has a beta of .143, which explains BI-based mobile banking. With a beta value of .122, EE is also an influential predictor variable. If the service provider provides effective leadership and flawless operations, the FC and EE forecast that financial companies and their users will have a positive mentality to use contemporary technology such as BT. PT is another indication of BI, with a beta of .139. This illustrates how consumer viewpoints of new technologies like BT are influenced by a higher degree of trust. The delicacy of financial transactions might explain the relationship between trust and technological acceptance. Previous innovation adoption research has also verified and validated trust (Alalwan et al., 2017; Kabir, 2021; Talukder et al., 2019).

We also investigated the direct and indirect effects of FC on actual BT usage. The proposed framework of UTAUT2 is used to describe the desire to embrace BT and its subsequent acceptance. Much of the prior research failed to examine whether the desire to accept BT had a mediating effect on the proposed relationship between FC and actual use behaviour (Granovetter, 1978). The finding for BI's mediating influence in the relationship between FC and actual user behaviour differ from earlier studies that discovered complete mediation (Kabir et al., 2021).

## 7. Research Implications

### 7.1 Theoretical Implications

The integration of innovations does not guarantee that they will be used and succeed. A conceptual approach is required to uncover the underlying driving reasons and challenges for using BT to track m-banking activities. Earlier studies have highlighted the importance of behavioural purpose and context in affecting technology adoption. This paper suggests that UTAUT2 understand better how innovations may be used to adopt blockchain-based mobile banking. The adoption of BT for m-banking activities is interpreted using behavioural modelling in this research. Technically, a conceptual system is constructed as a suitable paradigm for studying blockchain usage behaviour.

Supporting new technologies and digital transformation in an organisation, such as adopting BT, allows for dramatic change by developing skills and knowledge that provide businesses with a competitive edge. For this study, a computational theoretical model combining the UTAUT2 model with the PT factor is created to uncover BT acceptance intention and implementation factors. To examine the approaches of engaging and increasing knowledge in open technology acceptance research, we evaluated the literature in line with the suggested theoretical framework of this research. We surveyed the genuine users of BT-based m-banking called UPAY, which was launched in Bangladesh for the first time. This study will undoubtedly contribute to the UTAUT model's literature by confirming prior studies from various viewpoints.

PE, EE, SI, PT, HM, and FC were used as indicators to determine BI for BT adoption in the study. PE, SI, EE, PT, HM, and FC were identified as predictive factors in assessing user's desire to adopt BT, and they have a significant positive impact (Alkahtani et al., 2019). In a nutshell, this research enriches the conceptual approach by explaining the determinants that influence BT-based m-banking. Thus, using the most recent theoretical paradigm, our study reconciled the present discrepancy in the literature.

## 7.2 Practical Implications

Blockchain technology is primarily an internet-based technology with the potential to revolutionize many industries. This technology has the potentials to change the banking industry service completely. Blockchain is a distributed, digital record that enables secure corporate transactions, tracking, and bitcoin transfers. This technology allows users to capture and share a broader awareness of a system's status across a decentralised system. It can facilitate value transition and makes digital purchases greater reliable than typical payment methods. We can consider it an up-and-coming and transformative technology since it reduces risk, eliminates fraud, and provides transparency in a scalable manner for a wide range of applications; that is why people are interested in dealing more with BT based m-banking. However, it is transparent, and nobody is locked out even when looking for another party to make changes. All alterations to the document are logged in real-time, making them entirely transparent. It can make many secure transactions in less time and effort, which eventually helps both the users and the service provider. The rise of blockchain technology coincided with the financial services industries' shift to mobile payments, office less banking, and electronic exchange, threatening to disrupt international financial networks. The main reason for being a hot topic is because it is substantially less costly, and transactions are processed much faster.

