The Effect of Self-Service Technologies on Customer Experiences in Banking:
The Case of Ghana

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ABSTRACT

The surge in self-service technologies (SSTs) adoption in the banking industries across the globe has changed customers' banking experiences. Customers have developed a passion for SSTs, which has affects their intentions to save with a bank. The positive effects of employing SSTs in the banking industries are evident in literature; however, little is known on how SSTs affect customer experiences in the banking industries of developing countries like Ghana. The study involved a sample of 384 banking customers in Ghana. The study confirms the positive effects of SST adoption on customer experiences. The study establishes that customers' adoption of SSTs is influenced by their perception of SST usefulness and ease of use, which increases their satisfaction level. The study finds out that when SSTs are deployed individually, they have no effect on customer experiences in the banking sector. However, when the individual SSTs are combined in usage, they collectively produce a positive effect on customer banking experience.

KEYWORDS

Affective Experience, Customer Experience, Internet Banking, Internet of Things, Mobile Applications, Physical Experience, Self-Service Technologies, Sensory Experience, USSD, Web Technologies

INTRODUCTION

The growing interest in the use of self-service technologies (e.g., web applications, internet of things, unstructured supplementary service data technology, mobile applications, automated teller machines, etc.) for business operations across the globe is gradually altering consumer behaviors and experiences (Shahid Iqbal, Ul Hassan & Habibah, 2018). Self-service technologies (SSTs) are defined as technologies that customers use independently without interaction or assistance from a firm's employees (Meuter *et al.*, 2000). The adoption of SSTs in the area of banking undoubtedly has reduced customer waiting times, and queuing (De Leon, Atienza & Susilo, 2020). This trend has resulted in customers experiencing more responsive and equally effective banking services. The manifestation of these experiences is seen around the world as customers perform transactions in the

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comfort of their rooms (e.g., transfer between bank accounts and mobile money wallets), and update personal banking details via the internet.

Customer experience (CE) is a fundamental concept that is embraced in banking industries across the globe. CE encompasses every aspect of a firm's offering, stemming from the nature or quality of customer care to packaging, products and services, ease of use and reliability (Meyer & Schwager, 2007; Schmitt, Joško Brakus & Zarantonello, 2015). The economic climate and business environments require more than just innovative and low-priced products. Firms rely also on customer experiences for survival (Voorhees *et al.*, 2017). Customer decisions, intention to purchase or rely on the services of a firm such as a bank is greatly influenced by their experiences (Tannahill & Jamshidi, 2014) as their satisfaction level depends on their experiences (Schmitt, Joško Brakus & Zarantonello, 2015). This has resulted in banks paying attention to customer experience-based systems (Kim *et al.*, 2011) which SSTs offers.

The positive effects of employing SSTs in the banking industries across the globe is evident in literature (Nijssen, Schepers & Belanche, 2016; Shahid Iqbal, Ul Hassan & Habibah, 2018). Contemporary studies have focused on personal traits, technology adoption, customer purchase intention, and customer intention to continually use a firm's services, which is customer retention oriented (Ho & Ko, 2008; Foroudi *et al.*, 2018). Little is known about the individual and combined effect of the different types of SSTs on customer experience in the banking industries. Studies in this area can help banks to understand how different types of SSTs can be combined to obtain maximum customer experiences. This study seeks to fill the knowledge gap on the individual and combined effect of different SSTs on customer experience in the banking industry using Ghana as a case site. Specifically, the study will examine the types of SSTs used by customers, the experiences they gain, the factors that affect SST adoption and acceptance as well as the individual and combined effect of the different types of SSTs on customer experiences in the banking industry of Ghana. This study will contribute to literature and serve as a lens for banks to determine the type of SST to invest in to achieve maximum customer experience especially in developing countries where banks have limited investment resources.

BACKGROUND

Self-Service Technologies (SSTs)

SSTs are technological interfaces through which customers can attain services without the direct involvement of service firm employees (Meuter *et al.*, 2000). SSTs are replacing many face-to-face service interactions with the intention to make service transactions more accurate, convenient, and faster (Foroudi *et al.*, 2018). The introduction of the internet paved the way for the application of SSTs including mobile applications, unstructured supplementary service data technology (USSD), Automated Teller Machines (ATM), debit and credit card and mobile money in banking industries (Shaikh & Karjaluoto, 2015). In the Ghanaian banking environment, internet banking (web applications), USSD, mobile applications and ATMs are the most adopted and patronized amongst SSTs (PwC Ghana, 2020) and this influenced the choice of focusing on these four SSTs.

