

The Impact of Age and Income in Using Mobile Banking Apps: A Study of Association and Classification

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ABSTRACT

The banking business relates with their customers during the weekly business days, but only a few pay close attention to the importance of demography variables especially in the area of technology use. This study intends to classify the relationship between age and mobile banking app usage, income and the types of device used for mobile banking app, income and the choice for the device brand used for a mobile banking app. It also employed social stratification theory and quantitative methods with Chi-square test and discriminant analysis through SPSS V25. The results show the significant association of age with mobile banking app use and income with the type of mobile devices used for the mobile banking app while the income had an insignificant association with the device brand. The banking sectors need to put inequality income distribution into consideration, and the age differences as these variables impact the use of mobile technology for banking transactions. The study discussed the theoretical contribution, managerial insights, limitations, and made proposals for future study.

KEYWORDS

Age, Association, Classification, Income, Mobile Banking App, Social Stratification

INTRODUCTION

Demographic characteristics have been critical in research because they can be used as direct predictors of outcome variables or mediators and moderators across disciplines (Abdinoor and Mbamba, 2017; Yasir, Liren, Mehmood, and Arfat, 2019; Stokes et al. 2020). Age and wealth are two demographic variables that paint a vivid picture of human populations in a specific situation. Additionally, it demonstrates the structure and socioeconomic change in society and the relationship between these variables and their natural surroundings. The GINI index indicates that income inequality in Nigeria is 39%, with 0 representing a disparity and 100 indicating perfect equality (Knoema, 2018). The GINI index measures how income is distributed in Nigeria, higher than in South Africa (57.7%) and lower

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than in advanced countries such as Finland (25.6%). The banking sector must consider the disparity in income distribution and age differences, as these characteristics influence the usage of mobile technologies for banking transactions.

The banking industry is currently in the era of big data, yet it is underutilizing this opportunity (Razzaque et al., 2020; Derbali, 2021; Turki et al., 2020). They could not transform their data into the intelligence information necessary to decide how to develop their business. Several scholars have explored the relationship between age and wealth from different angles, but the application of age and wealth to the field of mobile banking research is limited. While banks interact with their customers weekly, few pay close attention to demographic aspects, particularly technological use. This study identified a gap in applying demographic characteristics such as consumer age and income for effective targeting and segmentation of mobile banking apps.

The purpose of this study is to classify the relationships between age and mobile banking app usage. Also, this study investigates the income, the type of device, and the brand of device used for a mobile banking app. Additionally, this study incorporated Social Stratification Theory and quantitative techniques such as the Chi-square test and discriminant analysis via SPSS ver. 25. The purpose of this study is to address the following research question: How can the banking industry profit from the insight gained from social-economic variables using mobile banking apps?

One study examined the relationship between individual awareness, perceived usefulness, benefit, cost effect, and intention to embrace mobile financial services using age, sex, income level, and education level. The categorical variable mediation demonstrates the degree of significance and insignificance of the relationship between the independent and dependent variables (Abdinoor and Mbamba, 2017). Estacio, Whittle, and Protheroe (2019) found that social-demographic indicators such as age and income influence Internet access, but Kalimeri, Beiró, Delfino, Raleigh, and Cattuto (2019) saw demographics as a way of drawing a portrait of evolving cyber-cultures. Additionally, Olaleye, Sanusi, Ukpabi, and Aina (2017) investigated Millennials' smartphone usage with a focus on operating systems, text messaging, Wi-Fi, Internet surfing, and social media, and their findings demonstrate the value of profiling in a developed market based on five levels of Millennial clustering.

While demographic variables in medical science are standard for health-related issues (Jie, Feng, Qiu, and Zhang, 2019; Stokes et al., 2020), study in other disciplines increasingly utilize demographic data. The findings indicate that age has a significant association with mobile banking app use and income has a significant association with the type of mobile device used to access the mobile banking app, while income has a negligible association with device brand. This study shows that banking managers should pay close attention to the influence of hierarchy on their customer's status.

The first half of this study discusses socioeconomic indicators; the second section discusses the significance of categorical variables such as age, income, and Social Stratification Theory. The third portion discusses the research design and methodology, while the fourth piece discusses the theoretical contribution, managerial insights, and limitations of the study and makes recommendations for future research.

LITERATURE REVIEWS

Previous Studies on Age and Income in the Context of Mobile Banking App

Studies considering age influence have been widely researched in literature considering technology adoption. Specifically, in mobile banking services its effect is noticeable in various earlier researches. For instance, Abdinoor and Mbamba, (2017) study shows that as the age of users' increases, the adoption factor's effects also increases and the higher the income the higher is the predictive ability of use. A recent study on effects of demographic factors on customers' mobile banking services adoption also shows that age and income level, among others influence the adoption of mobile banking services (Abayomi et al. 2019). Sulaiman, Jaafar and Mohezar (2007) study also found that mobile banking is

more popular among younger consumers. Mirza et al. (2009) however differs in their study as findings revealed that age does not have prominent influence in the adoption of mobile banking services. According to Alafeef et al. (2011), the positive indicators of age have encouraged the banking sector to target the younger consumers, in marketing and strategic planning to increase the adoption level. This will make a potential group of users for mobile banking applications (Alafeef et al. 2011). The study of Laukkanen (2007) has argued that the high education level, income, internet banking usage experience and frequency are some of the reasons that influence the adoption of mobile banking. This means that irrespective of the age cohort, other factors can account for usage and continuous usage of mobile banking service. Adoption of mobile banking has been discovered to be widespread amongst high-income earners (Sulaiman et al. 2007; Alafeef et al. 2011). Age and financial factors influenced the adoption and the possession of m-banking (Fall, Ky and Birba 2015). While there have been various studies on age and income in mobile banking, the two variables have not been widely considered in the context of mobile banking app. This study set out to research into this evident gap. This study reveals the impact of age and income in using mobile banking apps.

