Journal of Digital Science

ISSN 2686-8296

Volume 3 Issue 2 **December 2021**

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Determinants, Barriers and Strategies of Digital Transformation Adoption in a Developing Country Covid-19 era

Kingsley Ofosu-Ampong[0000-0003-0561-6376]

Baldwin University College, P. O. Box 19872, Accra – North, Ghana

https://doi.org/10.33847/2686-8296.3.2_5

Received 09.10.2021/Revised 03.11.2021/Accepted 09.12.2021/Published 28.12.2021

Abstract. The purpose of this paper is to examine the determinants and strategies of digital transformation adoption (DTA) in a developing country context through the lens of price value, hedonic motivation, inherent innovativeness and technology readiness. The study also investigates the impact of COVID-19 on banks in Ghana from the managers' perspectives and provide possible solutions for banks' successful transitioning and uptake of digital transformation in a post COVID-19 era. The study was carried out using a mixed-method approach from banks in Ghana. The findings of the study revealed that customers' technology acceptance and adoption of innovation is fraught with challenges. At the same time, employees/banks struggled to adjust to new technologies during the COVID-19 pandemic. Further, the findings indicate that price value, inherent innovativeness and technology readiness were the significant factors in DTA. Conversely, hedonic motivation was an insignificant factor in a developing country context. The paper concludes with a conceptual model for emergency digital transformation to respond to future pandemics.

Keywords: Digital transformation, Determinants, Manager's perspective, Covid-19 banking, Developing countries, Strategies.

1. Introduction

The future is digital. As such digital technology is globally recognised as a reliable tool for enabling bank transformation and development and interacting with customers. In recent times, digital transformation has been widely observed in operations management, information technology, and business for organisation and strategic changes. It has been described as a new development in information systems (IS) research [1]. Digital transformation in this context refers to leveraging digital technologies to (re)define the value position of an organisation, and it involves a new organisational identity [2].

Extant literature on digital transformation in developing countries is scanty and remain limited. However, the factors of digital transformation in the developed world are well-grounded in IS literature. To a large extent, the digital transformation happening in developed countries differed from developing countries. For instance, the technological infrastructures acquired by banks [1] in developed countries such as US or UK is more sophisticated and advanced than banks in a developing country like Ghana. Further, as widely noted in IS literature, research findings from developing countries do not directly apply to developed countries and vice versa due to socio-cultural factors [3]. Also, since the COVID-19 pandemic was declared a Public Health Emergency of International Concern by the World Health Organization on 30 January 2020, both developed and developing countries have embraced technology and dynamic capabilities as an enabler of agility and resilience and adopted different COVID-19 protocols to stay economically active and gain high profits. However, the factors associated with developing countries digital technologies in a banking institution is not well established and lack academic rigor. Therefore, given that the transformation is spanning from the developed countries and well established in their

banks, this research examines the factors of digital transformation in Ghana – a developing country. These issues hinder the successful implementation of digital technologies. Moreover, given the complex nature of banking and electronic services, requiring managers and employees to adopt new behaviours due to technological infrastructure changes is not easy, especially in developing countries [4]. Therefore, it is important to examine the critical factors that hinder a banks intention to adopt digital transformation processes in a developing country context.

The paper first explores the current state of digital transformation in banks in Ghana during the COVID-19 era. It then provides strategies and potential solutions to a post COVID-19 era. Importantly, the author unearths the determinants of digital transformation adoption in banking institutions in a developing country context. In lieu of the COVID-19 crisis, the paper also provides a framework for emergency digital transformation to respond to future pandemics.

2. Literature Review

2.1. Digital Transformation Adoption

Digital transformation adoption (DTA) affects many dimensions of the bank, such as competitiveness, decision-making, strategic direction, productivity, business model, and customers [5]. The COVID-19 pandemic is driving financial institutions to rethink and adapt their banking strategies in order to stay operational. However, banking institutions in developed countries are likely to perform better in turbulent situations like the COVID-19 pandemic than their counterparts in developing countries because of the heavy investment in information technology that increases resilience [6]. For example, McKinsey & Company found out that developed Asian countries utilised technology quicker to COVID-19 pandemic disruption to assist contact tracing and inform customers of product and services offerings [7]. Thus, to understand digital transformation, it is important to examine the current state of banks in the COVID-19 era and determine factors that can shape the adoption of digital transformation in developing countries.

Table 1 shows selected studies on digital transformation adoption, factors and the approaches used to unearth the phenomenon in different contexts. As shown, most of the studies used a quantitative approach, thereby creating a gap in the qualitative approach in digital transformation. This study serves as an opportunity to contribute to both research methodologies to understand the phenomenon holistically from a developing country context.

