The Contributions of E-Ticketing to The Performance of Transport Operations in South Western Nigeria

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ABSTRACT

The introduction of e-ticketing has changed this hitherto mode of payment. Thus, E-ticketing is a tool associated for the implementation of a pricing policy with the consideration of operational, commercial and social goals.

This study was carried out in Lagos, the former capital territory and the economic nerve centre of the country. For the purpose of this study, registered transport operators in the study area were randomly sampled while a total number of 50 passengers were sampled using incidental sampling technique. Data were collected with the aid of structured questionnaires and interview schedules. Regression analysis was used to establish the relationship between the performances of e-ticketing on variables such as: level of income, accessibility, perception and government policy on fuel among others.

The result of regression model showed that, coefficient of variables was statistically significant at 1%, probability level. The variables are age, gender, education, financial gain, and marital status. Age (β=1.42) negatively affects e-ticketing on performance of public transport operation. This shows that an increase in the number of years of the people about the use of e-ticketing the lesser the level of purchases while, Education is positively correlated with e-ticketing on performance of public transport operation and significant at 5% level. This shows that education has helped the respondents to understand the important use of e-ticketing which enhance the efficiency and effectiveness of the online purchases whereas, Income (β=3.46) is another variable of interest and it is positively significant at 1% level of probability. Income is one of the demographic factors that are often included in previous studies.

Conclusively, it was revealed that personal attributes of the passengers are the major determinants of performance of e-ticketing in public transport operation in the study area.

KEY WORDS: E-Ticketing, Performance, Transport, Operations

INTRODUCTION

Transportation services are the basis for economic, social and political development in most societies as it shows a close relationship to the style and quality of living of the society. Transportation plays an important role in the day-to-day activities of the society. Some of the roles it plays in our societies are social, economic, political and environmental. It is of interesting to note that, transportation system, majorly public transport in most part of Nigerian cities, is not sustainable (Adeniji, 1987). This can be attributed to the poor state of urban road networks that are under severe pressure, as seen by the poor traffic congestion and other notable transport externalities. Public transport operation in Nigeria is at present the joint responsibility of two broad groups, namely: the private sector and the public sector operators. The public sector businesses in Nigeria are either owned by Federal, State or Local government.

Adesanya (2002) has it that every state and local governments in Nigeria one way or the other have established their own public transport services which are relatively more organized, while most of the private sector operators are largely unorganized and depend more on fare revenues and financial supports from informal sources such as banks, friends, relatives, money lenders in order to finance their operations. The reasons being that, many governments owned mass transit companies in Nigeria have been equipped with better trained staff, workshops and maintenance facilities than most of private sector operators. Their services are also provided on fixed routes, and relatively cheaper than
those offered by private sector operators. While many government owned transport services have schedules or time tables, but they are inefficient in terms of performance because of their inadequate vehicles, declining fleet utilization rates, growing competition with private and paratransit operators, poor traffic management, congestion problems especially during peak travel periods and other problems associated with the operating environment (Umar, 2003).

Ticketing is a tool associated for the implementation of a pricing policy with the consideration of operational, commercial and social goals. The ticketing system is a medium through which the translation of fares into concrete means of payment (for the passenger) and fare collection (for the operator) are undertaking. Different types of tickets are used in public transport systems (ticket-based price discrimination). In other words, the price depends on the ticket type used. Ticket-based price discrimination is price discrimination in its purest form which makes no difference to an operator’s production costs whether a passenger makes a trip using a single ticket, a carnet or a season ticket. Indeed, it costs the same for the operator to transport a student, an elderly or a passenger paying full fare.

Generally speaking, the following types of tickets are in use in public transport network:

- Single ticket: one journey (no time limit) - Zonal single ticket - Origin-Destination single ticket;
- Single ticket: several journeys within a limited duration; Single-mode / Single-operator ticket; Multi-mode / Multi-operator ticket; Return ticket; Multi-journey ticket; Season ticket; Value ticket; Off-peak ticket / Night ticket; Combined ticket; Group ticket / Family ticket; • Special event ticket.

Ticketing media include: Cash; Tokens; Paper tickets; Magnetic strip ticket; Contact-based smartcard.