PE and EE have a significant impact on the intention to adopt BT, according to this study. Developers of BT-based m-banking systems should concentrate on creating a client-centric interface, recognizing the importance of robust and efficient functioning and the rapid flow of information to improve transparency and accessibility (Kazemi et al. 2015). The integrity and reliability of funding are a significant concern; PT is a crucial factor determining the motivation to use BT. Because BT is tech innovation, it is critical to trust the technology and its users. To increase their user's trust, financial institutions must decrease their ambiguity by providing adequate cyber security technologies that will encourage each organisation in the chain to feel more confident. The BT procedures must include organisational controls to prevent probable fraud and a violation of trust in transaction monitoring (Gu et al., 2009). Preliminary user's confidence would increase BT's acceptability. In addition, FC is a critical element of BT's mobile banking. The results of this paper can assist banking authorities in developing strategies for enlisting a significant percentage of banks to establish a BT-based m-banking network to provide a better banking platform for both organisations and their users (Kabir et al., 2021). In general, regulators, government, and business professionals are expected to raise critical awareness and expertise about the BT adoption process and its practical use in the banking and finance sector for various operations.

## 7.3 Limitations and Scope for Future Research

This research had a limited scope, which allowed for further research. First and foremost, this research is based on UTAUT2. UTAUT ignores some psychological assumptions about the adoption of BT, including privacy, risk and security evaluation procedures for apps, the need for connectivity, and the assumed link among multiple users. Furthermore, while UTAUT provides a framework for forecasting, it does not promote user acceptability (Brown et al., 2010). Secondly, our method simply provides a few components in order to explain BT-based m-banking adoption. It is suggested that researchers can broaden our model by adding elements from the benefits of digital technologies for firms (Buzin et al., 1978; Ardiansah et al. 2020). Thirdly, we focused on BT adoption determinants in Bangladesh, which may not give enough evidence to extrapolate our results to the rest of the world. Lastly, this study does not focus on the deployment method's technical components that need to be included in adopting such innovations. So, future studies should explore the technological elements of BT in a variety of innovative applications. It will be fascinating to see how BT may be used with other approaches to provide better answers.

## Acknowledgement

The contribution of East Delta University, Bangladesh is acknowledged herewith as the university has provided with the necessary logistic supports to conduct the research. The authors are thankful to the respondents for their valuable insights for the success of this study. The authors express their gratitude to the editors and reviewers for the constructive comments and suggestions during the review process, which helped to improve the overall standard of this article. We also want to thank the JTMB technical team members, particularly for their contributions to the paper.

## References

Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2017). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. International Journal of Information Management, 37(3), 99–110. https://doi.org/10.1016/j.ijinfomgt.2017.01.002

Alam, M. S., & Uddin, M. A. (2019). Adoption and implementation of enterprise resource planning (ERP): An empirical study. Journal of Management and Research, 6(1), 1-33.

Ali, O., Ally, M., Clutterbuck, & Dwivedi, Y. (2020). The state of play of blockchain technology in the financial services sector: A systematic literature review. International Journal of Information Management, 54(August 2019), 102199. https://doi.org/10.1016/j.ijinfomgt.2020.102199

Ali, Z., & Bano, H. (2022). Understanding Consumer Intention Towards Blockchain-Based Mobile Payment Adoption Services in Pakistan. International Journal of e-Collaboration (IJeC), 18(3), 1-21.

Ali, R., Barrdear, J., Clews, R., & Southgate, J. (2014). Innovations in payment technologies and the emergence of digital currencies. Bank of England Quarterly Bulletin, Q3. 4D

Alkahtani, M., Choudhary, A., De, A., & Harding, J. A. (2019). A decision support system based on ontology and data mining to improve design using warranty data. Computers and Industrial Engineering, 128, 1027–1039. https://doi.org/10.1016/j.cie.2018.04.033

Amin, A. L., Sultana, N., Saha, T., Nazrul, S. M. I., & Kashem, A. (2021). Customer's Attitude toward Mobile Banking Usage: A Case Study in Bangladesh. Journal of Asian Finance, Economics and Business, 8(2), 0419–0426. https://doi.org/10.13106/jafeb.2021.vol8.no2.0419

Andreas, C. (2012). UTAUT and UTAUT 2: A Review and Agenda for Future Research. The Winners, 13(2), 106–114.

