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Blockchain-Enabled Banking Services and Customers' Perceived Financial Well-being: A Structural Nexus

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Abstract. Grounded in Transformative Service Research (TSR), this study aims to examine the mechanism by which blockchain-enabled banking determines customers perceived financial well-being (FW). We conclude that blockchain features augment information transparency, which in turn determines customers perceived financial well-being. Data was collected through a survey filled by 283 individuals having bank accounts. The contextual setting of the study was provided by commercial banks operating in Pakistan. The primary data was analyzed through PLS-SEM to explore the direct and indirect relationships among blockchain features (efficiency, security, and regulatory compliance), perceived information transparency, and perceived financial well-being. The evidence points to the fact that: (1) Blockchain features are significant in determining customers' financial well-being; (2) Information transparency mediates the relationship between these features and customers perceived financial well-being; hence, that (3) Bank managers who embrace the challenging task of improving the perceived financial well-being of their customers, should adopt blockchain technology to enhance information transparency, and accordingly to augment the customers' financial well-being.

Keywords. *Blockchain; firm information transparency; perceived financial well-being.*

1 Introduction

The emergence of Blockchain technology has been presaged as the next level of disruptive revolution that is believed to revitalize the banking and finance industry as it is expected to augment the efficiency and effectiveness of financial services. Blockchain is defined as the decentralized or distributed ledger, encompassing the technological infrastructure and protocols that enable recording, validation, and simultaneous access of data among multiple stakeholders (Frizzo-Barker *et al.*, 2020). Blockchain stores financial data in blocks that can be shared between

members. These can be added together in a chronological sequence that form a chain. Once shareholders share their confirmation, stored data cannot be changed. Stakeholders involved in a transaction act as nodes, and validation is performed through cryptography (Awad *et al.*, 2018; Ammous, 2018; Arsi *et al.*, 2021; Bouri *et al.*, 2021a; 2021b; 2022a; 2022b). Blockchain is the technology at the base of the cryptocurrency existence: it was created to support digital currencies without assisting in predicting the return of the latter (Shahzad *et al.*, 2022b; Wang *et al.*, 2022; Wen *et al.*, 2022), nor guiding customers' individual trading strategies (Shahzad *et al.*, 2021a; 2022a). Blockchain-enabled banking is likely to provide stakeholders a transactional platform with greater security, transparency, speed, efficiency, and shared record, which can enhance customer trust. The effect of the COVID-19 pandemic on the price and trading volume of cryptocurrencies changed both by currency and geographical location (Naeem *et al.*, 2021; Shahzad *et al.*, 2021b; Dutta *et al.*, 2022; Kumar *et al.*, 2022).

The increased transparency of a financial transaction sustains customers' trust and predicts their attitude toward an entity (Naveed *et al.*, 2021). In the economic transaction, trust remains a key element. The adoption of Blockchain appears to be essential for banks to foster their competitive position and sustain their performance and growth. Besides revitalizing the banking sector, the adoption of Blockchain will also transform customers' well-being. Transformative service research (TSR) adheres to this concept and requires service providers to look after consumer well-being. The concept of consumer well-being remains an integral premise of societal marketing, which emphasizes the importance of meeting customers' needs while also considering the well-being of society as a whole (Hoeffler & Keller, 2002). Financial institutions in particular can demonstrate a societal marketing orientation by being transparent and ethical in their business practices (Ward & Lewandowska, 2006). Furthermore, Blockchain-enabled banking is believed to provide a higher level of transparency and security for customers, while also reducing the risk of fraud and improving the efficiency of banking operations. There is a growing consensus that the ultimate goal of financial services is to maximize the individual shareholder wealth, which determines one's financial well-being related to a person ability to meet current and ongoing financial obligations, while feeling secure about one's financial future.