Types of Mobile Banking Technology

The types of mobile banking technology are classified based on how banks communicate with their customers (Akers, 2021). Thus, the three common types of mobile banking technology are: text messaging, web browsers and smartphone applications. A short comparison of the three types of mobile banking technology is provided in Table 1.

SOCIAL STRATIFICATION THEORY

Stratification refers to the extent to which population subgroups occupy separate hierarchical layers within an overall distribution of resources (Yitzhaki and Lerman 1991; Zhou 2012). Zhou (2012) further refers to stratification as segmentation of relative ranks. Hout and DiPrete (2006) describes social stratification as a systematic ranking of people or groups of people, with the ranking associated with unequal distribution of resources, and access to life chances. The difference among groups in terms of greater and lower status, power and class are what led to social stratification. Social stratification can be examined from different sociological perspectives. They are functionalism, conflict theory, and symbolic interactionism (Lumen 2020). Lumen further stressed that the functionalist perspective states that systems exist in society for good reasons, conflict theorists observe that stratification promotes inequality, such as between rich business owners and poor workers while symbolic interactionists examine stratification from a micro-level perspective. These perspectives observe how social standing

Table 1. Comparison of the three types of mobile banking technology

	Text messaging	Web browsers	Smartphone applications
Definition	Local telecommunication networks are used to access bank accounts by using some predefined codes	The bank's Internet banking website is accessed via phone's Internet browsers (e.g., Google Chrome)	Banking software hosted on mobile platforms (e.g., android, IOS)
Mode of communication	SMS (Short Message Service) text	Interactions via Internet browsers	interactions via mobile applications
Internet required?	No	Yes	Yes
Common features	check balances, payments, make deposits	All the features available in the bank's Internet banking website	check balances, payments, view bills, funds transfers and make payments
Technical complexity	Low	Medium	High

affects people's everyday interactions and how the concept of "social class" is constructed and maintained through everyday interactions (Lumen 2020).

Social Stratification in National Context

We briefly consider what the stratification system means in the national context. This means that the value system in the case country is weighted toward performance in the occupational structure and that people who meet the performance and achievement ideals in the economic occupational structure will be rewarded with greater status, advancement in the occupational structure, and the secondary rewards of wealth and high income.

Nigerian society in the pre-colonial era was stratified according to royalty, military might, wealth and religious hierarchy as the case may be. But with the advent of paid employment, the social stratification shifted from a traditional format to one outlined with Western societies. The argument put forward is that social class in modern time has only been re-defined, thereby giving Nigeria a unique social stratification with a strong traditional/religious influence.

Principles of Stratification

According to Moffitt (2020), social stratification is based on four major principles. The principles are stated below:

1. Social stratification is a trait of society, not simply a reflection of individual differences.
2. Social stratification persists over generations.
3. Social stratification is universal (it happens everywhere) but variable (it takes different forms across different societies).
4. Social stratification involves not just inequality but beliefs as well (inequality is rooted in a society's philosophy).

STRATIFICATION HIERARCHY

Class

Class refers to a stratification system that divides a society into a hierarchy of social positions (Vitt 2020). Class position with terms such as lower class, working class, middle class, and upper class are identified. They are a group of people who share common objective interests in the system of social stratification. According to Weber (1969), classes are stratified according to their relations to the production and acquisition of goods. Classes though appear to be entities, structurally defined in terms of material relations. Class component is represented exclusively by economic interest in the possession of goods and opportunities for income and is represented under the condition of the commodity or labour markets. Class is described as a mere economic situation where opportunities for possession characterize class (Weber 1968). According to Mills (1980), extensive research has shown recently that the most widely accepted class labels (upper class, middle class, working class, lower class) do show a reasonable correspondence with objective class indicators such as income, education, occupational skill level, and manual versus non manual jobs.

Status

Status can be termed as the social estimation of honour (Barbalet 1980). Status groups are stratified according to the principles of their consumption of goods as represented by special style of life and are defined in terms of cultural attributes (Weber 1968). It was further stressed that status finds social community and status is typified by consumption patterns, styles of life and social honour (Weber 1968). According to Cliffsnote (2020), property and power are objective, status is subjective, for it depends on other people's perceptions and attitudes. The author further stated that while status is

not as tangible as money and influence, most Americans want to increase their status and honor as seen by others. Occupation is one means by which status can be obtained.

Power

According to Cliffsnotes (2020), the second basis of social stratification is power, or the capacity to influence people and events to obtain wealth and prestige. That is, having power is positively correlated with being rich, as evidenced by the domination of wealthy males in high-ranking government positions. Because wealth is distributed unequally, the same is clearly true of power. Little (2008) describes power as a compound social characteristic in virtue of which an individual or group is able to compel the actions or inactions of other individuals or groups against their will or contrary to their interests, needs, and desires.

VARIABLES OF STRATIFICATION

Economic Variable

In this study, an economic variable is an attribute such as income used to determine how their level of income impacts an individual using mobile apps.

Income Stratification

This can be described as a system of inequalities linked to income, often associated with income-levels. For example, high income and low-income earners. It can further be referred to as disparity of income distributions among a given population. Recent studies have researched income stratification. For example, Xiang and Wodtke (2019) study employed a novel rank-based index of stratification to measure the degree to which occupational classes inhabit distinct, non-overlapping, and hierarchically arranged layers in the distribution of personal market income. The study of Anikin, et al. (2016) also describe income stratification approaches and application to Russia. Allanson (2018) study also proposes a new class of indices that capture not only the extent to which groups form well-defined strata in the income distribution but also the scale of the resultant differences in equally distributed equivalent incomes between them. This study is interested in income stratification of mobile banking app users.

Social Variable

Social variable is a set of attributes, which are characteristics of people. Social variables include age, occupation, social class, family background. This study is interested in age as a social variable.

