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ACCESSIBILITY AND INFRASTRUCTURE IMPACT ON MOBILE PHONES CHOICES IN DEVELOPING ECONOMY: EVIDENCE FROM SIERRA LEONE

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Abstract

This study investigates the complex relationship between infrastructure, accessibility, and consumer choices for mobile phones in Sierra Leone. Comprehending the abstraction dynamics is essential to understanding mobile phone adoption in developing countries in its entirety. The study utilized quantitative approach. The factorability of the data in this study was evaluated using the Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy. The method known as Varimax orthogonal factor rotation was utilized to reduce the quantity of variables with high loadings on each factor. After the factorial analysis multiple regression was used to explain the relationship between the choices of mobile phones and Network coverage, Battery life, Repair and Maintenance, and Mobile internet access Strong internal consistency was supported by Cronbach's alpha values, indicating the reliability of the questionnaire. The composite reliability values and Average Variance Extracted were found to be within reasonable bounds, demonstrating that each construct's internal structure is reliable. The study established a significant relationship between Choice of Mobile Phones and Network coverage, Battery life, Repair and Maintenance, and Mobile internet access. This implies that at least one predictor variable significantly contributes to explaining the variability in the dependent variable and that the regression model as a whole is statistically significant. The close alignment between the predicted and observed values validates the effectiveness of the regression model. By exploring this relationship, this paper offers important insights into how infrastructure-related issues affect the state of mobile technology in developing nations.

Keywords: Mobile phones, consumer preferences, developing economy, infrastructure, accessibility

INTRODUCTION

Mobile phones have become commonplace tools for networking, commerce, and communication in an ever-more-connected world. They are a crucial part of contemporary life since their relevance transcends geographical boundaries and social differences (Savitha et al. 2019; Kumar & Chaubey 2015). Comer & Wikle, (2008) established that mobile phones have seen some of the fastest rates of household adoption of any technology in recent memory worldwide. It is imperative to acknowledge that the prevalence and use of mobile phones vary considerably between global settings. Consumer preferences and choices are heavily influenced by a wide range of factors, especially in emerging nations. Because of this, customers in developing nations are now driving demands for the same calibre of products as their counterparts in wealthy nations (Saffu & Walker, 2006). Fu and Kwan (2019) suggested that because of unstable electricity supplies and poor lighting, mobile phones with flashlights are also common in Africa.

Researchers, legislators, and corporations have all placed a great deal of emphasis on the phenomenon of consumer preferences and choices within the larger context of mobile technology. There are many different and complex factors that influence people to choose certain mobile phones over others. According to Kotler & Keller (2016), a range of elements, including psychological, social, cultural, and personal elements, affect how consumers behave when making purchases. Kotler et al (2019), stated that personal factors affect a customer's purchasing behavior include age and life cycle phases, occupation, attitude, lifestyle, and values.

It is a complicated interaction of different contextual factors rather than just being about the design, features, or brands. These contextual factors become even more important in the context of developing countries, like Sierra Leone, because the opportunities and difficulties that these environments present are different and call for special attention.

Dwi & Nyoman (2020) postulated that not much research has been done on the variables influencing consumer behavior in developing nations. Sierra Leone, a country in West Africa, is representative of a developing economy where people's lives are becoming more and more centered around their mobile phones. However, compared to more developed economies, Sierra Leone's mobile technology landscape is characterized by distinct opportunities and challenges. The country's mobile phone preferences are largely determined by factors like accessibility and infrastructure. According to Kotler & Keller (2016), a consumer's purchasing behavior is significantly influenced by their environment. These frequently take precedence over more conventional factors like device features or brand loyalty.

This study aims to investigate the complex relationship between infrastructure, accessibility, and consumer choices for mobile phones in Sierra Leone. We think that comprehending these dynamics is essential to understanding mobile phone adoption in developing countries in its entirety. By exploring this relationship, we hope to offer important insights into how infrastructure-related issues affect the state of mobile technology in developing nations.

This paper sought to address four main objectives. Firstly, to investigate how customer preferences for mobile phones in Sierra Leone are influenced by the quality and dependability of network coverage. Through an examination of user experiences with dropped calls or poor call quality resulting from network problems, the study aims to understand how these problems could influence consumer choices. The study's findings will shed light on how important network coverage is when choosing a mobile phone, which will be helpful information for anyone involved in the mobile telecoms sector.

Secondly, Understanding the association between mobile internet availability and Sierra Leonean consumers' preferences for mobile phones is the main goal of this paper. The research attempts to reveal how internet services shape customer choices by exploring how mobile internet access affects everyday activities and how it influences mobile phone features. Additionally, examining how internet speed affects choices for mobile phones would advance our knowledge of the variables affecting customers in emerging nations.

Thirdly, to probe into the connection between mobile phone preferences among consumers in Sierra Leone and maintenance and repair services. The study shed light on the role of after-sales services in influencing brand and model decisions by evaluating consumers' confidence in the repairability of their devices and the value of having access to quick and reliable repair services. Insights from this analysis will help service providers and mobile phone manufacturers improve consumer loyalty and happiness.

Finally, to study how consumers' preferences for mobile phones in Sierra Leone are influenced by battery life. The investigation looks at how battery duration and affects mobile phone usage and preferences in order to determine how important energy-related factors are when making decisions. This research will help to clarify the issues surrounding the availability of electricity and direct the manufacture of mobile phones that are compatible with the energy limitations of the area, promising users to make justifiable decisions.

Using data from Sierra Leone, this article highlights to policymakers, telecommunication companies, and mobile phone companies the significance of infrastructure in shaping mobile phone preferences in developing countries. This entails improving network coverage, ensuring a consistent supply of electricity, and improving mobile internet access.

