



Original Research Article

A Trend Analysis of the Utilisation of Post Offices in Benin City, Edo State, Nigeria

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ABSTRACT

This study examines the trend in the utilisation of post offices in Benin City, Edo State, Nigeria. The main objective of the research is to show the visible trends in post office utilisation using the volume of mails handled by the post offices and the revenue generated by the post offices. The pattern of post office distribution was established and this was done by determining the nearest neighbour statistics of the post office. In order to be able to determine the relationship between the volume of mail handled by the post office and revenue that it generates, Pearson's linear correlation was utilised. The data obtained were analyzed using the Statistical Package for Social Sciences (SPSS). It was observed that the volume of mail handled has been on the decline over time and from time series forecast that was carried out, it was observed that this decline will continue. Although the volume of mail handled by the post office has experienced decline, the revenue generated by the post office has experienced an unprecedented increase. This increase in revenue generation is owed to other services rendered by the post office; most noticeably the increase in the volume of parceled goods that are being couriered.

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1. INTRODUCTION

The post office is the public department or corporation responsible for rendering postal services to the public. The primary function of the post office is collecting, processing, transmitting and delivery of mails. Mails are all postal articles whose contents are in the nature of messages. Other services includes Expedited Mail Service (EMS) speed post, parcel post, special delivery, bulk post (Notice of AGM, bank statements, dividend warrants, shares, certificates, religious tracts, newsletters, journals, enquiries slips), counter services (inland money order, postage stamp, air letter cards, post card), philately, financial service (cash for Africa money transfer), private mail bag, postal media, pick up services, post office space rental, privately-operated postal agencies/sub-offices, post office counter space rental, licensing of postage meter franking machine, business reply services, agency service, and stamp duty (NIPOST, 2009).

For over ten years there has been a steady fall both in post office utilisation and in the number of post offices (Igbokwe, 2009). Post offices in many urban areas in Nigeria have found it difficult to survive (Igbokwe, 2009). The number of functional post offices nation wide has diminished and as result there has been a decline in the number of local mails being sent (Obiyan, 2011). This is due to the use of ICT in sending of electronic mails and SmS which is faster and more convenient (Obiyan, 2011). From the physical glimpse on the sustainability of the post office in the study area, it is feared that the closure of more post office is imminent except there are modalities put in place to check it (Obiyan, 2011).

Researchers and research organisations have observed that there is a drop in the usage of the post office in sending of mails and performing other activities (Igbokwe, 2009; Obiyan, 2011; United States Government Accountability Office, 2005). This has in turn, led to the closure of some post offices and also affected the fortune of the post offices. Kosar (2009) who is an analyst in the American nation government, observed that due to the decline in the utilisation of United State Postal Service (USPS), about 1000 are unable to stay in business due to the fall in revenue. He stated that the major reason for this decline could be due to the use of the internet in performing some of the functions of the post office, and advancement in Instant Messaging. Pommerening (2008) stated that the use of communications technologies and media, including E-mail, varies with socioeconomic characteristics such as age, race, sex, income, and educational attainment. Obiyan (2011), observed that 91.7% of the respondents believed that the utilisation of electronic mail has highly reduced the rate at which people employ the use of postal agencies in the sending and receiving of mails. It was observed that over the 82% of the respondents had not sent personal letters by post. Instead, they preferred to use any of the ICT (sms, e-mails and mobile phones) channels. The study revealed that the use of email has also positively affected the utilisation of the post office in the sending and receiving of parcels.

There are series of researches that have been centered on the utilisation of post office and the impact of I.C.T on the post office utilisation. There are also researches that have been carried out on the effect of time and utilisation of facilities (Adam, 1977; Aday and Andersen, 1981; Herbert and Thomas, 1982; Joseph and Phillips, 1984; Bhatti, 2005; Awaritefe, 2007; Stephen, 2008). However, there is a gap in the trend analysis in the utilisation of post office in the study area and this work intends to throw light into and establish indicators on how the post offices can be sustained in the study area.

This research intends to provide answers to the following research issues, namely the trend in the volume of mails handled and revenue generated by the post office, the factors that influence the utilisation of the post offices and the distribution of post office in Benin City.

