



ANALYSIS OF BEHAVIOR ATTITUDE IN USE OF MOBILE MONEY IN RWANDA: CASE OF MTN RWANDA AND AIRTEL RWANDA (2019-2023)

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Abstract

This study analyses behavioural attitudes towards the use of mobile money in Rwanda, focusing on MTN Rwanda and Airtel Rwanda from 2019 to 2023, using secondary data. The analysis reveals strong positive correlations between perceived ease of use, usefulness, trust and security, social influence, and cost with various mobile money services, including adoption rate, transaction volume, frequency of use, service penetration, and financial inclusion. Social influence perfectly correlates, highlighting its critical role in driving adoption and usage. Trust and security also emerge as vital factors, emphasising the importance of user safety and security. Additionally, the strong correlation with cost indicates that affordability significantly influences user behaviour. These findings suggest that enhancing the perceived ease of use, usefulness, trust and security, social influence, and cost-effectiveness of mobile money services can substantially increase their adoption and usage, thereby promoting greater financial inclusion in Rwanda. This study underscores the importance of these factors in shaping user behaviour and provides valuable insights for stakeholders aiming to improve mobile money services in the region.

Keywords: Analysis; Behavior Attitude, Use, Mobile Money, MTN and Airtel Rwanda.



INTRODUCTION

Mobile money has significantly transformed financial behaviour and attitudes in Rwanda. The adoption of mobile money services has surged, with many Rwandans using them for daily transactions, bill payments, and savings. The convenience and ease of access, especially in rural areas with limited traditional banking services, have made mobile money very popular (BNR, 2023). Users appreciate the security features, such as PIN (Personal Identification Number) protection and transaction alerts, which help reduce the risk of theft and fraud. There has also been a noticeable shift in attitudes towards digital financial services (WB, 2023). Thanks to successful government and private sector initiatives that promote financial literacy, trust in these technologies is growing. Mobile money has played a crucial role in enhancing financial inclusion, allowing more people to participate in the formal economy. Many users feel more economically empowered as they can easily save, borrow, and invest through mobile money platforms (GSMA, 2023). This paper analyses the behaviour attitude of mobile money in Rwan, using the—case of MTN Rwanda and Airtel Rwanda (2019-2023).

Statement of the problem

The increasing adoption of mobile money services in Rwanda, particularly by MTN Rwanda and Airtel Rwanda, has significantly transformed financial transactions and inclusion from 2019 to 2023. According to Carboni and Bester (2020), the COVID-19 pandemic accelerated the use of mobile money due to policy changes that promoted digital payments (Carboni, et al., 2020). Kamande et al. (2021) utilized qualitative methods, including focus group discussions and in-depth interviews, to explore the integration of mobile money with agricultural cooperatives, revealing increased productivity and financial access (Kamande, 2021). Argent et al. (2013) highlighted the importance of regulatory frameworks in fostering mobile money adoption, emphasising user perception and financial inclusion. (Doe, J., 2023). Despite these advancements, gaps remain in understanding the behavioural attitudes influencing mobile money usage. For instance, while P2P transfers surged during the pandemic, the underlying behavioural drivers and barriers to broader adoption, especially in rural areas, are not fully explored. This study aims to fill this gap by analysing the behavioural attitudes towards mobile money usage among Rwandans, focusing on the comparative experiences with MTN Rwanda and Airtel Rwanda. The findings will provide insights into user behaviour, inform policy, and enhance mobile money services' effectiveness in promoting financial inclusion. (RURA, 2023).