Even though ample body of research has been done on consumer behavior and mobile phone preferences in developed economies, relatively little of it has been done to understand these dynamics in the particular setting of developing nations (Dwi & Nyoman, 2020).

This paper seeks to close current research gaps by providing significant advances in theoretical information and real-world applications. First and foremost, it seeks to produce empirical data on the choice of mobile phones, focusing on the particular problems and variables that influence preferences for particular phones in the setting of developing nations like Sierra Leone, which has a unique socioeconomic environment. This study purposes to elucidate the complexities surrounding mobile phone selection in an environment characterized by specific socioeconomic settings.

Second, this research is the first to focus on variables such as network coverage, battery life, repairs and maintenance, and mobile internet access. Previous studies (Dwi & Nyoman, 2020; Malasi, 2012; Savitha et al., 2019; Wilska, 2003; Bhatt, 2008) have mostly concentrated on alternative variables. Through examining these particular factors, the research adds new perspectives to the present body of knowledge regarding the factors that influence mobile phone choices, enhancing our comprehension of how consumers make choices.

Thirdly, this study's methodology which includes a thorough analysis of the body of prior research, careful data collection, thorough data analysis, and deliberate synthesis establishes a methodical and repeatable framework for researchers in the future. The methodical approach guarantees the validity and dependability of the research findings and offers a strong basis for further scholarships in the area. Overall, through methodological rigor and perceptive contributions, this paper aims to not only fill in research gaps but also open up new paths for future scholarly investigations.

In line with the Study objective, the paper structure is as follow; Section 1 presents an overview of the study which provides an insight into the relevance of examining the impact that accessibility and infrastructure have had on mobile phone choice in Sierra Leone. In Section 2, the Literature review explores past studies on mobile phone preferences, including network coverage, mobile internet access, maintenance and repair services, and electricity availability. The theoretical background and hypothesis development are presented in Section 3, along with the conceptual framework that directs the investigation and the creation of hypotheses based on the variables that have been identified. Next, the research methodology is described in detail in Section 4, covering the study area, research design, data collection and analysis, variable Selection, and questionnaire design. In-depth discussions about the relationships between mobile phone choices, infrastructure, and accessibility are held in Section 5, which also presents the results and discussions, paving the way for Section 6 conclusions and summary.

LITERATURE REVIEW

Numerous studies on consumer preferences for mobile phones have been carried out in different nations. These studies have illuminated the complexity of mobile phone preferences, showing how they are influenced by a wide range of elements (Kotler & Keller (2016). Qazzafi's (2020) established that, some customers might not even be aware of the elements influencing their choice of a particular brand, service, or product. Tanksale, Neelam, and Venkarachalam (2014) state that mental orientation and product selection are combined in the decision-making process of consumers making purchases. According to Domie (2013), consumer decision-making is the process by which people, groups, and organizations choose, pay for, use, and discard goods and services in order to fulfill their needs and preferences. Kotler & Keller (2016) proposed that a variety of factors, such as cultural, social, personal, and psychological aspects, influence consumer purchasing behavior. According to Kotler et al (2019), personal factors that affect a customer's purchasing behavior include age and life cycle phases, occupation, attitude, lifestyle, and values. Dwi & Nyoman's (2020) research indicates that the primary factor influencing local customers is price.The influence of regional and international mobile branding factors on consumer purchase decisions was demonstrated by Farooq et al. (2018). Their study's objective was to investigate the factors that influence consumers' decisions to purchase a local or international brand or not. According to Maurya (2018) Robust brands are far more than just a label that helps consumers recognize and identify them they exist in the minds of consumers. The degree to which consumers prefer one brand over another is referred to as brand preference. Brand preference is the deliberate preference for a company's brand over a product. Client preference for a brand can be established by cultivating a positive brand perception. It is crucial to comprehend how these preferences manifest in various socio-economic and infrastructure contexts given the widespread adoption of mobile technology. In a study conducted by Malasi (2012), the impact of product attributes on the preference of mobile phones among undergraduate university students in Kenya was investigated. The findings of the study revealed that altering the product attributes significantly influenced the preferences of undergraduate students towards mobile phones. The research encompassed a range of product and brand attributes, including color themes, visible name labels, availability of diverse phone models, packaging for safety, level of awareness regarding safety concerns, as well as the overall appearance and design of the phone.

Kumar and Chaubey (2015) pointed that different product attributes that the consumer gives preference in selecting a hand set have been observed to be design, price, internet connections battery life , camera, video, quality, app downloading , operational systems and social networking. Savitha et al. (2019) in their study noted that mobile phone features are the

next most significant factor influencing the decision, after product quality. The need to buy mobile phones is provoked by actual need. The physical features of mobile phones that users like the most are the touch screen, design, and style. According to Fu and Kwan (2019), Africa is another region where mobile phones with flashlights are common due to erratic electricity supplies and dim lighting.

In this study by Bhatt (2008), the researcher examined how postgraduate students used their phones and what factors were important in influencing their decisions to buy phones. The elements include equipment development, services providers, and mobile phone carriers. Additionally, young people enjoy the majority of the essential features of mobile phones and are aware of the risks involved. Wilska (2003) found that both emotional and rational factors influence consumers' decisions to purchase mobile phones. The majority of customers are influenced by both rational and emotional factors. In addition to rational factors like communication and time management, the study found that young customers preferred emotional factors like games, music, cameras, and applications. Liu (2002) conducted a study on how brand decisions in the cellular phone industry are impacted by promotional activities. In their study, they examined the variables influencing Asian consumers' decisions to purchase various mobile phones. According to the study, choosing a mobile phone brand is determined by two factors. The two attitudes in question are the attitudes toward networks and mobile phones. Other than size, a big screen, and greater capacity, the most important considerations when buying a mobile phone are its new features.

