AFFECTIVE FACTORS IN THE USE OF BLOCKCHAIN TECHNOLOGY DECISION

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Abstract — ***The research literature in information technology by accepting new technologies shows that organizations have adopted block chain technology in the United States. We adopt several applications of block chain technology. Since many years, organizations accepted new technologies based on security, scalability and previous experiences. Although the adoption of block chain technology per organization is increasing, it is not known that it affects utility, ease of use, institutional confidence and privacy adopting block chain technology. This study scores a question about how much considerable utility is affecting the decision that the technology of the block chain is adopted. And, how much privacy will affect the decision that the technology of the block chain is adopted.***

Keywords — ***Internet of things,*** **Blockchain, TAM,** ***Digital Identity***

I. Introduction

The investigation inspected the variables impacting the choice to embrace Blockchain innovation in the US. Blockchain's development has expanded as of late as one of the top monetary innovations.The exploration will look at the variables that impact the choice to embrace Blockchain innovation, including apparent institutional trust (PIT), saw handiness (PU), saw convenience (PEOU), and saw Protection (PP) and their effect on the aim to utilize innovation (ITU). Peach (2017) contended that most writing tends to the effect of new innovations, yet the investigations don't consider the variables affecting these advances' reception. The populace utilized is IT directors acquainted with Blockchain innovation and situated in the U.S.; the examination used an online review to gather information. Factual Bundle for the Sociology (SPSS) will examine the gathered information.

Associations have been utilizing Blockchain innovation in monetary exchanges and applications for auto misrepresentation avoidance, dynamic models, and online media [1]. The extension of Blockchain innovation could make ready for Blockchain to be another troublesome innovation utilized in numerous applications around the world. For instance, Blockchain is assessed to save Santander bank $20 billion per year, possibly uplifting associations to take on Blockchain innovation [2]. Also, the investigation could give associations in the U.S. an upper hand over associations found abroad with regards to embracing Blockchain innovation. Eventually, the discoveries of the overview will be talked about, including the impediments and proposals for additional examination.

Background of the Problem

The examination will zero in on contemplating PIT, PU, PEOU, PP, and the impact of these components on embracing Blockchain innovation. contended that Blockchain innovation reception has been expanding fundamentally in the previous decade; fundamental to analyze the variables could impact the choice to embrace Blockchain
innovation. Besides, inspecting the components that impact the Blockchain chain's reception is huge on the grounds that it could assist partners with distinguishing factors that impact the reception of new advances later on[3].

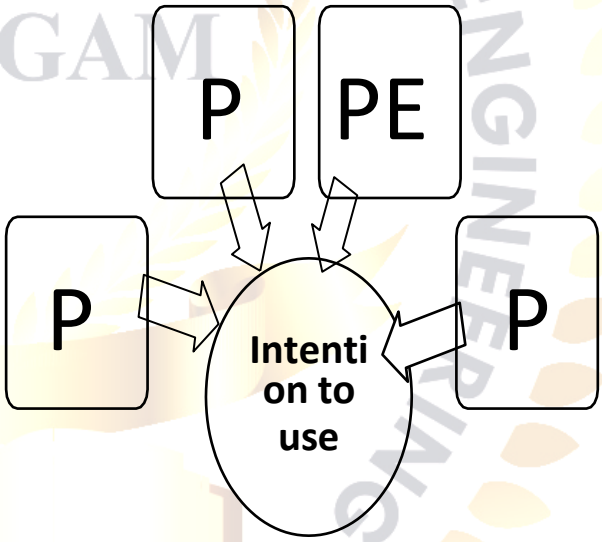

Figure 1: Extended TAM Theory

The investigation will use Innovation Acknowledgment Model (Cap) as a hypothetical establishment.Cap is an expansion of Ajzen and Fishbein's Hypothesis of reason activity (TRA) [7] In addition, Cap supplanted many TRA's actions with two essential builds apparent usability (PEU) and Saw Helpfulness (PU). For instance, Davis (1989) utilized two builds: PEOU and PU, to decide a person's aim to utilize innovation, as displayed in Figure 2. Also, [7] contended that The two speculations zeroed in on estimating conduct components; notwithstanding, most researchers use Cap in the data innovation region. The essential supposition of the TRA is accepting there is a high connection between's emotional standards to social goal and demeanor towards conduct [4].. In spite of the fact that, [5]. contended that the Hypothesis of

Arranged Conduct (TPB) was expanding TRA by adding the idea of social control.