Internet Banking (Web Applications)

Internet banking (Web applications) involves the use of a banking website for the performance of different banking services, ranging from accessing account information and general information on a bank's products and services, bill payment and the making of an investment (Hosein, 2011). Except for cash withdrawal, internet banking offers customers the opportunity to access almost any type of banking transaction at a click. In essence, internet banking provides universal accessibility from any internet linked computer, irrespective of the location worldwide (Shahzad, Xiu & Shahbaz, 2017; Yoon & Steeg, 2013)

Mobile Applications

Over the last few years, the mobile and wireless market has been one of the fastest growing markets in the world and it is still growing at a rapid pace (Hanif *et al.*, 2020). The convenience of mobile banking is that banks undertake the banking transaction outside of the working hours and is accessible from anywhere and has indeed become customer preference (Mullan, Bradley & Loane, 2017). Since mobile banking was introduced, consumers have been able to do banking services 24 hours a day using their mobile phones without having to visit the traditional bank branches or to find a computer with broadband connection for personal transactions. This has led to the ease of use of mobile banking since the availability of the system whenever they need it will increase their intention to adopt the system and become their preference as compared to the traditional banking system.

Unstructured Supplementary Service Data (USSD)

Most people in developing countries like Ghana do not have reliable internet access, also not everyone can afford to patronize broadband for internet banking or mobile banking, therefore USSD technology is gaining prominence (Fletcher & Owusu-Sekyere, 2018). Almost 85% of the Ghanaian population are conversant with USSD due to its use for loading mobile credit and mobile money transactions. USSD is a menu-driven technology that improves user experience by unleashing the ability to easily, quickly and cost effectively send essential alerts and information via short codes (e.g. *170#) (Fletcher & Owusu-Sekyere, 2018).

Automatic Teller Machines (ATM)

Although SST services including USSD, mobile applications, web applications allow for convenience and easy banking experiences by means of updating personal banking details, transfer of funds, payment of bills without the direct assistance of the bank's employees, it lacks the ability to withdraw and deposit physical cash. ATM customizes service offerings, reduces waiting time for customers, serves as an alternative channel for service delivery and provides vital information needed by customers in the shortest possible time (Lovelock & Yip, 1996). "ATMs combine a computer terminal, record-keeping system and cash vault in one unit, permitting customers to enter the bank's bookkeeping system with a plastic card containing a personal identification number (PIN) or by punching a special code number into the computer terminal linked to the bank's computerized records 24 hours a day" (Giddens, 2008). They were introduced first to function as cash dispensing machines but currently they have the ability to accept cash deposits and others thus giving customers a more fulfilling experience.

Customer Experiences (CE)

Customers interact with firms through staff, SSTs and service environments to obtain some level of satisfaction (Firdous & Farooqi, 2017). The outcome of such interaction is described as customer experience. In the last three decades customer experience has been mentioned, discussed, and theorized by scholars and practitioners. Early scholars studying experience introduced the term in a general framework and described experience as playful leisure activities, sensory pleasures, aesthetic enjoyment and emotional response (Sirapracha, 2012). However, it is important to realize that actual experiences are distinct from services (Pine & Gilmore, 1999). The authors specifically quoted that "when a person buys a service, he purchases a set of intangible activities carried out on his behalf. But when he buys an experience, he pays to spend time enjoying a series of memorable events in a personal way" (Pine & Gilmore, 1999, p. 2). Schmitt (2010) identified five different types of experiences that firms can create for customers - sensory experience, affective experience, cognitive experience, physical experience and social experience. The economic climate and business environments require more than just innovative and low-priced products but on customer experiences for survival (Voorhees & Fombelle, 2017; Grewal & Roggeveen, 2020). Thus, for a firm in the banking sector to survive, the collective effect of these five types of experiences cannot be underestimated.

Sensory Experience

Sensory experience relates to sight, hearing, touch, taste, and smell experiences and how they arouse aesthetic pleasure, excitement, satisfaction and a sense of beauty (Schmitt, 2010). It is a component of the CE whose stimulation affects the senses; an offering, whose aim is to provide good sensorial experiences, can address sight, hearing, touch, taste and smell so as to arouse aesthetic pleasure, excitement, satisfaction, and a sense of beauty. For example, banks utilizing SSTs inculcate biometric features which offer a safe banking environment for customers and reinforces their sensory experience through touch and eyesight related biometric authentication (Nagaraju & Parthiban, 2015).

Affective Experience

Affective experience is conceived as central to how people use, understand and interact with designed objects (Chahal & Dutta, 2015). It's a component of the Customer Experience which involves one's affective system through the generation of moods, feelings, emotions; an offering can generate emotional experience in order to create an affective relation with the company, its brand or products. In offering a better customer experience, banking firms regularly send messages which are targeted towards making customers feel the need to stay connected to their bank through various SSTs (Bilisbekov *et al.*, 2021). This creates an affection between customers and the bank.

Cognitive Experience

Cognitive experience relates to thinking and conscious mental processes to get customers to use their creativity or problem-solving skills so that they revise assumptions about a product (Chahal & Dutta, 2015; Schmitt, 2010). It is a component of the Customer Experience connected with thinking or conscious mental processes; an offering may engage customers in using their creativity or in situations of problem solving; furthermore, a company can lead consumers to revise the usual idea of a product or some common mental assumptions. Cognitive experience has been indicated to be essential in customers' intention to adopt internet banking as well as mobile banking (Sharma, 2019).