Even though consumer behavior and preferences have been the subject of many studies in developed economies, the importance of comprehending these dynamics in developing nations is becoming increasingly apparent (Dwi & Nyoman 2020).

Theoretical background

This study places itself within the framework of the consumer behaviour, which aims to give people more options. Researchers have long been interested in consumer decision making, many attentions have been given by scholars in explaining this concept. Although this evolution has been ongoing, it wasn't until the 1950s that the concept of consumer behaviour expanded to include a wider range of holistic activities that influence consumer decisions in response to the development and expansion of modern marketing (Blackwell et al. 2001). Modern definitions of consumer behaviour clearly reflect this. Consumer behaviour, according to Solomon et al. (2006), is the study of the procedures people or groups go through when they choose, pay for, use, or discard goods, services, concepts, or experiences in order to satiate needs and desires.

This early research, which was centered only on the act of purchasing, took an economic approach to the subject (Loudon AND Della Bitta 1993). From this approach, "Utility Theory," which contends that consumers base their decisions on what they expect to happen, is the most widely used model. It is believed that consumers make logical decisions out of self-interest alone (Zinkhan 1992). According to Aleskerov and Monjardet (2002), utility is the satisfaction provided separately based on choice for the decision marker. Utility theory presupposes that every choice is based on the utility maximisation concept, according to which the optimal decision is the one that offers (Towo 2012). The utility theory assumes that preferences are complete, reflexive and transitive regardless of the kind of utility function (Belton & Stewart, 2002).

Hypotheses development

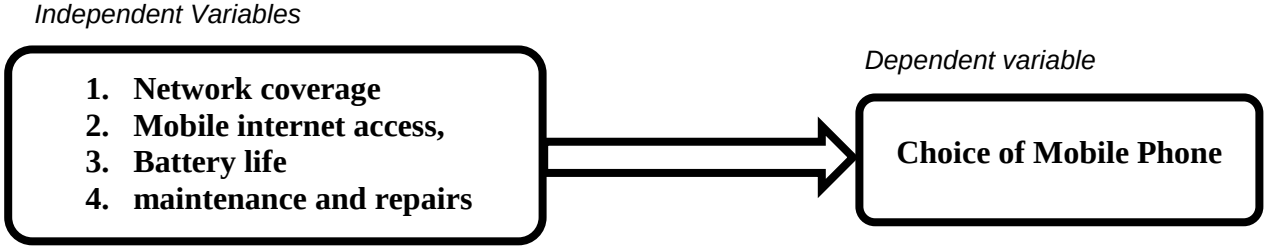
The research model and hypothesis for this project were developed based on literature reviews and other research studies with the objective to close the research gap and contribute to existing literature on consumer preference by examining the unique obstacles and factors that influence mobile phone preferences in Sierra Leone.

A hypothesis is a statement that interprets or extrapolates from a set of facts or principles; it typically serves as the foundation for potential experiments intended to verify its validity. In order to further the goals of the study, the following hypothesis were developed:

i. H1: Network coverage is associated with consumer's preference for mobile phones.
ii. H2: Battery life is associated with consumer's preference for mobile phones.
iii. H3: Maintenance repair services is associated with consumer's preference for mobile phones.
iv. H4: Mobile internet access is associated with consumer's preference for mobile phones.

Proposed Research Model

Figure 1 : Showing research model



RESEARCH METHODOLOGY

Study Area

The study was conducted in Sierra Leone, West Africa

Research Design

A descriptive approach was used in the study (Arshad, et al 2019). Consumers 'preferences were described using a descriptive study design, and the relationship between the variables was explained, comprehended, and predicted using an explanatory study design.

Sampling technique

The study adopted convenience sampling technique to select participants based on availability and employed a web based sampling technique for data collection through google forms. Convenience sampling, as defined by Dörnyei (2007), is a kind of nonprobability or non-random sampling in which study participants are selected based on practical factors like ease of participation, willingness to participate, or proximity to a study location. According to Bethlehem and Biffignandi (2012), web surveys are described as tools that are housed on a server on the World Wide Web (WWW), with the questionnaire situated within a web page that can be seen by a web browser. Because there is only one survey setup fee, which does not rise as the number of respondents increases, Hardigan et al. (2012) hypothesised that web-based surveys are less expensive. Although Sax et al. (2003) noted that this kind of approach can help with logistics.

Data Collection and Analysis

The research used cross sectional data collected from September to November 2023. Data were gathered through the use of a structured questionnaire. With Google Forms, the survey was published online through a number of websites accessible to Sierra Leoneans (Savitha et al. 2019). The final sample consisted of 242 respondents to the survey. The responses to the questionnaire were entered into the Statistical Package for Social Sciences (SPSS) software. The study's conclusions are reached through both descriptive and inferential data analysis.

Variable Selection

According to Maggino (2017); a solid measuring procedure in the social sciences necessitates a well-defined goal, regular data collection, and a careful analysis of the relationship between observed data and predefined concepts. The relationship between the

indicators and the desired purpose also has a substantial impact on the measurement approach and the production of composite indicators. In order to determine the factors underlying the variables of a questionnaire designed to assess the influence of infrastructure and accessibility on mobile phone preferences in Sierra Leone, this study proposed a factor analysis. The factorability of the data in this study was evaluated using the Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy. Kaiser's Criterion was utilized in order to ascertain the quantity of factors that required extraction. The method known as Varimax orthogonal factor rotation is utilized to reduce the quantity of variables with high loadings on each factor. For the purposes of this study, Network coverage, mobile internet access, battery life, repair and maintenance were all selected as constructs to examine the accessibility and Infrastructure Impact on Mobile Phone Choices in Sierra Leone (Kumar and Chaubey 2015; Fu and Kwan 2019).