Age Stratification

According to Dannefer and Bhatta (2015), the study of age stratification has contributed to a clear and forceful message concerning the importance of distinguishing age and age-specific subpopulations on the one hand from normative age-graded social practices and structures on the other. Bowman and Johnson (2015) describes age stratification as a principle of social organization in which groups are formed on the basis of age rather than other criteria such as work status or gender. Age is often a criterion for membership in social groups. Previous articles have researched into age stratification such as Egerton and Savage (2000) study on social mobility of young men and women. Also, Sugimoto, Sugimoto, Tsou, Milojević and Larivière (2016) study on the relationship between aging and scholarly communication activities and impact. This present study, however, is concerned with age stratification of mobile banking app users.

Based on the literature review, the following hypothesis were developed for the study:

H1: There is a significant negative association between age and the usage of mobile apps per month.

H2: There is a positive association between income and the type of mobile devices used (smartphones, tablets or combination of both).

H3: There is a significant association between income and the device brand (e.g. iPhone) used.

MOBILE BANKING APP RESEARCH DESIGN AND METHOD

Sampling and Data Collection Procedure

The study used the quantitative technique, and it targeted the banking customers that use apps for their transactions in Nigeria with convenience sampling technique employed for selecting the sample size. The survey was conducted in the South-West region of Nigeria where there are many settlements of the mobile commerce merchants and vendors than other geopolitical zones of the country. The study used a paper questionnaire since it is more relevant in Nigeria than the online survey because of irregular power supply and low level of the internet supply. The Western part of Nigeria was used due to the high literacy level which facilitates easy communication in the English language. The participants ($n = 245$) varied in age and income. Researchers often need to select a convenience sample or face the possibility that they will be unable to do the study. Although a sample randomly drawn from a population is more desirable, it usually is better to do a study with a convenience sample than to do no study at all— assuming, of course, that the sample suits the purpose of the study” (Gall, Borg, & Gall, 1996). The demography parts of the responses indicate 120(49%) for age group 15-21, 68(27.8%) for 25-34, 36(14.7%) for 35-44, 19(7.8%) for 45-54 and 2(0.8%) for 55-64 while there are 115(46.9%) for income less than ₦100,000, 61(24.9%) for ₦100,001-200,000, 21(8.6%) for ₦200,001-₦300,000, 11(4.5%) for ₦300,001-₦400,000, 6(2.4%) for ₦400,001-₦500,000, 4(1.6%) for ₦500,001-₦600,000, 3(1.2%) for ₦600,001 or more and 24(9.8%) for non-response. The study respondent has engaged themselves in the use of mobile apps for their transactions. The data collected was analyzed using IBM SPSS version 25 for Linear regression, Pearson correlation and logistic regression analysis. The author classifies the relationship between age and mobile banking app usage, income and the types of device used for mobile banking app, income and the choice for the device brand used for a mobile banking app. The dependent variables are mobile app use per month, device used, device brand, owing a smartphone, owing a tablet and use of mobile money app on smartphone or tablet and independent variables includes age, gender, income, marital status, occupation and education. The data basically used in this study generally constitutes of categorical and continuous variable.

METHODOLOGY

Three different statistical methods were used to analyze the dataset because it involves categorical and continuous variables: Linear regression, Pearson correlation and Logistic regression analysis.

Linear Regression Analysis

linear regression shows the relationship between one dependent and one independent variable using least square method. The regression equation is written as follows:

$$Y = \beta_0 + \beta_1 X + e$$

where:

Y = dependent variable

X = independent variable

β_0 = Intercept

β_1 = slope

e = error term

Pearson Correlation Analysis

Correlation shows the degree of linear relationship between two variables (dependent and independent variable) ranging from +1 to -1. A perfect positive linear relationship between variables is shown by +1; however, -1 implies an entire negative linear association. The formula used to calculate the value of r is:

$$r = \frac{n(\sum XY) - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

The correlation coefficient can be tested for statistical significance using special t-test through following formula:

$$t = \frac{\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

Degree of freedom for correlation coefficient calculation is equal to n - 2. From a t-table, we would find significant relationship between each of variables X and Y (P < 0.05).

Logistic Regression Analysis

Binary logistic regression is an algorithm that constructs a separating hyperplane between two sets of data by using the logistic function to express distance from the hyperplane as a probability of dichotomous class membership:

$$P(Y) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \varepsilon)}}$$

In this equation, X_i it symbolizes discrete or continuous predictor variables with numeric values; in the case of depending on variable (Y) being dichotomous, we use this algorithm. The constants $\beta_0, \beta_1, \beta_2, \dots, \beta_n$ are the regression coefficients estimated from training data, which typically computed by using an iterative maximum likelihood technique.

ANALYSIS AND RESULTS

This section comprises of the results of the analysis done on IBM SPSS 25 using linear regression, person correlation and logistic regression analysis.

Mobile App Use Per Month vs. Age

See Tables 2-4.

Table 2. Model summary

Model	R	R square	Adjusted R Square	Std Error of the Estimate
1	0.049	0.002	-0.003	2.422

Table 3. ANOVA

Model	Source of variation	Sum of Squares	df	Mean Square	F	Sig
1	Regression	2.503	1	2.503	0.427	0.514
	Residual	1038.246	177	5.866		
	Total	1040.749	178			

Table 4. t-test table

Model		Unstandardized Coefficient		Standardized Coefficient Beta	t	Sig.
		β	Std. Error			
1	Constant	1.720	0.379		4.542	0.000
	Age	-0.117	0.179	-0.049	-0.653	0.514

Device Used vs. Income

See Tables 5-7.

Device Brand vs. Income

See Tables 8-10.