2. METHODOLOGY

The data for this study were collected through oral interview and a structured questionnaire. A total of 350 questionnaires were administered in the study area to respondents. Five staff from each of the functional post offices were issued questionnaires and were orally interviewed. Statistical analysis was carried out with the aid of Statistical Package for Social Sciences (SPSS) version 16.0. The trend in the volume of mail traffic conveyed by the post office and the revenue generated were also considered. In order to identify the trend, the use of time series analysis was applied. The use of time series analysis, made it possible to appraise the trend in the usage of the post office and the three years moving averages was applied. It was also used to forecast the future trend that will be experienced by the post offices.

2.1. The Study Area

Benin City which is the capital of Edo State is an urban agglomeration that lies within $6^{\circ} 20' 20.979''\text{N}$ to $6^{\circ} 34' 19.678''\text{N}$, $5^{\circ} 37' 35.3202''\text{E}$ to $5^{\circ} 46' 37.1203''\text{E}$. Benin City has its greatest physical growth within the Oredo Local Government Area and extends into the neighbouring local Government Area of Ovia North East at Isihor and Uhumonde at Eyaen. The study cuts across the three major local government areas located

in Benin City which are Ikpoba-Okha Local Government Area, Egor Local Government Area and Oredo Local Government Area (Figures 1 and 2). Oredo Local Government Area has an area of 249 km² and a population of 374,671, while Egor Local Government Area has an area of 93 km² and a population of 339,899 and Ikpoba Okha Local Government Area has an area of 862 km² and a population of 371,106.