Questionnaire design

The study's seven-point Likert scale of agreement (Arshad, et al 2019), which goes from strongly disagree to strongly agree, was used to evaluate its goals for studying how infrastructure affects mobile phone choices in Sierra Leone and accessibility. In order to better understand respondents' thoughts and experiences with regard to network coverage, mobile internet access, maintenance and repair services, and the availability of electricity in Sierra Leone, these questions were created. The answers on the Likert scale are quantitatively analyzed, and the findings are covered in the section that follows.

RESULTS AND DISCUSSIONS

Demographic Statistics of the Respondent

Gender

The distribution of gender in the sample was described using a frequency table. Table 5.1 indicates that 63 participants (26%) were female, while the majority of participants (n = 179, 74%) were male.

Age of the respondent

The age distribution of the sample was summarized using descriptive statistics. According to table 5.1, the largest age group was 26 -35years (n = 106, 43.8%), 36-45years (n = 70, 28.9), 16 -25years (n = 40, 16.5) and 40 - 60years (n = 21, 8.7%). With n = 5, or 2.1 %, the smallest age group was 60 years and above. Table 5.1 displays the findings for the

respondents' age distribution. The data suggested that more young people took part in the survey. This affirms the general expectation as most people want to have mobile phones.

Experience in using mobile phones

Descriptive statistics were calculated to explain the distribution of experience in using mobile phones from the sample. Most respondents have 16years and above (n = 105, 43.4%), followed by 11-15 years (n = 70, 28.9%), 6-10 years (n = 52, 21.5%) and 1-5 years (n = 14, 5.8%). The smallest experience group was less than 1year (n = 1, 0.4%). The experience suggested that respondent with very good mobile usage knowledge, affirming the reliability of data used in this study.

Qualification of respondent

Majority of the respondents have master's degree (n = 95, 39.3%) followed by bachelor degree (n = 93, 38.4%), Diploma (n = 25, 10.3%), and other qualifications (n = 22, 9.1%). With PhD n = 7, or 2.9%, making the lowest of respondents. With majority of respondent been educated at Masters' and bachelor's level, indicates that respondents were capable to exercise sound judgement and complete the questionnaire appropriately to the best of their knowledge. Hence contributing to the quality of data collected during this study.

Location of respondent

According to table 1, Majority of the respondents are residing at Western area (n = 129, 53.3%) followed by Southern Province (n = 43, 17.8%), Eastern Province (n = 43, 17.8%), Northern Province (n = 16, 6.6%), and North Western Province (n = 11, 4.5%) making the location with the smallest number of respondents.

Table 1 Demographic profile of the Respondents

Category	Variable	Frequency (N)	Percent
Gender	Female	63	26
	Male	179	74
	Total	242	100
Age groups	16 - 25yrs	40	16.5
	26 – 35yrs	106	43.8
	36 – 45yrs	70	28.9
	46 – 60yrs	21	8.7
	61 years and above	5	2.1
	Total	242	100

Table 1…

Experience in using mobile phones	Less than 1 year	1	0.4
	1-5 years	14	5.8
	6-10 years	52	21.5
	11-15 years	70	28.9
	16 and above	105	43.4
	Total	242	100
Qualification	Bachelors	93	38.4
	Diploma	25	10.3
	Masters	95	39.3
	Other	22	9.1
	PhD	7	2.9
	Total	242	100
Location	Eastern Province	43	17.8
	North Western province	11	4.5
	Northern Province	16	6.6
	Southern Province	43	17.8
	Western Area	129	53.3
	Total	242	100

RESULTS

Assessment of the Measurement Model

According to Hair et al. (2010), the measurement model lays out the guidelines for how measured and latent variables should correspond. The measurement model evaluation discussed below concentrated on determining the validity, internal consistency, and reliability of constructs measured using a variety of items (Ho, 2013). Data purification and other criteria were assessed at this stage to evaluate the suitability of the measurement model. In view of this an exploratory factor analysis was performed and results are presented in subsequent sections.

Suitability of data

The KMO test is a tool designed to assess whether data are suitable for factor analysis. Stated differently, it evaluates the suitability of the sample size (Shrestha, 2021). In order to assess the suitability of the data for factor analysis, Kaiser-Meyer-Olkin and Bartlett's test of Sphericity were applied to the data gathered for the Accessibility and Infrastructure Impact on Mobile Phone Choices in Sierra Leone study.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to determine whether the data were suitable for factor analysis. The results showed a highly favourable value of 0.891, indicating excellent adequacy for factor analysis (Kaiser, 1974). Furthermore, Bartlett's Test of Sphericity attained statistical significance (approximately $\chi^2 = 2872.966$, df = 190, p

<.001), indicating that the variables in the dataset are related and supporting the rejection of the null hypothesis that the correlation matrix is an identity matrix (Bartlett, 1954). Together, these findings offer compelling proof that factor analysis on the dataset is appropriate (table 2).

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.891
Bartlett's Test of Sphericity	Approx. Chi-Square	2872.966
	df	190
	Sig.	.000

Exploratory Factor Analysis

When a researcher wants to find out which variables in a set form logical subsets that are comparatively independent of one another, they can use Factor Analysis, a multivariate statistical technique, on a single set of variables (Tabachnick, 2013). In the early phases of research, exploratory factor analysis is frequently used to learn more about the relationships between a set of variables and to verify dimensionality (Pituch and Stevens 2016).

The data set is examined in this study using exploratory factor analysis to find complex relationships between items and group items that are a part of integrated concepts (Shrestha, 2021; Mseti, 2020).