Table 1. Selected Studies on Digital Transformation Adoption

Authors	Theory	Country	Methodology	Adoption Factors
[8]	UTAUT2	Jordan	Questionnaire completed by 500 bank customers Structural Equation Modeling	Hedonic motivation Self-efficacy Habit, Trust
[9]	UTAUTx Consumer-related constructs	United Kingdom	Questionnaire completed by 268 consumers Structural Equation Modelling	Performance expectancy Social influence Innovativeness Trust, Perceived risk
[10]	UTAUT	United Arab Emirates	Questionnaire completed by 638 citizens Exploratory Factor Analysis	Effort expectancy, Facilitating conditions Trust
[11	UTAUT	Switzerland	Questionnaire completed by 462 freshmen Partial Least Squares Structural Equation Modeling	Trustworthiness Social presence Adaptiveness Appearance
[12]	Technology Acceptance Model (TAM)	Greece	Questionnaire completed by 161 employees in the banking sector Multivariate Regression Analysis	Perceived ease of use Perceived usefulness Perceived self-efficacy
[13]	UTAUT2	India	Questionnaire completed by 568 rural women Structural Equation Modeling	Effort expectancy, Habit Facilitating conditions Perceived competence

2.2. The Importance of Digital Transformation

Transforming banks with technologies (also called digital transformation) is a holistic concept that looks at the relationship between technologies, organisations, and strategic changes [1]. The concept is driven by technology advancement – i.e. using digital, mobile, social and new technologies to change customers' expectations [14]. Nicknamed digital entrepreneurship, the term digital transformation is often understood as the upfront implementation of the latest technologies to enhance business. However, investing in technologies requires a clear understanding of the relationship between the organisational and technological culture and institutional resilience to anticipate, cope, adapt, and not only the risk aspect. This makes the term disruptive, transformative, and unpredictable [15,16]. In lieu of the transformation, banks are adopting customer-centric approaches rather than product-centric to remain competitive [17]. Identified areas for improvement include addressing neglected customer segments, reducing bank operating costs, firm assessment of the traditional and online banking, optimising business processes, understanding customer usage behaviour of bank resources, improving customer selection and investing in artificial intelligence and big data analytics [17,18].

Notwithstanding the novel idea of transforming banks with technology, some barriers do exist. Barriers identified in the literature include high acquisition cost, internet access, online banking platform, and customer ICT performance. The startup cost for electronic banking and implementation of digitalisation in banks may be expensive [18]. [19] found some barriers to include attitude towards change, the high cost in purchasing and cost of greenness at the organisational level, implementing and maintaining technology equipment affect the adoption of online banking. Hosting online banking for customers is affected by insufficient knowledge and limited funding resources [20]. Consequently, complementing face-to-face service with online banking may cost more to harness and develop.

Despite the several benefits of online banking to customers, research shows that the adoption of self-service technology is less patronised [21]. According to [22], customers' acceptance of technology, age structure and use behaviour affect their knowledge and expectation towards digital technology, performability and use. Other obstacles include the difficulty of use and lack of technology skills with electronic banking accounts for the constraints to digital transformation in banks.

2.3. Developing Country Context Scenario

In the Ghanaian banking sector, COIVD-19 was expected to create a fiscal gap of GHS 11.4 billion. The Government of Ghana put in the following measures a) improve the FX inflows and increase government debt by US$ 1 billion through the IMF rapid credit facility, b) defer interest payment on non-marketable instruments with an expected GHS 1.2 billion impact cashflows from investment instruments, and c) adjust expenditure on Capex and goods and services to a tune of GHS 1.2 billion [23]. The Bank of Ghana also put in measures such as policy rate and reserves, interest payment, commercial bank support, and support to mobile money users to curb the impact of the pandemic [24]. There were free mobile money transfers up to GHS100 (approximately 17 USD) and a 0.75% flat rate on mobile money transfers above GH₵100 (equivalent to 16 USD) championed by the Standard Chartered Bank of Ghana to support the digital transformation agenda. ABSA Bank Ghana also promoted waiver of charges on instant interbank transfers on its digital channels and free mobile money transfers up to GH₵100 to customers.

2.4. Conceptual Model and Hypothesis Development

As shown in Fig. 1 are the four determinants (price value, hedonic motivation, inherent innovativeness (IN) and technology readiness (TR) have been included in the conceptual model. This study introduces IN and TR in addition to [24] proposed and validated constructs (PV and HM). The motivation of the proposed conceptual model is from [24] unified theory of acceptance and use of technology (UTAUT2). IN and TR have been extensively used and noticed in the IS and marketing literature [25,45].

Hedonic motivation

HM is the feeling of excitement, cheerfulness and enjoyment towards the use of technology [24]. Prior studies have found that factors associated with HM such as enjoyment and excitement, are the essential predictors of users' intention to adopt a technology [4]. Further, [46] found the positive influence of HM on customers intention to use innovation and consequently enhance their intrinsic motivation. Therefore, the following hypothesis is deduced:

H1: HM influences the adoption of digital transformation.

Price value

Previous research has found PR's positive influence on institutions and employees' intention to use technology [24]. However, for a banking institution to consider the use of technology, certain consideration is made. For instance, when the advantage of acquiring and using a banking innovation is greater than the PV of the associated banking cost, the PV will positively influence intention to adopt. Therefore, the following hypothesis:

H2: PV influences the adoption of digital transformation.

