The influence of mobile money services on customers in the Bolgatanga municipality, Ghana

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Abstract: Mobile telecommunications can help low-income countries improve their fixed-line and internet infrastructures. Mobile phones boost information availability, reduce search costs, facilitate supply coordination, and benefit low-income people. Mobile banking, often known as m-money, uses mobile networks to allow account balance queries and money transfers without the use of physical infrastructure. Ghanaians strongly prefer mobile money transfer services because of their low cost and accessibility across all economic strata. These simple and dependable services are suitable for clients who have little financial means, as most Ghanaians do. There has been very little empirical research into the benefits and challenges of mobile money services. Because of a paucity of data at the individual level, research into the penetration of financial services in low-income countries such as Ghana is limited. This study looks at both the advantages and disadvantages of using mobile money services. The study analyzed data from a mobile money survey using Partial Squares Structural Equation Modelling (PLS-SEM). This evidence supports the hypothesis that benefits will increase customer sentiment, while restrictions will decrease patronage. The researchers will conduct additional research into the theoretical and practical implications of mobile money systems' benefits and drawbacks for consumers. It supports the hypothesis that advantages improve consumers' perceptions, while impediments reduce patronage. Additional research will consider both the theoretical and practical implications of mobile money systems' benefits and challenges for users.

Keywords: Benefits, Challenges, Customers, Financial inclusion, Mobile money, Mobile phones, System.

1. Introduction

Mobile telecommunications can help low-income countries overcome inadequate fixed-line and internet infrastructure. Mobile phones enhance information accessibility, reduce search expenses, facilitate supply coordination, and improve services for low-income households. Mobile banking, often known as m-money, utilizes mobile networks to provide account balance inquiries and money transfers without the need for physical infrastructure. As stated in Mothobi and Grzybowski [1] the use of Mobile Banking has the capacity to improve the economies of low-income countries and reduce poverty. The growing use of mobile devices has significantly changed the way people access financial services, particularly mobile money, which is a crucial method of payment in the digital economy [2]. Most of the 90 nations with mobile money services fall into the low- and middle-income categories. Smart Communications and Banco de Oro introduced the Philippine mobile money service in 2001. In 2007 and 2008, Kenya, Tanzania, and Uganda introduced mobile money services. Apprehensions over security can be the reason for the low acceptance and utilization of mobile money.

Financial inclusion provides marginalized individuals with readily available loans and services. According to the World Bank and United Nations Capital Development Fund (UNCDF), mobile money can offer cost-effective, secure, easily reachable, flexible, and user-friendly financial services, particularly in impoverished rural countries. Mobile phones facilitate payments and transfers for individuals who have limited access to banking services or do not have a bank account. The widespread use and acceptance of mobile phone networks, along with the absence of affordable alternatives, particularly in rural areas, and the comparatively lower fees for services compared to traditional bank accounts, have contributed to the rapid growth of mobile money usage, particularly in developing countries. Family and friends' opinions influence the adoption of mobile transactions. Individuals with low socioeconomic status acquire knowledge about mobile money through their familial, social, and peer networks. The research on financial inclusion is insufficient [3].

The rapid expansion of mobile phone networks has led to the emergence of M-money wallets, which bear similarities to traditional bank accounts [4]. Mobile financial transactions that are both cost-effective and dependable have the potential to increase fund availability and mitigate criminal vulnerabilities. Indian merchants necessitate a dependable payment system to cater to the demands and preferences of their customers. Wallet services, point-of-sale transactions, and sound wave payments are all cost-effective mobile payment options. Merchant acceptability is contingent on a variety of factors, including the perception of value-added services, level of awareness, cost, product compatibility, usability, and technology [5].

In their study, Singh and Sinha [6] discovered that populations in less developed countries employ informal networks to safeguard their assets, such as livestock and precious gems, by storing them under mattresses or participating in Rotating Savings and Credit Associations (ROSCAs). Informal saving is hazardous, inappropriate, and inadequate. Having liquid assets is crucial for unexpected circumstances, such as a downturn in health. It is not advisable to hold a large amount of cash due to the risk of theft or lack of self-control. Users can conveniently convert physical currency into electronic money, or vice versa, by utilizing mobile money agents available across the entire country. Mobile money users require convenient options for depositing and withdrawing cash, as well as authorized agents who own sufficient electronic funds or physical currency to facilitate these transactions.

As stated in reference Akomea-Frimpong, et al. [7] mobile money is widely favored in developing economies worldwide. Mobile money serves as a handy banking option in India, Uganda, Argentina, Tanzania, Zambia, Nigeria, Ghana, and Kenya due to the prevalence of unbanked individuals. Mobile money users allocate a greater portion of their savings towards unexpected healthcare expenses than anticipated ones. Individuals residing in rural areas, identifying as female, lacking formal education, and experiencing irregular income tend to allocate a greater portion of their savings towards health emergencies. While Governments and Central Banks have indeed increased mobile money services, the impoverished population has derived minimal advantages from these efforts. Policy and regulatory modifications have the potential to enhance the progress of mobile money systems and promote the integration of formal financial services. Enhancing mobile money accessibility and utilization can be achieved by the expansion of electronic money issuers and retail agents, active participation of the government in mobile money development, and cooperation between the government and mobile money issuers for employee payments and tax collection.