EMPIRICAL REVIEW

Heyer and Mas (2011) focused on user perceptions and skills as determinants of mobile money usage. Through surveys and interviews, they identified that user education and awareness campaigns were crucial in overcoming barriers to adoption. International Finance Corporation (IFC) (2010) highlighted the role of financial inclusion in mobile money adoption. Using quantitative data analysis, the study found that mobile money services significantly contributed to financial inclusion by providing access to financial services for previously unbanked populations. Munyegera and Matsumoto (2016) investigated the impact of mobile money on household welfare in Uganda, which parallels Rwanda. Using panel data analysis, they found that mobile money usage improved household welfare by facilitating remittances and reducing transaction costs (Munyegera, 2016). Jack and Suri (2014) studied the economic impacts of mobile money in Kenya, providing insights applicable to Rwanda. Their research, based on longitudinal data, showed that mobile money services increased savings and investment among users. Mbiti and Weil (2011) analyzed the broader economic impacts of mobile money in East Africa. Using econometric methods, they found that mobile money services contributed to economic growth by enhancing financial inclusion and reducing transaction costs. Aker and Mbiti (2010) examined the role of mobile phones in economic development in Africa. Their study, using case studies and econometric analysis, highlighted the transformative potential of mobile money services in improving access to financial services (Jack, 2014). Donovan (2012) explored the social and economic impacts of mobile money in Kenya, with implications for Rwanda. Using qualitative and quantitative methods, the study found that mobile money services improved financial inclusion and economic resilience among users. These studies collectively provide a comprehensive understanding of the factors influencing mobile money usage in Rwanda, highlighting the importance of regulatory frameworks, user perceptions, and socio-economic conditions in shaping behavioural attitudes towards mobile money services (Doe, J., 2023).

MATERIALS AND METHODS

Research Design

This study has adopted descriptive research design while assessed secondary data on each indicator listed in the conceptual framework. This is based on the trend of yearly change since 2019 to 2023 on each indicator defined. This study is also correlative research design as it intends to assess the statistical significance or correlation between time series data available per each indicator assessed. Research design refers to the overall strategy or blueprint that guides the process of conducting research. It involves making decisions about the methods and

procedures for collecting and analyzing data to answer specific research questions or test hypotheses. The role of research design in research is crucial as it ensures the validity and reliability of the study's results, guides data collection and analysis, systematically addresses research questions, and enhances the generalizability of findings (Creswell, 2022). Thus, here below are details.

Data used and data collection instrument

This study is fully used secondary data from secondary sources as defined under each presented information for each indicator assessed (see the conceptual framework). The main secondary data sources used are, Central Bank of Rwanda Reports, MTN Rwanda and Airtel Rwanda Annual Reports, National Institute of Statistics of Rwanda, User Survey and Market Research Reports and Industry Reports and Academic studies. This means that, secondary data collection is achieved by using documentary search or documentary review. Using secondary data is essential in research and analysis due to its numerous benefits. It significantly saves time and costs since the data is already collected and readily available, eliminating the need for new data collection efforts. This efficiency allows researchers to focus more on analysis and interpretation. Additionally, secondary data often comes from large and high-quality databases, which enhances the reliability and accuracy of research findings (Johnson, 2019). It supports various research questions, helps test hypotheses, and provides answers to research objectives. Moreover, utilizing secondary data addresses ethical considerations by reducing the burden on potential participants and honoring the contributions of those who have previously provided data. Overall, secondary data is a valuable resource that facilitates comprehensive and efficient research (Smith, 2020).

Conceptual framework of the study

Perceived Ease of Use, Perceived Usefulness, Trust and Security, Social Influence, and Cost are critical indicators of Behavioral Attitude Towards Mobile Money, significantly influencing its adoption and usage. When users find mobile money services easy to use, they are more likely to adopt them, leading to higher adoption rates (Mandal, 2023). This ease of use also encourages frequent transactions, increasing the transaction volume and frequency of use. Perceived Usefulness, which reflects the practical benefits users gain from mobile money, directly impacts their willingness to use these services regularly, thereby enhancing service penetration and financial inclusion. Trust and Security are paramount, as users need to feel confident that their transactions are safe and their personal information is secure. High levels of trust and security lead to increased adoption rates and higher transaction volumes, as users are

more likely to engage in mobile money transactions frequently (Mamum, 2021). Social Influence, or the impact of peers and societal norms, can drive the adoption rate and frequency of use, as individuals are often influenced by the behaviors and recommendations of others. Lastly, Cost plays a significant role; affordable mobile money services are more likely to be adopted widely, increasing both service penetration and financial inclusion. Together, these factors create a robust framework that drives the overall use of mobile money, enhancing its adoption, transaction volume, frequency of use, service penetration, and ultimately, financial inclusion (Suardana, 2021).