Inherent Innovativeness

IN is the degree to which a bank has interest and curiosity in innovations related to banking processes. [41] indicated that consumers or institutions are considered innovative when they experiment with new things, ultimately leading them to adopt new technology solutions. Bank managers with innovativeness are more willing and inclined to try new technologies [26]. In this regard, a bank's inherent innovativeness, especially during the Covid-19 pandemic, will promote the adoption of new technologies. Therefore, the following hypothesis:

H3: IN influences the adoption of digital transformation.

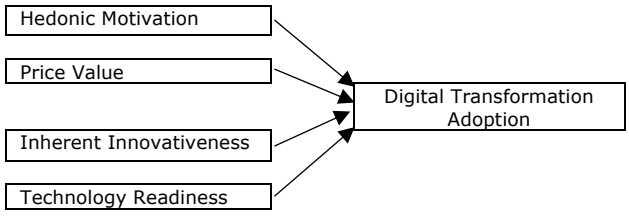

Fig. 1. Conceptual Model of Digital Transformation Adoption

Technology Readiness

Prior studies [25, 27, 28] have found that a firm's positive attitude towards new technologies may influence them to believe that the technology can improve the firm's efficiency, flexibility and business process continuity. Similarly, [27] found that TR influences customer satisfaction and intention to use new technologies. Therefore, the following hypothesis:

H4: TR influences the adoption of digital transformation.

3. Methodology

A qualitative and quantitative method was employed to determine digital transformation adoption in a developing country context through a structural equation modelling. Further, the study explores the impact of COIVD-19 on banking in Ghana and barriers to technological transformation in banking through an inquiry approach. In a qualitative study, the researcher learns from the participants through exploration. The critical phenomenon of this approach is the process, idea, and key concept studied [29]. A list of representations of the categories and case descriptions of COVID-19 impact on banks was formulated from extant literature based on participants' views. Data for the study was collected through online interviews (with a semi-structured guide) to adhere to COVID-19 protocols. Interviews allow the researcher to get an in-depth understanding of the phenomenon of study – feelings and respondents' attitudes [29]. The recurring themes from extant literature served as the research instrument for the analysis and were screened for validity by the researcher in Ghana.

Population and Sampling

All private banks in the Greater Accra Region of Ghana formed the target population. In all, twenty-eight banks were identified. Forty (40) of the managers of the banks were randomly selected to form part of this study. The managers came from the operations (16), general manager (4), client solution (4), electronic banking (10), SME (2), relationship (3) and corporate departments (1) in the bank (see Table 2). The majority of the positions were occupied by males (65%) while females occupied 35% (see Table 1).

Data Analysis

The qualitative analysis started by transcribing the recorded interviews using NVivo 11.0 software and analysing them into categories and sub-categories [30]. The software supports categorising unstructured data in the form of an audit trail to ensure coding and data interpretation consistency. The researcher replayed the interviews severally to ensure transcription accuracy, and interviews transcribed them verbatim. Pseudonyms were used for the participants to ensure confidentiality.

The quantitative analysis was assessed using the SmartPLS. The assessment of the model validation was performed in two steps, a) evaluation of the measurement model and b) examining the structural model by assessing collinearity issues and predictive relevance of the variables.

Table 2. Demographic data of respondents (n=40)

Demographic information	Frequency
Gender	
Male	26
Female	14
Position held	
Operations manager	16
General manager	4
Head of client solution	4
Electronic banking specialist	10
Relationship manager	3
Head, SME banking	2
Corporate manager	1
Years of banking service	
1-5 years	9
6-10 years	13
11-15 years	11
16 years and above	7
Did COVID-19 affect your bank operations	
Yes	40
No	0

Table 2 (continued)

Which delivery channel is the most preferred during the COVID-19 pandemic	
Internet banking and emails	9
Mobile banking	19
Automated teller	9
Face-to-face transaction	3

4. Results

The result of the study is in two parts. The first part focuses on the results of the qualitative analysis, while the part two focus on the quantitative analysis.

Part I: Qualitative Analysis

Barriers and Strategies of Digital Transformation

As shown in Table 3 are the identified themes on the impact of COVID-19 on banks and challenges associated with digital transformation as referred to in the literature and predominant in Ghana banks. The interviews suggest that all the banks in Ghana are affected by the COVID-19 pandemic and face many challenges migrating to digital transformation. The section concludes with post COVID-19 strategies identified in the study and supported by extant literature.

Table 3. Quantitative categories and sub-categories of the interview guide

Categories	Sub-categories
The impact of COVID-19 on banks	• Customer outcome • Social interaction • Traditional versus online banking
Barriers to digital banking transformation	• Cost • Customer • Internet access/exposure to risk
Post COVID-19 strategies to promote digital transformation in banking	• Fostering electronic banking acceptance • Employee • Deploying artificial intelligence • Harnessing the power of big data analytics

Source: Authors' categorisation

Current State of Banking in Ghana – The Impact of COVID-19 Pandemic

To understand the barriers that prevent digital transformation in the COVID-19 era, the study explored Ghana's current state of banking. Most of the managers interviewed indicated that the COVID-19 has negatively impacted their bank operations. However, the impact has opened an avenue for customers to patronise their online services (internet banking and mobile banking), which has been dormant since implementation. Table 4 is a detailed representation of the categories, sub-categories and case description of managers' experience with the impact of COVID-19 on banks in Ghana.