Financial inclusion facilitates the provision of healthcare money to households; however, underdeveloped nations have experienced a delay in this progress. Mobile money can be advantageous for rural households and women who do not have access to traditional banking services. Mobile phones have successfully provided access to banking services to one billion individuals who previously did not have access, reducing the disparity in financial inclusion. The utilization and expenditure of healthcare services are anticipated to increase as a result of the implementation of mobile money accounts among rural families. Mobile banking boasts a staggering 299 million users across more than 60% of developing markets, but a staggering 2.5 billion individuals lack access to institutional financial services and are considered "unbanked". The Sustainable Development Goals (SDGs) prioritize the importance of financial

services. In December 2017, mobile money transactions totaled $31.5 billion, up 21% from $26 billion in 2016 [8].

Mobile money has surpassed conventional banks in developing and rising nations, a phenomenon referred to as "leapfrogging" [9]. Financial inclusion can help distribute risk among economically disadvantaged individuals residing in both urban and rural areas who have heightened risk sensitivity. The expansion of formal banks in financial inclusion strategies has been impeded by cost and market failure. Consumers are able to obtain a mobile phone, while the adaptable infrastructure distributes airtime through secure network channels. Mobile money enables consumers who lack access to financial services to conveniently and safely transfer and store money at a low cost.

Ghana's mobile money transfer service, which facilitates the acceleration of institutional procedures, has experienced excessive demand [10]. The program has achieved success due to its affordability and accessibility to individuals across different income brackets. The user-friendly, efficient, and reliable technology has the capability to offer financial services to individuals without access to traditional banking or those who choose more affordable alternatives. This technology development is suitable for clients who struggle to obtain affordable and easily accessible financial services for their business operations.

There is a scarcity of empirical research investigating the benefits and challenges of mobile money services. The exploration of financial service penetration in low-income countries such as Ghana is limited due to the absence of individual-level data. Nevertheless, the field of worldwide cell phone impact studies is expanding. There is a scarcity of literature about the benefits and challenges of mobile money in Bolgatanga Municipality. Hence, the primary emphasis lies on the influence of mobile money on customers in the Bolgatanga Municipality. The specific objectives are: a) evaluate the benefits of mobile money services in the Bolgatanga Municipality; and b) evaluate the challenges associated with mobile money services in the Bolgatanga Municipality.

2. Literature Review

2.1. Mobile Money

The advent of mobile money has significantly transformed global payment behaviors, particularly in nations lacking conventional banking infrastructure. Kenya introduced mobile money in 2007, allowing individuals without bank accounts to transfer, spend, and manage their finances using their mobile phones. M-Pesa enables funds to be deposited into a mobile phone account and distributed over encrypted SMS using a personal identification number (PIN). This system promotes inclusivity by providing a readily available alternative to traditional bank accounts. Mobile money provides transactional connectivity, ensuring security, rapidity, and effectiveness in accommodating both traditional usage and the structural and economic disruptions caused by COVID-19. The system's functionalities and applications encompass bill payments, merchant payments, bundled payments, international money transfers, and the compatibility between bank and mobile money platforms. Comprehending the benefits and challenges of mobile money is essential in the contemporary financial landscape [11].

2.2. Mobile Money Evolution

Significant changes in procedures accompany the development of mobile money, which can result in unpredictable and complex situations that require careful small-scale assessment [9]. MTN achieved the status of being Kenya's top mobile money provider in March 2007, following its 10-year presence in South Africa and the Philippines. The popularity of Mobile money (M-PESA) in Swahili has been enhanced by the expansion of its financial offerings. Countries ranging from Argentina to Zambia introduced a total of 271 mobile money services in 2015. There were 411 million registered accounts in 2015, with 134 million actively used for 90-day contracts and 33 million for daily transactions. In 2009, MTN introduced its initial mobile money service in Uganda, following the successful implementation of M-Pesa in Kenya [2]. Additional companies involved were Warid, Airtel, United Telecoms Limited (UTL), and Orange Telecom. In 2018/19, seven Ugandan Mobile Money Service Providers (MMSPs) had a significant growth in mobile money transactions, rising from 1.35 billion to 2.51 billion. A mobile money ecosystem

comprises Mobile Network Operators (MNOs), banks, regulatory agencies, agent networks, merchants, retailers, businesses, customers, device producers, and platform providers.