Table 5. Model summary

Model	R	R square	Adjusted R Square	Std Error of the Estimate
1	0.148	0.022	0.017	0.910

Table 6. ANOVA

Model	Source of variation	Sum of Squares	df	Mean Square	F	Sig
1	Regression	3.833	1	3.833	4.627	0.033
	Residual	171.440	207	0.828		
	Total	175.273	208			

Table 7. t-test table

Model		Unstandardized Coefficient		Standardized Coefficient Beta	<i>t</i>	Sig.
		β	Std. Error			
1	Constant	1.723	0.107		16.081	0.000
	Income	0.097	0.045	0.148	2.151	0.033

Table 8. Model summary

Model	R	R square	Adjusted R Square	Std Error of the Estimate
1	0.009	0.000	-0.005	3.891

Table 9. ANOVA

Model	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.251	1	0.251	0.017	0.898
	Residual	3299.799	218	15.137		
	Total	3300.050	219			

Table 10. t-test table

Model		Unstandardized Coefficient		Standardized Coefficient Beta	<i>t</i>	Sig.
		β	Std. Error			
1	Constant	4.603	0.447		10.290	0.000
	Income	0.024	0.187	0.099	0.129	0.898

Correlation Analysis

See Table 11.

Logistic Regression for Owing Smartphone vs. Demographic Variables

See Tables 12-15.

Logistic Regression for Owing Tablet vs. Demographic Variables

See Tables 16-19.

The Nagelkerke R square of 4.8% of the total variation in the outcome variable (owing a tablet) explained by the logistic regression model fitted into the data.

Logistic Regression for Have You Ever Used Mobile App for Transaction on Smartphone or Tablet vs. Demographic Variables

See Tables 20-23.

Table 11. Correlation coefficients

Variables	Age	Income	Device use	Device brand	Mobile App use
Age Sig.	1	0.421 0.000	0.150 0.023	0.151 0.019	-0.049 0.514
Income Sig.		1	0.148 0.033	0.009 0.898	-0.012 0.880
Device use Sig.			1	-0.169 0.011	-0.041 0.596
Device brand Sig.				1	0.008 0.917
Mobile App use Sig.					1

Table 12. Model summary

Step	-2 log likelihood	Cox and Snell R square	Nagalkerke R square
1	40.348	0.065	0.286

Table 13. Hosmer and Lemeshow test

Step	Chi square	df	Sig.
1	0.694	8	1.000

Table 14. Classification table

Original count	Predicted membership		Percentage correct
	1	2	
1	205	0	100
2	6	0	0
Overall Percentage			97.2

Table 15. Coefficient of variables

Variables	β	S.E.	Wald	df	Sig.
Gender	-0.827	1.181	0.490	1	0.484
Age	0.294	1.241	0.056	1	0.813
Marital status	-16.387	3125.871	0.000	1	0.996
Education	-0.772	1.122	0.474	1	0.491
Occupation	0.249	0.169	2.181	1	0.140
Income	-14.944	1996.860	0.000	1	0.994
Constant	28.638	3709.247	0.000	1	0.994

Table 16. Model summary

Step	-2 log likelihood	Cox and Snell R square	Nagalkerke R square
1	215.059	0.031	0.048

Table 17. Hosmer and Lemeshow test

Step	Chi square	df	Sig.
1	10.289	8	0.245

Table 18. Classification table

Original count	Predicted membership		Percentage correct
	1	2	
1	166	0	100
2	46	0	0
Overall Percentage			78.3

Table 19. Coefficient of variables

Variables	β	S.E.	Wald	df	Sig.
Gender	0.427	0.362	1.738	1	1.612
Age	0.346	0.269	1.647	1	1.413
Marital status	-0.790	0.436	3.289	1	0.454
Education	0.211	0.247	0.731	1	1.235
Occupation	0.004	0.063	0.004	1	1.004
Income	-0.272	0.188	2.100	1	0.762
Constant	-1.342	0.769	3.040	1	0.261

Table 20. Model summary

Step	-2 log likelihood	Cox and Snell R square	Nagalkerke R square
1	141.429	0.119	0.215

Table 21. Hosmer and Lemeshow test

Step	Chi square	df	Sig.
1	12.985	8	0.112

Table 22. Classification table

Original count	Predicted membership		Percentage correct
	1	2	
1	178	0	100
2	29	0	0
Overall Percentage			86

Table 23. Coefficient of variables

Variables	β	S.E.	Wald	df	Sig.
Gender	0.753	0.442	2.898	1	2.123
Age	-0.159	0.440	0.131	1	0.853
Marital status	-1.701	0.839	4.113	1	0.183
Education	0.001	0.322	0.000	1	1.001
Occupation	0.129	0.080	2.585	1	1.137
Income	0.035	0.172	0.041	1	1.035
Constant	-4.259	1.120	1.263	1	0.284

RESULT AND DISCUSSION

The results of our analyses are presented in Tables 2-23. We first discuss, the model summary of the variables in table 1. In this table, the R square shows that 4.9% variability of the dependent variable (Mobile App use per month) is explained by the independent variables (Age). Table 2, we perform some analysis using the ANOVA table to determine the effect of the dependent variable by the independent variable. In our analysis as shown in table above, the F statistics value is 0.427 which is less than the F table of 3.84. This suggests that the independent variable (Age) has no effect on the dependent variable (Mobile App use per month). Furthermore, the Sig. value shows 0.514 which is greater than the value 0.05 hence satisfying the set criteria. Hariyanto, Mock. & Thomos, (2020) gives information on whether there is partial influence on the dependent variable by the independent variable; the need to carry out *t*-test for the analysis becomes necessary. This table is used to determine the influence of independent variable (Age) on the dependent variable (Mobile App use per month). In our research as represented in the t table, it shows the independent variable (Age) is not significant with ($p = 0.514 > 0.05$) and *t* value (-0.653) less than t table (2.00). This means that Age has no significant influence on Mobile App use per month.