In conclusion, the managers revealed that the impact of the COVID-19 is the advent of new technologies and corporate change culture in banking. However, the change depends on employee and customer acceptance, understanding, and perception of digital transformation.

Table 4. Representation of the categories and case description of COVID-19 impact on banks

Main category	Sub-category	Case description	Number of sub-codes
Customers preparedness	Technology acceptance and innovation adoption during the crisis is low	Customers initially reject the change. However, technologically inclined customers get used to the shift knowing there is a limited option. Customers need to be involved with banks' transformation to encourage use.	8
	Usage behaviour	Prior knowledge of systems encourages usage behaviour. Customers gradual shift from analog to digital services is benefiting other online service use and acceptance. Also, the expectation and use of online services had a reflection on customers' ages.	6
	Expectations	The study revealed that customers' expectations are diverse. In contrast, some prefer to use a customer helpline, and others prefer instant messaging on our platform. Others chose to come to the banking hall, knowing the long waiting time to address issues that can be done on the phone.	4
	Traditional versus online approach	The interviews revealed that online services were fast and the best while most preferred personal face-to-face banking as the most suitable and secured. Some customers refused to obey the social distancing protocol despite signage	3
	Internet access and network instability	Customers complained of poor network slowing their business activities with the bank. Interesting, much focus was on the premier customers.	9
	Low deposits	Drop-in daily transactional limits, coupled with low income and deposits (heightened credit risks). Most clients were not able to honour their monthly loan payments	3
Employees/ Bank preparedness	High Cost	Going online is very expensive. Most employees were provided with laptops and internet access to work from home.	10
	Technology acceptance and innovation adoption during the crisis is low	Acceptance of working remotely with technologies was fraught with low interest by employees. However, initial training on software and hardware encouraged acceptance and involvement.	6
	Technological constraints and internet instability	Aside from the high cost of digitalisation and IT equipment provided to employees to work remotely, there were constant internet instabilities. Most were staying in the hinterlands and remote areas. Some employees were also overwhelmed by the technological work from home policy. Working remotely with different applications and devices was a challenge for some.	7
	Distractions	Working from home requires employees to have high self-discipline. Distraction from family members, home electronics, and social media were some of the employees' challenges.	5

Source: Authors' representation

"We have no option now but move all processes and operations online and train employees to develop the skillset to work in a digital world." [Kwesi – Manager]

"Global Covid-19 had a very negative impact, but the banking sector has greatly benefited from COVID-19 in the sense that it has pushed banks to be innovative and serve their customers beyond the traditional way of running a business. Banks have become more receptive in terms of technology." [Serwaa – Manageress]

"Most training is done online, and it is a good thing. Also, there was easy adoption of internet banking and marketing communication during the pandemic. Thus, more customers have switched to the use of online banking, which will help the bank save on cost." [Mich – Manager]

"Covid has exposed how vulnerable most financial institutions are. Most banks were caught unprepared during the lockdown period, and technological innovations will ensure

convenient banking customers. In any way, there was easy adoption of internet banking and marketing communication during the pandemic." [Ellen – Manageress]

The interview revealed that managers need to develop a Quick Pandemic Recovery Plan and intensify digital channels' use. Promote remote onboarding of customers and focus on transactional businesses. The following were managers take-home experiences with the COVID-19 pandemic in Ghana:

1. Digital drive
2. Process optimisation and customer onboarding
3. Equipping all colleagues to work remotely
4. Video conferencing and focus on technological constraints

Barriers to Digital Transformation

Cost. Among the significant challenges mentioned by the managers, the cost was the most recurring theme that prevented most banks in Ghana from taking an active part in electronic banking. According to the managers, complimenting face-to-face business with electronic banking is very expensive.

"Digital technologies and infrastructure to meet banking transformation are associated with high costs and need to be managed well so that much expenses are not shifted to the customers. The cost is a major hindrance to digital banking transformation." [Akosua – Manageress]

"To go online is very expensive, especially in this COVID-19 period. When the president announced the lockdown, my bank decided to secure remote working systems. The systems were very expensive if we have continued to work from the office. Still, the benefit was good, notwithstanding the new modalities for restructuring credit facilities for customers and grant moratorium." [Joseph – Manager]

"There is no readily available public funding for implementation of banking technologies. Most people assume that the banks are self-reliant and have the necessary resources and financial powers to acquire, implement and maintain technology and banking transformation without support. Even so, customers barely patronise the technology services when implemented. Therefore, the cost becomes double." [Eunice – Manageress]

Customers. The managers revealed that customers' readiness to accept new technologies and the overall digital transformation is challenging. However, managers reveal more transactions from customers' bank accounts to their mobile money wallet, indicating the trend of future payment (i.e., mobile) methods during a crisis. The banks also showed low adoption of innovation and difficulty adjusting to new technologies during the crisis, especially remotely working from home. In short, there was low technology acceptance and innovation adoption during the COVID-19 pandemic among customers.