Mobile money payments cover a wide range of financial transactions, including deposits, withdrawals, money transfers, utility bill payments, airline ticket purchases, retail transactions, Lotto and sports betting, salary disbursements, loans, state aid, insurance, bank transactions, school fee payments, and tax payments. Uganda swiftly implements these services in developing areas to meet its objective of achieving 78% financial inclusion. Various factors, such as technological advancements, user preferences, unique product offerings, favorable laws and regulations, institutional partnerships, customer satisfaction, expectations, service quality, pricing, convenience, accessibility, reliability, and security, influence mobile money services. Mobile money has facilitated the growth of mobile commerce, extended financial services to individuals without access to traditional banking, and mitigated expenses and delays [2].

2.3. The Concept of Mobile Financial Transactions

Mobile banking, often known as mobile payment, is the process of conducting financial transactions using a mobile device such as a phone, personal digital assistant (PDA), or contactless device, as stated by Nitschke [12]. To enhance the efficiency of microfinance, mobile banking employs expedited, cost-effective, and highly secure transactions. Microtransactions primarily utilize these services. SMS or Mobile Internet banking can also utilize dedicated applications installed on the mobile device. Approximately two million individuals utilize mobile devices. According to the UN Economic and Social Council, mobile phones have the ability to overcome limitations in infrastructure in distant rural areas of Africa. The widespread adoption of mobile phones has had a significant impact on people's lives, as their user-friendly nature and affordability have enabled low-income credit unions and banks to utilize them extensively.

Mobile phones have a positive effect on economic growth, and in developing countries, this influence may be twice as significant. Although mobile phones have contributed to small firms' success and economic growth, there is less research on the specific ways in which they enhance productivity in developing countries. Researchers have accurately analyzed the impact of mobile money on the expansion of credit unions and banks. Certain companies fail to recognize the possibilities of mobile phones. Both rural and urban Ghanaians possess cell phones. Ghana's two operators, MTN and Vodafone, have experienced a growth in mobile customers from 6.5 million in June 2018 to 8 million. In contrast, the number of fixed lines stands at 293,400. The proliferation of mobile phone usage has brought about significant transformations in several areas of the economy, particularly in the urban informal sector. This has had a profound impact on Ghana's rapidly expanding industry and its workforce [12].

As per references Nitschke [12] and Talom and Tengeh [13] the service allows users to deposit money into their mobile phone account, transfer balances to other users (including merchants), and convert deposits into conventional currency. Electronic fund transfers and cash withdrawals incur charges for users. M-PESA is the preeminent mobile phone-based money service in impoverished nations. Opening an M-PESA account is straightforward. To register, you only need to present a Ghana Card, Voters' ID, Identity Card (ID card), or Passport, unlike the process of creating a bank account. An endeavor to establish its payment services as the primary option.

2.4. Benefits of Mobile Money Systems

Underdeveloped countries like Kenya widely use mobile money due to its lower transaction costs compared to Western Union, MoneyGram, and transportation companies [6]. This adoption has also led to an increase in remittances, which has assisted households in maintaining stable consumption levels and managing risk. Mobile money enables individuals to deposit small amounts into a secure account for short-term expenses. Mobile phones use SIM cards to encrypt the user's PIN upon entry. Burkinabe immigrants remit funds to their home country utilizing mobile financial services.

Mobile phones enhance the quality of life in isolated areas. Mobile banking is advantageous for individuals of all income levels. Mobile phones enable individuals to remotely access mobile banking

services, social networking platforms, and the internet. Sub-Saharan Africa widely uses M-Pesa, Vodafone's micro-financing initiative, which it launched in 2007 for Safaricom and Vodacom. M-Pesa is prevalent in Kenya, Uganda, Tanzania, Rwanda, and Burundi. Orange Botswana and Mascom Wireless allow cash withdrawals using mobile money Visa cards at ATMs. Unlike M-Pesa, e-wallet services require a bank account and require access at ATMs using a **phone number and pin**. Banks can provide mobile services on cellphones in addition to traditional over-the-counter and internet banking options. Mobile telephony can enhance infrastructure in low-income countries. Mobile money benefits isolated communities lacking access to traditional banking services. Mobile phones help underdeveloped countries with inadequate infrastructure to advance socially and economically [1].

Mobile money provides financial services to those who are not traditional bank customers through digital platforms and alternative channels. Mobile money provides services for deposit, withdrawal, remittance, and bill payment. Mobile money has broadened financial services for low-income populations, particularly in Sub-Saharan Africa. Rural, developing countries are rapidly adopting mobile money, according to World Bank reports. Mobile money is more cost-effective and efficient than cash, facilitating financial inclusion for the underprivileged. In 2015, Mobile Money transactions in Kenya were valued at $2.16 billion, while in Uganda in 2014, they were $10.8 billion, indicating the potential to improve financial inclusion in Sub-Saharan Africa [3].

Mobile money enables deposit, transfer, and withdrawal services without requiring a bank account. Over 96% of countries offer this service, despite less than one-third of the population having access to banking. Mobile money is quicker, more cost-effective, and more secure [14]. Mobile Money agents facilitate rapid deposits and withdrawals. Randomized controlled trials have demonstrated that mobile money is beneficial for aid distribution, salary disbursement, conflict zones, and other purposes. The discourse surrounding mobile money's value-added products, including digital bank accounts, is growing. Impoverished individuals have embraced mobile money and digital payments.