Physical Experience

Physical experience provides customers with different ways of doing things (Chahal & Dutta, 2015; Schmitt, 2010) . It is a component of the Customer Experience coming from the practical act of doing something; in this sense the pragmatic component includes but is not exhausted by the concept of usability. It does not only refer to the use of the product in the post purchase stage, but it extends to all the product life-cycle stages. ATM usage to deposit and withdraw cash or carry out a banking process at the ATM is a refreshing physical experience which reinforces a customer's intention to reuse the service (Abd, Aziz & Hussien, 2014).

Social Experience

Social experience widens the private feelings of the individual by relating to something outside of the individual's closed condition thus creating a sense of self – improvement (Chahal & Dutta, 2015; Schmitt, 2010) . It is a component of the CE that involves the person and, beyond, his/her social context and relationship with other people or also with his/her ideal self. Social experience suggests a means by which a customer encourages the use/consumption of a product together with other people. This togetherness in customer use of products is the core of a common passion that may eventually lead to the creation of a community or still a tribe of fans. The social experience in customer use of a product can also be a means of affirmation of a social identity, inducing a sense of belonging or of distinction from a social group; in this case the link with the lifestyle component is very relevant. In recent times the use of mobile money through USSD in most African countries has created a social experience which has led to the informal sector being more active as a community in banking (Aborogu et al., 2016).

RESEARCH MODEL AND HYPOTHESIS FORMULATION

The adoption and utilization of SSTs are influenced by a couple of factors which have been highlighted in contemporary literature. Literature has identified SSTs adoption factors including convenience (Nielsen, 2005), security (Nasri, 2011), computer self-efficacy (Samar, Ghani & Alnaser, 2017), credibility (Lakshmi & Ganesan, 2010) and perceived convenience (Collier & Kimes, 2013).

Figure 1 Research Model
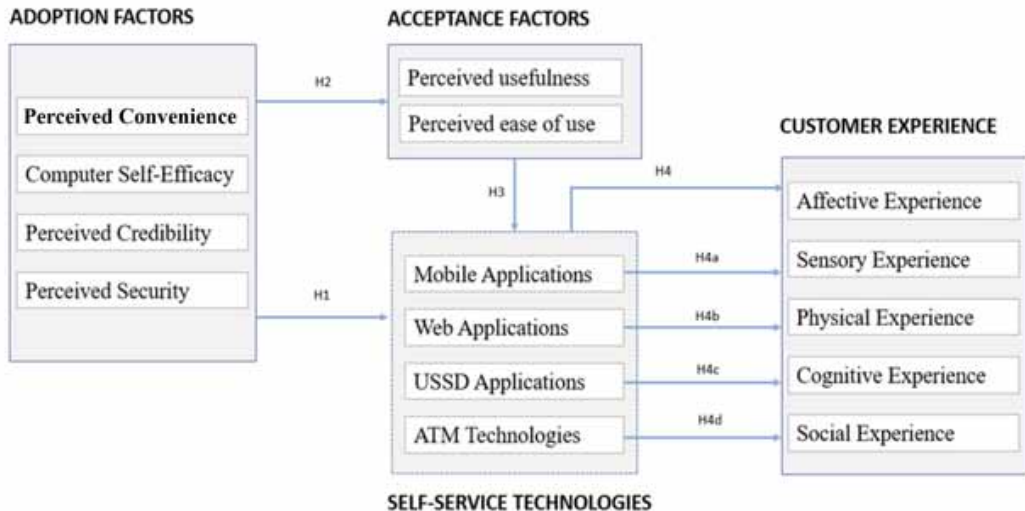
Studies conducted to understand the relationship between SST characteristics (perceived risk, perceived ease of use, and perceived usefulness), consumer technology readiness, social pressures (coercive, normative, and mimetic), and SSTs adoption revealed that SSTs characteristics, consumer technology readiness and social pressures were crucial determinants of SST adoption (Yang, Liu & Ding, 2012; Kaushik & Rahman, 2015).

Other studies conducted to examine whether SSTs influence customer value and customer readiness revealed that, SST characteristics or adoption factors including ease of use, usefulness, and cost-saving positively influence customer values and customer readiness which then influences customers desire to adopt or use internet banking (web applications) (Boon-itt, 2015; Ho & Ko, 2008). It can therefore be inferred from literature that, SSTs like web technologies adoption are influenced by factors which include cost-savings strengthened by SSTs ease of use and usefulness. The unavailability of literature generalization of the relationship between the broad overview of SSTs adoption factors and its adoption makes it relevant to measure how the SSTs adoption factors (convenience, security, computer self-efficacy, and credibility) informs customers SSTs adoption decision and how that relationship is strengthened by acceptance factors (ease of use and usefulness). This leads to the us hypothesizing:

H1: SSTs adoption among customers in the banking industry is driven by the adoption factors, namely, convenience, security, computer self-efficacy and credibility.