The literature investigating the role of Blockchain and its transformative impact on customer well-being is still limited. Additionally, most of the past studies have been conducted in developed economies where the pace of technological adoption and regulatory compliance is divergent from developing economies. Banks act as a catalyst in stimulating economic growth in developing countries like Pakistan, which is now under the jurisdiction of the Financial Action Task Force (FATF) for encountering increasing number of financial scandals and facing rising challenges to sustain transparency. Therefore, to comply with the tightened international regulatory mechanism and safeguard customers' well-being, as well as to ensure efficiency, security and transparency, the banking system needs to explore robust and effective technologies (Garg e*t al.*, 2021). Accordingly, the banking system of Pakistan has the potential to embrace Blockchain-based systems. Accordingly, this study aims to (1) explore Blockchain technology interventions,

which are likely to improve an individual's financial behavior and well-being in Pakistan, and (2) contribute towards the growing literature on financial services and their transformative role in shaping customers' financial well-being.

2. Literature review

Recently, financial well-being has gained significant attention from regulators, managers, and academics: past studies examine various antecedents of financial well-being such as financial knowledge and behavior, consumer spending and self-control, credit card literary, bank information transparency and self-efficacy (Losada-Otalora & Alkire, 2019), and firm information transparency and trust (Naveed *et al.*, 2021). Research on financial well-being and the perceived feeling of being able to meet current and future financial obligations, remains limited. Blockchain, as a breakthrough in information transmission and data storage, might transform the existing model of financial services to a more efficient, convenient and transparent one. Despite the growing belief that the adoption of these technologies might have a potential transformative impact on consumer financial well-being, evidence with this regard remain scarce. Hence, this study aims to explore how Blockchain-enabled banking is perceived by the banking customer, and the extent to which it can magnify one's level of perceived financial well-being by considering the societal marketing orientation. Blockchain-enabled banking and societal marketing orientation are mutually exclusive concepts that, when combined, can have a significant impact on the banking industry and society (Rain *et al., 2022*). Indeed, the use of Blockchain technology in banking can provide a higher level of transparency, security, and efficiency for customers (Hoeffler & Keller, 2002). A societal marketing orientation in banking can ensure that financial institutions prioritize the needs and financial well-being of society. These two concepts can help create a banking industry that is not only more efficient and secure, but also more socially responsible and ethical (Ward & Lewandowska, 2006). This can help to build a more sustainable and equitable society, where financial services are accessible to all and contribute to their financial well-being.

2.1 Blockchain-enabled security and efficiency
The adoption of this modern technological disruption by some banks is likely to offer them a competitive edge over competitors, as efficient and secure Blockchain-enabled banking services will allow customers to better manage their financial goals and objectives. However, till date, there are limited research that respond to the nexus between Blockchain enabled efficiency and security and customer perceived financial well-being. Transformative consumer research (TSR) overlooks the pivotal role of services in driving household as well as consumer well-being. It suggests that service providers should foster the welfare of the consumer to whom they provide their services (Anderson *et al.*, 2013). Stimulated by the TSR agenda, the seminal study by Burgen *et al.* (2017) establishes the foundation to examine the overlooked concept of financial well-being. Extending

this notion, the transformative role of Blockchain-enabled banking services would be pragmatic to determine the customer financial well-being. Evidence regarding the customer perceived benefits of Blockchain-enabled services and its transformative impact on customer well-being remains quasi-nonexistent. Therefore, this study aims to examine how Blockchain-enabled efficiency and the security of the banking services trigger customers' financial well-being.

H₁: Blockchain-enabled efficiency and security result in high level of FW

2.2 Blockchain-enabled regulatory compliance

The aftermath of the global financial crisis has imposed various regulatory reforms on the financial sector worldwide, therefore regulatory compliance remains the prime concern for banks to defend their legitimacy. Rules and regulations are most needed to safeguard the bank stakeholders' interests, while also fostering the integrity and reputation of the financial system. Financial institutions are under increasing pressure to elevate their compliance as part of their operational strategy to sustain sound corporate reputation. Likewise, customers perceive banks that comply with regulations as safe to interact with. Moreover, regulatory compliance is essential for ensuring a transparent banking system, any pitfall in the banking sector directly affects the financial well-being of the society (Garg *et al.*, 2021). Blockchain appears to have the fundamental capacity to integrate all financial processes, while enabling banks to comply with regulations in an effective manner.