Principal component analysis (PCA) is a statistical technique used to identify substantial patterns in the dataset and highlight variation for which principal data components are computed (Shrestha, 2021). The exploratory factorial analysis in this study were investigated using principal components extraction to determine if they represented recognizable elements are associated with mobile phone choices. The method known as Varimax orthogonal factor rotation is utilized to reduce the quantity of variables with high loadings on each factor. To enable this, during the process, items with Communality and factor loading less than 0.5 threshold were dropped as suggested by Mseti (2020) and Sharabati et al (2010) and cross loaded items across factors were deleted until all factors were clean. The analsysis revealed indicating that the extracted factors account for a sizable amount of their variance. It took six iterations to clean all factors from the four factors including Network coverage, mobile internet access, battery life, repair and maintenance as constructs to examine the accessibility and Infrastructure Impact on Mobile Phone Choices in Sierra Leone.

Based on the data analysis, the four factors' cumulative variance explained is 64.695%. This number represents the percentage of variance in the observed variables that can be explained by all of the latent factors that have been found. These factors account for almost two thirds of the total variability, which shows that the analysis has a significant level of explanatory

power. The measured constructs' underlying structure is meaningfully and significantly represented by this cumulative variance value. Understanding the connexions within the dataset is greatly aided by the factors derived from the analysis, which strike a balance between avoiding over fitting and capturing enough variance for interpretability. These results confirm the robustness of the factor analysis by highlighting its value in recognising significant patterns and dimensions within the observed variables. Their involvement in the research is justified due to their significant factor loadings, despite slightly lower Communality values.

The items "MIA4" and "NC8" show robust factor loadings of 0.590 and 0.543, respectively, even though their communality values fall below the traditional threshold of 0.5. The factor loadings that surpass the predetermined threshold suggest a robust correlation between the items and the latent constructs that were discovered via factor analysis. "MIA4" and "NC8" have communality values of 0.411 and 0.403, respectively, which are marginally below the traditional threshold. Nonetheless, the significant variance they add to the identified factors justifies their continued inclusion in the study. These results highlight the complexity of factor analysis, where the choice of which variables to keep in the study is influenced by the interaction of factor loadings and communality values. The rotated component and communalities matrix is presented in table 3 below.

Table 3 Rotated Component Matrix and Communalities

Rotated Component Matrix					**Communalities**	
Items	Network Coverage	Battery life	Repairs and Maintenance	Mobile Internet Access	Initial	Extraction
NC1	0.849				1.000	0.758
NC2	0.807				1.000	0.686
NC3	0.772				1.000	0.735
NC4	0.699				1.000	0.621
NC5	0.689				1.000	0.645
NC6	0.667				1.000	0.551
NC7	0.612				1.000	0.526
NC8	0.543				1.000	0.403
BL1		0.758			1.000	0.608
BL2		0.706			1.000	0..816
BL3		0.698			1.000	0.774
BL4		0.697			1.000	0.834
BL5		0.639			1.000	0.508
RM1			0.826		1.000	0.729
RM2			0.798		1.000	0.732
RM3			0.697		1.000	0.581
MIA1				0.764	1.000	0.695
MIA2				0.749	1.000	0..622
MIA3				0.674	1.000	0.703
MIA4				0.590	1.000	0.411
Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.						

Construct Validity and Reliability

The validity of the scales was tested using the Exploratory Factor Analysis to determine the factor loadings of the variables. Principal Component Analysis was used to reduce the amount of data and prioritize variables that account for a significant percentage of variance in order to examine the validity and reliability of the scales (Burns & Burns, 2008). By looking at each indicator's factor loadings, convergent and discriminant validity were evaluated. The findings, which are presented in Table 3, showed that indicators had higher loadings on the assigned constructs (boldly indicated) than on other factors. This observation confirms that the measurement tools have satisfactory convergent and discriminant validity.

The reliability of a questionnaire is examined with Cronbach's alpha (Shrestha, 2021). Cronbach's alpha is a measure of internal consistency. In general, Cronbach's alpha value more than 0.7 is considered as acceptable. A high level of alpha shows the items in the test are highly correlated (Lavrakas, 2008).

Cronbach's Alpha coefficients were used to evaluate the measurement constructs' internal consistency reliability. For Network Coverage (Alpha = 0.899), Battery Life (Alpha = 0.864), and Repairs and Maintenance (Alpha = 0.822), the results show high levels of internal consistency, indicating that the items within these factors consistently and reliably measure the intended constructs. Even with a marginally lower Alpha of 0.726, the Mobile Internet Access factor nevertheless exhibits a respectable degree of internal consistency. All in all, these results support the validity of the measurement tools and the validity of the study's evaluation of Network coverage, mobile internet access, battery life, repair and maintenance.

According to Netemyer et al. (2003), composite dependability is a gauge of scale item internal consistency. Composite reliability, according to Fornell and Larcker (1981), is a measure of the shared variation across the observed variables that is used to represent a latent construct.

In the more advanced phase, the composite reliability value must be greater than 0.7, but values in the range of 0.6 to 0.7 are acceptable (Shrestha, 2021). Fornell and Larcker (1981) stated that the construct's convergent validity is still sufficient if the AVE is less than 0.5 and the composite reliability is greater than 0.6.

For this study, Network Coverage exhibits a strong Composite Reliability of 0.805, highlighting the internal coherence among its component elements. Battery Life has a reliability coefficient of 0.703, which indicates that there is a satisfactory degree of consistency between the items used to measure this construct. With a Composite Reliability of 0.732, Repairs and Maintenance demonstrate a dependable internal structure that adds to this factor's overall

trustworthiness. Even with its marginally lower reliability of 0.648, mobile internet access is still fairly reliable.

According to Fornell & Larcker (1981), the Average Variance Extracted (AVE) is a measure of the amount of variance a construct takes on relative to the amount of variance caused by measurement error. AVE is more than or equal to 0.5 confirms the convergent validity. However, Fornell & Larcker (1981) state that the construct's convergent validity is still sufficient if the AVE is less than 0.5 and the composite reliability is greater than 0.6.