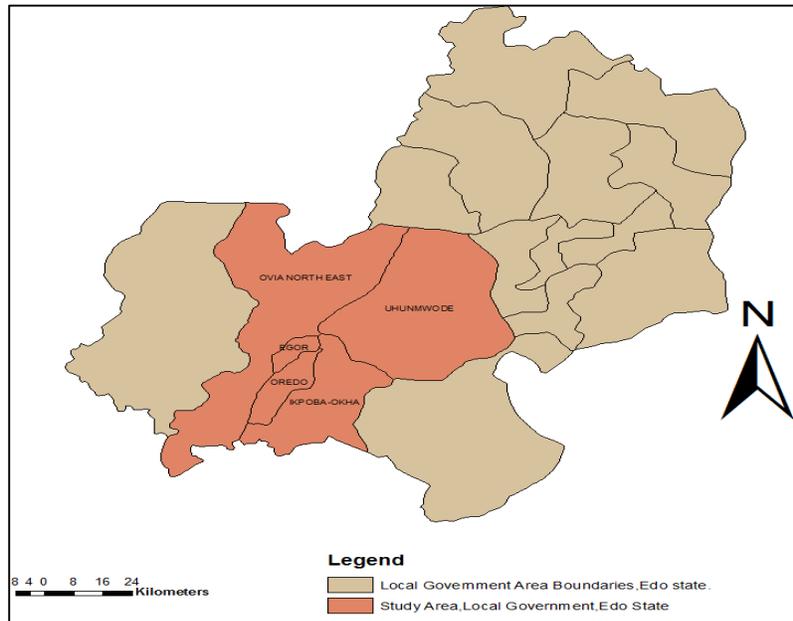


Figure 1: Map of Edo State showing the study area

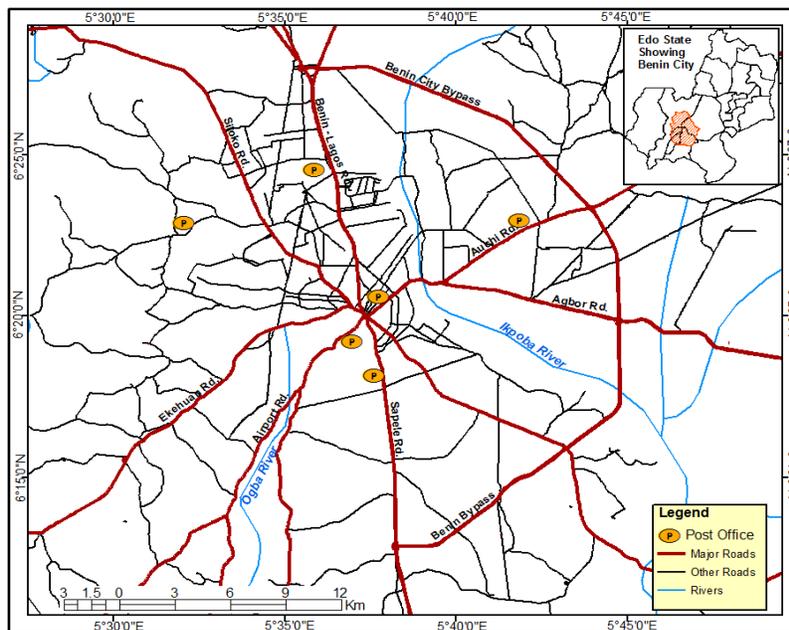


Figure 2: Location of post offices in Benin City

3. RESULT AND DISCUSSION

3.1. Spatial Distribution of Post Offices in Benin City

The nearest-neighbour analysis was used to calculate for the degree of the spatial distribution of post offices. This was used to help to ascertain the nature of the distribution of the post offices; whether these post offices are clustered, dispersed or are randomly located within the city. The nearest-neighbour analysis makes it possible to describe any point pattern in terms of single statistic R_n on a scale ranging from 0-2.5. The bottom of this scale (0-0.9) represents a situation of extreme clustering while the upper limit (2.15) represents maximum dispersal with the mid-point of 1 representing a random distribution. The R_n is calculated by measuring the distance which separates each point from its nearest neighbour.

The value of R_n was calculated using Equation 1:

$$R_n = \frac{2d}{\sqrt{n/a}} \quad (1)$$

Where:

d = mean distance between a point and its nearest neighbour

a = area conceived

n = number of points

Using Google Earth, the following crow fly distance of the nearest neighbour data was generated (Table 1).

$$\text{Recall, } R_n = \frac{2d}{\sqrt{n/a}}$$

$$\text{Mean distance (d) = } 16.16/6 = 2.69\text{km}$$

Equation (1) was used to calculate R_n as 0.38.

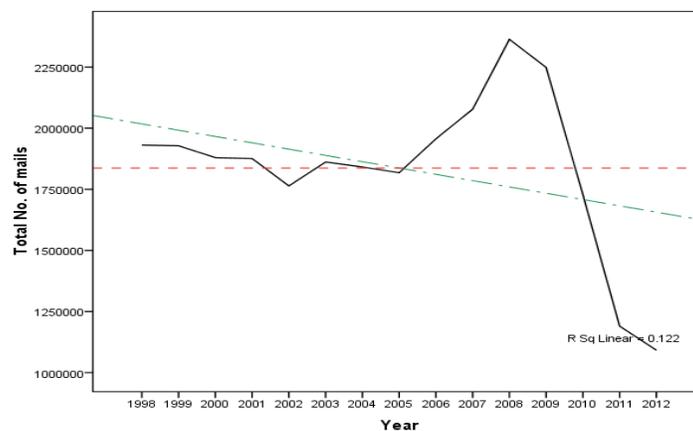
Since the R_n value of 0.38 is less than 1, it means that the average neighbourhood distance between the post offices is shorter than the value for random arrangement. Because the distances are short, it means that these post offices are closer to each other and there is therefore a degree of clustering. The distribution pattern of these post offices is clustered. It is evident that due to the clustered nature of the pattern in which the post offices are distributed, the areas where they are found enjoy the services rendered by the post office better than other areas that are farther away from the post office. People who are not around the post office range have to travel across long distances to make use of the post office service. The dwellers outside the post office range are discouraged by the travel time they have to spend to utilize the post office, even where there is need for it. An alternative service provider that is closer to them will be used for the sending of parcel goods. For sending of mails, they prefer to make use of ICT which is within their domain by sending SMS, email, MMS etc. via their phones. For the sending of such things as certificates and documents that are going to be used online, they would rather scan it and send it via email. It is expected that as the population of the city is growing, more post offices have to be established to serve those areas that are not effectively serviced by the existing post offices.

Table 1: Crow-fly distance of the nearest neighbour in km

Post office	Nearest neighbours	Nearest neighbour distance (d)
Aduwawa Road	Akpakpava	5.87km
Airport Road	Akpakpava Road	0.45km
Akapkava Road	Airport Road	0.45km
Sapele Road	Airport Road	0.59km
Siluko Road	Airport Road	3.93km
Ugbowo Road	Siluko Road	4.87km
		$\Sigma d = 16.16\text{km}$