Today, four other generations of ticketing systems co-exist in the world and sometimes operate even in the same city:

(i) The oldest system of tokens or paper tickets is still widely used worldwide.
(ii) The magnetic ticketing system that was introduced in the 70s, can be divided into two major parts:
- Ticketing with automatic belt drive (the most common format)
- Ticketing with manual a sweeping motion of the ticket by the passenger.
(iii) Contactless ticketing appeared in the 90s. The advantage it has is that it is fast replacing the other two types of ticketing. Many public transport networks are replacing their first ticketing generation system directly by a contactless one, and this has assisted them to surpass the magnetic ticket generation stage. Contactless ticketing uses Radio Frequency Identification (RFID) or Near Field Communication (NFC) technology to establish a communication between the card and the validation device.
(iv) Mobile ticketing systems based on the use of the passenger’s mobile phone for the payment of travel cost. Mobile tickets are being issued using SMS (short text message) or mobile barcodes. The ticket selection is performed by sending an SMS to the background system, either accompanied by a specifying text or by sending it to a specific phone number for each possible ticket. An electronic ticket is then returned through SMS to the user.

LITERATURE REVIEW

An electronic ticket (commonly abbreviated as e-ticket) is a digital ticket. Electronic ticketing for public transport is usually referred to as travel card or transit pass. It is also used in ticketing in the entertainment industry. An electronic ticket system is a more efficient method of ticket entry, processing and marketing for companies in the railways, flight and other transport industry. Electronic ticketing is a form of electronic commerce for different kinds of tickets, for instance public transport or long-distance travel by train or air plane, but also for touristic sites or leisure events. Like any other industry, the travel management industry also faces challenges brought by technological advances. E-ticketing by definition combines the issue and delivery of ticket into a single operation (www.travelandtourism.com, 2005). An e-ticketing model allows authorised travel agents to transmit ticketing information directly to the airline’s database, enabling passengers to check-in and board the flight without showing a paper ticket. E-tickets substitutes the paper-based flight coupons by an electronic ticket image that is stored in the airline’s database. With an e-ticket, details of the passengers’ journey are stored in an airline database, and are retrieved using a unique lookup code.
This means that there is no need to issue a physical ticket to the passenger; instead the code can be delivered via the Internet or over the phone. E-ticketing, the new way of issuing and delivering tickets is becoming prevalent and is employed by many airline companies in an effort to reduce the costs that goes to printing tickets.

In India, for instance, it is projected that the e-ticketing will result in 10 to 15 million US dollar saving (www.travelandtourism.com, 2005). While e-ticketing creates cost savings for the public transport companies, travellers get their benefits in terms of convenience. The travellers do not need to carry a paper ticket, which means that the tension of misplacing a ticket is eliminated. The move towards e-ticketing has also received warm welcome from corporate sectors. The electronic management of ticket information helps the companies in tracking their expenditures and support corporate travel policies more efficiently (Hopkin, 2005). Globally, in 2005 electronic tickets account for approximately 30% of all tickets issued, compared to 19% in 2004.

Electronic ticketing has been developed as an evolution of credit cards with magnetic stripe due to concerns of inefficiency in information management and control of the operations. The technological platform registers users, controls ticket sale, loads credits on board the bus and issues management reports allowing accurate monitoring of data (Lubeck et al., 2009)