"Except for customers in the big cities, customer technology acceptance, use and trust in our digital services are low. We need to do more sensitisation and education for customers to prevent the rejection of digital technologies in banking because it will be the medium of service and transaction for the day. Nevertheless, it is important to say that customers' behaviour gradually changes from analog thinking to digital use. With the launch of Bank of Ghana's mobile money interoperability system, most customers expect to use digital skills to make financial transactions without hassle." [Enoch – Manager]

"There is a paradigm shift with our digital banking transformation. We have realised that the young are more ready and skilled, and most opt for digital services. Age has therefore become a determinant with customers knowledge and expectations towards digital technologies in banking." [Sandra – Manageress]

"Some customers expect the digital transformation of their banking activities. However, the banks implement these technologies, customers barely use them conveniently or to their full advantage. Some customers even prefer coming to the banking square to confirm their transaction after conducting it online." [Rich – Manager]

"I would say the lockdown was the beginning of contactless banking. Since the president announced it, digitalisation has been the order of the day. This led to some bank closure and

face-to-face interaction and transactions. Consequently, the action affected our financial inflows – low transactions." [Kofi – Manager]

"Oh, on the employee side, the acceptance of innovation was fraught with challenges especially training them on new technologies to enable their work from home policy. Some were already tech-savvy, but others took a while to come to the new normal reality. They struggle to adjust to new technologies, especially those in our satellite and remote/rural parts of Accra." [Claudia – Manageress]

Exposure to risks. The interviews revealed that banks' digital transformation exposes the customer and the bank to online risks. The [31] disclosed 2295 fraud cases in 2019 compared to 2,175 cases in 2018. As reported by a manager;

"In our effort to adopt latest banking technologies have made our banks more vulnerable to attacks and risk such financial scamming, anti-money laundering, identity theft and more sophisticated types of cyber-crime. This attitude discourages customers from adopting online services entirely." [Eugene – Manager]

Prevalent fraud cases identified in the Ghanaian banking industry include suppressing cash and deposits, forgery and manipulation of documents, cheque fraud and cyber and email fraud. As banks continue to go fully digital, they are strongly advised to enhance monitoring processes, both physical and technological and cybersecurity infrastructure to reduce the fraudulent incidence of call diversion and prevent unauthorised access in a post COVID-19 era.

"Automation of banking process could lead to job loss and increase fraud activities due to high use of online banking. There is a lot to think about with full automation." [Yaw – Manager]

Internet access and digital means Managers persistently lamented the poor internet accessibility by customers in accessing digital services. The interviews revealed that the number of customers that access the online services was comparably low to the total customer base.

"Oh ok. You know that internet access is a huge problem in our part of the world not to talk of the customers' digital means (to acquire smartphones and laptops) to access our online services. Presumably, most banks know the low number of customers that will use their digital services; however, we have no option but to implement. I know the new normal of doing business will force customers to online services." [Freda – Manageress]

"One major challenge of customers accessing our online services is the means. Smart technologies and engaging in online activities are quite expensive." [Josephine – Manageress]

Strategies to Promote Digital Transformation in Post COVID-19

The managers were asked to state post COVID-19 strategies that can promote digital transformation in banks. After the researcher examined the strategy, the theme was categorised into two as supported in extant literature reviewed. The first category includes a) fostering online banking acceptance, b) digital literacy for customers, and c) hybrid banking. These factors contextualise the Ghanaian bank's experience and offer post Covid-19 strategies to promote digital transformation in developing countries. The second includes a) deploying artificial intelligence and machine learning, b) harnessing the power of big data analytics, and c) addressing the digital transformation myth. These factors focus on providing recommendations on how new technologies can transform banks to adapt to the new normal.

Fostering online banking acceptance. The interviews revealed that customers are often slow to embrace new banking technologies because of security reasons. Banks today cooperate with customers to know their challenges and find

solutions to promote digital corporate transformation. One manager was of the view that *"…. putting measures such as improving customers self-efficacy with ease-of-use technologies would increase online banking acceptance. Engaging customers in a recreational and marketable fashion to try digital technologies would also encourage acceptance" [Kate – Manageress].* According to [32], collaborative online activities and prompt feedback can promote exchange experiences and ideas among customers and banks, promoting competence and increasing users' self-efficacy. Tailoring systems to meet user characteristics and customers' competence may ensure rapid acceptance of online banking. This leads to a user-need analysis for adaptive electronic banking to meet the customers' expectations (personalisation of systems) [33].