3.2. Time Series Modeling of the Volume of Mails Handled

Time series analysis was applied to estimate the observed trend in the volume of mails handled by post offices in the study area. This statistical analysis was carried out with the aid of statistical package for social science (SPSS) version 16.0. From Figure 3, line A represents the times series plot or time plot. Line B depicts the location of the mean on the “y” axis which is about 1.8 million mails. Line C reveals the pattern of the time series trend (trend line). The trend of the plot slopes downward signifying an annual decrease in the overall yearly mails handled. However, the overall pattern of the time series plot showed that from 1998-2001 the number of mails were fairly above the mean, though decreased and dropped below the mean in 2002. It went up above the mean the following year and dropped again. There was a sharp rise from 2005 with the highest peak in 2008. From 2008 the volume of mail being handled by the post office began to drop. It dropped drastically well below the mean in 2011 and 2012. Generally, the plot shows strong seasonal variation in terms of the number of mails handled. The decline in the volume of mail handled by the post office is due to the drop in the level of patronage by the population in the utilisation of the post office in the sending of messages, greeting cards etc in the form of mails. The people have embraced and employed the use of ICT in conveying mails which was one of the primary services of the post office rendered to the people.



Key: A  B  C 

Figure 3: Time series plot of total number of mails handled by the five LGAs

3.3. Time Series Forecast for the Volume of Mails Handled

The time series forecast for the volume of mails handled by post offices in the three local government area was carried out using the exponential smoothing model. The forecast was done with the aid of SPSS and the following exponential smoothing parameters were utilised. Table 2 shows that the model prediction is

significant at 0.05 with a 't'-value of 6.277 and very low standard of error of 0.159. Using these values, Table 3 was generated.

Table 2: Exponential smoothing model parameters

Model	Estimate	SE	t	Sig.
Total No. of mails-Model_1 No Transformation Alpha (Level and Trend)	1.000	0.159	6.277	0.05

Table 3: Time series forecast for the next five years

Model (Year)	2013	2014	2015	2016	2017
Total No. of Mails (Forecast)	993,890	895,840	797,790	699,740	601,690
UCL	1,454,962	1,926,821	2,522,944	3,225,102	4,021,043
LCL	532,818	-135,140	-927,364		

For each year, the *exponential smoothing* model was used to forecast the volume of mails in the upcoming years. The forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier. Table 2 shows a-five years (2013-2017) forecast for the number of mails handled in the area. The time series expert modeler procedure of SPSS version 16 was used. This is because it applies exponential smoothing model and can make predictions even in seasonal trend. As can be detected from the time plot in Figure 3, the trend shows strong seasonal variation. The model predicted the likely total number of mails that will be handled for these years based on the trend drawn from the historical data. The predicted values (number of mails) are highlighted in the forecast table (Table 2). The forecast shows a declining trend. For example, in 2013 (the first year of forecast) the predicted number is 993,890 mails and in 2017 (last year of forecast) the value is 601,690 mails. This is graphically displayed in the model's forecast plot. In the Forecast Table 2, the UCL represent the Upper Confidence Limit and LCL is the Lower Confidence Limit, this is set to 0.05 (95%) level. Figure 4 shows the forecast trend that is likely to be witnessed in the next five years.

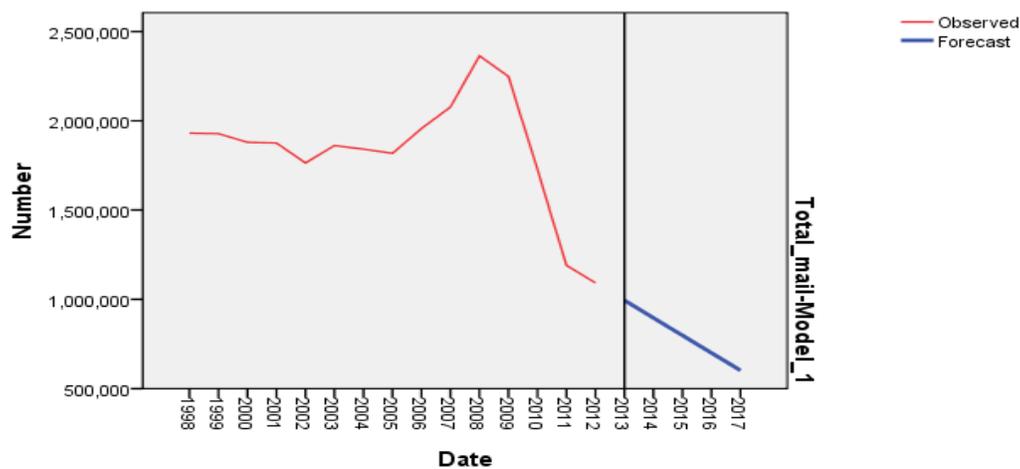


Figure 4: The time series forecast plot for the volume of mails

3.4. Time Series Plot of Revenue Generated

Time plot was carried out to see how revenue generated from postal services varies over time, and whether the trend corresponds with that of the total mails handled. The trend line (line C) in Figure shows an increasing trend, meaning that revenue increased with time. This observation is unexpected knowing that the volume of mail handled by the post offices located in the study area is declining. The cause of the unexpected phenomena is a result of an increase in the parcel delivery undertaken by the post offices. The time series line plot (line A) shows seasonal fluctuation but from 2005-2012 the revenue fluctuates above the mean (line B).