Reduced costs and distance have diminished the need for peer-to-peer transfers. To address increasing crime rates, the network will store and transport goods over short distances. Avoiding cash for an additional kilometer or storing money at home would result in a cost of 1.24% or 0.8% for consumers. Consideration of service type, transaction origin, and distance price differential could enhance profitability. Urban crime creates a price gap between rural and urban customers, making short-distance and long-distance transportation/storage deals lucrative [4]. Mobile payment technology provides retailers and consumers with a competitive advantage over traditional methods. Management is agile in retail. Loyalty programs and promotions improve customer retention. Trust influences the perceived usefulness and adoption of wallet services [5]. A mobile phone is used to store virtual money in a SIM card-linked account [8]. Customers can deposit, transfer, and withdraw cash using this service. It operates without requiring an internet connection and is compatible with simple mobile phones. Mobile money could supplant physical currency.

Mobile money has reduced the traditional banks' problem of asymmetric information when providing loans to poor individuals without collateral. Individuals without bank accounts may now monitor the flow of money into digital accounts instantly [9]. For those without bank accounts, computers can generate credit scores from these records. Over time, mobile money users can access interest-earning savings accounts, livelihood financing, and risk-mitigating insurance. Electronic records enhance tax collection by tracking overseas transactions and expenditures. Mobile money systems should be used to monitor international transactions and identify instances of money laundering. Governments and donors may invest in mobile money if it promotes welfare and risk-sharing across countries. Mobile money enhances informal risk-sharing by reducing domestic transfer expenses.

2.5. Challenges Associated with Mobile Money Systems

Mobile phone usage increases as infrastructure improves. Infrastructure is hindering mobile banking. Inadequate infrastructure leads to an increased prevalence of mobile financial transactions. It offers voice and internet services in Sub-Saharan Africa because of inadequate infrastructure. Prepaid mobile services

reduced phone costs, leading to a significant increase in mobile subscribers. SA, Ghana, Namibia, and Ethiopia ranked behind Botswana in 2014 subscriptions. Remote phone users do not have essential services [1].

Ugandans are cautious about mobile money because of security concerns [2]. Examples include attacks on authentication, theft of identity, and vulnerabilities in USSD. Weak PIN reset mechanisms make it simple to carry out authentication attacks such as guessing, smearing, and snooping. Scammers can influence mobile money transactions and steal identities using false or offline SIM swaps. The lack of encryption in USSD communication channels exposes it to potential attacks. Wireshark intercepts unencrypted data during the verification process. Thin SIM transmits USSD messages over attacker-controlled servers. SMiShing and Vishing attacks utilize deceptive text messages to manipulate mobile users into revealing critical information. Brute-force, DoS, man-in-the-middle, salami, and replay attacks have the potential to disrupt mobile money systems. Employee fraud accounts for more than 80% of remote system fraud. Agents engage in fraudulent activities by stealing funds and imposing additional fees during mobile money transactions. In 2015, Uganda had the highest rates of fraud and criminality in the region, with 53% of mobile money agents in Uganda and 42% in Tanzania reporting fraud.

Mobile money scammers took advantage of subscribers, operators, and agents. Fraudsters pilfer mobile money codes, SIM cards, PINs, and other data to manipulate transactions. Fraudsters deceive employees and agents by utilizing multiple fake accounts and passwords to steal. In 2017, Ghana imposed fines on 3,000 mobile money brokers for colluding with subscribers to defraud service providers. Mobile money businesses have accused their employees of aiding scammers. Operators without sophisticated mobile money algorithms are vulnerable to fraud. Scammers are prevalent in Ghana, sending anonymous calls, texts, deceptive advertisements, and pay-out SMS messages. Technologists deceive and conceal information technology systems from the public. Ghanaian fraud involves deceptive advertisements, phone calls, and text messages to obtain funds illegally. Effective internal controls are necessary for mobile money carriers to prevent fraud [7]. Increasing savings rates enhances economic growth [6]. Savings accounts are not accessible in underdeveloped countries because of poor banking infrastructure, elevated transaction expenses, financial illiteracy, and a lack of information. For financial endeavors, rural populations with low income and no access to banking services rely on microfinance and informal finance. Microfinance institutions offer essential financial services to marginalized individuals, but their significant operational expenses lead to elevated transaction costs.