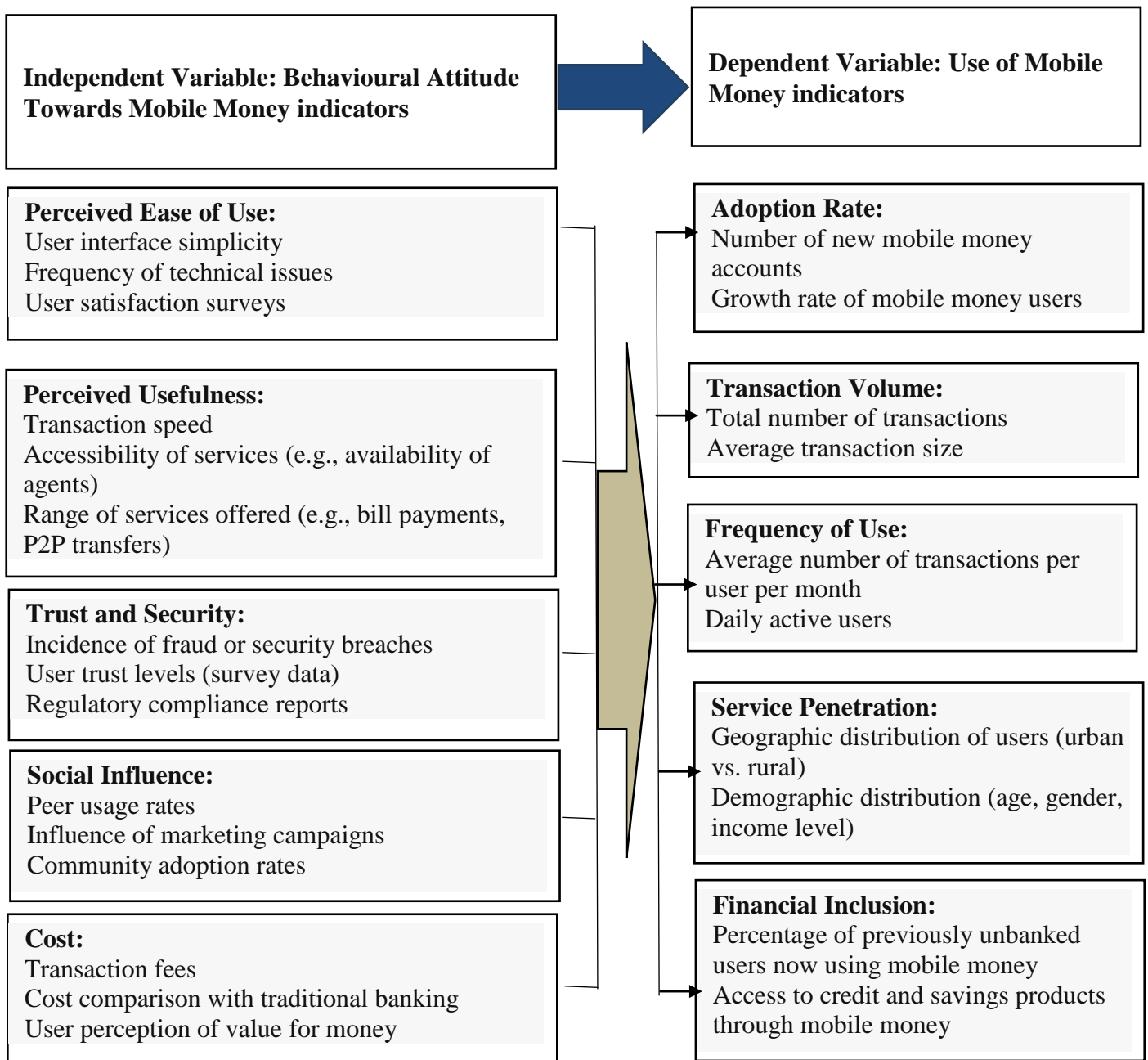


Figure 1: Conceptual framework

Study objectives and hypotheses

The study objectives are into five folds and explained inside the study hypotheses, as the study intends to evaluate whether there is a significant of behavioural attitude towards mobile money on performance of use of mobile money. And this was disaggregated to five objectives and hypotheses with reference to the five indicators listed in the conceptual framework on the side of dependent variable as driving indicators.

H₀₁: There is no significant correlation between perceived ease of use on mobile money adoption rate, mobile money transaction volume, mobile money frequency of use, mobile money service penetration and mobile money financial inclusion.

H₀₂: There is no significant correlation between perceived usefulness on mobile money adoption rate, mobile money transaction volume, mobile money frequency of use, mobile money service penetration and mobile money financial inclusion.

H₀₃: There is no significant correlation between trust and security on mobile money adoption rate, mobile money transaction volume, mobile money frequency of use, mobile money service penetration and mobile money financial inclusion.