Attaran, M., & Gunasekaran, A. (2019). Government and Public Sector. https://doi.org/10.1007/978-3-030-27798-7_6

Aberson, C. L. (2019). Applied power analysis for the behavioral sciences. Routledge.

Azjen, I. (1980). Understanding attitudes and predicting social behavior. Englewood cliffs.

Ajzen, I. (1991). The theory of planned behavior. Organisational behavior and human decision processes, 50(2), 179-211.

Bandura, A. (1986). Social foundations of thought and actions, doi:10.2307/258004.

Barnes, S. J., & Corbitt, B. (2003). Mobile banking: concept and potential. International Journal of Mobile Communications, 1(3), 273–288. https://doi.org/10.1504/IJMC.2003.003494

Browne, R. H. (1995). On the use of a pilot sample for sample size determination. Statistics in medicine, 14(17), 1933-1940.

Brown, S., Dennis, A., & Venkatesh, V. (2010). Predicting collaboration technology use: Integrating technology adoption and collaboration research. Journal of Management Information Systems, 27(2), 9–54. https://d oi.org/10.2753/MIS0742-1222270201

Buzin, C. H., Dewhurst, S. A., & Seecof, R. L. (1978). Temperature sensitivity of muscle and neuron differentiation in embryonic cell cultures from the Drosophila mutant, shibirets1. Developmental Biology, 66(2), 442–456. https://doi.org/10.1016/0012-1606(78)90250-6

Cas, Kuppelwieser, Volker G.Hair, J. F., Sarstedt, M., & Hopkins, L. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128 Chin. (1998). 1998 Plschapter.Pdf.

Cepeda-Carrion, G., Cegarra-Navarro, J. G., & Cillo, V. (2019). Tips to use partial least squares structural equation modelling (PLS-SEM) in knowledge management. Journal of Knowledge Management.

Chin, W. W., Marcelin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. Information Systems Research, 14(2). https://doi.org/10.1287/isre.14.2.189.16018

Cui, T., Ye, H., Teo, H. H., & Li, J. (2015). Information technology and open innovation: A strategic alignment perspective. In Information and Management (Vol. 52, Issue 3). https://doi.org/10.1016/j.im.2014.12.005

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace 1. Journal of applied social psychology, 22(14), 1111-1132.

Dijkstra, T. K., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. Computational Statistics and Data Analysis, 81, 10–23. https://doi.org/10.1016/j.csda.2014.07.008

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. Information Systems Frontiers, 21(3), 719-734.

Francisco, K., & Swanson, D. (2018). The Supply Chain Has No Clothes: Technology Adoption of Blockchain for Supply Chain Transparency. Logistics, 2(1), 2. https://doi.org/10.3390/logistics2010002

Geisser, S. (1974). A Predictive Approach to the Random Effect Model. <i>Biometrika,</i><i>61</i>(1),101-107.doi:10.2307/233429069. 34, 1–13.

Gu, J. C., Lee, S. C., & Suh, Y. H. (2009). Determinants of behavioral intention to mobile banking. Expert Systems with Applications, 36(9), 11605–11616. https://doi.org/10.1016/j.eswa.2009.03.024

Gratz, Z. S., & Gravetter, F. J. (1999). Spss manual to accompany Gravetter and Wallnau's essentials of statistics for the behavioral Sciences, 3rd edition. Brooks/Cole Pub. Company. (Gratz & Gravetter, 1999)

Granovetter, M. (1978). Threshold models of collective behavior. American journal of sociology, 83(6), 1420-1443.

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage publications.

Hair Jr., J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. International Journal of Multivariate Data Analysis, 1(2), 107. https://doi.org/10.1504/ijmda.2017.10008574

Hale, S. E., & Ojeda, T. (2018). Acceptable femininity? Gay male misogyny and the policing of queer femininities. European Journal of Women's Studies, 25(3), 310–324. https://doi.org/10.1177/1350506818764762

Harris, W. L., & Wonglimpiyarat, J. (2019). Blockchain platform and future bank competition. Foresight, 21(6), 625–639. https://doi.org/10.1108/FS-12-2018-0113

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Huit, G. T. M., Hair, J. F., Proksch, D., Sarstedt, M., Pinkwart, A., & Ringle, C. M. (2018). Addressing endogeneity in international marketing applications of partial least squares structural equation modeling. Journal of International Marketing, 26(3), 1–21. https://doi.org/10.1509/jim.17.0151

Isaac, O., Abdullah, Z., Aldholay, A. H., & Ameen, A. A. (2019). Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Asia Pacific Management Review, 24(4), 335-354.