2.6. Proposed Adoption AIS Model

The model was created using established criteria that impact the attitudes of mobile money service consumers. These are the benefits and challenges of mobile money system. Figure 1 depicts the model's conceptual framework.
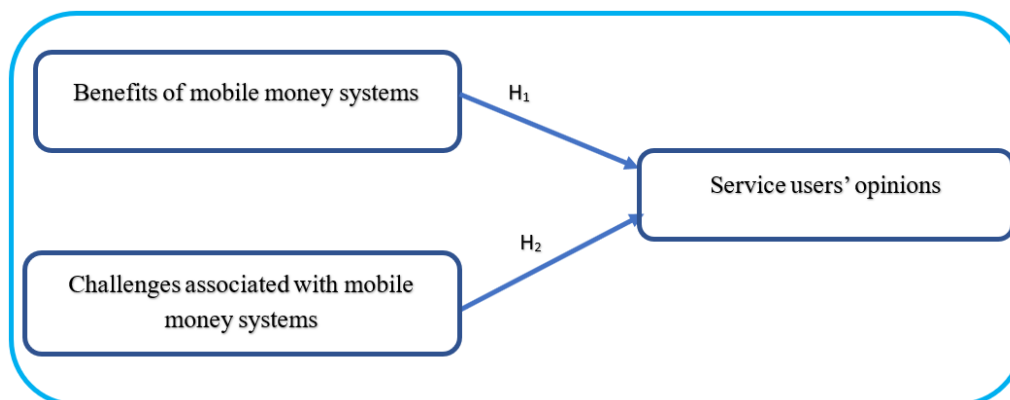

Figure 1.
Proposed model.

2.7. Research Hypothesis Development

Valid research necessitates the testing of hypotheses. Well-thought-out hypotheses are crucial. Every study's purpose must be an essential part of its design. Develop an objective theory, and then experiment with a hypothesis. Based on the studied literature, the study will derive its hypotheses from variables that influence the advantages and disadvantages of mobile money.

2.8. Benefits of Mobile Money System

Mobile money in Kenya is popular due to its ability to lower transaction costs and facilitate transfers [6]. They also offer secure savings accounts and online banking services. Telecommunication companies and financial institutions provide mobile banking services to individuals across all income brackets. Mobile money services have enhanced financial inclusion for low-income groups, particularly in Sub-Saharan Africa. Mobile money operates in nations where less than one-third of the population possesses a bank account, allowing users to deposit, transfer, and withdraw funds. It enhances speed, security, and convenience while reducing transaction expenses. Mobile money facilitates aid distribution, salary payments, and transactions in volatile environments. Individuals without bank accounts can instantly monitor their financial transactions with mobile money, which eliminates the information imbalance that conventional institutions impose. It has the potential to boost tax revenue and improve credit scores. With mobile money, monitoring international transactions and detecting money laundering should be more efficient. This decreases domestic transfer expenses and enhances informal network risk-sharing [9]. Therefore, our hypothesis:

Hypothesis 1: The benefits (BF) of mobile money systems will positively influence service users' opinions (SUO).

2.9. Challenges Associated with the System

Improved infrastructure leads to increased mobile phone usage, but hampers mobile financial transactions due to development challenges. Sub-Saharan Africa relies on mobile phones for voice calls and internet access due to the absence of fixed-line infrastructure. Remote consumers lack essential infrastructure and services, but prepaid mobile services have led to an increase in mobile subscribers. Mobile money systems are vulnerable to identity theft, authentication assaults, and USSD vulnerabilities. Agent-driven fraud is prevalent in mobile money transactions [1, 2]. Scammers exploit system fraud without using complex algorithms. Less developed countries lack formal financial services due to insufficient banking infrastructure, high transaction costs, financial illiteracy, and a lack of knowledge. References Singh and Sinha [6] and Akomea-Frimpong, et al. [7] highlight that microfinance and informal financial institutions incur substantial operational expenses, resulting in higher transaction costs for individuals without access to traditional banking services. Researchers provide the following hypothesis:

Hypothesis 2: Challenges (C) associated with mobile money systems will negatively influence service users' opinions (SUO).

3. Methodology

In this work, the positivist method generalizes social truths. It provides projective knowledge and verification without human bias [15, 16] allowing the hypothesis to be accepted. As a result, new ideas and research emerge. According to the survey, mobile money services influence customers in Bolgatanga Municipality. Past research informed the study's questions and claims. Research used closed-ended questions, statements, and a 5-point Likert scale. Samples should be large enough to answer the study issue and statistically representative [17]. Attributes and accessibility were determined using a convenience sample of 300 clients. Management and staff prepared the questionnaire for customers to complete in the banking hall and at various workstations. The study prefers the use of PLS SEM for analysis [18]. The instrument's reliability pilot test was time-constrained. Researchers signed, updated, and examined the questionnaire. The data was coded and reduced following error removal.

4. Result and Discussion

Only 260 of the 300 surveys that the researchers distributed to clients returned, indicating an estimated 87% response rate [19]. In prior studies, a response rate of 87% was considered appropriate for statistical conclusions.

The analysis uses customer replies from mobile money. This chapter presents the results of the primary study. The chapter examines mobile money usage after a thorough client analysis. We then processed the data using PLS-SEM and IBM SPSS Statistics 20. The second section goes over the measuring model's indicators, which include construct, convergent, and item-level discriminant validity. We discuss and compare the results of the hypothesis tests.