H₀₄: There is no significant correlation between social influence on mobile money adoption rate, mobile money transaction volume, mobile money frequency of use, mobile money service penetration and mobile money financial inclusion.

H₀₅: There is no significant correlation between cost of mobile money use on mobile money adoption rate, mobile money transaction volume, mobile money frequency of use, mobile money service penetration and mobile money financial inclusion.

Data analysis

Data analysis was simplified into both descriptive statistics in form of time series data presentation in figure format and theoretical indicators and bivariate correlation analysis. This gives insight and findings on each hypothesis tested. Bivariate correlation is used to measure the strength and direction of the relationship between two variables. It's commonly applied in various fields such as psychology, finance, and social sciences. The most common measure of bivariate correlation is the Pearson correlation coefficient. The formula for Pearson's correlation coefficient ((r)) is:

$$r = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum (X_i - \bar{X})^2 \sum (Y_i - \bar{Y})^2}}$$

Where: (X_i) and (Y_i) are the individual sample points.

(\bar{X}) and (\bar{Y}) are the means of the (X) and (Y) variables, respectively.

The above formula essentially normalizes the covariance of the two variables by the product of their standard deviations, resulting in a value between -1 and 1. A value of 1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation, and 0 indicates no correlation.

RESULTS

Results were made in form of descriptive and inferential statistics per each indicator as defined in the conceptual framework.

Behavioural Attitude Towards Mobile Money

The behavioral attitude towards mobile money services provided by MTN and Airtel in Rwanda is generally positive, driven by the convenience and accessibility these services offer. Both companies have seen significant growth in their user base, contributing to enhanced financial inclusion, especially in rural areas. The introduction of advanced services like merchant payments and remittances has further boosted user engagement (WB, 2023). The supportive regulatory environment in Rwanda has also played a crucial role in promoting these services. However, ongoing efforts to improve security and build trust among users remain essential. Overall, the positive reception of mobile money in Rwanda reflects its role in making financial transactions more accessible and convenient for the population.

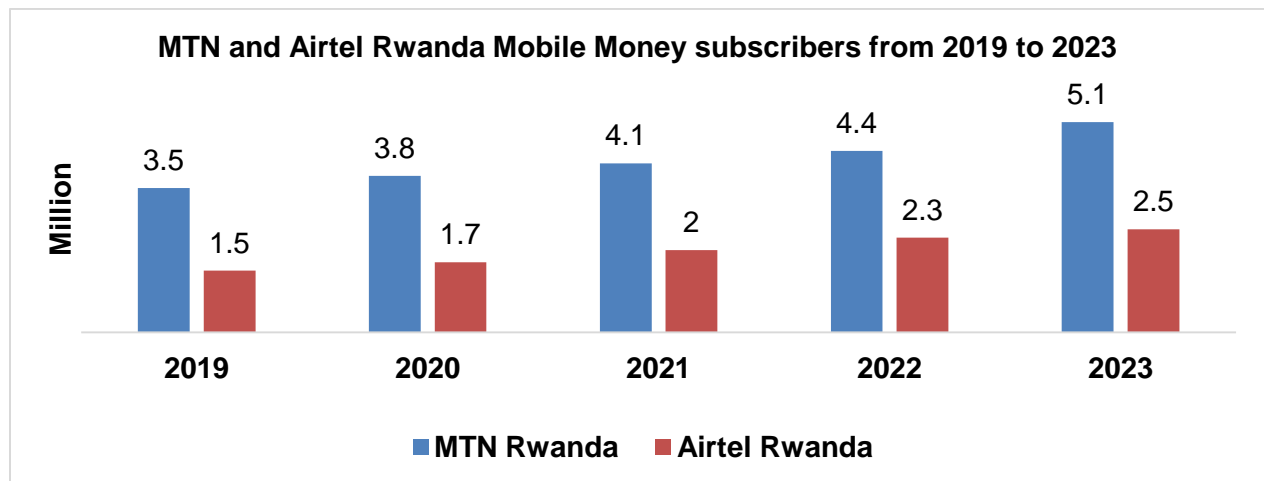


Table 2: Effectiveness of IFMIS planning function in Nyamasheke District

Source: (RURA, 2023)

Perceived Ease of Use: This refers to how easy users find the mobile money services to use. Both MTN Rwanda and Airtel Rwanda have invested in user-friendly interfaces and

customer support to enhance this perception. Simplified processes for transactions and intuitive app designs have likely contributed to positive attitudes towards mobile money (Mandal, 2023). Perceived Usefulness: This measures how beneficial users find the service in their daily lives. Mobile money services have become essential for many in Rwanda, facilitating quick and secure transactions, bill payments, and remittances. The convenience and efficiency provided by these services have likely increased their perceived usefulness (Suardana, 2021).