H₂: Blockchain-enabled regulatory compliance results in high level of FW

2.3 Blockchain and information transparency

Information transparency has been attributed to mitigate information asymmetry and build stakeholder trust by disclosing issues that are usually left in the dark. In the context of banking, information transparency is conceived as the perceived quality of information shared by banks with their shareholders. Recently, regulators have been increasingly asking for a more transparent information disclosure to safeguard the financial well-being of individuals against the devastating effect of misleading information. Consequently, banks have been integrating the element of transparency into their information disclosure. Accordingly, information transparency became performance evidence as well as an indicator to identify well-reputed banks. The increasing demand for greater transparency is based on the notion that reliable information is requisite to make sound resource allocation decisions (Netemeyer *et al.*, 2018). Past studies document that based on informed and rational decision-making, customers thrive on their overall well-being (Brüggen *et al.*, 2017). Despite increased attention to the analysis of transparency measures, limited attention has been devoted to how a household's financial well-being is contingent to information transparency. The role of bank information transparency in determining the financial well-being remains slightly unfocused, and the mechanism through which the bank's transparency provokes well-being is not well documented (Losada-Otálora and Alkire, 2019).

H₃: Information transparency mediates the relationship between efficiency and security, regulatory compliance and FW

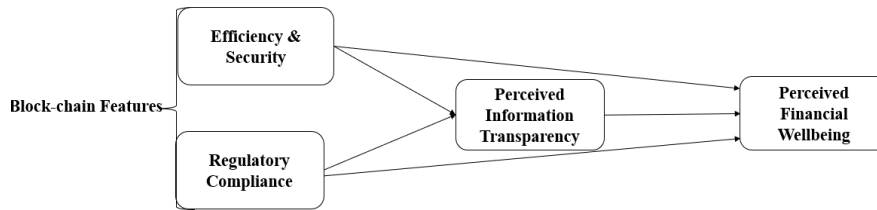Figure 1 outlines the proposed theoretical model based on TSR theory:

Fig. 1 Theoretical Model

3 Methodology

This study was based on a quantitative design, whereby data was collected through a survey. The proposed model was estimated through PLS-SEM. The sample included individuals with bank accounts in commercial banks located in Islamabad (Pakistan). A convenience sampling method was adopted for data collection. Out of 600 distributed questionnaires, only 283 were used for analysis after removing the missing values. Table 1 shows the detail characteristics of the sample selected.

Table 1 Descriptive & Correlation Matrix

	Mean	S.D	Gdr	Age	Edu	Exp.	FW	ES	RC	IT
Gdr	1.12	0.4	1							
Age	2.04	0.8	0.03	1						
Educ	1.87	0.7	0.05	0.19**	1					
Exp.	1.76	0.8	0.01	0.05	0	1				
FW	3.61	0.5	0.06	0.02	0.02	0	1			
ES	2.98	0.7	0.03	0.01	-0.04	-0.12	0.38**	1		
RC	3.43	0.7	0.02	0.06	-0.02	-0.01	0.54**	0.54**	1	
IT	3.79	0.6	0.02	0.04	0.01	-0.01	0.61**	0.40**	0.54**	1

Note: ** shows the significance at 5%

The study variables were assessed through scales adopted from past literature. Financial well-being was assessed based on the six-item scale by Gerrans *et al.* (2014). The perceived benefits of Blockchain banking named as efficiency and security and regulatory compliance were adopted from Garg *et al.* (2021). The mediating variable incorporated as perceived information transparency has been adopted from the explanatory variable, and the broker information transparency was measured through four items scale adapted from (Liu *et al.*, 2015). The study also incorporated several control variables: gender, age, education and marital status affect their assessment of perceived financial well-being.

3 Data analysis

3.1 Measurement model

PLS-SEM were utilized for their appropriateness in estimating simultaneous caus-al relationships among variables. A three-step modelling was used to analyze the collected data, including the common factor analysis utilized to determine the number of latent variables, and the confirmatory factor analysis (CFA) employed to validate the measurement model and test the structural model. Validity was de-termined using convergent and discriminant validity parameters. The average var-iance extracted with outer loading were also applied to measure the convergent va-lidity of the latent variables. To establish the convergent validity, the Average Variance Extracted (AVE) of the latent variable and outer factor of each item in the variable must be greater than 0.70 as argued by (Hair *et al.*, 2017). The results for the AVE, factor loadings, composite reliability (CR), and Cronbach alpha are all presented in Table 2. Cronbach alpha and CR were used to confirm the high in-ternal reliability and consistency of the latent variables.