H2: Adoption factors positively associate with SSTs acceptance factors namely, ease of use and usefulness in the banking industry.

H3: Acceptance factors positively associate with SSTs adoption in the banking industry.

Carbone (1994) defined experience as ''a take away impression formed by customers' encounters with products, services and businesses- a perception produced when humans consolidate sensory information''. Customer experience is an important driver to the survival of any business organization (Grewal & Roggeveen, 2020; Voorhees & Fombelle, 2017) and this has led to the recent surge in customer experience research studies.

Foroudi, Gupta & Sivarajah (2018) conducted an exploratory study to investigate the effects of smart technology on customer dynamics and customer experience. The study sampled 330 retail stores in London and used a covariance-based structural equation modelling (AMOS) approach for the analyses and validation of results. The results showed that there is a direct relationship between customer dynamics, customer experience and customers' participation in the adoption of self-service technologies in a retail setting. The relationship was found to be driven by customers' willingness and the ability to learn.

Scherer & Wünderlich (2015) also conducted a study to examine how the ratio of self-services and personal services influences customer retention over time. The study revealed that the ratio of self-service to personal service usage affects customer retention in a u-shaped manner and that the intermediate levels of both self-service and personal services usage had the lowest likelihood of defection (Scherer & Wünderlich, 2015). The study suggested that firms should not shift customers from personal service towards self-service completely. The study explained when and how self-service technologies create valuable customer experiences. The study left a gap by not explaining the extent to which self-service and personal service should be combined to achieve a higher level of customer satisfaction. Moreover, the influences of self-services were not measured independently to assess their contribution to customer satisfaction which could serve as an insight to the banking industry in determining the type of SSTs to deploy whether individually or in a combination. This leads to the hypothesis:

H4: Customer experience is positively influenced by self-service technologies namely mobile applications, web applications, USSD applications and ATM usage.
H4a: There is a positive relationship between mobile applications usage and customer experience.
H4b: There is a positive relationship between web applications usage and customer experience.
H4c: There is a positive relationship between USSD applications usage and customer experience.
H4d: There is a positive relationship between ATM usage and customer experience.

RESEARCH METHODOLOGY

Sampling and Data Collection

The study employed a quantitative approach to objectively examine the effect of self-service technology adoption on customer experience in the banking industry of Ghana. Quantitative methods use formal processes in which numerical data are used to measure the phenomenon to arrive at a conclusion, which best fits the objectives of this study (Harrison, Reilly & Creswell, 2020).

In this study, the population comprised of customers in the banking industry of Ghana. Random sampling technique was adopted to select a sample of 384 out of the population following the mathematical formula of Bartlett, Kotrlik & Higgins (2001).

Sample size where 'n' is the required sample size, 'p' is the percentage occurrence of a state or condition (0.5), 'e' is the percentage maximum error required (0.05) and 'z' is the value corresponding to level of confidence (1.96).

Printed and electronic questionnaires were used for the data collection based on a 5-point Likert scale ranging from 1- strongly disagree to 5- strongly agree. The electronic questionnaire was created

using google forms and distributed to the study participants. Printed questionnaires were printed for participants not conversant with electronic questionnaire.

Methods of Data Analysis

Descriptive statistics and structural equation modelling were used as the methods for data analysis. The data obtained was cleaned and analyzed with IBM SPSS Statistics 25 and SmartPLS version 3.3.2. The statistical software IBM SPSS was used for the descriptive statistics, frequency, and distribution of the data whiles the variance-based structural equation modelling software SmartPLS was used for the structural model. It estimated the various measurement model validity and reliability, the parameters of the structural equation model and other statistical measurements considered appropriate to answer the research questions. The Partial Least Squares (PLS), bootstrapping, blindfolding and PLS Predict algorithms of SmartPLS were used for the analysis of the structural equation model. In assessing the validity of the constructs and evaluating the model, four major test tools were employed. These included internal consistency tests (Cronbach's alpha and Composite Reliability), convergent validity (Average Variance Extracted), discriminant validity and collinearity assessment.