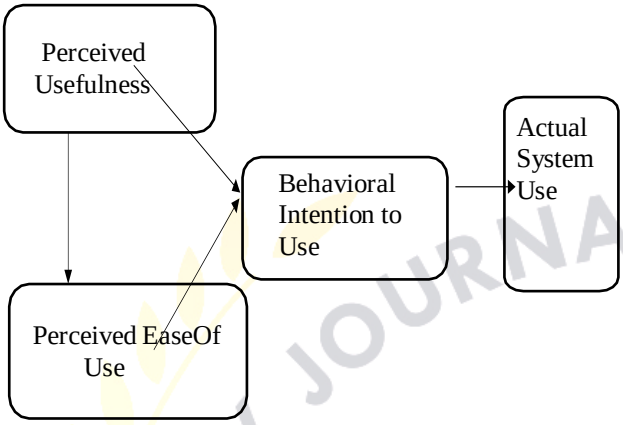

Figure 2 TAM's Constructs (Davis, 1989)

While Hat has been broadly utilized in many investigations and acquired a lot of help, it actually accompanies limits. Additionally, a few researchers scrutinized Cap for excluding human and social factors that may affect taking on new innovations like Blockchain [7].

[13] contended that institutionaltrust is the connection among people and organizations. There are critical innovation organizations that control the majority of the developments In the data innovation field [5]. Also, It is basic to find out about the effect of institutional trust on clients on taking on new advances. The analyst will broaden Cap by adding the institutional trust variable to probably acquire more precise outcomes about factors affecting the choice to embrace new innovation like Blockchain. Moreover,expanding Cap by adding apparent Protection and saw institutional trust will presumably give researchers a more clear image of components impacting new advances.

II. LITERATURE REVIEW

The literature review performed provided a summation of what scholars have discussed about Blockchain technology adoption. The chapter included the methods used to search, identify, and synthesize the literature. Furthermore, the theoretical orientation section discusses TAM, Diffusion of Innovation (DoI), and the Unified Theory of acceptance and use of technology (UTAUT). The literature review discussed Blockchain technology and its applications like smart contracts, digital identity, corporate governance, and the Internet of Things (IoT). The literature review will include an overview of scholarly literature that discussed Blockchain privacy and trust in Blockchain providers. The literature review's conclusion examined the quality of the scholarly literature review, including the methodological strengths and limitations.

Blockchain Technology

Blockchain is a decentralized technology used to authenticate, store, and verify transactions between two parties. [13] argued that Blockchain is used in financial transactions and used to process and verify smart contracts. Blockchain maintains records of all transactions in each block, making it harder to tamper with smart contract records. In addition to smart contracts, [25] argued that organizations used Blockchain applications to store medical records, the voting process, and secure digital identity. Moreover, Blockchain is considered a disruptive technology that might significantly impact financial institutions, medical insurance companies, the energy industry, real estate, and digital identity [25].

Blockchain Applications

A smart contract is one of the Blockchain applications used to negotiate and verify contract agreements between different parties. Smart contracts include a set of conditions; if the various parties agreed on them, the application automatically carries out the contract. [8]. argued that smart contracts would significantly change real estate; hence, users can buy and sell lands and properties. Smart contracts will substantially reduce the involvement of third parties like lawyers, banks, and brokers. In addition, contracts are very sophisticated regarding fractional ownership, and smart contracts create clear conditions for fractional ownership of the real estate. [8] argued that Blockchain would revolutionize real estate by facilitating transactions to buy, sell, and rent properties to be more like the process of exchanging stocks online. Additionally, learning about smart contract applications and their use could significantly impact users and consider adopting Blockchain technology.

Digital Identity

argued that there are 7 billion internet-connected devices, and by 2025, that number will reach 22 billion; however, 1.1 users worldwide do not have a way to claim ownership over their identities. Furthermore, [9] argued that organizations could implement Blockchain's digital identity management application to reduce the current issue related to digital identity, including identity theft and fraudulent identities. Additionally, Blockchain's digital identity management will significantly impact adopting Blockchain technology since it is useful and easy to use and implement [8].Digital identity applications could increase the users' perception of the usefulness of Blockchain technology.

Internet of Things (IoT)

Sun discussed IoT and some of the challenges that might slow IoT adoption, like scalability and security. Integrating Blockchain into IoT can significantly reduce the scalability and security challenges using distributed ledger technology (DLT) [15] IoT devices have been a target for Distributed Details of Service (DDoS) Attacks, IoT's security vulnerability makes it exposed and an easy target for malicious users [13].