When the Average Variance Extracted (AVE) values for the constructs are examined, the values for Mobile Internet Access are 0.486, Battery Life is 0.491, Repairs and Maintenance is 0.602, and Network Coverage is 0.506. Fornell & Larcker (1981) contend that even though Battery Life and Mobile Internet Access's AVE values are only slightly below the traditional cutoff of 0.50, convergent validity is still sufficient if AVE is less than 0.5 and composite reliability is greater than 0.6. Both constructs are kept in the study based on this criterion because of their acceptable composite reliability values. This choice is reinforced by the knowledge that, even with somewhat reduced AVE values, the constructs nevertheless show satisfactory convergent validity, meeting predetermined standards and guaranteeing the reliability of the study's measurement tools.

Table 4 Construct Validity and Reliability

Main Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Network coverage	0.899	0.805	0.506
Battery life	0.864	0.703	0.491
Repairs and Maintenance	0.822	0.732	0.602
Mobile internet access	0.726	0.648	0.486

Regression Analysis

Regression analysis is a general term for a collection of statistical procedures used to approximate the relationships between one or more independent variables and a dependent variable. According to Ali & Younas (2021), regression models are helpful for determining how study variables relate to one another, particularly when there is a strong correlation between the independent and dependent variables. Regression analysis's primary goal is to forecast how changes in any one or all of the independent variables will affect the dependent variable (Airout et al., 2023). The association between network coverage, mobile internet access, battery life,

repair, and maintenance as constructs to examine the accessibility and infrastructure impact on mobile phone choices in Sierra Leone was explained in this study using a multiple linear regression. The model is given by:

$Yi = \beta 0 + \beta 1NCi + \beta 2BLi + \beta 3RMi + \beta 4MIAi + \varepsilon i$

Yi = Choice of Mobile Phone

β0 = Constant term

NC = Network Coverage

BL = Battery life

RM = Repairs and maintenance

MIA4 = Mobile Internet Access

ε = error term representing unexplained variation

i= Number of respondent

Suitability of data for regression

Heteroscedasticity is indicated when the variance of errors varies at different values of the independent variable. Berry & Feldman (1985) and Tabachnick & Fidell (1996) claim that mild heteroscedasticity has little bearing on significance tests, but that marked heteroscedasticity can seriously distort results and weaken analysis, increasing the risk of a Type I error. The White test p-value equals 0.215 (F=1.548). Generally; if the P value is less than 0.05, we can conclude that heteroscedasticity exit (White, 1980). In this study the P<0.005. Therefore, the variance is homogeneous.

Squared multiple correlations (SMC) are used to calculate multicollinearity; a value of 0.090 or greater shows the presence of multicollinearity (Tabchnick & Fidell, 2014). According to Pallant (2011), multicollinearity of some kind is implied by a correlation between independent variables of greater than 0.8. The variables' correlations were assessed in order to prevent regression bias brought on by multicollinearity, as indicated in Table 5 below. All other correlation coefficients are less than 0.50, with the exception of the correlation coefficient between network coverage and Battery life, which has a value of 0.594, less than 0.70 (Cao et al 2023; Zhao et al, 2016).

Variables are assumed to have a normal distribution for a regression analysis. Relationships and significance tests may be distorted by variables with non-normal distributions (Waters & Osborne, 2019). The data in this study was distributed normally, as indicated by the histogram that is shown below. According to Kline (2005), a tolerance of less than 0.10 or a variance inflation factor (VIF) of more than 10 is required to demonstrate multicollinearity. There is a significant multicollinearity issue or concern when the tolerance is less than 0.10 and/or the

variance inflation factor (VIF) is larger than 10. (Field, 2013, Zhao et al, 2016). The variance inflation factor (VIF) was used to assess multicollinearity. While a VIF value of 10 is considered problematic by Myers (Myers, 1990), Allison (1999) proposed a VIF value of 2.50 as a more conservative cut-off. As shown in table 4, the highest VIF was 1.842 (far below the cut-off of 10, and also below the conservative cut-off of 2.5), suggesting that multicollinearity is not likely to be a serious problem in this study (Zhao et al 2016).

Table 5 Collinearity Statistics and Pearson Correlation Matrix of Constructs

	Description	Collinearity Statistics of Constructs		Pearson correlation Matrix of Constructs			
No	Main Construct	Variance Inflator Factor	Tolerance	1	2	3	4
1	Network coverage	1.746	0.573	1.000			
2	Battery life	1.842	0.543	0.594	1.000		
3	Repairs and Maintenance	1.484	0.674	0.461	0.543	1.000	
4	Mobile internet access	1.289	0.776	0.445	0.39	0.289	1.000

Figure 2: Histogram showing normal distribution of data.