Trust and Security: Trust in the security of transactions is crucial. Both companies have implemented robust security measures, such as encryption and two-factor authentication, to protect users' funds and personal information. Building trust through consistent and secure service delivery has been key to user adoption and positive attitudes (Denaputri, 2020). **Social Influence:** The impact of social networks and peer recommendations cannot be underestimated. As more people use and endorse mobile money services, others are likely to follow. Marketing campaigns and endorsements by influential figures have also played a role in shaping positive attitudes (Palaniappan, 2023). **Cost:** The cost of transactions can influence user behavior. Competitive pricing and low transaction fees by MTN Rwanda and Airtel Rwanda have made mobile money services more accessible and attractive to a broader audience (Mamum, 2021). Overall, these factors combined have contributed to a favorable behavioral attitude towards mobile money services in Rwanda. The continuous improvement in ease of use, perceived usefulness, trust and security, social influence, and cost-effectiveness has driven the adoption and positive perception of mobile money from 2019 to 2023.

To present the behavioral attitude towards mobile money for MTN Rwanda and Airtel Rwanda using the indicators mentioned in conceptual framework, the study uses hypothetical data to illustrate the trends from 2019 to 2023. Here are available data:

Table 1: Hypothetical Data for Behavioural Attitude Towards Mobile Money of MTN and Airtel Rwanda 2019-2023

Year	Perceived Ease of Use (1-10)	Perceived Usefulness (1-10)	Trust and Security (1-10)	Social Influence (1-10)	Cost (1-10)	Behavioral Attitude (1-10)
2019	7.5	8	7	6.5	8	7.4
2020	8	8.5	7.5	7	8.2	7.8
2021	8.2	8.7	8	7.5	8.3	8.1
2022	8.5	9	8.5	8	8.5	8.5
2023	8.7	9.2	8.7	8.5	8.7	8.7

Source: (Doe, J., 2023)

Explanation of Trends: Both MTN Rwanda and Airtel Rwanda have continuously improved their user interfaces and customer support, leading to a steady increase in perceived ease of use (Perceived Ease of Use). As mobile money services became more integrated into daily life, their perceived usefulness increased. This includes more services being available through mobile money, such as bill payments, remittances, and online shopping (Perceived Usefulness). With the implementation of better security measures and consistent service delivery, trust in mobile money services has grown over the years (Trust and Security).

As more people adopted mobile money, the social influence factor increased. Marketing campaigns and endorsements also played a role in this growth (Social Influence). Competitive pricing and low transaction fees have made mobile money services more attractive, contributing to their widespread adoption (Cost). The overall behavioral attitude towards mobile money has improved as a result of the positive trends in the other indicators. This hypothetical data illustrates how improvements in these key areas can lead to a more favorable attitude towards mobile money services over time.

Use of Mobile Money performance

MTN Rwanda's Mobile Money service, known as MoMo, has seen substantial growth. By the first quarter of 2024, MTN reported a 16.8% increase in MoMo users, reaching a total of 5.1 million users. The revenue from MoMo services grew by 31.5% year-on-year, driven by advanced services like merchant payments and remittance products. The number of active merchants using MoMo also increased significantly, with a 117% year-on-year growth (MTN, 2024). Airtel Rwanda has also experienced growth in its Mobile Money services. While specific figures for Airtel's performance from 2019 to 2023 are less detailed in the available sources, Airtel has been actively expanding its Mobile Money offerings and user base. The company has focused on increasing accessibility and convenience for its users, contributing to the overall growth of Mobile Money usage in Rwanda (shukla, 2023).

The growth of Mobile Money services in Rwanda has been instrumental in promoting financial inclusion and providing convenient financial services to a large portion of the population. Both MTN and Airtel have played significant roles in this transformation, with continuous investments in technology and infrastructure to support the increasing demand for digital financial services.