4.1. Data Screening of Survey

Data screening guarantees precise and error-free analysis. Identifying false or careless assertions enhances the rigor of organizational science. Validating data reveals incorrectly coded missing values and responses that are uncertain. This study employed value placement and eliminated suspicious responses and outliers to address missing data [20]. The normal distribution is important in PLS-SEM because it does not assume any specific data distribution [21].

Utilize skewness and kurtosis for evaluating variable symmetry instead of Kolmogorov-Smirnov and Shapiro-Wilk tests. Kurtosis quantifies the symmetry of variable distribution, while skewness quantifies the peakness. Skewed distributions exhibit skewness values exceeding +1 or falling below -1 [21]. The permitted skewness ranges from -3 to +3, and the kurtosis ranges from -10 to +10 [22]. It is suggested to use skewness and kurtosis without specifying a range [23]. This study employs a skewness range of -3 to +3 and a kurtosis range of -10 to +10 as acceptable values [22]. Table 1 presents the distribution of skewness and kurtosis statistics.

Table 1.
Data distribution based on skewness and kurtosis test.

Construct	Excess kurtosis	Skewness	Number of observations used
BF_5	-1.25	0.11	256.00
BF_7	-0.68	0.11	256.00
BF_9	-0.46	0.27	256.00
C_1	-0.30	0.03	256.00
C_2	0.03	-0.12	256.00
C_6	-0.09	-0.03	256.00
SUO_1	-0.33	-0.04	256.00
SUO_5	-0.33	0.04	256.00

In the study data, the distribution of mobile money consumers' responses is uniformly skewed and normal. Kurtosis levels range from -10 to +10. As a result, both skewness and kurtosis are within acceptable limits, and the data are suitable for the study.

4.2. Customer Profile and Usage of Mobile Money

We required the profile of mobile money consumers because their ability to provide acceptable information on research variables heavily depends on their profile. According to the findings of this survey, respondents are of various ages, socioeconomic statuses, and vocations. Similarly, the customer profile was required, as different customer statuses may provide different input on the aspects being considered. Table 2 contains information about the customers' profiles.

Table 2.
Customer profile and usage of mobile money.

Item	Category	Count	Column N %
Age of respondent	18-25	164	64.06%
	26-35	68	26.56%
	36-45	16	6.25%
	46 and above	8	3.12%
	Total	256	100.00%
Occupation of respondent	Private business	28	10.94%
	Civil servant	24	9.38%
	Student	200	78.12%
	Others	4	1.56%
	Total	256	100.00%
Period of mobile money service usage	Less than 1 year	32	12.50%
	1-2 years	44	17.19%
	3-5 years	80	31.25%
	Above 5 years	100	39.06%
	Total	256	100.00%
Frequent service use	Payment of bills	52	20.31%
	Buy airtime/Data	196	76.56%
	None	8	3.12%
	Total	256	100.00%
Mobile money service use	MTN mobile money	184	71.88%
	Airtel-Tigo mobile money	12	4.69%
	Vodafone cash	60	23.44%
	None of the above	0	0.00%
	Total	256	100.00%

The majority of mobile money system clients (64.06%) are between the ages of 1 and 25, followed by 26-3, 36-45, and 46 and up, and students dominate the services.

Customers are classified as private businesses, civil servants, students, and others, with students accounting for 78.12%. According to Table 2, the period of Mobile Money Service Usage is closely distributed, with over 5 years (39.06%) being the most common, followed by 3-5 years (31.25%), 1-2 years (17.19%), and less than 1 year (12.50%).

In terms of Frequent Service utilize, respondents were asked to name the service for which they most frequently utilized it. Buying airtime/data was the most popular with 76.56%, followed by 'Payment of bills' with 20.31%, and none of the two with 3.2%. MTN Mobile Money has the most patronage (71.88%), followed by Vodafone Cash (23.44%), and Airtel-Tigo Mobile Money (4.69%).

4.3. Data Analysis of Constructs

Every study topic begins with a qualitative description of the phenomenon of interest, followed by quantitative measurement. Data analysis and utilization are critical after creating and performing the experiment [24]. For years, social science scholars have used statistical analysis to produce, investigate, and confirm findings. This section covered fundamental statistical methodologies as well as partial least square structural equation modeling. This method can be used to confirm or reject theories, as well as to identify data patterns and correlations [23].

4.4. Measurement Assessment

Reflective measurement models evaluate indicators and construct dependability. The average variance extracted (AVE) for each metric determines its validity. You can use the Fornell-Larcker criterion to compare a reflectively measured construct to other measures in the same model. Cross-loading and HTMT are two examples [23].