Jain, G., Kamble, S. S., Ndubisi, N. O., Shrivastava, A., Belhadi, A., & Venkatesh, M. (2022). Antecedents of Blockchain-Enabled E-commerce Platforms (BEEP) adoption by customers–A study of second-hand small and medium apparel retailers. Journal of Business Research, 149, 576-588.

Kabir M. R. (2021). Behavioral intention to adopt blockchain for a transparent and effective taxing system. In Journal of Global Operations and Strategic Sourcing (Vol. 14, Issue 1). https://doi.org/10.1108/JGOSS-08-2020-0050

Kabir M. R., Ibrahim, M., & Khondker, M. B. U. (2020). Adoption of Mobile Banking for Financial Inclusion in Bangladesh: An Empirical Study Using Extended TAM. Solid State Technology, 63(6), 4203-4221.

Kabir M. R., Islam, M. A., Marniati, & Herawati. (2021). Application of blockchain for supply chain financing: Explaining the drivers using sem. Journal of Open Innovation: Technology, Market, and Complexity, 7(3). https://doi.org/10.3390/joitmc7030167

Kabir M. R., & Islam, M. (2021). Behavioral intention to adopt blockchain technology in Bangladeshi banking companies, AIP Conference Proceedings, 2347, 020025. https://doi.org/10.1063/5.0051654

Kawasmi, Z., Akwasi Gyasi, E., & Dadd, D. (2020). Blockchain Adoption Model for the Global Banking Industry. Journal of International Technology and Information Management, 28(4).

Kazemi, H., Miller, D., Mohan, A., Griffith, Z., Jin, Y., Kwiatkowski, J., Tran, L., & Crawford, M. (2015). 350mW G-band medium power amplifier fabricated through a new method of 3D-copper additive manufacturing. 2015 IEEE MTT-S International Microwave Symposium, IMS 2015, 36(1), 157–178. https://doi.org/10.1109/MWSYM.2015.7167037

Khatoon, A. (2020). A blockchain-based smart contract system for healthcare management. Electronics (Switzerland), 9(1). https://doi.org/10.3390/electronics9010094

Lee, B., & Lee, J. H. (2017). Blockchain-based secure firmware update for embedded devices in an Internet of Things environment. The Journal of Supercomputing, 73(3), 1152-1167.
Liu, X. (2013). Full-Text Citation Analysis : A New Method to Enhance. Journal of the American Society for Information Science and Technology, 64(July), 1852–1863. https://doi.org/10.1002/asi

Mahomed, N. (2017). Understanding consumer adoption of cryptocurrencies. Master Thesis, Gordon Insititute of Business Science, University of Pretoria., November, 139. https://repository.up.ac.za/handle/2263/64874

Martins, C., Oliveira, T., & Popovič, A. (2014). Understanding the internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. International Journal of Information Management, 34(1), 1–13. https://doi.org/10.1016/j.ijinfomgt.2013.06.002

Ardiansah, M., Chariri, A., Rahardja, S., & Udin, U. (2020). The effect of electronic payments security on e-commerce consumer perception: An extended model of technology acceptance. Management Science Letters, 10(7), 1473-1480.

