ADOPTION OF BLOCKCHAIN TECHNOLOGY BY THE FINANCIAL INSTITUTIONS OF PAKISTAN

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Abstract- The advent of disruptive innovative technology in developed nations are emerging as a new instrument to improve the traditional banking system indeveloping nations. The adoption of distributed ledger technology isindeed a necessary condition for the coming future of financial markets.The purpose of this study is to explore the current challenges and opportunities for adoption of blockchain technologyby the financial institutions of Pakistan.To analyzed the data a Structural equation model is used and emprirical data is collected from a sample of 202 financial experts working in the banking sector of Pakistan. Results confirm that currently Scalability is a big challengeforadoption of a new disruptive technology. In contrary in the coming future results show that DLT have the significant role for reducing the cost for online transactions, improving the traceability of information, increase the security, transparency, immutability, and audibility of financial insitutions.This study offers novel insights to the Governement of Pakistan for encouraging all the public and private sector organizations to reducemanual andpaper based system, rebuild trust with citizens, become transparent and start thinking in terms of larger interests of the state in challenging technological times ahead.

Keywords- Block Chain Technology, Financial Institutions, Transparency, Traceability, Cost, Structural equation modeling

I. INTRODUCTION

The connection between business model advancement and technological innovation has involved scholastic discussion for some a long time (Schumpeter 1939). Blockchain technology is one of the most recent in a considerable digital technology that have all the earmarks of being proclaiming a new industrial revolution (Perez 2010). The financial industry paid over $ 1.4billion on a research of blockchain(Forum) as it is anticipating that colossal advantages from moving should be the new BCT; financial institutions are also planning to save $15–20billion on their foundation by 2022 (Wright and De Filippi 2015). The blockchain capability is to influenceaccountability and transparency in government has officially gotten some consideration from designers, the pattern would seem, by all accounts, to be near the improvement of new, progressively efficient, less exorbitant end-client controlled items and administrations to contend with items generally offered by financial instutitonsand the improvement of financially increasingly profitable plans for coalface specialists (for example music industry rights claims for specialists in digital empowered organizations, for example, WhatsApp, Airbnb and Uber (Tapscott 2016). Atzori; Bohme and etal says that while BCT can possibly enable people and networks to update their communications in legislative issues, business, and society everywherewith an exceptional level of disintermediation using computerized, trustless exchanges, the customary elements of the countrywide can't be replaced with blockchain-based services. The state is a vital essential issue of coordination in the society (Atzori 2015);(Böhme, Christin et al. 2015). Blockchain isa database which is shares by all member parties in a distributed network, that stores all transactions occurring in the network (McLean 2016). Each transaction executed in blockchain is confirmed by consensus of majority in the system. The information recorded into blockchain become irrevocable, unalterable and auditable transaction records. Block chain keep a verifiable record of every single online transaction ever made(Crosby, Pattanayak et al. 2016). Blockchain technology is believed to expedite the business operations (transactions) of financial institutions. The fast tracking of operations makes it easier for small businesses to get finances and also from banks to assess mortgage portfolios in just a click (Barnes 2015). During the ministerial meeting of the 14th OIC summit of the Organization of Islamic Cooperation, which convened in Jeddah, Prime Minister of Pakistan Imran Khan said “The Muslim world not paying much attention to Science and Technology, we have an organization called COMSTAC. we are on the verge of another industrial revolution with A.I and BCT. We must not be left behind again. We must pay more attention and spend more of our resource in strengthening our self in this field” (News 2019). In 2017, The State Bank of Pakistan has made a remarkable proposal inquiring financial institutions as to whether they would deploy a distributed ledger technology so as to ensure budgetary exchanges and strengthen online installment frameworks. "We may adopt the blockchain system to encourage exchanges. Financial institutions may approach the State bank of Pakistan and advise in the event that they need to utilize the new innovation." Said by Inayat Hussain, State Bank of Pakistan Executive Director Banking Supervision Group (Shadman 2017). Financial institutions face substantial process inefficiencies, wide cost base