Furthermore, devices' rapid growth requires a more scalable central system to validate, authenticate, and connect different devices. Additionally, scalability is a significant challenge that might slow down IoT adoption [13]. It is crucial to study all the factors that might impact Blockchain technology's adoption before conducting the research.

Blockchain privacy

[13] argued that Blockchain technology is gaining a lot of interest in academia and the IT industry. Still, there are some concerns about Blockchain privacy that should be investigated. Furthermore,[10] argued that most research related to Blockchain technology focused on two threads: discovering cyber-attacks against Blockchain and putting proposals to mitigate the risk, but there is no in-depth research about privacy and security in Blockchain technology. The researcher will investigate privacy as one factor that might influence the decision to adopt Blockchain technology. It is crucial to investigate factors that might have a significant influence on the decision to adopt Blockchain.

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the proposed theories for the proposed dissertation topic. TAM is an extension of Ajzen and Fishbein's Theory of reason action (TRA) [7].TAM replaced many TRA's measures with two primary constructs perceived ease of use (PEU) and Perceived Usefulness (PU). Davis used two constructs PEU and PU, to determine an individual's intent to use technology. [7]. argued that Both theories focused on measuring behavioral elements; however, scholars TAM has widely used in the information technology area.

Unified Theory of Acceptance and Use of Technology (UTAUT)

Venktash et al. (2011) developed the unified Theory of acceptance and use of technology (UTAUT) to integrate the eight main user acceptance models. UTAUT integrated TAM, TRA, TPB, the Diffusion of Innovation, and the personal computer (PC [4]. identified four constructs (effort expectancy, social influence, performance expectancy, and facilitating conditions) and four moderators (age, gender, voluntariness, and experience) to predict the intention of using new technologies, as shown in Figure 3. [4]. argued that UTAUT explained that 52% of the technology use variance and 77% of the behavioral intention variance used technology.

Current Findings

The Federal Trade Commission (2015) was a business case for IoT risk management, where many of the recommendations were available in other NIST and Defense Information Systems Agency (DISA) related guidance. The report stated that they did not want to create regulation because it would stifle IoT emerging markets and development (Federal Trade Commission, 2015). With the mass proliferation of IoT, roughly 25 billion vulnerable sensors could execute a massive botnet by nefarious individuals (Federal Trade Commission, 2015).[14] raised points about targeting high-value people or things through IoT at a specific event using GPS proximity. Targeting included an executive meeting or a hospital to disable IoT sensors [14]. [4] stated that secure IoT sensors using BLE flashing is not possible on a large scale. It needs an automated process and careful development process to protect against well-known Bluetooth vulnerabilities and additional adaptive triggers to alert monitoring systems of a security change 12] monitoring IoT BLE was possible with manual intervention by static categorization of all available options on an IoT device. Alerts, when a value changed and monitored specific values or conditions, would be possible with manual IoT categorization [12].

Pre-Test between IoT BLE Sensors

The pre-test between sensors discovered changes between the pilot study, which used one sensor, and pre-test conditions used two new sensors to evaluate the Threats to Bluetooth. With the pre-test conditions set, each tool executed from the Kali Linux virtual machine. Each Threat to Bluetooth ran and the level of access calculated by using the CVSS base score in Table 4 and added local environmental conditions during the pre- test experiment. The calculations adjusted using the base scores calculated from the category where each tool was evaluated by itself using the CVSS v3.1 calculator. Any tools resulting in a zero score did not receive further evaluation. The test discovered changes from the Pilot study and base score; however, each test condition remained the same between the two IoT BLE sensors.

According to Satam BLE data analysis used a Wireshark sniffer configured with Bluetooth filters to target Bluetooth traffic. Wireshark was configured with 20 specific filters focused on BLE traffic between the Kali Linux VM and the IoT BLE sensor. Wireshark was used to capture, and filter large amounts of network traffic stored in PCAP files . In Table 6, 20 Wireshark filters were used during the experiment to match monitoring criteria for the NIST Security Controls and Recommendations checklist.