Online Purchasing Behaviour and Socio-Demographic Factors

Many studies have tried to gain an improved insight into understanding the consumer behavior in cyberspace (Butler and Peppard, 1998; Chen and Shergill, 2005; Kolsaker et al., 2004). According to Shwu (2003) and Burke (2002), consumer purchases decision are influenced strongly by demographic, economic, social, situational and technological factors. Four relevant demographic factors; age, gender, education and income are found to be significant with the consumers’ attitude towards online shopping. Schiffman and Kanuk (1997) suggested that the higher the consumers’ socio-economic status, (measured by education, income, and occupational status) the more positive the consumers’ perceptions of online buying relative to offline buying. In addition Wood (2002) in his studies found that younger adults, those under 25 years old are more interested in using technologies like the Internet to find out about new products, search for product information and compare and evaluate alternatives. Ratchford et al. (2001) on the other hand suggested that the reason for this is that older consumers may perceive the benefits of Internet shopping to be less than the cost of investing in the skill needed to do it effectively, and therefore avoid shopping on the Internet. Earlier studies done by Steenkamp et al. (1999) and Venkataram and Price (1990) indicated that consumers’ innovativeness is lower among older consumers, and they tend to be satisfied with conventional shopping methods. Besides age, gender is also found to be an important variable in determining the consumers’ attitudes towards online shopping. Monsuwe et al. (2004) reported that males express a greater favourable attitude towards internet shopping than females. They are more positive about using the Internet as a shopping medium, whereas female shoppers prefer to use catalogues to shop at home. Similarly Shwu (2003) discovered that the mean attitude score for males towards online shopping was significantly higher than for females. Nevertheless, Wallace (2005) noted that the increasing use of the Internet by women, their growing economic power and their dominant influence on household shopping behaviours have made them a market segment to be targeted in the future. According to Burke (2002) and Dholakia and Uusitalo (2002) education is found to affect the adoption behaviour of online purchasing. Li et al. (1999) suggested that the reason for this is that education is often positively correlated with an individual’s level of Internet literacy. Higher educated consumers are found to be more comfortable in using non-store channels, such as Internet to shop. Income is one of the demographic factors that are often included in previous studies. Monsuwe et al. (2004) reported that consumers with higher household incomes tend to shop more online compared to lower income consumers. This finding is found to be consistent with the previous studies done by Danthu and Gracia (1999) and Hoffman et al. (1999). Consumers with middle-income groups are most likely to shop using Internet as a medium. The explanation of these findings could be that higher household incomes are often positively correlated with possession of computers, Internet access and higher education levels of consumers (Lohse et al., 2000).
Benefits for public transport operators and authorities

The benefits for operators are hard to quantify, as the main aim of e-ticketing is an improved service quality. According to Huomo (2009), there is sometimes a lack of understanding of the pros and cons of e-ticketing. Stroh et al. (2007) go even further, saying that ‘several business case calculations have shown that these implementation and operating costs would not be outweighed by the reduction in ticket distribution costs.’ (Stroh, Schneiderbauer, Amling & Kreft, 2007) However, this assumption is based on smart-card technology; the authors additionally argue that NFC technology allows a beneficial business case for public transport operators. E-ticketing enables a better integration of alternative services into the scheme, making it more attractive for customers to use it. Another important benefit relates to the operator’s reputation, as it appears as a pioneering enterprise. The larger Asian schemes have succeeded in setting up a brand (e.g., Octopus in Hong Kong) that enjoys great popularity. However, the benefits are to a large extent an element of uncertainty (PricewaterhouseCoopers, 2011). Nonetheless, some of the benefits can be monetised. The reduction of costs related to reductions in boarding times and thus a better throughput can reduce costs, especially in high-demand areas. But this is also possible only when enough users adopt this technology. A reduction in fraudulent travel can be quantified as well. Due to accurate data on passenger flows, e-ticketing might also help to better exploit the network’s capacities and to improve the user experience by setting up tailor-made services for individual passengers.

Iseki et al. (2008) reviewed three smart-card systems in the United States and determined that individual transport operators bear the majority of the deployment costs. According to them, the main beneficiaries of smart-card systems are individual operators and the end users. But they also note that each scheme creates different costs and benefits, depending heavily on the public transport characteristics of the given region (e.g., whether a single operator or multiple operators are involved, government subsidy structures, existing ticketing infrastructure, etc.). They come to the conclusion that large operators are likely to have a better cost-benefit ratio than other companies involved in the system. Iseki et al. (2008) conclude that smart and integrated ticketing systems hold tremendous promise for bringing benefits to operators (and users), but cause substantial costs as well. However, Welde (2012) concludes in his study on the smart-card ticketing system for the city of Trondheim that ‘it often takes time before all challenges are overcome and benefits can be realized’ and that, from a purely economic point of view, investments in public transport are only seldom profitable. In line with this, the Australian Department of Finance and Deregulation (2008) states that only a few of the existing schemes are ‘designed to return a direct profit to the scheme owners.