Measurement Instrument

Drawing on existing literature, the measuring instrument for the study was designed using the constructs in the research model. Adoption factors were measured with four sub constructs namely perceived convenience, computer self-efficacy, perceived security, and perceived credibility. Measuring items from scales developed by Collier & Kimes (2013), Samar (2017), Rose et al. (2012) and Wang et al. (2003) were adapted to measure the constructs. Acceptance factors in the research model were measured using two sub-constructs namely perceived usefulness and perceived ease of use. Measuring items for the two constructs were adapted from Samar (2017). In exploring the type of self-service technology adopted in the banking industry, the respondents were asked to select from among a set of options. These options were Web Technology (E-banking, online banking, or internet banking), USSD Technology (short code example *555#), Mobile App Technology and Internet of Things Technology (ATM Machines). Customer experience was operationalized by measuring five types of experiences namely sensory experience (sense), affective experience (feel), cognitive experience (think), physical experience (act) and social identity experience (relate). Measuring items for physical experience (act) and social experience (relate) were drawn from Schmitt (2015) whiles items used to measure affective experience (feel) and cognitive experience (think) were drawn from Rose et al. (2012) and Novak, Hoffman, and Yung (2000). Finally, sensory experience (sense) was measured with items drawn from S Rose et al. 2012 and Gentile, Spiller, and Noci (2007). Table 2 shows the measuring instrument for the constructs with their respective Cronbach's alpha and other reliability metrics establishing the internal consistency of the adapted measures.

DATA ANALYSIS AND FINDINGS

Demographics

A total of 374 responses were obtained for the analysis, out of which 213 (57%) were males and 161 (43%) were females. A greater proportion of the respondents were high school graduates; 191(51.1%) and 252 (67%) were employed. 118 (31.6%) have worked for five years and over. A summary of the demographic statistics is tabulated in Table 1 below:

Structural Model Estimation and Evaluation

The variance-based structural equation modelling software SmartPLS was used for the model estimation and evaluation. Internal consistency tests, convergent validity and discriminant validity were adopted to evaluate the model constructs while a collinearity measure was adopted for the structural model assessment.

Table 1 Demographic Statistics

	Description	Frequency	Ratio
Gender	Male	213	57.0
	Female	161	43.0
Age	18-28	207	55.3
	29-38	136	36.4
	39-48	22	5.9
	49 -58	9	2.4
Level Of Education	JHS	2	.5
	SHS	21	5.6
	Degree	191	51.1
	Masters	151	40.4
	PHD	4	1.1
	Certificate	5	1.3
Employment Status	Unemployed	122	32.6
	Employed - Public sector	84	22.5
	Employed - Private sector	135	36.1
	Self-employed	33	8.8
Number of years of working	Below 1 year	81	21.7
	1-2 years	64	17.1
	2-4 years	111	29.7
	5 years and above	118	31.6

Source: (Authors construct, 2021)

Internal Consistency Tests

Internal consistency measures how well a set of indicators measures a single latent variable. Cronbach's alpha and composite reliability were adopted for the internal consistency test. According to (Nunnally, 1994), an alpha value of 0.7 at the early stages of a research is accepted. The results of the analysis in Table 2 indicated that all the constructs resulted in a Cronbach alpha greater than 0.7 confirming that the constructs met the reliability test. Composite reliability measures the extent to which a set of indicators are reliable for the study. It also considers a threshold of 0.7 at the initial stages of the research as acceptable. The result of the analysis of the data indicated that all the constructs resulted in a composite reliability value greater than 0.7 confirming that the constructs met the composite reliability test.

Convergent Validity Tests

Convergent validity is the extent to which a measure correlates positively with an alternative measure of the same construct. According to (Bagozzi & Yi, 1988; Fornell & Larcker, 1981), if an outer loading is greater than 0.708 then the latent variable can explain at least 50% of its indicator's variance. The result of the analysis on convergent validity indicated that the outer loadings SExp4 and PExp4 were less than .708, indicating that they did not meet the convergent validity acceptance level and hence were removed from subsequent analysis.

Table 2 Construct Measurement and Model reliability metrics

Construct	Item Code	Reference	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Affective Experience (AE)	AE1	Rose et al. (2012), Novak, Hoffman, and Yung (2000)	0.843	0.847	0.896	0.683
	AE2					
	AE3					
	AE4					
Cognitive Experience (CE)	CE1	Rose et al. (2012), Novak, Hoffman, and Yung (2000)	0.798	0.803	0.868	0.621
	CE2					
	CE3					
	CE4					
Computer Self Efficacy (CSE)	CSE1	Samar (2017)	0.848	0.847	0.898	0.687
	CSE2					
	CSE3					
	CSE4					
Perceived Convenience (PCon)	PCon1	Collier & Kimes (2013)	0.854	0.854	0.901	0.696
	PCon2					
	PCon3					
	PCon4					
Perceived Credibility (PCred)	PCred1	Wang et al. (2003)	0.836	0.837	0.891	0.671
	PCred2					
	PCred3					
	PCred4					
Perceived Ease of Use (PEU)	PEU1	Samar (2017)	0.867	0.868	0.909	0.716
	PEU2					
	PEU3					
	PEU4					
Physical Experience (PExp)	PExp1	Schmitt (2015)	0.711	0.724	0.823	0.539
	PExp2					
	PExp3					
	PExp4					
Perceived Security (PSec)	PSec1	Samar (2017), Rose et al. (2012)	0.854	0.863	0.901	0.696
	PSec2					
	PSec3					
	PSec4					
Perceived Usefulness (PU)	PU1	Samar (2017)	0.879	0.880	0.917	0.735
	PU2					
	PU3					
	PU4					
Sensory Experience (SExp)	SExp1	Gentile, Spiller, and Noci (2007), Rose et al. (2012)	0.738	0.754	0.837	0.565
	SExp2					
	SExp3					
	SExp4					