The BlueZ testing tools were administrative and debugging tools misused during the experiment. Gatttool was a Linux command-line utility used to interact with BLE devices and connected directly to a known Bluetooth MAC address to display all profile characteristics. Additionally, Gatttool set a security level to communicate with a BLE device. HCITool, HCI Config, and HCIdump were administrative utilities to scan, configure, and receive debugging information from a BLE device. A separate program Bluetoothctl was a command-line configuration utility and scanned and paired with BLE devices.

III. RESEARCH METHODOLOGY

The research was a single-subject, multi-facility experimental This chapter aims to discuss the research methodology used to examine factors influencing the decision to adopt Blockchain technology. A nonexperimental with a predictive approach was used to conduct the study; The predictive approach allowed the researcher to examine the influence of perceived ease of use, perceived usefulness, perceived institutional trust, and perceived privacy on the decision to adopt Blockchain technology. In addition, the researcher conducted an online survey to collect data and used a random sampling technique to recruit participants for the survey. Furthermore, The chapter will discuss in-depth research methodology, participation selection, procedures, data collection, analysis, instruments, and ethical considerations.

Purpose of the Study

The study aims to examine the potential influence of PEOU, PP, PIT, PU on the intention to use Blockchain technology (ITU). In addition, the study could potentially help corporates and service providers to predict the adoption of new technologies. Additionally, The study is significant not only for IT service providers but also for information technology scholars.Furthermore, the study contributed knowledge regarding the adoption of new technologies like Blockchain. Finally, the study tested to add to the body knowledge of TAM theory by adding two constructs perceived privacy and perceived institutional trust.

Research Design

Creswell Quantitative, nonexperimental predictive research is used in the study to examine the factors influencing the decision to adopt Blockchain technology. The study utilized a survey instrument to measure the influence of perceived ease of use (PEU), perceived usefulness (PU), perceived institutional trust (PIT), and perceived privacy (PP) on the intention to use Blockchain technology (ITU). Furthermore, Qualtrics is a third-party company that will recruit, disseminate the survey, and collect the survey results. The research design is nonexperimental with a predictive approach; the study used a quantitative methodology to determine the relationship between two or more variables using statistical data [10]. The research design is appropriate for this study since the four variables used in the study are measurable and quantified.

[11] argued that correlational research is designed to measure relationships between variables or test hypotheses about predictions discussed in the study. Therefore, the nonexperimental research design with a quantitative methodology is appropriate for this study since the study examines the factors that influence the decision to adopt Blockchain technology.

The research design will follow a quantitative methodological approach aligned with post-positivist philosophical assumptions [3].argued that the post-positivist approach advocates that social reality is stable enough and could be patterning to be known. Furthermore, the post-positivist approach assumes that social truth is knowable and measurable [11]. Additionally, those assumptions are the philosophical ground on which data can be collected and analyzed in studies with providing logical coherence [12].Furthermore, post-positivism assumes independence between the scholar and the object studied, aligning with the study's research design. Finally, the constructs in the study will be measured using a survey instrument.

The study used a simple random sampling technique; the time span is cross-sectional, including an online survey. Additionally, the participants are IT supervisors in the United States who are familiar with Blockchain technology. This nonexperimental study utilized a multiple regression statistical method to analyze the collected data using SPSS. Furthermore, the multiple regression statistical method is appropriate for the research since the study measured the influence of multiple independent variables on one dependent variable [14]. The sample size was determined using G*power to ensure the proper sizing of multiple linear regression with 95% power and 5% error probability. The survey contained close-ended questions with a Likert 7-point scale Power Analysis.

The study utilized the G*Power program to determine participants' sample size with an effect size of f2 = 0.15, a power confidence interval of 1-β error probability = 0.95, and an error probability of α= 0.05. (Cohen, 2014). A priori analysis is used to determine the appropriate significance level [24]. The one tail A priori showed an actual power of 0.95 and a Df of 124 with the recommended minimum sample size of 129.

Based on G* Power's calculated results, the level of accuracy to predict whether the null hypothesis should be accepted or rejected is 95%, with a 5% margin of error. [24] argued that the scholarly community generally accepts a 5% margin of error as a sufficient power.

Further, [24] argued that a commonly used power for quantitative studies is 0.95 because it indicates that the chances of detecting an effect of independent variables on dependent variables are 0.95%. Thus, the power analysis will determine if the null and alternative hypotheses will be statistically accepted or rejected. Additionally, the primary assumption of statistical power in a hypothesis test is the probability that this test will detect an already existing impact [24].