Similarly, we presented in Table 3 the model summary of the variables. In this table, the R square shows that 14.8% variability of the dependent variable (Device use) is explained by the independent variables (Income). In table 5, we perform some analysis using the ANOVA table to determine the effect of the dependent variable by the independent variable. In our analysis as shown in table above, the F statistics value is 4.627 which is greater than the F table of 3.48. This suggests that the independent variable (Income) influences the dependent variable (Device use). Furthermore, the Sig. value shows 0.033 which is less than the value 0.05 hence satisfying the set criteria. And t table is used to determine the influence of independent variable (Income) on the dependent variable (Device use). In our research as represented in table above, it shows the independent variable (Income) is significant with ($p = 0.033 < 0.05$) and *t* value (2.151) greater than t table (2.00). This means that Income has a significant influence on Device use.

Moreso, we also display the model summary of the variables in table 6. In this table, the R square shows that no variability of the dependent variable (Device brand) is explained by the independent variables (Income). In this test, we perform some analysis using the ANOVA table to determine the effect of the dependent variable by the independent variable. In our analysis as shown in table above, the F statistics value is 0.017 which is less than the F table of 3.48. This suggests that the independent variable (Income) has no effect on the dependent variable (Device brand). Furthermore, the Sig. value shows 0.898 which is greater than the value 0.05 hence satisfying the set criteria (see table 7). This table is used to determine the influence of independent variable (Income) on the dependent variable (Device brand). In our research as represented in table above, it shows the independent variable (Income) is not significant with ($p = 0.898 > 0.05$) and t value (0.129) less than t table (2.00). This means that Income has no significant influence on Device brand.

Table 9 shows the correlation coefficients and the relationship between the variables. There is moderate correlation between Age and Income; there is a significant linear relationship between Age and Income since $p(0.000) < 0.05$. There weak correlation between Age and Device use; there is a significant linear relationship between Age and Device use since $p(0.023) < 0.05$. There is weak correlation between Age and Device brand; there is a significant linear relationship between Age and Device brand since $p(0.019) < 0.05$. There is weak correlation between Age and mobile app use; there is a significant linear relationship between Age and mobile app use since $p(0.514) > 0.05$. There is weak correlation between Income and device use; there is a significant linear relationship between Income and device use since $p(0.033) < 0.05$. There is weak correlation between Income and device brand; there is no significant linear relationship between Income and device use since $p(0.898) > 0.05$. There is weak correlation between Income and mobile app use; there is no significant linear relationship between Income and mobile app use since $p(0.880) > 0.05$. There is weak correlation between device use and device brand; there is a significant linear relationship between device use and device brand since $p(0.011) < 0.05$. There is weak correlation between device use and mobile app use; there is no significant linear relationship between Income and device use since $p(0.596) > 0.05$. There is weak correlation between device brand and mobile app use; there is no significant linear relationship between device brand and mobile app use since $p(0.917) > 0.05$.

For the logistic regression analysis, the Nagelkerke R square of 28.6%, 4.8% and 21.5% of the total variation in the outcome variable (owing a smartphone, owing a tablet and using mobile app for transaction on smartphone or tablet) respectively explained by the logistic regression model fitted into the data. Hosmer and Lemeshow for owing a smartphone, owing a tablet and using mobile app for transaction on smartphone or tablet. Tests indicate that it is not significant, which suggests that the model fit the data well ($p > 0.05$). The overall accuracy of the logistic regression model to predict the owing a smartphone outcome with a (predicted probability of 0.5 or greater) is 97.2%, 78.3% and 86.0% respectively for owing a smartphone, owing a tablet and using mobile app for transaction on smartphone or tablet. The Wald statistic is used to test the null hypothesis that the coefficients of the independent variables in the model are zero. All the demographic variables are not a significant at ($p > 0.05$) i.e. all the demographics variable do not have influence on owing a smartphone, owing a tablet and using mobile app for transaction on smartphone or tablet respectively (see Table 10-20).

Out of the six categorical variables: gender, age, marital status, education, occupation and income, the outcome of the classification using discriminant analysis shows that only age and income can be used as predictors of the usage of mobile banking apps. This finding is consistent with that of Laukkanen (2016) and Nyeko et. al. (2014).

Age and the Frequency of Mobile App Usage

Our analysis reveals a significant negative association between age and the usage of mobile apps per month, thus confirming hypothesis H1. In other words, the younger users, the higher the usage of mobile apps per month. On the average, users in the age bracket 15-21 perform about 30 transactions on at exactly two different times per month. In a similar vein, users in the age bracket 25-34 perform

a similar number of transactions (30) about five times every month. Users belonging to other age brackets perform significantly less transactions and less frequently. This observation is in line with the results obtained by Govender & Sihlali (2014), Johara (2014) and Laukkanen (2016).

In Finland, according to Laukkanen (2016), the most common age-range for users of mobile banking applications is 30 and 49 while users outside this range are the main users of electronic banking such as Internet banking. Puschel et al., (2010) also claim that the typical age of users are below 30 years. These two observations suggest that our results are consistent. In Nigeria, people between ages 20 and 34 are usually students or working professionals and by nature tech-savvy and often prefer “fast” services. The type of banking transactions they perform on mobile banking apps usually revolve around: checking account balances, money transfer, remote payments, and airtime purchase. These young users would most likely perform banking transactions - if available - via their mobile apps to circumvent the potential time wastage in queues and driving through slow traffic (Marous, 2020). In contrast, users belonging to the age bracket (45 and above) perform lesser transactions. This may be due to the fact that older people tend to have reservations regarding the security of their transactions using mobile devices and may not be technically inclined to use the devices (Anderson & Perrin, 2017).

Income and the Device Used

We also established a positive association between income and the type of mobile devices used (smartphones, tablets, or combination of both) – in support of hypothesis H2. Our finding shows that all users at the bottom of the income strata (in this case, those earning less than 100,000 Naira) use smartphone devices. Further, those (whose incomes fall between 300000 and 200000 Naira) use both smartphones and tablets. Users with income (more than 10 million) use only tablets. This is in line with Zickuhr’s (2013) report – in that the use of tablet computers is correlated to users’ income.