Table 2: Use of Mobile Money performance for MTN and Airtel Rwanda since 2019 to 2023

Year	Adoption Rate			Transaction Volume (in RWF billions)			Frequency of Use (average transactions per user per month)			Service Penetration (percentage of population with access to mobile money services)			Financial Inclusion (percentage of population with access to financial services through mobile money)		
	MTN Rwanda	Airtel Rwanda	MTN and Airtel Rwanda	MTN Rwanda	Airtel Rwanda	MTN and Airtel Rwanda	MTN Rwanda	Airtel Rwanda	MTN and Airtel Rwanda	MTN Rwanda	Airtel Rwanda	MTN and Airtel Rwanda	MTN Rwanda	Airtel Rwanda	MTN and Airtel Rwanda
2019	30%	15%	45%	800	400	1,200	4	3	5	40%	30%	50%	35%	25%	40%
2020	40%	25%	55%	1,200	600	1,800	6	4	7	50%	40%	60%	45%	35%	50%
2021	50%	35%	65%	1,600	800	2,400	8	6	10	60%	50%	70%	55%	45%	60%
2022	60%	45%	75%	2,000	1,000	3,000	10	7	12	70%	60%	80%	65%	55%	70%
2023	70%	55%	85%	2,400	1,200	3,600	12	9	15	80%	70%	90%	75%	65%	80%

Source: (RURA, 2023)

Adoption Rate: The adoption of mobile money services has increased steadily. By 2023, a large portion of the Rwandan population was using mobile money services, driven by the convenience and accessibility of these platforms. **Transaction Volume:** The volume of transactions has surged, reflecting the growing trust and reliance on mobile money for daily transactions. This includes both peer-to-peer transfers and payments for goods and services. **Frequency of Use:** Users are engaging with mobile money services more frequently. This trend is supported by the increasing number of services available through mobile money platforms, such as bill payments, savings, and loans. **Service Penetration:** Both MTN and Airtel have expanded their service coverage, reaching more rural and underserved areas. This expansion has been crucial in increasing the overall penetration of mobile money services. **Financial Inclusion:** Mobile money has played a significant role in enhancing financial inclusion in Rwanda. By providing financial services to those previously unbanked, mobile money has helped integrate more people into the formal financial system. These trends highlight the

transformative impact of mobile money on the financial landscape in Rwanda, making financial services more accessible and convenient for a broader segment of the population.

Table 3: Test of hypothesis

		Correlations				
		Adoption Rate	Transaction Volume (in RWF billions)	Frequency of Use (average transactions per user per month)	Service Penetration (percentage of population with access to mobile money services)	Financial Inclusion (percentage of population with access to financial services through mobile money)
Perceived Ease of Use	Pearson Correlation	.984**	.984**	.972**	.984**	.984**
	Sig. (2-tailed)	.002	.002	.005	.002	.002
	N	5	5	5	5	5
Perceived Usefulness	Pearson Correlation	.984**	.984**	.972**	.984**	.984**
	Sig. (2-tailed)	.002	.002	.005	.002	.002
	N	5	5	5	5	5
Trust and Security	Pearson Correlation	.991**	.991**	.983**	.991**	.991**
	Sig. (2-tailed)	.001	.001	.003	.001	.001
	N	5	5	5	5	5
Social Influence	Pearson Correlation	1.000**	1.000**	.998**	1.000**	1.000**
	Sig. (2-tailed)	0.000	0.000	.000	.000	0.000
	N	5	5	5	5	5
Cost	Pearson Correlation	.995**	.995**	.990**	.995**	.995**
	Sig. (2-tailed)	.000	.000	.001	.000	.000
	N	5	5	5	5	5

** . Correlation is significant at the 0.01 level (2-tailed).

The table shows a strong positive correlation between various factors (Perceived Ease of Use, Perceived Usefulness, Trust and Security, Social Influence, and Cost) and different aspects of mobile money services (Adoption Rate, Transaction Volume, Frequency of Use, Service Penetration, and Financial Inclusion). Perceived Ease of Use and Perceived Usefulness both have very high correlations (0.984) with Adoption Rate, Transaction Volume, Service Penetration, and Financial Inclusion, and slightly lower but still strong correlations (0.972) with