Furthermore, [16] argued that incorrect sample size could lead to type 1 or II errors. A type I occurs when a correct null hypothesis is being rejected (false positive). On the other hand, type 11 error occurs when a false null hypothesis is accepted (false negative) [16] Therefore, multiple F-test with multiple linear regression and a priori tests used to ensure the adequacy of the power used in the study. The minimum number of responses required to detect significance was 129, with a medium effect size of .15, the significance level of .05, and statistical power (1-β) = .95, and the assumption of normal distribution.

IV . RESULTS

In This chapter , the quantitative study results were presented and discussed to study the influence of perceived usefulness, perceived ease of use, perceived institutional trust, and perceived usefulness on the decision to adopt Blockchain technology. Additionally, the chapter included a description of the sample and the hypothesis testing. Furthermore, the collected data were analyzed using multiple regression analysis, the outcomes of the assumptions of regression were presented and discussed. Finally, the reliability of the independent variables was assessed using Cronbach alpha's coefficients test. At the end of the chapter, a summary of the results was presented, including an interpretation of the findings.

Description of the Sample

The participants' recruitment was conducted via a third party (Qualtrics). Qualtrics employed a random sampling technique to identify and invite potential candidates from a standing panel of 10,000. Initially, 500 participants participated, which represents a 5% response rate. One hundred seventy participants completed the survey, which represents 34% of the responses. The study's minimum number of participants was calculated using G*Power analysis based upon the statistical power of 80%. The minimum number of participants was 129; therefore, the number of participants exceeded the required number to determine the findings' significance. The average time to complete the survey was seven minutes. The study participants' descriptive information was fifteen percent of female participants; 85% were male. The age distribution indicated that most participants were under forty, 60%, and 40% were forty years and older. Of most participants, 67% have over ten years of IT experience, and 33% have less than ten years of experience in the IT field.

Table 1

Participants Distribution by age		
Age	Frequency	Percent
21-40	102	60%
Over 40	68	40%
Total	170	100%

Note. This table demonstrates the participants' distribution by age.

Table 2: Participants Distribution by Years of Experience

Years of experience	Frequency	Percent
Less than 10 years	102	33%
10 years and over	114	67%
Total	170	100%

HYPOTHESIS TESTING

A descriptive statistics table is helpful to get information about all variables included in the model. The number of cases in the dataset is recorded under column N. The average for each variable is registered under the column Mean. The Range of variables is recorded under the Maximum and Minimum columns. Additionally, examining the values in the Std. Deviation column is used to assess variability [24]. Std. Deviations reflect the difference between the data point and the means. Thus, the deviation value varies; if the difference between the data value and the mean is significant, the Std. Deviation will be significant. Conversely, if the values of the mean and the individual data are similar, the Std. Deviation should have a small value.

Table 3: Descriptive Statistics of PU, PEOU, PIT, PP, AND ITU variables.

N	Minimum	Maximum		Mean	Std. Deviation
PU	170	1.00	7.00	2.8216	1.61677
PEOU	170	1.00	6.50	2.5216	1.41765
PIT	170	1.00	6.53	2.5216	1.31461
PP	170	1.00	7.00	3.7809	1.68337
ITU	170	1.00	7.00	2.3971	1.47654
Valid N (listwise)	170				

Note. This table demonstrates the (n) number of participants, mean and standard deviation for each variable.

Assumptions of Linear Regression

Independence of observation, linear variable relationship, homoscedasticity of residuals, no multicollinearity, no significant outliers, and residual are normally distributed are the assumptions associated with linear regression [24]. Linear regression assumes that independent variables are measure on a continuous or nominal scale [2].

V CONCLUSION

This study was nonexperimental explanatory research that studied the extent of perceived usefulness, perceived ease of use, perceived institutional trust and perceived privacy on the decision to adopt Blockchain technology. The study expanded on the knowledge of the Technology Acceptance Model theory by confirming the statistical significance impact of perceived ease of use, perceived usefulness, and perceived institutional trust. The findings of the study can be generalized in the United States to IT professionals. The study contributes to the literature and concludes that perceived privacy does not significantly influence the decision of IT managers to adopt Blockchain technology.

The study revealed the significance of institutional trust on the decision to adopt new technologies like Blockchain. Additionally, the study showed that most IT managers prioritize ease of use and usefulness over privacy. While the study did not discuss the reasoning behind the participants' answers, qualitative research using the same constructs could better understand the perception of IT managers when it comes to privacy. Lastly, the study discussed the limitations and recommended areas for further research.

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