issues and also the financial crises discovered that it's not always possible to recognize the real present owner of assets. Its further a problem to repeat ownership undermining a long chain of shifting buyers in global financial transaction services (Nofer, Gomber et al. 2017).Moreover, due to the money launderingPakistan loses annually 10 billion US dollar, as indicated by the US State Department gauges, the money goes out of Pakistan through illicit channels (NEWS 2017). Moreover, In September 2017, Habib Bank Limited of Pakistan, New York branch agreed to pay a fine of 225 million US dollar against several violations of the state's regulatory provisions(Reporter 2017) . In March 2017, a US State Department released a report labelled Altaf Khanani group an illegal tax avoidance association and blamed it for washing billions of dollars for terrorist and crime outfits. The group, which was assigned a transnational composed wrongdoing bunch by the USA in November 2015, encourages illegal cash development among Pakistan, UAE, USA, UK, Australia and Canada, among different nations, as indicated by the report(Iqbal 2017).In February 2015, State Bank of Pakistan block 65 million US dollar suspicious transaction originating from Malaysia(DAWN 2015). In November 2015, KASB bank ex director laundered over Rs5 billion from Pakistan to Germany, China and Iran (DAWN). Similarly, in a year 2007 a Pakistani underground banker was arrested and upon searching his home the authorities discovered 256,700 EUR in cash and all other records. In the same day policy also arrested several of his customers whom were coming to his home with money. This isn't the only case in context of Pakistan several types of financial facilitators are engaged in this. The money acquired through criminal acts is exchanges through these underground bankers. Mostly the money is kept outside the legal financial institutions mostly the money is moved abroad (Soudijn 2012).

Therefore in January 2018, State bank of Pakistan external relations department launchesa survey (ERD/M&PRD/PR/01/2018-07) to identify and manage systematic risks arise from foreign and within country financial system (Department 2018). According to the FATF, recently Pakistan is evolving from Grey list in to the Whitelist (Khalid). So, from the above discussion we can arise the following main questions.

Is blockchain provides a powerful combination of security and immutability?
Is blockchain have capability to reveal the opaqueness of numerousproductions as society progresses towards a world that requires more transparency and closer integration?
Is blockchain also reduces the cost of transactions while concurrently increasing safety and authenticity?
The current article examines how blockchain technology can be adoptedby the financial institutions of Pakistan. The study presented in this article focuses on the DLT challenges and opportunities for the adoption of banks. A survey has been conducted from 10 major banks to know about prerequisite of distributed ledger technology for the coming future. The Section 2 provides literature, 3 explain research methodology, 4 clarify result summary, and the work ends with conclusion, limitation and future developments.

II. LITERATURE REVIEW AND HYPOTHESES

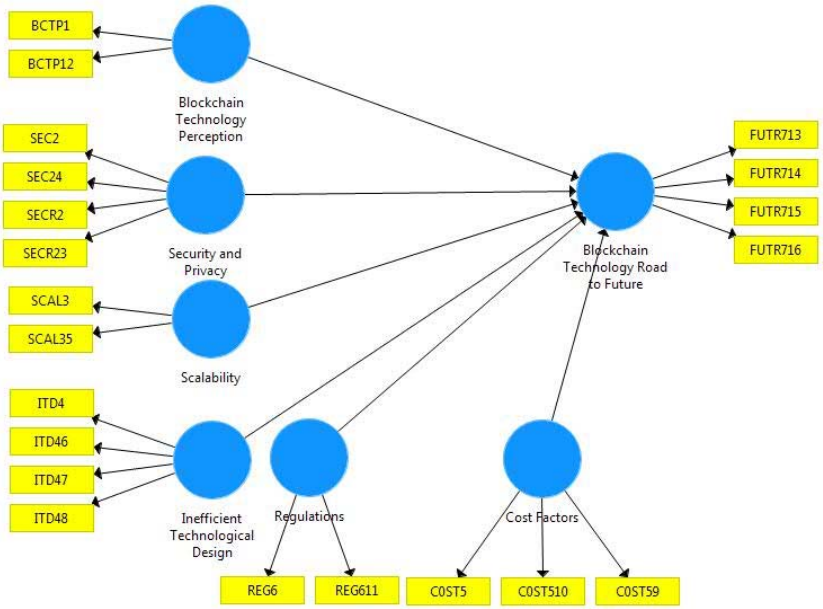


Figure1 shows the hypothesis relationship

The Diffusion of Innovation Theory, proposed by Everett Rogers in 1962, where he enlightens that how an idea, a producttakes root in a society through sections of population. It took place first among the "innovators" followed by "early adopters" that makes up almost sixteen percent of the population and considered to be the intrepid persons whom are sharp enough to see opportunities even before they exist, they are willing to take risk, experiment it and challenge the status quo(Dearing, Meyer et al. 1994). The question is now arisewherewe place block chain technology in this adoption era? It's widely believed that block chain is in the "early majority" phase of extraordinary growth and it's expected that block chain adoption is at the cusp of full adopted. The figure 1shows the hypothesis relationship.