METHODOLOGY

This study was carried out in the administrative seats of selected State of South western Nigeria that is, Lagos. The state is well known to have existed for a long time as economies nerve and administrative centres in Nigeria. The activities of the colonial administration between the mid-20th century accelerate their growth and development. More so, it is of importance to note that its relatively advanced transport systems, such as the railways and motorable roads have escalated their growth since the late 19th century. The state is connected by major and express roads with a convenience location in the country which makes them accessible to the more economically developed regions in the country.

For the purpose of this study, population of only registered public transport companies in the aforementioned areas constituted the population of the study. This study adopted a stratified sampling technique for the selection of respondents from the study areas. This is because public transport companies are scattered all over the study area. Total of 50 respondents will be selected for the collection of information in the study area.

The data that were collected through survey questionnaires and interview schedules were collated and coded in a spread sheet. Both descriptive and inferential statistics, using Stata 11.0 were used.

Both descriptive and inferential statistics will be used. The descriptive statistics will involves the use of tables, frequency distributions and percentages. The method will be employed to analyse the
socio-economic characteristics of the respondents vis-a-vis the distribution of their gender, age, marital status, educational status, family size. While the inferential statistics used will involves regression model to show the relationship which exist between dependent variable and the explanatory variables.

The model intends to identify the contribution of e - ticket on the performance of public transport with performance as the dependent variable and gender, age, marital status, education, income, occupational status, financial benefit, accessibility and convenience, attitude, perception, government policy as independent variables.

The regression model specified in this study to identify the contribution of e - ticket on the performance of public transport can be expressed as follows:
The model is in explicit form:

\[ Y = f(X_1, X_2, X_3, \ldots, X_n) + e \]  

where \( Y \) = Performance
\( X_1 = \) Gender (Dummy variable, male (1) female (0))
\( X_2 = \) Age (years)
\( X_3 = \) Level of Education (formal (1) informal (0))
\( X_4 = \) Marital status (single (1) married (0))
\( X_5 = \) Occupational status (civil servant (1) otherwise (0))
\( X_6 = \) Income (Naira)
\( X_7 = \) Financial benefit (Naira)
\( X_8 = \) Accessibility and convenience (Dummy, access (1) otherwise (0))
\( X_9 = \) Attitude (yes (1) No (0))
\( X_{10} = \) Perception (yes (1) No (0))
\( X_{11} = \) Government policy (yes (1) No (0))
\( U_i = \) error term

RESULTS AND DISCUSSION

A summary of the distribution of these variables that are expected to have important implications on the contribution of e - ticketing to the performance of public transport operation in south western Nigeria is presented in Table 1. About 60% of the respondents were male while 40% were female. This shows that female respondents were generally less likely to be involved in the use of e- ticket than the male counterpart. Therefore there is the need to encourage women to get themselves involve in the use of e - ticket by changing their attitude and perceptions towards online shopping relative to offline buying. Schiffman and Kanuk (1997). Monsuwe et al. (2004) reported that males express a greater favourable attitude towards internet shopping than females. They are more positive about using the Internet as a shopping medium, whereas female shoppers prefer to use catalogues to shop at home. Besides gender, age is also found to be an important variable in determining the consumers’ attitudes towards online shopping.

The Table 1, also shows that 10% of the respondents were less than age of 25years. 60% were within 26 – 45 age groups, while 20% where between 46 – 55 years age cohort and just about 10% were more than 56 years old. This revealed that the population sampled was predominantly middle aged. This age – groups are known to be energetic and therefore expected to be economically active in exploring avenue for business opportunities (Steenkamp et al., 1999). Earlier studies done by Venkataram and Price (1990) indicated that consumers’ innovativeness is lower among older consumers, and they tend to be satisfied with conventional shopping methods.

The result of the educational status of the respondents is in Table 1. Six per cent had primary education, 20% had post primary education, and 10% had vocational/Technical education while the remaining 64% had attended either polytechnics or Universities. The distribution clearly reveals that, all the respondents (100%) had acquired one level of education or the other. According to Burke (2002) and Dholakia and Uusitalo (2002) education is found to affect the adoption behaviour of online purchasing.

In respect of their marital status, about 70% were married while 30% were single. This implies that, the married are more likely to be relatively stable, making financial institutions to view them as
more reliable and makes them more likely to be committed to the use of e-ticket compared to the unmarried.