Osmani, M., El-Haddadeh, R., Hindi, N., Janssen, M., & Weerakkody, V. (2021). Blockchain for next-generation services in banking and finance: cost, benefit, risk and opportunity analysis. Journal of Enterprise Information Management, 34(3), 884–899. https://doi.org/10.1108/JEIM-02-2020-0044

Owusu Kwateng, K., Osei Atiemo, K. A., & Appiah, C. (2019). Acceptance and use of mobile banking: an application of UTAUT2. Journal of Enterprise Information Management, 32(1), 118–151. https://doi.org/10.1108/JEIM-03-2018-0055

Osborne, J., Costello, A. & Kellow, J. (2008). Best practices in exploratory factor analysis. In Osborne, J. (Ed.), Best practices in quantitative methods (pp. 86-99).

Pavlou, P. A., Tan, Y. H., & Gefen, D. (2003). Institutional trust and familiarity in online interorganisational relationships. In Proceedings of the European Conference on Information Systems (ICIS) Naples, Italy.

Pérez-Sánchez, M. de los Á., Tian, Z., Barrientos-Báez, A., Gómez-Galán, J., & Li, H. (2021). Blockchain technology for winning consumer loyalty: Social norm analysis using structural equation modeling. Mathematics, 9(5), 1–18. https://doi.org/10.3390/math9050532

Peters, G. W., & Panayi, E. (2015). Understanding Modern Banking Ledgers Through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money. SSRN Electronic Journal, 1–33. https://doi.org/10.2139/ssrn.2692487

Pieters, J. J., Kokkinou, A., & van Kollenburg, T. (2022, March). Understanding blockchain technology adoption by non-experts: an application of the unified theory of acceptance and use of technology (UTAUT). In Operations Research Forum (Vol. 3, No. 1, pp. 1-19). Springer International Publishing.

Puthal, D., Malik, N., Mohanty, S. P., Kougianos, E., & Yang, C. (2018). The blockchain as a decentralised security framework [future directions]. IEEE Consumer Electronics Magazine, 7(2), 18-21.

Queiroz, M., & Wamba, S. (2019). Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. Int. J. Inf. Manag., 46, 70-82.

Qi Dong, J. (2009). User acceptance of information technology innovations in the Chinese cultural context. Asian Journal of Technology Innovation, 17(2), 129-149.

Rajan, C. A., & Baral, R. (2015). Adoption of ERP system: an empirical study of factors influencing the usage of ERP and its impact on end use. IIMB Manag Rev 27 (2): 105–117.

Ramayah, T., Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). Partial least squares structural equation modeling (PLS-SEM) using smartPLS 3.0.

Raza, S. A., Shah, N., & Ali, M. (2018). Acceptance of mobile banking in Islamic banks: evidence from modified UTAUT model. Journal of Islamic marketing.

Riffai, M. M. M. A., Grant, K., & Edgar, D. (2012). Big TAM in Oman: Exploring the promise of online banking, its adoption by customers and the challenges of banking in Oman. International Journal of Information Management, 32(3), 239–250. https://doi.org/10.1016/j.ijinfomgt.2011.11.007

Rigdon, E. E., Sarstedt, M., & Ringle, C. M. (2017). On Comparing Results from CB-SEM and PLS-SEM: Five Perspectives and Five Recommendations. Marketing ZFP, 39(3), 4–16. https://doi.org/10.15358/0344-1369-2017-3-4

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In An integrated approach to communication theory and research (pp. 432-448). Routledge.

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2020). Handbook of Market Research. In Handbook of Market Research (Issue September). https://doi.org/10.1007/978-3-319-05542-8

Sarstedt, M., Ringle, C. M., Henseler, J., & Hair, J. F. (2014). On the Emancipation of PLS-SEM: A Commentary on Rigdon (2012). Long Range Planning, 47(3), 154–160. https://doi.org/10.1016/j.lrp.2014.02.007

Somon, K. E. (2020). Understanding the variables influencing the adoption of the blockchain technology (Master's thesis, University of Twente).

Småros, J., Lehtonen, J., Appelqvist, P., & Holmström, J. (2003). The impact of increasing demand visibility on production and inventory control efficiency. International Journal of Physical Distribution & Logistics Management, 33, 336-354.