Further, the interviews revealed that technological conditions necessary for digital transformation had been delayed and prerequisites not met. "*With my several years in banking, one common problem is the will and implementation power to see through digital projects. When my bank decided to connect all its satellite banks, I remember we secured the infrastructure and started creating for each satellite. However, out of the 34 satellite banks, only six (6) were connected. On the bank side, we were not ready – financially, human capital, technologically and infrastructure. Waste of resources, I guess, because we will need enhanced servers and infrastructure because of time-bound factor." [Dan – Electronic Banking Specialist]*

Hybrid banking. The interviews revealed that Ghanaian customers are yet to come to terms with online banking to the full extent. The implication is that a "hybrid banking" approach that is face-to-face interaction and online service banking will play an essential role in the long-term survival of banks in developing countries. Till customers embrace the entire digital transformation, banks should reduce the heavily and unprepared cost associated with technologies and approach it from the gradual user acceptance stage. The COVID-19 has proven that customers are dynamic but approach systems and regulations in a gradual process. Systems acceptance has been based on customer preparedness, self-efficacy, secure banking, and prior knowledge. Hybrid banking will also promote equity in banking, which are essential responsibilities of financial and banking institutions.

Deploying artificial intelligence. The interviews further revealed artificial intelligence and its important role in the future development of banks in Ghana. One interviewee stated how they have started collaborating with universities and research institutions for strategic support and new infrastructure development and application to advance AI. *"One essential resource driver available to customers is their level of comfort and ease of use with new information technologies. Artificial intelligence is permeating banking operations and such we have collaborated with a university to provide better insight in its application and integration with our current systems" [Kwame – Manager]*. [34] suggest that "technology integration is a critical component of value co-creation because of its ability to integrate, collaborate and access other resources." Reshaping service delivery and technology's ability to co-evolve business processes is more evident with artificial intelligence than any known technological forces. Research has found that AI is intertwined with customers' perception and technology acceptance, readiness, trust, and security [35]. The efficient use of AI in a higher-value use context, such as real-time personalised investment portfolios and real-time personalised advice on bank accounts, will provide seamless opportunities and insight for banks in emerging markets [36]. Recent utilisation of AI-enabled devices in banking, coupled with customers growing interest and adoption of AI technologies, allows collection, analysis, storage and access of large datasets, both by financial institutions and technology providers [37].

Harnessing the power of big data analytics. The new normal requires banks to spot and anticipate recent trends, demands, and requirements within the shortest possible time, and this is possible with data analytics. This move towards new customer insight and services approaches may lead to a paradigm shift where banks invest. One interviewee confirms the emergence and importance of big data analytics and how the organisation is actively looking into such investment. "*I think the next big thing happening to banks is the advent of big data. Big data analytics has already been used to evaluate financial crime management solution rules, customer-centric analytics and micro-segmentation, IVR analysis, and B2B merchant insights. One cannot afford to miss out on its potentials for bank revolution." [Prince – Manager].* By harnessing the power of data analytics, a business can provide opportunities and options for growth. The emergence of COVID-19 has shown that data analytics play a predominant role in business anticipation, coping and recovery, and can enhance the agility of organisations [38].

Addressing digital transformation myth. The interviews revealed how digital transformation seems to be on the minds and agenda of electronic banking specialists and operation managers. Indicating they are already in touch with tech giants to transform business operations because of the COVID-19 lessons. *"The little COVID-19 has shown us is enough to go fully digital and transform our processes" [Jona – Operations Manager].* However, the digital transformation migration is a whole cooperative adaptation process. As stated by [39], "the application of these new technologies and their appropriate implementation to improve business performance is an important issue to the organisation" and if not well implemented, would affect all dimensions of the organisation, including business model, competitiveness, decision-making, productivity, strategic direction, and customers [40].

Consequently, preparing a banking institution after the COVID-19 pandemic involves more than acquiring the services of a tech giant or moving information to the cloud. It involves embracing technology to connect the business end-to-end, i.e., the employees, suppliers, stakeholders, and customers, and moving the business process to the next level. By leveraging technology in the various aspect of banking, the electronic specialist or IT lead can approach digital transformation as such; a) tackle digital transformation in a phased approach, e.g., the financial aspect versus the e-commerce aspect, b) keep employees and customers at the centre of the transformation, and c) digital transformation should be the culture and way of life of the bank.

Part II: Quantitative Analysis

Determinants of Digital Transformation Adoption

This study adopts a two-stage approach to examine the determinants of digital transformation adoption, i.e. measurement model assessment and structural model assessment. The measurement items of price value and hedonic motivation were adapted from [24], inherent innovativeness was adapted from [41], and technology readiness was adapted from [25]. All the measurement items were on five Likert scales.

Measurement Model Assessment

The assessment of the construct reliability was conducted via composite reliability (CR) and average variance extracted (AVE). As shown in Table 4, the CR values range from 0.839 to 0.909, indicating that all the latent constructs met the minimum threshold of 0.70. However, the assessment of the Cronbach alpha indicates that all the latent construct values exceeded 0.7 thresholds apart from PV (0.683)

[42]. Similarly, the AVE all exceeded the minimum threshold of 0.5 [44]. Further, the estimation of collinearity was assessed using variance inflation factor (VIF). As shown in Table 5, all the values were less than 5, indicating no collinearity issue [43].