4.5. Indicator Reliability

Internal consistency, reliability, and validity of reflective research models must be evaluated [23]. Internal consistency refers to how effectively the entire set measures a given construct on a given scale [25]. Internal consistency reliability evaluates the extent of linkage between construct indicators. Reflective study measurement methodology necessitates the inspection and reporting of PLS path model derived findings. Outer Loadings are the measurement. Composite Reliability, Cronbach's Alpha, AVE, and Discriminant Validity are all measures of reliability [23]. Cronbach's alpha values should be greater than 0.6, with Composite reliability with similarity of ratings greater than 0.70 but less than 0.95. Therefore, it is necessary to report both Cronbach's alpha and composite reliability. Cronbach's alpha, the lower bound, and composite reliability, the upper bound, determine dependability. The grand mean of the construct's indicator squared loadings determines the average variance extract (AVE). The notion explains 50% or more of the indicator variance with an Ave of 0.50 or higher [26]. This study model's discriminant validity is evaluated. Cross-loadings, Fornell-Larcker, and HTMT tests were used to determine discriminant validity [23]. The study, on the other hand, employed Composite Reliability, Cronbach's Alpha, AVE, and cross-loadings. These are detailed in the tables displayed below.

Table 3.
Reliability and convergent validity.

Construct	Indicator	Outer loading	Cronbach's alpha >0.6	Composite reliability >0.7	Average variance extracted (AVE) >0.5
Benefits of mobile money system	BF_5	0.54	0.65	0.78	0.51
	BF_7	0.88			
	BF_9	0.52			
Challenges associated with mobile money system	C_1	0.61	0.69	0.77	0.53
	C_2	0.80			
	C_6	0.75			
Service users' opinions	SUO_1	0.84	0.70	0.76	0.53
	SUO_5	0.73			

Source: Ringle, et al. [27].

For all constructs, composite reliability is greater than 0.70 but less than 0.95 [23]. This is within acceptable bounds. Cronbach's alpha values for all research constructs surpass 0.6 [23]. The analyzed object has AVE values ranging from 0.51 to 0.53, which are more than 0.5 [23]. Table 3 shows that the research components have excellent internal consistency and explain 50% or more of the indicator variance.

4.6. Discriminant Validity

This study then investigates measures of discriminant validity. We refer to the degree of difference between variables as discriminant validity [25]. That is how empirically distinct a construct is. Discriminant validity indicates that a construct is distinct and captures phenomena that other constructs in the model do not. The study used cross-loadings to examine the discriminant validity of indicators. It initially supports the reflecting construct and discriminant validity because each reflective indicator should load the connected construct the most. Table 4 demonstrates that a table with rows for indicators

and columns for the latent variable is best for assessing and reporting cross-loading. Cross-loading from Table 4 confirms the discriminant validity of the study's reflective constructs, as each reflective indicator loads the most on its own.

Table 4.
Cross-factor loading of the construct.

Construct	Benefits of mobile money system	Challenges associated with mobile money system	Service users' opinions
BF_5	0.54	0.21	0.20
BF_7	0.88	0.61	0.39
BF_9	0.52	0.22	0.13
C_1	0.60	0.61	0.39
C_2	0.32	0.80	0.76
C_6	0.39	0.75	0.70
SUO_1	0.32	0.80	0.84
SUO_5	0.34	0.66	0.73

Source: Ringle, et al. [27].

4.7. Discussion of Hypotheses

In this study, hypotheses must be tested. To respond to the research question, develop and test a well-thought-out hypothesis. Hypotheses were developed for the study's outcome as relationship assertions between two or more quantifiable variables [28]. Using logical methodologies, testable, falsifiable, and realistic hypotheses were developed. We used t-values and p-values to analyze hypotheses. The significance level for t-values was adjusted to >1.28 (significant level = 10%), >1.65 (significant level = 5%), and >2.33 (significant level = 1%). The p-values were set to be significant at the following levels: 0.10 for *, 0.05 for **, and 0.01 for *** [24]. The relationship is supported if the p-values fall within these three ranges. Table 5 displays the results of the research hypothesis testing.

Table 5.
Summary of hypotheses testing.

Hypothesis	Description	T values	P values	Significant level	Results
H_1	BF_ -> SUO	6.24	0.00	***	Supported
H_2	C_ -> SUO_	32.96	0.00	***	Supported

Note: Significant value: (***p < 0.01 and NS: Not significant).
Source: Ringle, et al. [27].

Table 5 shows that service users' perceptions have supported the links between the benefits of mobile money systems and the obstacles associated with these systems. That is all the evidence for the two hypotheses. Each hypothesis is thoroughly examined.

Hypothesis 1: Benefits of mobile money systems will positively influence users' opinions to patronize

The hypothesis testing in the study indicates that the benefits of mobile money systems will positively improve service consumers' attitudes toward patronizing in the Bolgatanga municipality. The hypothesis H1 receives support from t = 6.24 and p = 0.00. This research backs up previous findings about the advantages of mobile money. Mobile money has become a popular financial service in developing countries because it reduces transaction costs and remittances while also allowing users to open safe savings accounts and access services remotely [5]. Users of mobile money can deposit, transfer, and withdraw money without having a bank account. It also reduces transaction costs while improving convenience, security, and speed [1, 3, 5, 26]. It has alleviated the asymmetric information constraint that traditional

banks confront when lending to the collateral-less poor, enabling the unbanked to track their financial transactions in real time [9].