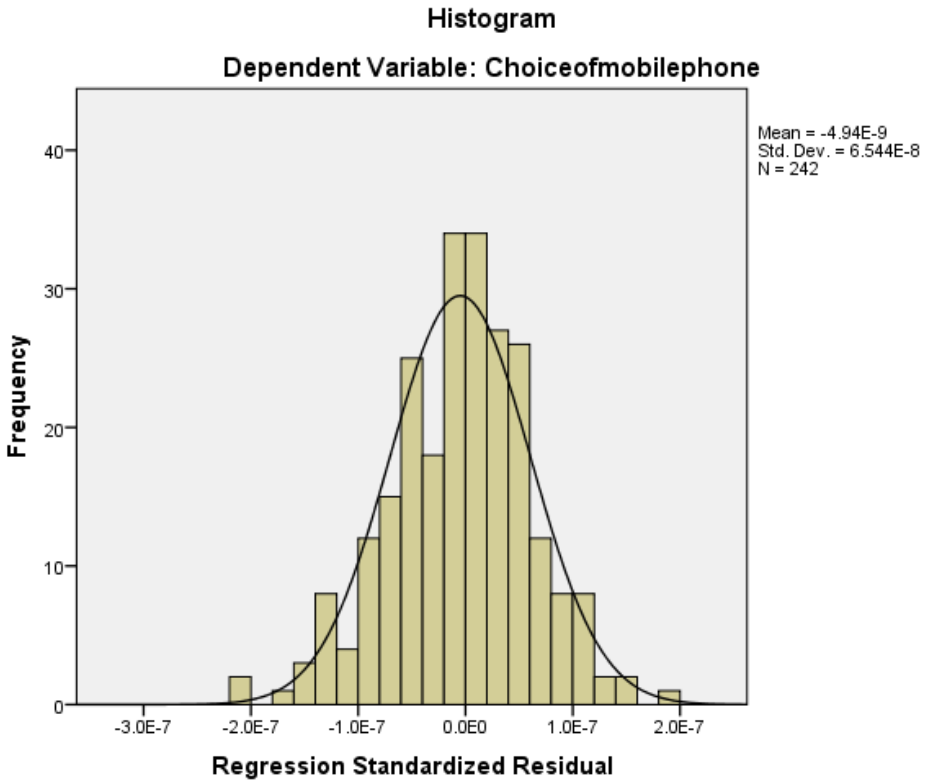
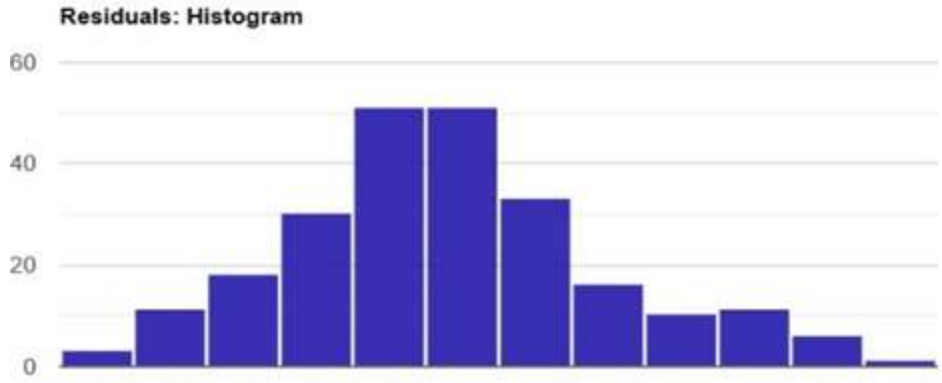


Figure 3 : Histogram showing normal distribution of residuals.



Regression results

The multiple linear regression results showed that the choices of mobile phones (Y) were significantly influenced by the collective effects of Network coverage (X1), Battery life (X2), Repair and Maintenance (X3), and Mobile internet access (X3) ($F(4, 237) = 1.303628942e+30$, $p < .001$, $R^2 = 1$, $R^2adj = 1$). Subsequent examination of individual predictors revealed that the following were significant predictors within the model: Mobile internet access ($t = 462293268273226.7$, $p < .001$), Battery life ($t = 534117180275708.8$, $p < .001$), Repair and Maintenance ($t = 389858152697309.44$, $p < .001$), and Network coverage ($t = 873777651974150$, $p < .001$). The dependent variable's whole variance is explained by the model, as evidenced by the R square of 1. .

Table 6 Regression output

	Coeff	**SE**	**t-stat**	**Stand Coeff**	**p-value**
Constant	2.66E-14	1.0600000e-14	2.499	0	0.0131
Network coverage	0.25	2.8600000e-16	8.73778e+14	0.506	0
Battery life	0.25	4.68e-16	5.34117e+14	0.317	0
Repairs and Maintenance	0.25	6.41e-16	3.89858e+14	0.208	0
Mobile internet access	0.25	5.41e-16	4.62293e+14	0.23	0
*R^2= **1**		*Adjusted R^2= 1			

From table above, A significant F-statistic ($F = 1.30e+30$, $df = 4, 237$, $p < .001$) was found in the analysis of variance (ANOVA) table, suggesting that the predictors (Þi) of the regression model can account for some of the variability in the dependent variable (yi). The high F-statistic indicates that the four predictors in the regression model together explained a significant portion of the variance in the dependent variable. The null hypothesis, according to the low p-value, is

rejected, indicating that the regression model lacks explanatory power. With a mean square of 1.9e-27, the residuals unexplained variability were extremely small, indicating that the regression model did a good job of explaining the observed variance. All things considered, the ANOVA results support the regression model's statistical significance in explaining the relationship between the predictors and the dependent variable.

Table 7 ANNOVA

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Regression (between ŷi and ȳ)	4	9906.121	2476.53	1.30E+30	0
Residual (between yi and ŷi)	237	4.50E-25	1.90E-27		
Total (between yi and ȳ)	241	9906.121	41.104		

CONCLUSIONS

Summary of findings

The study participants' demographic profile is displayed, encompassing information on gender distribution, age groups, mobile phone usage history, educational background, and geographic location. Males made up 74% of the participants, and the largest age group (43.8%) was between the ages of 26 and 35. The majority of participants (43.4%) had been using mobile phones for more than 16 years, and 39.3% had master's degrees. The majority of participants (53.3%) were found in the Western Area.

The validity, internal consistency, and reliability of the measurement model were the main areas of evaluation. The data's suitability for factor analysis was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity; the results showed a significant Bartlett's Test result and a highly favourable KMO value of 0.891. After doing an exploratory factor analysis (EFA), the model's significant explanatory power was demonstrated by the cumulative variance explained, which came out to be 64.695%.

A significant portion of the variance was explained by the four factors (Network coverage, Mobile internet access, Battery life, Repairs and Maintenance) that were derived from the EFA. The factor loadings supported the inclusion of the factors in the study even though the Communality values were slightly lower. The factor analysis's resilience was validated by its capacity to identify noteworthy trends and aspects among the observed variables, offering insightful information about how infrastructure and accessibility affect mobile phone preferences in Sierra Leone.