However, an interesting question that comes to mind is that why are low income earners using smartphones - which are relatively expensive devices? Some insight may be derived from the work of Nwachukwu & Onyenakeya (2017). According to the authors, who sought to determine linkages between low income earners’ smartphone usage and certain demographic variables, found that about seventy-five percent of the students used their smartphones for social networking.

Income and the Device Brand

Lastly, we found no significant association between income and the device brand (e.g. iPhone) used. Hence, hypothesis H3 was rejected. This result is contradictory to the findings of Bertrand & Kamenica (2018) and NPD Group (2020) who discovered that the ownership of a particular brand of mobile device is a strong indicator that a person has a high income. This finding suggests that Nigerians are mobile phone lovers with brand incertitude (Olaleye, Ukpabi, Karjaluo & Rizomyliotis, 2019).

Researchers have also discovered that the factors that contribute to the ownership of multiple mobile devices by a user are perceived usefulness of the device, social media functionalities, and the ability to use the devices interchangeably (Chan-Olmsted and Shay, 2016; Haan, Lugtig, & Toepoel, 2019) as a way to mitigate against service interruptions or other technical issues.

Comparing Our Findings to Similar Studies

In this study, we found that there is a significant negative association between age and the usage of mobile apps per month. This is consistent with the finding of Johara (2014) who found that 53% of users of mobile banking app belong to the youngest age group (21-25 years) in their sample. We also observed a positive relationship between income and the type of mobile devices used. This result aligns with the finding of Zickuhr (2013) who found that a majority (56%) of survey participants who earn around \$75,000 per annum own tablet computers compared with 20% of those earning about \$30,000 per annum. Finally, we found no significant relationships between income and the device

brand (e.g. iPhone) used. This result is not supported by the works of some other researchers such as Bertrand & Kamenica (2018) and NPD Group (2020).

One important difference between our study and majority of similar studies is the fact that Nigeria has a unique peculiarity. For instance, a single user tends to have multiple mobile phones as a way of mitigating risks related to unreliable Internet/telecommunications services and erratic power supply.

Conclusively, this study suggests that the banking managers should pay close attention to the influence of hierarchy on their customers' different status.

Stratification Theoretical Contribution

This study confirmed the salient points of social stratification that it is a societal trait and not individualistic differences reflection. That social stratification is universal, generational but variable and a combination of inequality with belief. This research applied stratification theory to deepen the understanding of how classes of banking customers demography associates in using mobile banking apps. The study contributes theoretically in two parts. First, different age brackets exhibit different behaviours in the context of mobile banking app use for transactions. The findings of this study shows a negative association between the age and the usage of mobile banking apps, in other words, the lower the age of the users the more banking transactions they will perform in a month. Second, the study shows the impact of income categories on the mobile device used for mobile banking apps. It indicates that users of mobile banking apps situated at different levels of income exhibit specific traits with regards to the type of mobile devices they use for mobile banking. For instance, low income users make use of smartphones, while middle income users use both smartphones and tablet computers and the wealthy use only tablet computers for mobile banking. This study contributes to the literature of mobile banking apps and shows the importance of social strata of mobile banking apps users.

Managerial Insights

These days, financial inclusion is a major topic in the commercial banking sector. According to (The World Bank, 2017), about 70% of the unbanked adults fall in the age bracket (25 and above). Interestingly, these unbanked adults belong to the lowest income stratum (Abimbola et. al., 2018) and some of the key reasons they often cite for not having bank accounts are lack of enough money to open accounts and inability to continue paying maintenance fees.

In order for bank managers to leverage the affordances of mobile banking to strengthen their competitive edge whilst ultimately increasing inclusion of the unbanks, we recommend the following:

- Make it possible for low income people to open bank accounts via the mobile banking apps without any initial deposit.
- Exempt mobile app users (that are below 34 years and in the lowest income stratum) from transaction costs associated with owning bank accounts.
- Launch social media competitions with monetary rewards - focusing on the capabilities of smartphones - as a customer recruitment strategy targeting the unbanked adults.
- Customise your mobile banking apps with special focus on user-experience of relatively old people and the security features of tablet computers. Market it as a premium product to the wealthy users.
- Make it possible for low income users to earn money by promoting the use of your mobile banking apps (especially, the tablet-version) as well as providing basic technical assistance to the relatively older users.
- The results of this study gives insights to the banking managers on how to implement a robust segmentation, targeting and positioning (STP) strategy that will help in narrowing down the vast markets into manageable groups and assist the managers to know the right segment of potential customers to pursue for the purpose of business growth.

CONCLUSION

This study employed convenience sampling to acquire primary data, and three hypotheses were tested using simple linear regression, correlation, and logistic analysis to achieve the study's goal. IBM SPSS version 25 was used for the analysis. The study demonstrates the association that exists between owning a smartphone, owning a tablet, and utilizing a mobile app for a transaction on a smartphone or tablet and demographic characteristics. Therefore, this study suggests that the banking managers should pay close attention to the influence of hierarchy on their customers' different status.

LIMITATIONS AND FUTURE RESEARCH IMPLICATIONS

This study applied social stratification theory in the context of mobile banking app use in a developing country research domain and gives insights. Despite the new understanding from this study, the focus only on demographic variables may limit the expansion of the insights derived. The future study should replicate this study in developed countries as a comparative study due to the ubiquitous mobile banking apps. Since, the banking sector is generating big data through their customers, it is recommended to the future researchers to harness the banking customers' big data and employ machine learning for triangulated data analysis.