Table 2. Continued

Construct	Item Code	Reference	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Self-Service Technology (SST)	SST_WEB	PwC Ghana (2020)	1.000	1.000	1.000	1.000
	SST_USSD					
	SST_Mobile					
	SST_ATM					
Social Experience (SoExp)	SoExp1	Schmitt (2015)	0.897	0.904	0.928	0.763
	SoExp2					
	SoExp3					
	SoExp4					

Source: (Author's construct, 2021)

Discriminant Validity Tests

Discriminant validity is a measure of the extent to which a construct is truly distinct from other constructs. Cross loadings, Fornell and Larcker (F&L) criteria and heterotrait-monotrait (HTMT) were used to test for discriminant validity. According to (Chin, 2010; Fornell & Larcker, 1981), the square root of AVE should be greater than the highest correlation coefficient of each construct of the latent variable which was supported. Moreover, the loadings of an indicator on its assigned latent variable should be higher than its loadings on all other latent variables to meet the validity criterion. The report of the cross-loading validity analysis showed that all the loadings on the latent variables were greater than each of the loadings on the corresponding constructs, signifying that the cross-loading criterion has been fulfilled. An estimation of the correlations between the constructs in the model based on the average of heterotrait-monotrait correlation suggested by (Henseler, Ringle & Sarstedt, 2015) was adopted. According to (Ab Hamid, Sami & Sidek, 2017), 0.90 is a good threshold for HTMT validity. The results of the analysis of the HTMT validity indicated that all of the constructs were smaller than 0.9 explaining that the discriminant validity criterion has been met.

Table 3. Discriminant Validity and Collinearity Values

Constructs	Loadings	VIF	Constructs	Loadings	VIF	Constructs	Loadings	VIF	Constructs	Loadings	VIF
AE1	0.814	2.048	PCon1	0.805	1.757	PExp1	0.785	1.518	SExp1	0.834	1.790
AE2	0.875	2.665	PCon2	0.847	2.136	PExp2	0.732	1.371	SExp2	0.813	1.735
AE3	0.879	2.434	PCon3	0.879	2.498	PExp3	0.794	1.529	SExp3	0.703	1.313
AE4	0.731	1.532	PCon4	0.804	1.760	PExp4	0.612	1.192	SExp4	0.639	1.209
CE1	0.792	1.632	PCred1	0.827	1.877	PSec1	0.842	2.216	SST_ATM	0.475	1.017
CE2	0.797	1.689	PCred2	0.830	1.934	PSec2	0.886	3.103	SST_Mobile	0.465	1.013
CE3	0.780	1.664	PCred3	0.800	1.762	PSec3	0.784	1.783	SST_USSD	0.778	1.041
CE4	0.784	1.467	PCred4	0.819	1.860	PSec4	0.822	1.899	SST_WEB	0.376	1.019
CSE1	0.850	2.269	PEU1	0.846	2.593	PU1	0.870	2.423	SoExp1	0.846	2.249
CSE2	0.847	2.145	PEU2	0.885	2.909	PU2	0.872	2.471	SoExp2	0.898	3.324
CSE3	0.851	2.136	PEU3	0.871	2.433	PU3	0.856	2.239	SoExp3	0.905	3.664
CSE4	0.766	1.531	PEU4	0.779	1.882	PU4	0.829	1.955	SoExp4	0.843	2.452

Source: (Author's Construct, 2020)

Table 4. Summary of Hypothesis Results

| Hypothesis		Estimate	SD	T Statistics	P Values	Hypothesis
Adoption Factors -> Self-Service Technology	H1	-0.044	0.107	0.410	0.682	Not Supported
Adoption Factors -> Acceptance Factors	H2	0.786	0.025	31.840	0.000	Supported
Acceptance Factors -> Self-Service Technology	H3	0.197	0.044	4.527	0.000	Supported
Self-Service Technology -> Customer Experience	H4	0.104	0.053	1.985	0.047	Supported
Mobile App -> Customer Experience	H4a	0.035	0.052	0.677	0.499	Not Supported
Web App -> Customer Experience	H4b	0.069	0.052	1.343	0.180	Not Supported
USSD App -> Customer Experience	H4c	-0.025	0.052	0.483	0.630	Not Supported
ATM -> Customer Experience	H4d	0.053	0.053	0.984	0.326	Not Supported

**SD = standard deviation
Source: Author's Construct, (2020)

Collinearity Assessment

When two indicators in the model are highly correlated, it results in the problem of collinearity. The problem of collinearity is assessed using the Variance Inflated Factor measure (VIF). As some authors considers that there exists the problem of collinearity when VIF is equal to or greater than 5 (Hair, Ringle & Sarstedt, 2011), authors including (Diamantopoulos & Siguaw, 2006) argues that there exists the problem of collinearity when VIF is greater than or equal to 3. This study assumes a VIF threshold of 3. The results of the collinearity assessment indicated that all the indicators resulted in VIF less than 3 indicating that there was no problem of collinearity in the constructs except SoExp2, and SoExp3.