III. RESULTS SUMMARY AND DISCUSSION

Highly correlated and interchangeable indicators are reflected towards one another and their reliability must be examined and reported (Haenlein and Kaplan 2004); (Hair Jr, Hult et al. 2016); (Petter, Straub et al. 2007). It very well may be seen that the majority of the individual indicator reliability are near the base acknowledgment level of 0.4. Moreover, prior literature has recommended the utilization of composite reliability rather than Cronbach's alpha to quantify inner consistency reliability in social science. From table 1, such values are demonstrated to be bigger than 0.7, so high levels of internal consistency have been exhibited among all reflective latent variables. To check convergent validity, each latent variable's Average Variance Extracted (AVE) is assessed. From table 1 on right side, it is discovered that the majority of the AVE values are greater than 0.4 and near edge of 0.5, so convergent validity is affirmed.

Construct	Indicator	loadings	IR	CR	AVE
BTP	BCTP1	0.832	0.693	0.61	0.756
	BCTP12	0.905	0.819		
S&P	SEC2	0.576	0.322	0.73	0.411
	SEC24	0.654	0.428		
	SECR2	0.701	0.492		
	SECR23	0.636	0.405		
SC	SCAL3	0.772	0.596	0.79	0.664
	SCAL35	0.855	0.732		
ITD	ITD4	0.678	0.459	0.74	0.434
	ITD46	0.374	0.139		
	ITD47	0.705	0.498		
	ITD48	0.800	0.64		
CF	COST5	0.753	0.568	0.72	0.471
	COST510	0.668	0.447		
	COST59	0.632	0.399		
RG	REG6	0.726	0.528	0.78	0.645
	REG611	0.874	0.764		
BF	FUTR713	0.682	0.466	0.77	0.456
	FUTR714	0.706	0.499		
	FUTR715	0.650	0.423		
	FUTR716	0.661	0.437		

A. Discriminant Validity

Moreover, to check dircriminant validity,(Fornell and Larcker 1981)recommend that the square root of Average Variance Extracted in each inactive variable can be utilized, if this worth is bigger than other correlation values among the latent variables. The outcome demonstrates that discriminant validity is very much estabablished.See below table for checking discriminant validity.

BTP	0.869						
BF	0.301	0.675					
CF	0.272	0.522	0.686				
ITD	0.206	0.513	0.512	0.659			
RG	0.200	0.376	0.327	0.367	0.803		
SC	0.242	0.262	0.496	0.551	0.388	0.815	
S&P	0.382	0.387	0.460	0.453	0.264	0.464	0.641

B. Structural Path Significance

SmartPLS can create T-statistics for significance testing of both the inward and external model, utilizing a system called bootstrapping. In this method, an enormous number of subsamples (e.g5000) are taken from the original sample with substitution to give bootstrap errors, which thusly gives surmised T-values for significance testing of the structural path. The bootstrap result approximates the typicality of the information. See table 3 on right side for T-Statistics of Path Coefficients.

Path Coefficients	T Statistics (|O/STDEV|)
BTP -> BF	2.011
CF -> BF	3.894
ITD -> BF	4.412
RG -> BF	2.302
S &P -> BF	2.420
SC -> BF	1.221

After evaluating the path coefficient for the inner model, we can investigate the external model by checking the T-statistic in the outer loadings. As displayed in table 4, the majority of the T-statistics are greater than 1.96 aside from Scalability so we can say that the outer model loadings are highly significant.

Outer loadings	T Statistics (|0/STDEV|)
BCTP1 <- BTP	13.210
BCTP12 <- BTP	22.167
COST5 <- CF	12.581
COST510 <- CF	9.125
COST59 <- CF	7.024
FUTR713 <-BF	10.817
FUTR714 <- BF	14.614
FUTR715 <- BF	9.661
FUTR716 <- BF	10.000
ITD4 <- ITD	8.226
ITD46 <- ITD	2.860
ITD47 <- ITD	9.121
ITD48 <- ITD	15.866
REG6 <-RG	6.700
REG611 <-RG	13.704
SCAL3 <- SC	5.696
SCAL35 <- SC	8.110
SEC2 <- SEC	5.089
SEC24 <- SEC	8.107
SECR2 <- SEC	9.887
SECR23 <- SEC	6.652

C. Model's f^2 effect size

	BTP	BF	CF	ITD	RG	SC	S&P
BTP		0.023					
BF							
CF		0.116					
ITD		0.116					
RG		0.048					
SC		0.055					
S&P		0.010					