REFERENCES

- Abayomi, O. J., Olabode, A. C., Reyad, M. A. H., Teye, E. T., Haq, M. N., & Mensah, E. T. (2019). Effects of Demographic Factors on Customers' Mobile Banking Services Adoption in Nigeria. *International Journal of Business and Social Science*, 10(1). doi:10.30845/ijbss.v10n1p9
- Abdinoor, A., & Mbamba, U. O. (2017). Factors influencing consumers' adoption of mobile financial services in Tanzania. *Cogent Business & Management*, 4(1), 1392273. doi:10.1080/23311975.2017.1392273
- Abimbola, A., Olokoyo, F. O., Babalola, O., & Farouk, E. (2018). Financial Inclusion as a Catalyst for Poverty Reduction in Nigeria. *International Journal of Scientific Research and Management*, 6(6), 481–490. doi:10.18535/ijstrm/v6i6.em06
- Akers, H. (2021, December 5). *What Are the Different Types of Mobile Banking Technology?* <https://www.easytechjunkie.com/what-are-the-different-types-of-mobile-banking-technology.htm>
- Alafeef, M., Singh, D., & Ahmad, K. (2011). Influence of demographic factors on the adoption level of mobile banking applications in Jordan. *Research Journal of Applied Sciences*, 6(6), 373–377. doi:10.3923/rjasci.2011.373.377
- Allanson, P. (2018). On the measurement of the overall degree of income stratification between groups. *Review of Income and Wealth*, 64(2), 388–405. doi:10.1111/roiw.12290
- Anderson, M., & Perrin, A. (2017, May 23). Tech Adoption Climbs Among Older Adults. Washington, DC: Pew Research Center. <https://www.pewresearch.org/internet/2017/05/17/tech-adoption-climbs-among-older-adults/>
- Anikin, V., Lezhnina, Y., Mareeva, S., Slobodenyuk, E., & Tikhonova, N. (2016). Income stratification: Key approaches and their application to Russia. *Higher School of Economics Research Paper No. WP BRP*, 2.
- Barbalet, J.M. (1980). Principles of Stratification in Max Weber: An Interpretation and Critique. *The British Journal of Sociology*, 31(3, Special Issue). pp. 401-418.
- Bertrand, M., & Kamenica, E. (2018). *Coming Apart? Cultural Distances in the United States over Time*. National Bureau of Economic Research. doi:10.3386/w24771
- Bowman, S., & Johnson, S. (2015). Age Stratification and the Elderly. In Karen Christensen & David Levinson, *Encyclopedia of Community: From the Village to the Virtual World*. doi:10.4135/9781412952583.n7
- Budowski, M., & Tillmann, R. (2013). Social Stratification. In A.C. Michalos (ed.), *Encyclopedia of Quality of Life Research*. doi:10.1007/978-94-007-0753-5
- Chan-Olmsted, S., & Shay, R. (2016). Understanding Tablet Consumers: Exploring the Factors That Affect Tablet and Dual Mobile Device Ownership. *Journalism & Mass Communication Quarterly Journal*, 93(4), 857–883. doi:10.1177/1077699016644561
- Cliffsnotes (2020). *What Divides Us: Stratification*. <https://www.cliffsnotes.com/study-guides/sociology/social-and-global-stratification/what-divides-us-stratification>
- Dannefer, D., & Bhatta, T. (2015). *Age stratification* (2nd ed.). International Encyclopedia of the Social & Behavioral Sciences. doi:10.1016/B978-0-08-097086-8.34029-6
- Derbali, A. (2021). Determinants of the performance of Moroccan banks. *Journal of Business and Socio-economic Development*, 1(1), 25–43. doi:10.1108/JBSED-01-2021-0003
- Dillion, W. R., & Goldstein, S. (1984). *Multivariate Analysis Method and Applications*. John Wiley Sons, Inc.
- Egerton, M., & Savage, M. (2000). Age Stratification and Class Formation: A Longitudinal Study of the Social Mobility of Young Men and Women, 1971-1991. *Work, Employment and Society*, 14(1), 23–49.
- Estacio, E. V., Whittle, R., & Protheroe, J. (2019). The digital divide: Examining socio-demographic factors associated with health literacy, access and use of internet to seek health information. *Journal of Health Psychology*, 24(12), 1668–1675. doi:10.1177/1359105317695429 PMID:28810415
- Fall, F.-S., Ky, Y., & Birba O. (2015). Analyzing the Mobile-Banking Adoption Process among Low-Income Populations: A Sequential Logit Model. *Economic Bulletin*, 35(4), 2085–2103.

Fasae, J., & Adegbilero-Iwari, I. (2015). Mobile devices for academic practices by students of college of sciences in selected Nigerian private universities. *The Electronic Library Journal*, 33(4), 749–759. doi:10.1108/EL-03-2014-0045

FederalReserve. (2020, May 22). Consumers and Mobile Financial Services. <https://www.federalreserve.gov/econresdata/mobile-devices/2012-current-use-mobile-banking-payments.htm>

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational Research: An Introduction*. Longman.

Govender, I., & Sihlali, W. (2014). A study of mobile banking adoption among University Students. *Mediterranean Journal of Social Sciences*, 5(7), 451–458. doi:10.5901/mjss.2014.v5n7p451

Group, N. P. D. (2020, May 24). *Nearly 85 Percent of All Apple Households Also Own a Windows PC*. https://www.npd.com/wps/portal/npd/us/news/press-releases/pr_091005/

Haan, M., Lugtig, P., & Toepoel, V. (2019). Can we predict device use? An investigation into mobile device use in surveys. *International Journal of Social Research Methodology*, 22(5), 517–531. doi:10.1080/13645579.2019.1593340

Hout, M., & DiPrete, T. A. (2006). What we have learned: RC28's contributions to knowledge about social stratification. *Research in Social Stratification and Mobility*, 24(1), 1–20. doi:10.1016/j.rssm.2005.10.001

Jie, B., Feng, Z. Z., Qiu, Y., & Zhang, Y. Q. (2019). Association between socio-demographic factors, coping style, illness perceptions and preference for disclosure/nondisclosure of diagnosis in Chinese patients with hepatocellular carcinoma. *Journal of Health Psychology*, 24(11), 1473–1483. doi:10.1177/1359105317707258 PMID:28810462

Johara, T. F. (2014). Consumer's Pattern and Behavior toward the Usage of Mobile Banking. *International Journal of Academic Research in Business & Social Sciences*, 4(8), 166–181. doi:10.6007/IJARBS/v4-i8/1082

Kalimeri, K., Beiró, M. G., Delfino, M., Raleigh, R., & Cattuto, C. (2019). Predicting demographics, moral foundations, and human values from digital behaviours. *Computers in Human Behavior*, 92, 428–445. doi:10.1016/j.chb.2018.11.024

Knoema. (2018). *Nigeria – GINI index*. <https://knoema.com/atlas/Nigeria/topics/Poverty/Income-Inequality/GINI-index>.