Talukder, S., Chiong, R., Dhakal, S., Sorwar, G., & Bao, Y. (2019). A two-stage structural equation modeling-neural network approach for understanding and predicting the determinants of m-government service adoption. Journal of Systems and Information Technology, 21(4), 419–438. https://doi.org/10.1108/JSIT-10-2017-0096

Tamilmani, K., Rana, N. P., Wamba, S. F., & Dwivedi, R. (2021). The extended Unified Theory of Acceptance and Use of Technology (UTAUT2): A systematic literature review and theory evaluation. International Journal of Information Management, 57(October 2020), 102269. https://doi.org/10.1016/j.ijinfomgt.2020.102269

Taylor, S., & Todd, P. (1995). Assessing IT usage: The role of prior experience. MIS quarterly, 561-570.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. MIS quarterly, 125-143.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS quarterly, 157-178.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J. H., & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. Information Systems Journal, 21(6), 527–555. https://doi.org/10.1111/j.1365-2575.2011.00373.x

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS quarterly, 157-178.

Vinzi, V. E., Trinchera, L., & Amato, S. (2010). PLS path modeling: from foundations to recent developments and open issues for model assessment and improvement. In Handbook of partial least squares (pp. 47-82). Springer, Berlin, Heidelberg.

Weerakkody, V., El-Haddadeh, R., Al-Sobhi, F., Shareef, M. A., & Dwivedi, Y. K. (2013). Examining the influence of intermediaries in facilitating e-government adoption: An empirical investigation. International Journal of Information Management, 33(5), 716–725. https://doi.org/10.1016/j.ijinfomgt.2013.05.001

Williams, M. D., Rana, N. P., & Dwivedi, Y. K. (2015). The unified theory of acceptance and use of technology (UTAUT): a literature review. Journal of enterprise information management.

Wold, H. (1980). Model construction and evaluation when theoretical knowledge is scarce: Theory and application of partial least squares. In Evaluation of econometric models (pp. 47-74). Academic Press.

Xu, L., Chen, L., Gao, Z., Carranco, L., Fan, X., Shah, N., & Shi, W. (2020). Supporting blockchain-based cryptocurrency mobile payment with smart devices. IEEE Consumer Electronics Magazine, 9(2), 26-33.

Yeong, Y. C., Kalid, K. S., & Sugathan, S. K. (2019). Cryptocurrency acceptance: A case of Malaysia. International Journal of Engineering and Advanced Technology, 8(5), 28–38. https://doi.org/10.35940/ijeat.E1004.0585C19
Yuan, M. (2011). R Egularized MOdel S Election and. January, 34–62.

Latan, H., & Noonan, R. (2017). Partial least Squares Path Modeling: Basic Concepts, methodological issues and applications. Springer International Publishing. (Latan & Noonan, 2017)

**Appendix I: Base theories of the unified theory of acceptance and use of technology (UTAUT) model**

| Theory | Explanation of the Theory | Source Author | Year |
|---|---|---|---|
| Theory of Reasoned Action (TRA) | Individual response is projected based on prior intent and behaviour. | Azjen, 1980 | 1980 |
| Social Cognitive Theory (SCT) | Environmental effect like societal force and specific personal aspects like personality are similarly imperative to forecast behaviour. | Bandura, 1986 | 1986 |
| Technology Acceptance Model (TAM) | Perceived usefulness and perceived ease of use can explain the end users' technology acceptance tendency. | Davis, 1989 | 1989 |
| Theory of Planned Behaviour (TPB) | Psychological drivers influencing technology adoption have been explained in this model for the first time. | Azjen, 1991 | 1991 |
| PC Utilization Model | It is a model of combined TRA and TPB to explain use behavior instead of intention to use. | Thompson et al., 1991 | 1991 |
| Motivational Model (MM) | Extrinsic and intrinsic stimulus for the usages of technology have been described in this model. | Davis et al., 1992 | 1992 |
| Combined TAM-TPB Theory | Subjective norm and perceived behavioural control have been added with the TAM to ensure a comprehensive explanation of technology acceptance. | Taylor &Todd, 1995 | 1995 |
| Diffusion of Innovation Theory (DIT) | Drive from intention to pervasive use has been explained in this model. | Rogers, 1995 | 1995 |