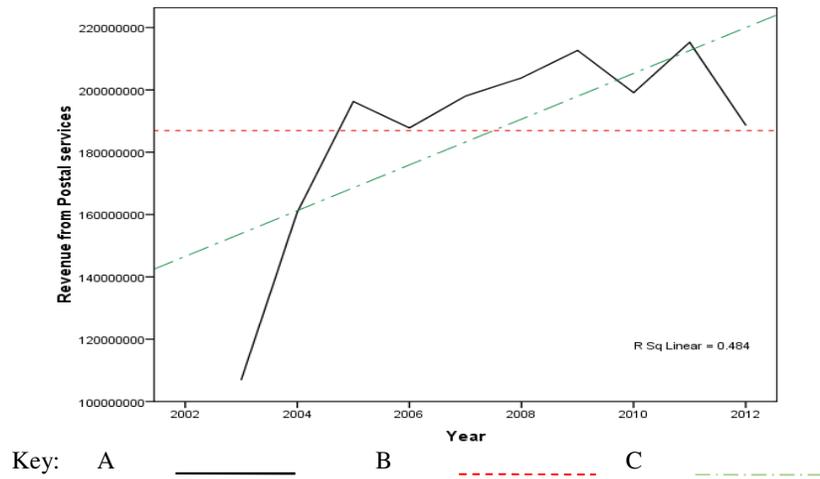


Figure 5: A time series plot for the revenue generated by the post office

To investigate how revenue varies over time, a simple linear regression (least square approach) was carried out. The correlation (Table 4) shows that there was a strong positive correlation (0.696) between the variables (which is the revenue generated by the post offices and the volume of mails handled by the post offices in the study area). That is to say, an increase in the volume of mail handled by the post office will lead to an increase in the revenue generated by the post office.

Table 4: Correlation between revenue generated and volume of mails handled by the post offices

		Revenue from Postal services	Year
Pearson Correlation	Revenue from Postal services	1.000	0.696
	Year	0.696	1.000
Sig. (1-tailed)	Revenue from Postal services	.	0.013
	Year	0.013	.
N	Revenue from Postal services	10	10
	Year	10	10

3.5. Analysis of the Factors that Influences the Utilisation of the Post Office

The result of the binary logistic regression shows that short distance of between 0-4km significantly increases the likelihood or probability of utilizing postal services. In other words, those residing much closer to the post office would be encouraged to utilize the services offered by the post office. This increased likelihood is confirmed by the Exponentiated B (Exp B) [the exponentiated B is was used to show the proportional changes in the independent variables that will lead to changes in the dependent variables] since the values of each class of the variable (distance) are more than 1. However, for distance of <1km the Exp(B) is roughly 31, indicating that when a distance of 1km is added, the odd ratio is 31 times as large meaning that utilization will likely increase by 31 times. While for distance of 1-4km the Exp(B) is about 12, indicating that the odd ratio has dropped from 31 to 12 as distance increased. By implication, even though 1-4km distance significantly increases the likelihood of patronizing post offices at 0.05 level of confidence, a further increase in distance will return a negative Beta coefficient value (B) and an Exp (B) less than 1, which means a decrease likelihood. Increase likelihood reached its threshold at 1-4km class from here further distance away from post office will decrease patronage. This is confirmed by the Wald statistic in the parameter estimate table which initially recorded 34.9 for distance <1km and 25.7 and 37.5 for 1-4km and >4km distances respectively. The drop from 34.9 to 25.7 which is the threshold of positive likelihood (increase) and to 37.5 which is the start of negative likelihood (decrease) means that distance above 4km decreases the patronage.