In this paper, measurement scales for examining how infrastructure and accessibility affect mobile phone preferences in Sierra Leone were methodically validated. The study prioritized variables with significant variance using Principal Component Analysis (PCA) and Exploratory Factor Analysis (EFA), guaranteeing a focused assessment of scale validity. By closely examining factor loadings, convergent and discriminant validity were validated, approving the reliability of the measuring instruments. Strong internal consistency was supported by Cronbach's alpha values, indicating the reliability of the questionnaire. The composite reliability values and Average Variance Extracted (AVE) were found to be within reasonable bounds, demonstrating that each construct's internal structure is reliable. The thorough validation processes offered by the study offer a strong basis for investigating the variables influencing mobile phone preferences in Sierra Leone. The regression model's dependent variable and predictor variables have a highly significant relationship, according to the ANOVA test results. With a p-value near zero and an incredibly large F-statistic for the regression term, there is compelling evidence to refute the null hypothesis that there is no relationship. This implies that at least one predictor variable significantly contributes to explaining the variability in the dependent variable and that the regression model as a whole is statistically significant.

Moreover, the low residual mean square and sum of squares values suggest that a significant amount of the total variation in the dependent variable is effectively captured and explained by the model. The close alignment between the predicted and observed values validates the effectiveness of the regression model.

As a result, the hypothesis that the included predictor variables collectively have a significant impact on the dependent variable is supported by the statistical tests. The predictors considerably contribute to the explanation of the observed variation, and the model is considered highly reliable for outcome prediction.

Study Contribution

This empirical study offers significant theoretical and practical insights. The results are consistent with Kotler & Keller's (2016) findings, which show that a variety of factors and elements influence people's decisions to select particular mobile phones over others. Similarly, distinct product attributes and mobile phone features are the next most important factor influencing the decision to purchase a mobile phone, according to Kumar and Chaubey (2015) and Savitha et al. (2019).

These findings align with well-established theories of consumer behavior that maintain that a consumer's satisfaction with a product is entirely dependent on the decision-maker's selection (Aleskerov & Monjardet, 2002).

In order to be more strategic and focused in their product development and improvement, it offers sensitive information and insight to mobile phone makers, distributors, retailers, and telecommunication companies operating in the dynamic and inventive business. Mobile phone firms can target distinct consumer categories globally by offering different product combinations based on market segmentation. Mobile phone features including network coverage, battery life, and internet access can differ depending on the product mix. By taking these recommendations into account, the businesses would surpass their rivals in potential market segments. Businesses might also think about the post-purchase services they could offer to their product's customers. As consumer preferences, new products, and technology change the market, mobile phone manufacturers should gradually enhance their devices' characteristics in the intended market.

Additionally, this study adds to the body of knowledge by offering new data on mobile phone preferences from developing nations like Sierra Leone. It contributes to the empirical literature by highlighting the importance of network coverage, mobile internet access, battery life, repair, and maintenance as factors that may affect consumers' decisions when purchasing mobile phones.

Every country has distinct cultural traits, social norms, and political environments that impact the business landscape and the state of organizations. Through the consideration of these national factors, this study broadens our body of knowledge.

Implications for practice

This paper draws the attention of policymakers, mobile phone enterprises and telecom firms how important infrastructure is in influencing mobile phone preferences in underdeveloped nations with evidence from Sierra Leone. This includes enhancing mobile internet access, extending network coverage, and providing after sales services for repair and maintenance of mobile phones. They can expand the whole mobile technology prospect and make it more user-friendly and enticing by tackling these infrastructure issues.

Manufacturers, distributors, retailers, and telecom companies can impact the study's recommendations to improve their strategic plans. Market segmentation and product development can be influenced by the focus on unique product attributes and the significance of elements like network coverage, battery life, and mobile internet access.

Additionally, the study offers strategic recommendations for enterprises that operate in creative and dynamic marketplaces. Businesses can keep ahead of the competition by taking into account consumer preferences, technological advancements, and market trends.

This paper concludes by presenting significant evidence, primarily from Sierra Leone, emphasizing the importance of particular factors influencing mobile phone purchase decisions made by consumers.

Limitations

A constraint of this study is that its conclusions and results might not be universally applicable to other developing nations. Sierra Leone's particular circumstances and difficulties might not exactly match those in other countries, and regional differences in consumer preferences can be substantial. The sample size and participant representativeness may have limited the study's findings. A truly representative sample of the Sierra Leonean population can be difficult to obtain, and the study might not have included the viewpoints of all regions or demographic groupings in the nation. Although research is done in a set amount of time, infrastructure conditions and customer preferences may change over time. The study's conclusions might not accurately represent shifts in customer preferences. The study might not have taken into consideration all of the outside variables that could affect consumers' preferences for mobile phones, like shifts in governmental regulations, global occurrences, or the release of new technology.

Future research

Succeeding research endeavours may concentrate on longitudinal studies that monitor alterations in mobile phone inclinations and infrastructure predicaments across time in Sierra Leone. This method would offer a more thorough comprehension of how these dynamics change and adjust to new situations. Comparative study examining mobile phone preferences and infrastructure impact across several developing nations could be another strategy is worth noting. Research could also focus on examining similarities and differences between Sierra Leone and other countries can aid in developing a more comprehensive understanding of these dynamics. Furthermore, a thorough examination of particular Sierra Leonean regions, since regional preferences and infrastructure can differ greatly from one another. This can offer a more complex picture of the mobile technology environment in the nation. If academics could look into how gender affects preferences for mobile phones and infrastructure issues that would be interesting. Gender-based differences can influence more focused strategies because women and men may have different needs and priorities.

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