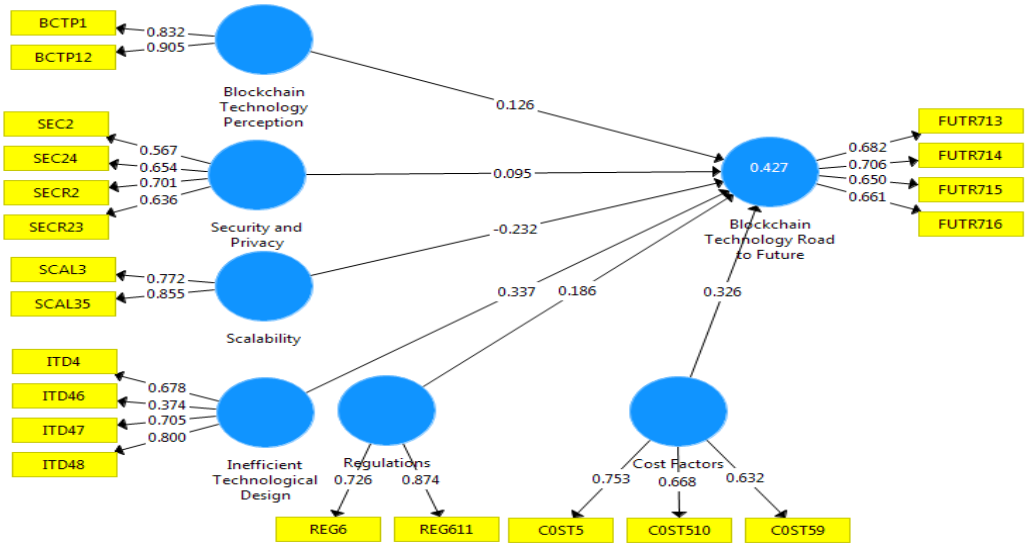


Figure 2: structural model

Notwithstanding checking collinearity, there can be a dialog of the model's f^2 impact size which shows how much an exogenous latent variable contributes to an endogenous latent variable's R^2 values (R Square for Blockchain Technology Road to Future is 0.427 and for R Square Adjusted is 0.409). In straightforward terms, effect size surveys the strength or mangnitude of connection between the latent variables. As presented in Table 5 , Such dialog can be significant on the grounds that effect size encourages specialists to evaluate the general commitment of an exploration study (Chin, Marcolin et al. 2003). Moreover, see below figure 2 for the structural model.

IV. CONCLUSIONS, LIMITATIONS AND FUTURE DEVELOPMENTS

This study suggests novel insights on the features driving acceptance of blockchain technology for financial institution of Pakistan. In addition, currently the Governmental dealings like driving licences renewals, firm registrations, issuance of national identity cards (NICs), transactions involving assets such as vehicles and immovable property aretime consuming and tedious. These processes demand time because all departments concerned usually lack vertical integration and horizontal synergies. Integration, for example, between the National Database Registration Authority (NDRA), the private banks and interior ministry is still way off the present-day requirements. A lot of certification is still paper based. Integration of financial institutions through distributed ledger technology presents a huge opportunity costas well as man-hours. Through an empirical study, we investigatedthe challenges and opportunities for the adoption of Distributed ledger technology. We examinedour data through SEM, a new smart technique able to guess the constructs interrelated dependences in a single analysis. We showed thatScalability shows a negative impact on adoption of BCT. In contrary, we have to look the future trends of DLTwill bring a gigantic transparency advances that could reduce any doubts of imbalance for all the orgnaizations of Pakistan. The current study has several limitations, that proposeinstant futureresearch direction for pratictioners. First, our results basedon empirical research, we stimulateour Government and developers in Pakistanto explore differenttechnologies to test the generalizability of our results to other contexts.For government institutions, early collaboration with the private sector will ultimately be the influential factor which could set the bound of blockchain adoption across all other industries.The private sector, mostly bankingcould perhaps take the lead and offer partnerships for guidance to the governmental organizations. Ultimatley in return would help the private sector itself, which often complains of tardy feedback from public sector institutions. Second, the current study focusonlyonsome specific banks in order to better shape and understand the necessity of DLT for the integration of banking sector. Hence, we boostresearchers to comprehend such study in a broader perspective fornon financialinstitutions as well. Finally, it must be prompted that our study has primarilyfocused on technology acceptance, which is the basic necessary condition for the developmentof banking sector through the adoption of BCT. The current studysignifies a first, essential cornerstone to comprehend how DLT might actually lead to development in for all the manual and paper based system organizations.

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