Table 5: Parameter estimate of binary logistic regression

	Beta coefficient	Standard error	Wald statistics	Degree of freedom	Significance level	Exp B
Sex (male)	0.181	0.406	0.199	1	0.655	1.199
Distance (<1km)	3.458	0.585	34.975	1	0.000	31.740
Distance (1-4km)	2.556	0.514	24.700	1	0.000	12.889
Distance (>4km)			37.470	2	0.000	
Income (<7500)	6.715	1.620	17.180	1	0.000	824.96
Income (7500-15,000)	6.497	1.274	25.995	1	0.000	663.11
Income (15,001-30,000)	5.799	1.193	23.646	1	0.000	329.89
Income (30,001-60,000)	3.758	1.068	12.378	1	0.000	42.855
Income (60,001-120,000)	-2.096	0.944	4.933	1	0.026	0.132
Income (>120,000)			34.959	5	0.000	
Education (no formal)	-1.051	0.897	1.374	1	0.241	0.350
Education (primary)	1.863	0.934	3.980	1	0.046	1.155
Education (secondary)	-0.150	0.942	3.997	1	0.032	0.131
Education (tertiary)			4.959	3	0.175	
Age (<24)	-8.979	1.294	48.184	1	0.000	0.000
Age (25-34)	-3.976	1.006	15.630	1	0.000	0.019
Age (35-44)	2.587	0.925	7.817	1	0.005	2.075
Age (45-54)	0.868	0.912	0.905	1	0.341	1.420
Age (>55)			60.340	4	0.000	

Based on income variable, the result shows that low to moderate income earners (ranging from 7500-60,000) increases the likelihood of patronizing or utilizing post office services. While high income earners of over 60,000 decreases the likelihood of utilizing the services. This is confirmed by the Beta coefficient-value of the Table 5. Income class of <7500, 7500-15,000, 15,001-30,000, 30,001-60,000 which returned Beta coefficient-value of 6.715, 6.497, 5.799, 3.758 respectively and income class 60,001-120,000 returned Beta

coefficient-value of -2.096. Further confirmation is seen in the Exp (B) which returned value less than 1 (0.132) indicating a decrease in the odd ratio and other categories (from <7500-60,000) returned high Exp (B) values over 1. All the income categories returned significant B-value at 0.05 level of confidence. Table 5 shows that for the level of education variable, no formal education category did not record significant Beta coefficient-value at 0.05 confident level. However, those in primary class significantly increase the likelihood of utilizing post offices with an odd ratio of roughly 1 time, therefore, when level of education is raised by 1 step further, there is high significant possibility that patronage will increase by 1 times the initial value. The secondary educational level returned a negative Beta coefficient-value of -0.150 and Exp (B) value less than 1 indicating a decrease in patronage. Consequently, when education level is raised by 1 step or level, the likelihood of utilizing post services will drop. Overall, it implies that educational qualification significantly influence utilization. The Wald statistic confirmed that as education level increases from secondary to tertiary, the degree of decrease is raised from 3.980 to 4.959, meaning that those with secondary to tertiary qualification may likely not patronized post offices.

With respect to age variable, the analysis revealed that age group <24 and 25-34 returned negative Beta coefficient-values of -8.979 and -3.976 respectively and Exp (B) less than 1. While age group of 35-44, and 45-54 returned Beta coefficient-values of 2.587, and 0.868 with Exp (B) values of 2.075 and 1.420 respectively. This means that youthful age ranging from less than 24 to 34 decreases the likelihood of utilizing postal services, while greater than 34 increases the likelihood of patronizing post office.

Table 6: Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	177.732	0.524	0.734

Overall, the model summary in Table 6 shows a significantly high relationship between the dependent variable (utilization) and the predictors (sex, distance, income, level of education and age group) collectively. However, in Table 5, by individual standard, sex did not significantly explain the variation in utilization. The Cox & Snell R-square and Nagelkerke R-square were both used in the analysis as Pseudo R-square. They respectively returned strong strength of relationship and explained proportion of about 52 (0.524) and 72 (0.734) percent. This implies that the selected variables (independent) significantly predicted the variation in utilization.

4. CONCLUSION

The study examined a trend analysis in the utilisation of post office in Benin City. The post office has witnessed a decrease in the overall yearly mails handled which indicated that there was a drop in the rate at which the post office is utilised to send mails by the people. Irrespective of the decrease in the rate at which mails are sent through the post office, it has witnessed an unprecedented increase in revenue, and this was as a result of the increase in the rate at which it is being used to send parcel goods. The following factors were found to have influence on the utilisation of the post office; distance, income, education, and age. It was observed that distance and age had a higher influence on the utilisation of the post office than the other factors.

5. CONFLICT OF INTEREST

There is no conflict of interest associated with this work.

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