Table 5. Construct Reliability and Validity

Construct	CR	rho_A	AVE	CrA	VIF	R2
Price value	0.853	0.857	0.746	0.683	2.341	
Hedonic motivation	0.839	0.791	0.638	0.721	1.092	
Inherent innovativeness	0.845	0.778	0.649	0.728	2.664	
Technological readiness	0.842	0.728	0.640	0.722	1.807	
Digital Transformation Adoption	0.909	0.849	0.768	0.849		0.803

The model's predictive capability was also assessed using the R2 through a bootstrapping procedure. R2 values 0f 0.25, 0.50 and 0.75 can be classified as weak, moderate, and strong, respectively [43]. From the analysis, the R2 value is 0.803, indicating a strong predictive power of the exogenous constructs. Thus, explaining 80.3% of the variance in digital transformation adoption. The discriminant validity was examined to establish the constructs' validity using the Fornell-Larcker, as shown in Table 6 [44].

Table 6. Discriminant Validity – Fornell-Larcker

	DTA	HM	IN	PV	TR
DTA	0.876				
HM	0.239	0.799			
IN	0.839	0.186	0.805		
PV	0.729	0.281	0.736	0.864	
TR	0.768	0.196	0.654	0.568	0.800

Structural Model Assessment

Findings from the structural model estimation indicate that three hypotheses (H1, H3 and H4) in the proposed conceptual model were supported, as shown in Table 7. The effect size (F2) also indicates that 0.02, 0.15 and 0.35 represent small, medium and large values, respectively.

Table 7. Path Coefficients

Path	**Coefficients β**	**P Values**	**STDEV**	**F2**	**Support**
Price Value → DTA	0.166	0.027	2.225	0.059	*H1:* Supported
Hedonic Motivation → DTA	0.033	0.488	0.694	0.005	*H2:* Not supported
Inherent Innovativeness → DTA	0.479	0.000	5.653	0.436	*H3:* Supported
Technology Readiness → DTA	0.354	0.000	4.383	0.352	*H4:* Supported

Having identified the barriers and strategies of digital transformation in a developing country context like Ghana, the present study represents an important contribution to the factors that determine the adoption of digital transformation in banks. Basically, price value significantly predicted digital transformation adoption in banks. Moreover, inherent innovativeness and technology readiness significantly predicted the adoption of digital transformation in a developing country. Conversely, hedonic motivation did not influence banks decision to adopt.

As shown in Fig. 2, inherent innovativeness seems to be the strongest predictor of digital transformation adoption. This means that banks in developing countries should consider customers and employees' curiosity and interest in trying new banking technologies. Importantly, this prediction is followed by technology readiness. Thus, a positive banks attitude towards new banking technologies will influence customers and employees in the digital transformation agenda. This finding is similar to [27] study on customer satisfaction and interest in using new

technologies. Consequently, banks should focus on developing employees and customers' competence (self-efficacy) in making this a reality in developing countries.

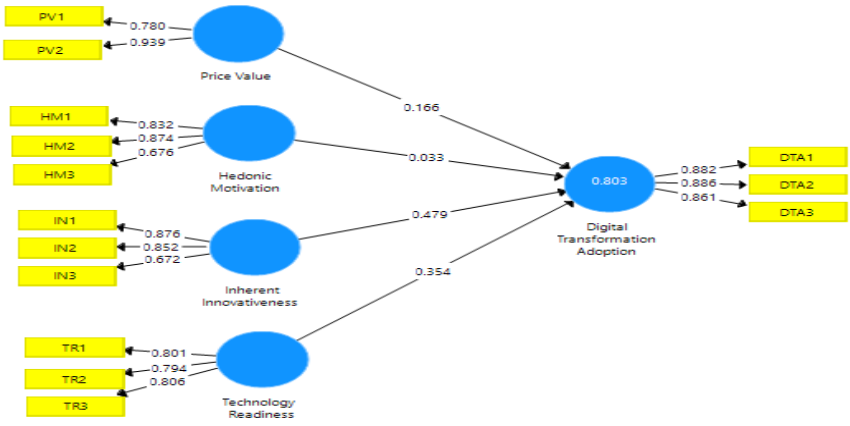

Fig. 2. Results of the research model (constructs adapted from [24, 25, 41])

The non-significant influence of hedonic motivation on digital transformation adoption is not consistent with results from previous studies [8]. However, many reasons can be assigned. The first is the rate at which the customers and banks' price value and technological readiness surpass the excitement and fun in acquiring the digital technologies. As shown in Figure 2, price value was the third strongest factor predicting digital transformation adoption. This means that banks do prioritise the cost as paramount to hedonic motivation. Nevertheless, the non-significance of hedonic motivation among the four constructs does not make it less valuable.

A conceptual model for emergency digital transformation to respond to future pandemics

As shown in Fig. 3, the model serves as a framework for leveraging digital technologies in banking and financial institutions to respond to future pandemics such as the novel COVID-19. The framework is based on the validated proposed model in Figure 2. The model suggests that for successful implementation of digital transformation in banking, financial institutions must first promote and incentivise digital technologies to minimise person-to-person contact and reduce the spread of the virus (inherent innovativeness). Also, there should be a secure, resilient digital technologies for the robustness of platforms and systems to facilitate financial transactions, i.e., mobile money transfer in developing countries during pandemics (price value). For the purpose of business continuity, firms should enable regulations to suit prevailing circumstances and context of banking which may boost agent and merchant operations (technology readiness) [25], especially in developing countries like Ghana where mobile money transfer surpasses all payment platforms.