Table 2 Descriptive statistics of measurement model

Variable name (Scale Source)	Items	Factor loading	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's α
Efficiency and Security (Garg *et al.,* 2021)	ES1	0.795	0.708	0.924	0.897
	ES2	0.870			
	ES3	0.825			
	ES4	0.870			
	ES5	0.845			
Financial Well-being (Gerrans *et al.,* 2014).	FW1	0.886	0.749	0.947	0.933
	FW2	0.899			
	FW3	0.820			
	FW4	0.853			
	FW5	0.892			
	FW6	0.841			
Information Transparency (Liu *et al.*, 2015)	IT1	0.888	0.813	0.945	0.923
	IT2	0.915			
	IT3	0.895			
	IT4	0.907			
Regulatory Compliance (Garg *et al.*, 2021)	RC1	0.831	0.721	0.928	0.903
	RC2	0.870			
	RC3	0.886			
	RC4	0.830			
	RC5	0.827			

3.2 Structural model

The structural model was assessed only after establishing the reliability and validi-ty of the constructs. All the hypotheses were supported expect for H_1 according to which efficiency and security have an insignificant impact on the bank customers' financial well-being. The findings confirm that the efficiency and security of the

blockchain have an insignificant (significant) relationship with financial well-being (information transparency), where β = -0.046 (0.427) and p-value = 0.505 (0000). Regulatory compliance has a statistically significant relationship with information transparency and customers' financial well-being with a path coefficient of 0.458 and 0.248, and p-values of 0.000 and 0.001 respectively, which supports the 2nd hypothesis. Table 3 summarizes the mediation analysis for this study.

Table 3 Mediation analysis results

	Direct Effect	Indirect Effect	Mediation Results
RC ➔ IT ➔ FW	0.248***	0.299***	Complementary mediation
ES ➔ IT ➔ FW	-0.046	0.279***	Indirect-Only mediation

*** shows the significance at 1%

4. Discussion, conclusion, and future research

Aligned with the proposed TSR research directions of Losada-Otálora (2019), this study was devoted to study the impact of new information technologies, hereby Blockchain, on the improvement of information transparency, and its ensuing influence on customers' financial well-being. This study showed that banks might adopt Blockchain to uplift transparency, which in turn remain integral to improve the financial well-being of their customers. This expanded and validated the work of Brüggen (2017), who proposed technological interventions to uplift customer well-being. The findings of this study showed that regulatory compliance – as a potential feature of Blockchain technology – has a significant positive impact on customer financial well-being. Likewise, the indirect impact via information transparency also remains positively significant. The indirect impact of perceived efficiency and security as a potential feature of Blockchain technology has a significant positive impact on financial well-being. Nonetheless, the direct impact of efficiency and security on financial well-being remains insignificant.

This study has a number of managerial, policy and societal implications. Financial institutions, including banks, policymakers and regulators can use the insights of this study to improve the financial well-being of their communities. Bank management and institutions that offer financial services can avail this objective by designing strategies with more transparent information. By adopting Blockchain technology, the banking sector of Pakistan can benefit from complying with stringent international regulations and enhancing information transparency in order to revitalize customers' trust. Blockchain adoption will enable banks operating in Pakistan to gain a competitive edge by improving their efficiency and uplifting their customer's financial well-being. Additionally, the implications of combining societal marketing orientation and Blockchain-enabled banking are significant, as it has the potential to transform the banking industry, while contributing to the financial well-being of society (Hoeffler & Keller, 2002). The implications of this combination are far-reaching and have the potential to create a more sustainable, equitable, and socially responsible banking industry that prioritizes the needs and well-being of society as a whole. Future studies could examine the affective response of customers based on their affective assessment of the in-

formation transparency and could focus on the interaction of the cognitive and affective evaluation of the information in framing the perceived information transparency and financial well-being of customers.

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