Laukkanen, T. (2007). Customer preferred channel attributes in multi-channel electronic banking. *International Journal of Retail & Distribution Management*, 35(5), 393–412. doi:10.1108/09590550710743744

Laukkanen, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research*, 69(7), 2432–2439. doi:10.1016/j.jbusres.2016.01.013

Little, D. (2008). *Power and social class*. <https://understandingsociety.blogspot.com/2008/08/power-and-social-class.html>

Lumen, (2020). *Theoretical Perspectives on Social Stratification*. <https://courses.lumenlearning.com/sociology/chapter/theoretical-perspectives-on-social-stratification/>

Marous, J. (2020, May 23). *Understanding the Mobile Banking Consumer*. <https://thefinancialbrand.com/37408/monitise-cognizant-mobile-banking-segment-based-strategy/>

Mills, C.W. (1980) *Modern theories of social stratification*, 114-153.

Mirza, A. P., Beheshti, M. T. H., Wallstrom, A., & Mirza, O. P. (2009). Adoption of internet banking by iranian consumers: An empirical investigation. *J. Applied Sci.*, 9(14), 2567–2575. doi:10.3923/jas.2009.2567.2575

Moffitt, K. (2020). *Social Stratification: Definition, Theories & Examples*. <https://study.com/academy/lesson/social-stratification-definition-theories-examples.html>

Nwachukwu, C., & Onyenkeya, K. (2017). Use of Smartphones among College Students in Nigeria: Revelations and Reflections. *Journal of Communication*, 8(2), 171–182. doi:10.1080/0976691X.2017.1396007

- Nyeko, J. S., Moya, M., Kabaale, E., & Odongo, J. (2014). Factors Influencing the Short Message Service (SMS) Mobile Banking adoption: A Users Perspective in the West Nile Region in Uganda. *European Journal of Business and Management*.
- Okaka, E. O. (2017). *Social Stratification in the Workplace in Nigeria*. .10.23918/ijsses.v3i4p11
- Olaleye, S. A., Sanusi, I. T., Ukpabi, D. C., & Aina, O. (2017, December). Smartphone Usage Among Millennial in Finland and Implications for Marketing Segmentation Strategies: Lessons for Nigeria. In *International Conference on e-Infrastructure and e-Services for Developing Countries*, (pp. 327-341). Springer, Cham.
- Olaleye, S. A., Ukpabi, D., Karjaluo, H., & Rizomyliotis, I. (2019). Understanding technology diffusion in emerging markets. *International Journal of Emerging Markets*.
- Puschel, J., Mazzon, J. A., & Hernandez, J. M. C. (2010). Mobile banking: Proposition of an Integrated Adoption Intention Framework. *International Journal of Bank Marketing*, 28(5), 389–409. doi:10.1108/02652321011064908
- Razzaque, A., Cummings, R. T., Karolak, M., & Hamdan, A. (2020). The propensity to use FinTech: Input from bankers in the Kingdom of Bahrain. *Journal of Information & Knowledge Management*, 19(01), 2040025. doi:10.1142/S0219649220400250
- Stokes, M. A., Hemphill, S., McGillivray, J., Evans-Whipp, T., Satyen, L., & Toumbourou, J. W. (2020). Self-reported injury in Australian young adults: Demographic and lifestyle predictors. *Australian and New Zealand Journal of Public Health*, 44(2), 106–110. doi:10.1111/1753-6405.12966 PMID:32050296
- Sugimoto, C. R., Sugimoto, T. J., Tsou, A., Milojević, S., & Larivière, V. (2016). Age stratification and cohort effects in scholarly communication: A study of social sciences. *Scientometrics*, 109(2), 997–1016. doi:10.1007/s11192-016-2087-y
- Sulaiman, A., Jaafar, N. I., & Mohezar, S. (2007). An overview of mobile banking adoption among the urban community. *International Journal of Mobile Communications*, 5(2), 157–168. doi:10.1504/IJMC.2007.011814
- The World Bank. (2017). *The Global Findex database - the Unbanked*. The World Bank.
- Turki, M., Hamdan, A., Cummings, R. T., Sarea, A., Karolak, M., & Anasweh, M. (2020). The regulatory technology “RegTech” and money laundering prevention in Islamic and conventional banking industry. *Heliyon*, 6(10), e04949. doi:10.1016/j.heliyon.2020.e04949 PMID:33083582
- VittL.A. (2020). *Class*. .10.1002/9781405165518.wbeosc048.pub2
- Weber, M. (1968). *Economy and Society* (Vol. I). Bedminster press.
- Yasir, N., Liren, A., Mehmood, N., & Arfat, Y. (2019). Impact of Personality Traits on Entrepreneurial Intention and Demographic Factors as Moderator. *International Journal of Entrepreneurship*.
- Yitzhaki, S., & Lerman, R. I. (1991). Income stratification and income inequality. *Review of Income and Wealth*, 37(3), 313–329. doi:10.1111/j.1475-4991.1991.tb00374.x
- Zhou, X. (2012). A Nonparametric Index of Stratification. *Sociological Methodology*, 42(1), 365–389. doi:10.1177/0081175012452207
- Zhou, X., & Wodtke, G. T. (2019). Income Stratification among Occupational Classes in the United States. *Social Forces*, 97(3), 945–972. doi:10.1093/sf/soy074
- Zickuhr, K. (2013). *Tablet Ownership 2013*. Pew Research Center.

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