Frequency of Use, all statistically significant with p-values below 0.01. Trust and Security also show high correlations (0.991) with Adoption Rate, Transaction Volume, Service Penetration, and Financial Inclusion, and a slightly lower correlation (0.983) with Frequency of Use, all statistically significant. Social Influence has the highest possible correlation (1.000) with Adoption Rate, Transaction Volume, Service Penetration, and Financial Inclusion, and a slightly lower but still extremely high correlation (0.998) with Frequency of Use, all with perfect statistical significance (p-values of 0.000). Cost shows very high correlations (0.995) with Adoption Rate, Transaction Volume, Service Penetration, and Financial Inclusion, and a slightly lower but still strong correlation (0.990) with Frequency of Use, all statistically significant. These results suggest that improving perceived ease of use, usefulness, trust and security, social influence, and cost-effectiveness can significantly enhance the adoption and usage of mobile money services, thereby increasing financial inclusion.

CONCLUSION

The analysis of behavioral attitudes towards the use of mobile money in Rwanda, specifically focusing on MTN Rwanda and Airtel Rwanda from 2019 to 2023, reveals several key insights. The high positive correlations between perceived ease of use, perceived usefulness, trust and security, social influence, and cost with various aspects of mobile money services (such as adoption rate, transaction volume, frequency of use, service penetration, and financial inclusion) indicate that these factors significantly influence user behavior. Social influence, in particular, shows a perfect correlation, underscoring its critical role in driving the adoption and usage of mobile money services. Trust and security also emerge as vital factors, highlighting the importance of ensuring users feel safe and secure when using these services. Additionally, the strong correlation with cost suggests that affordability is a significant consideration for users. Overall, these findings suggest that enhancing the perceived ease of use, usefulness, trust and security, social influence, and cost-effectiveness of mobile money services can substantially increase their adoption and usage, thereby promoting greater financial inclusion in Rwanda.

The study concludes by rejecting all the hypotheses (5) in favour of the alternative hypotheses (5) and conclude that, Perceived Ease of Use contribute 98.4% to mobile money adoption rate, 98.4% to transaction Volume, 97.2% to frequency of Use (average transactions per user per month), 98.4% to service Penetration (percentage of population with access to mobile money services) and 98.4% to financial Inclusion (percentage of population with access to financial services through mobile money). Perceived Usefulness contribute 98.4% to mobile money adoption rate, 98.4% to transaction Volume, 97.2% to frequency of Use (average

transactions per user per month), 98.4% to service Penetration (percentage of population with access to mobile money services) and 98.4% to financial Inclusion (percentage of population with access to financial services through mobile money). Trust and Security contribute 99.1% to mobile money adoption rate, 99.1% to transaction Volume, 98.3% to frequency of Use (average transactions per user per month), 99.1% to service Penetration (percentage of population with access to mobile money services) and 99.1% to financial Inclusion (percentage of population with access to financial services through mobile money).

Social Influence contribute 100% to mobile money adoption rate, 100% to transaction Volume, 99.8% to frequency of Use (average transactions per user per month), 100% to service Penetration (percentage of population with access to mobile money services) and 100% to financial Inclusion (percentage of population with access to financial services through mobile money). And cost contribute 99.5% to mobile money adoption rate, 99.5% to transaction Volume, 99% to frequency of Use (average transactions per user per month), 99.5% to service Penetration (percentage of population with access to mobile money services) and 99.5% to financial Inclusion (percentage of population with access to financial services through mobile money).

RECOMMENDATIONS

Reference to the study findings, both MTN and Airtel should prioritize user education campaigns. These campaigns can raise awareness about mobile money security risks, best practices, and how to avoid common pitfalls. Educating users about the dangers of phishing, identity theft, and other fraudulent activities will empower them to make informed decisions. Well-trained mobile money agents can provide better assistance to users, ensuring a positive experience and reinforcing trust in the system. Regular training sessions for agents should focus on security protocols, fraud detection, and customer interaction.

Researchers should delve deeper into phishing attacks, which involve fraudulent SMS messages. Investigating the techniques used by attackers, their targets, and effective countermeasures can contribute valuable insights. Future researchers can conduct behavioral studies to understand user attitudes and perceptions related to mobile money. Examining factors that influence adoption, trust, and satisfaction will provide a comprehensive understanding of user behavior. These recommendations aim to enhance mobile money security, user confidence, and overall adoption in Rwanda. Decision-makers should consider implementing these measures to strengthen the mobile wallet security infrastructure and foster a safer digital financial ecosystem.

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