Figure 2. Validated structural model
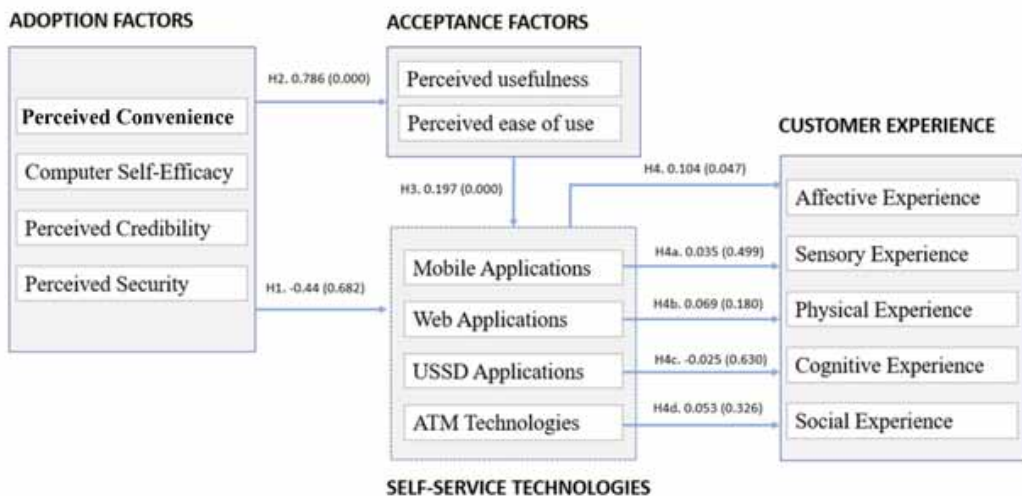
Results on Hypothesis Testing

The testing of the hypothesis was done using regression analysis carried out with the Smart PLS software and its bootstrapping functionality. The study presented seven hypotheses. At a 5% level of significance, three(3) of the hypotheses were supported whiles four(4) were not supported. *H2*, *H3* and *H4* were supported whiles *H1, H4a, H4b, H4c* and *H4d* were not supported. Table 4 shows a summary of the results of the hypothesis testing whiles Figure 2 shows the validated structural model based on the results of the hypothesis testing.

DISCUSSION

The study aimed at examining how different types of self-service technologies including ATM, mobile applications, web applications and USSDs individually or collectively influence customer experience in the banking industry with Ghana as a case. Specifically, the study examined the different types of SSTs used by customers, the experiences they gain from using SSTs, factors that affect SSTs adoption and the effect of SSTs adoption on customer experiences in the banking industry of Ghana. The result from the randomly sampled banking customers in Ghana revealed that customers' adoption of SSTs is influenced by their perception of SSTs usefulness and ease of use which increases their satisfaction level. Also, the combined usage of SSTs was identified to be resulting in customer experiences while the individual SSTs wasn't.

Banking customers adoption of the self-service technologies under study (mobile applications, web applications, USSD applications and ATM technologies) in the banking industry of Ghana was identified to be not directly influenced by the adoption factors (computer self-efficacy, perceived credibility, perceived security and perceived convenience) (H1: =-0.044, t = 0.410, p = 0.682, not supported). The adoption of SSTs by customers in the banking industry of Ghana does not depend on (1) how socially influential they may feel after using SSTs; (2) how secured they perceive the SSTs employed by their banks are (3) how good they are with using computer technologies and (4) how credible they perceive the SSTs adopted by their banks. This finding about the adoption factors directly influencing SSTs is not consistent with previous research (Yang, Liu & Ding, 2012; Kaushik & Rahman, 2015). Perhaps, these factors may directly influence banking customers' adoption of SSTs elsewhere due to demographic difference or perhaps the level of development. However, this is not the case in Ghana, following the empirical results of this study.

Further analysis revealed that, customers in the banking industry of Ghana prefer to use SSTs employed by their banks when they consider it useful and as well easy to use (H2: =-0.786, t = 31.840, p = 0.000, supported; H3: = 0.197, t = 4.527, p = 0.000, supported). This explains that customers in the banking industry of Ghana adopt to use SSTs employed by their banks when they perceive some level of usefulness and easy to operate qualities with them. This finding establishes that SST adoption factors are necessary but are relevant when they influence acceptance factors such perceived ease of use and perceived usefulness. This is in consonance with existing literature (Boon-itt, 2015; Ho & Ko, 2008).