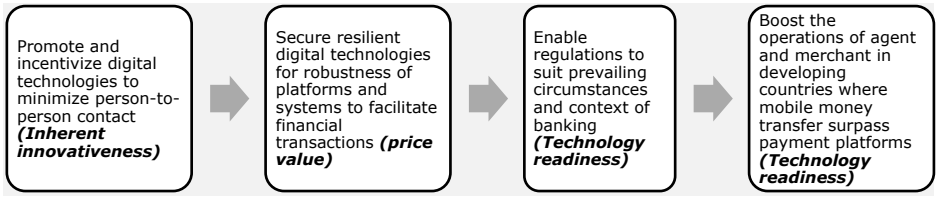

Fig. 3 Proposed conceptual model for emergency digital transformation

Contribution to research, policy and practice

This study makes important contributions to research, policy and practice to organisations that want to carry out digital initiatives. In terms of research, this study contributes to the body of knowledge on digital transformation adoption and bank transition to digitalisation by revealing the possible challenges and solutions that potential banks will face in a developing country context. It also tested and validated PV, IN and TR as key determinants of digital transformation adoption in a developing country. Given the existence of societal and cultural peculiarities in different nations, this contribution is important. This study also provides a framework that future banking and financial institutions can adopt to tackle pandemics and reduce the impact on the economy.

Concerning practice, managers of banking institutions can draw on the experiences and factors likely to affect their transition to digitalisation from this study. Thus, banking institutions venturing into digital transformations better understand challenges and strategies, a knowledge gap arguably not readily available in post Covid-19 to banking institutions in developing countries. Therefore, banking and financial institutions planning on digital transformation in developing countries need to consider fostering online banking acceptance, hybrid banking, deploying artificial intelligence, harnessing the power of big data analytics and addressing the digital transformation myth. The study contributes to policy by drawing practitioners' attention to the fact that creating a favourable banking environment enabled by digital technologies will positively influence the adoption of online banking services.

5. Conclusion and future research

Despite banks' huge investment in digital technologies in developing countries like Ghana, challenges such as technology acceptance, online service reluctance, and poor usage behaviour persist in the banking sector, especially when COVID-19 protocol encourages use. In lieu of the COVID-19 pandemic on the global market, the study examined the impact on banks in Ghana and revisited how digital technology is fundamental to online banking and services. This further led to exploring the barriers to the digital transformation taking place in developing countries like Ghana. The study findings suggest that digital technologies use is not entirely accepted by customers and employees, and hybrid banking is effective as banks continue their digital transformation. On the customer side, technological constraints and internet instability during the COVID-19 period prevented successful financial transactions. Employees' reluctance to work remotely, difficulty adjusting to new technologies, distraction from family members and home electronics, technological constraints, and internet instability were the perceived challenges associated with the COVID-19 pandemic.

Further, this study emphasises the point that digital transformation adoption cannot be studied from one source or context alone. Rather, the contextual price value or cost, the level of inherent innovativeness and the technological readiness of banks should be considered as they may inhibit or promote digital transformation adoption in developing countries.

Managers' perspectives on barriers to digital transformation in banking include cost, customers' readiness to accept and use digital technologies, exposure to risks, and customers' internet access and digital means. Post COVID-19 strategies to promote digital transformation in banking in developing countries entail fostering online banking acceptance, adopting a hybrid banking approach, investing in artificial intelligence, and harnessing big data analytics. Also, managers can tackle digital transformation in a phased approach by keeping employees and customers at the center of the transformation and making digital transformation the bank's culture and way of life.

The participants' interest in this study underscores the importance of the exploratory approach to digital technologies in banks, notwithstanding the need to explore other methodologies to garner new insights. Importantly, participants' direction to digital transformation in banks was not straightforward, revealing that the field of research is still young, and much attention is needed in the developing country context. Future research can begin by exploring the perceived and actual responses to the use and implementation of digital transformation. Lastly, the starting place for future research is to empirically explore the conceptual model for emergency digital transformation in responding to future pandemics. New insight from extant literature can broaden the model limitation's scope for better preparedness to pandemics in the banking sector.

The study has some limitations. First, it is difficult to generalise the study because the sample is very small. The study only focused on the managers' perspectives of the impact of COVID-19 on banks in Ghana and the technological transformation of banks without including the voices of customers and employees during the pandemic. Further, the study participants are from private banks in Ghana without including public banks and other financial institutions like microfinance impacted by the COVID-19 and experiencing a digital transformation**.**

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Aims and Objectives

Published online by ICS two times a year, Journal of Digital Science (JDS) is an international peer-reviewed journal which aims at the latest ideas, innovations, trends, experiences and concerns in the field of digital science covering all areas of the scholarly literature of the sciences, social sciences. The main topics currently covered include: Artificial Intelligence Research; Digital Economics, Education, Engineering, Finance, Health Care.

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