Hypothesis 2: Challenges associated with mobile money systems will negatively influence users' opinions to patronize.

According to Table 5, the difficulties associated with mobile money systems will have a negative impact on consumers' willingness to patronize. With a positive association (t = 32.96, and p = 0.00), this analysis confirms hypothesis two (2). This finding is supported by previous research [1, 2, 5, 7]. Although mobile phone penetration is higher in regions with better infrastructure, infrastructure development impedes mobile financial transactions. Due to a lack of fixed-line infrastructure, Sub-Saharan Africa relies on mobile phones for voice and internet. Customers in remote areas lack critical infrastructure and services. Security concerns expose mobile money systems to various forms of attacks [1, 2]. Scammers take advantage of system fraud when operators do not have advanced algorithms [5, 7].

4.8. The Study Model

The structural model study produced the final model for mobile money service in Bolgatanga municipality, as shown in Figure 2. The benefits of mobile money, as well as the obstacles associated with mobile money systems, all have an impact on service users' opinions. The final model is depicted in Figure 2.
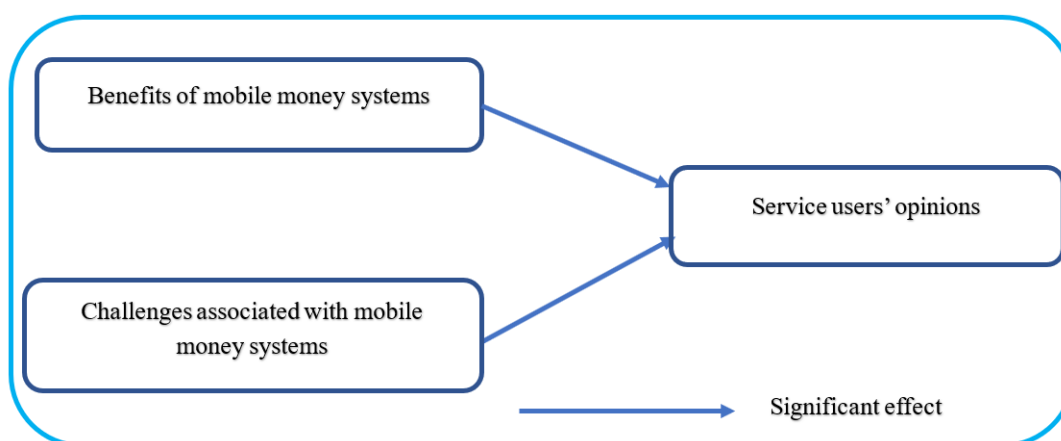

Figure 2.
Study model.

5. Conclusions, Limitations and Recommendations

Summary of research hypotheses and findings. The section first reiterates the study topic and hypotheses before delving into the outcomes based on the research questions. The final notes highlight the study's shortcomings and future research. This study looks at the advantages and disadvantages of mobile money services for residents of Bolgatanga Municipality. The study fills a knowledge gap and adds to our understanding of mobile money services. According to the findings of this survey, respondents are of various ages, socioeconomic statuses, and vocations. The majority of mobile money system consumers are between the ages of one and twenty-five. The time spent using Mobile Money Services is very evenly spread, with those older than 5 years using it the most. Respondents were asked to name the most common reason they utilize the service, with buying airtime/data being the most popular. The study examined 300 customer surveys, of which 260 were returned for analysis. The main focus is on the benefits and drawbacks of mobile money for Bolgatanga Municipality customers. The findings revealed that the benefits of mobile money systems will positively influence service users' opinions, while the challenges of mobile money systems will negatively influence users' thoughts about using mobile money services in the Bolgatanga municipality.

This research will lay the groundwork for legitimate financial transactions on mobile phones, supporting government authorities in their efforts to regulate corporate transactions. It will also help the banking industry improve loan availability and banking services for individuals, as well as contribute to a better understanding of the financial ramifications of mobile money transactions. The study will also benefit financial service providers by providing information on the relevance of mobile money transactions.

5.1. Limitation of the Study

Despite its practical and theoretical value, this work has limits. The study's sample size, location, and sample size are all limitations. Although the Bolgatanga municipality's major business center served as the participant pool, the results may not be entirely generalizable. The study focused solely on the advantages and disadvantages of mobile money services in a specific region of the country. Therefore, the resulting opinion pattern is different from that of other geographical areas.

5.2. Suggestions for Future Research

The study's limitations necessitate further research to gain a deeper understanding of mobile money services. Future research should look into the impact of mobile money on financial inclusion for both the unbanked and banks.

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Institutional Review Board Statement:
The Ethical Committee of the Bolgatanga Technical University, Ghana has granted approval for this study on 4 October 2023 (Ref. No. BTU/AC/01).

Transparency:
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:
The authors declare that they have no competing interests.

Authors' Contributions:
All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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