More interestingly, there was a positive relationship between SSTs adoption and customer experiences when these SSTs are all available for use (H4: =0.104, t = 1.985, p = 0.047, supported), which was not the case when at least one SSTs was not available (H4a: = 0.035, t = 0.677, p = 0.499, not supported; H4b: = 0.069, t = 1.343, p = 0.180, not supported; H4c: = -0.025, t = 0.483, p = 0.630, not supported; H4d: = 0.053, t = 0.984, p = 0.326, not supported). This explains that, in the banks' quest to realize customer experiences in Ghana, they should employ all possible combinations of SSTs in their daily operations. The need for USSD technologies is justifiable by the fact that most Ghanaians do not have reliable internet access, also not everyone can afford to patronize broadband for internet banking (Asante & Hayford-Acquah, 2017). In such situations, resort to USSD technologies for transacting businesses. The need for ATM technologies can also be aligned with reasons such as the long waiting times in queues (Meuter *et al.*, 2000). Queuing in Ghanaian banks is very common and a major problem which goes against customer satisfaction most often. Also, the proliferation

of mobile phone usage and internet facilities (though expensive in Ghana) makes it quite justifiable for the need of internet banking facilities to help customers transact business over the internet with their smartphone and or computers. Drawing from this finding, the customer satisfaction goal of the banking industry of Ghana can be achieved upon the implementation of all possible banking SSTs in order to account for every single customer's banking need with and without internet facilities.

IMPLICATIONS FOR RESEARCH

This study makes contributions to contemporary literature in the area of self-service technology, customer satisfaction and banking. The conceptual model highlights the type of self-service technologies employed and adopted by customers in the banking industries of developing countries such as Ghana (i.e. web applications, mobile applications, USSD applications and ATM technologies). It further shows the experiences (affective, sensory, physical, cognitive and social experiences) and factors that influence the adoption of SSTs (perceived usefulness and ease of use). The empirical evidence adds to extant literature by highlighting the positive effect of SSTs on customer experience. More interestingly, the study points out the relevance of deploying all possible combinations of SSTs or individual SSTs in the banking industry of developing countries such as Ghana as it influences customer experience. This study has developed a new potential research trajectory for exploration into future studies of whether banks should deploy all available SSTs or choose some SSTs over others to influence customer experience positively.

IMPLICATIONS FOR PRACTICE

In practice, this study has presented an insight to the banking industry by establishing a relationship between SSTs and customer experiences, the type of SSTs employed by the customers of the banking industry in Ghana and the factors that influence their adoption. This provides insight to bankers in deploying all possible combinations of the major SSTs (web applications, mobile applications, USSD applications and ATM technologies) used in Ghana. More specifically, the study established that, there was a statistically significant relationship between the combined effect of SSTs and customer experience while there existed an insignificant relationship between each of the individual SST and customer experiences. The Ghanaian banking industry must notice that technology is expensive, and that appropriate SSTs should be deployed where necessary. As established earlier, the Ghanaian community suffers high cost of internet and sometimes complete unavailability and in such cases, SSTs including ATM technologies and USSD applications should be deployed to reduce the cost of deploying SSTs at "wrong" geographical locations.

Practitioners need to understand that factors including customers' perceived convenience, computer self-efficacy, perceived credibility and perceived security does not directly result in customers' intention to adopt SSTs in the banking industry. And that, there is the need to deploy more useful and easier to use graphical user interface applications or technologies to customers, as they are the main influencing factors to customer SSTs adoption which tend to increase their banking experience.

CONCLUSIONS

The objective of the study was to examine the effect of self-service technologies adoption on customer experience in the banking industry of Ghana. Specifically, the study examined the types of SSTs used by customers, the experiences they gain from using SSTs, factors that affect SSTs adoption and the effect of SSTs adoption on customer experiences in the banking industry of Ghana. The analysis of the data revealed that customers in the banking industry of Ghana use web technologies, mobile applications, ATM technologies and USSD applications as SSTs. SSTs adoption by customers was found to be influenced by perception of SST's ease of use and usefulness as acceptance factors. A more thrilling revelation was that there was a significant relationship between the combined SSTs (web applications, mobile applications, ATM technologies and USSD applications) and customer

experience; however, the relationship between each SST and customer experience turned out not significant.

LIMITATIONS AND FUTURE RESEARCH DIRECTION

The study did not peruse the effect of different SSTs (i.e. web applications, mobile applications, USSD applications and ATM technologies) on the various types of customer experiences (i.e. affective experience, cognitive experience, physical experience, social experience and sensory experience). Future research on this topic should test these effects which may explain why the individual effect of SSTs do not affect customer experience, but the combined effect affects customer experience. Furthermore, the study used data from only Ghana and that could have influenced the results, hence there is the need for future studies on this topic in another country.

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