Table 1: Frequency and Percentage Distribution of Respondents by their socio-demographic characteristics

<table>
<thead>
<tr>
<th>Socio-Demographic characteristics</th>
<th>Frequency</th>
<th>Percentage %</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>40</td>
<td>100.0</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 25</td>
<td>5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>26 – 45</td>
<td>30</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>46 – 55</td>
<td>10</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>56 above</td>
<td>5</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Educational Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>3</td>
<td>06</td>
<td>06</td>
</tr>
<tr>
<td>Post primary</td>
<td>10</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Vocational/Technical</td>
<td>5</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>Tertiary</td>
<td>22</td>
<td>6.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>15</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Married</td>
<td>35</td>
<td>70</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2015

4.2. Contributions of e-ticketing to the performance of public transport operations.

Table 2 shows regression of e-ticketing on performance of public transport operations. The result of regression model shows that Table 2 has coefficient of variables that were statistically significant at 1%, 5% and 10% probability levels. The variables are age, gender, education, financial gain, and marital status. Age (-4.12) negatively affects e-ticketing on performance of public transport operation. This shows that an increase in the number of years of the people about the use of e-ticketing the lesser the level of purchases. Wood (2002) in his studies found that younger adults, those under 25 years old are more interested in using technologies like the Internet to find out about new products, search for product information and compare and evaluate alternatives. Ratchford et al. (2001) on the other hand suggested that the reason for this is that older consumers may perceive the benefits of Internet shopping to be less than the cost of investing in the skill needed to do it effectively, and therefore avoid shopping on the Internet.

Education is positively correlated with e-ticketing on performance of public transport operation and significant at 5% level. This shows that education has helped the respondents to understand the important use of e-ticketing which enhance the efficiency and effectiveness of the online purchases. Li et al. (1999) suggested that the reason for this is that education is often positively correlated with an individual’s level of Internet literacy. Higher educated consumers are found to be more comfortable in using non-store channels, such as Internet to shop.

In terms of gender (1.86), it is significantly correlated with the use of e-ticketing positively. Shwu (2003) discovered that the mean attitude score for males towards online shopping was significantly higher than for females. Nevertheless, Wallace (2005) noted that the increasing use of the Internet by women, their growing economic power and their dominant influence on household shopping behaviours have made them a market segment to be targeted in the future.

Income (3.46) is another variable of interest and it is positively significant at 1% level of probability. Income is one of the demographic factors that are often included in previous studies.
Monsuwe et al. (2004) reported that consumers with higher household incomes tend to shop more online compared to lower income consumers. This finding is found to be consistent with the previous studies done by Danthu and Gracia (1999) and Hoffman et al. (1999). Consumers with middle-income groups are most likely to shop using Internet as a medium. The explanation of these findings could be that higher household incomes are often positively correlated with possession of computers, Internet access and higher education levels of consumers (Lohse et al., 2000).

Table 2: Regression of Contribution of e-ticketing to the performance of public transport Operations.  

| Explanatory variable | Coefficient | Std. Err. | Z     | p>|z|  | (95% conf.) | Interval  |
|----------------------|-------------|-----------|-------|-----|-----------|-----------|
| Ln (age)             | 0.3         | 0.1124542 | -4.12*** | 0.001 | -0.0014458 | 0.5614458 |
| Ln(education)        | 0.6         | 0.1825742 | 2.52**  | 0.033 | 0.2002776 | 0.3702776 |
| Gender               | 0.6         | 0.3140476 | 1.86*   | 0.054 | 0.0077829 | 1.4827829 |
| Income               | 0.4         | 0.1154701 | 3.46*** | 0.001 | 0.1658150 | 0.6341841 |
| Attitude             | -2.34e.15   | 0.2999508 | 0.00   | 1.000 | 0.0083285 | 1.208328  |
| Perception           | -2.91e – 15 | .1661644 | -0.00  | 1.000 | -0.2336997 | 0.3369971 |
| Financial Benefit    | -2.57e – 15 | .288624  | -0.00  | 1.000 | -0.5853567 | 0.5853567 |
| Constant             | 9.21.e – 15 | .4544276 | 0.00   | 1.000 | -0.9216218 | 0.9216218 |

Number of Obs. 50  
F (13, 36) 18.43  
Prob. > F 0.0000  
Pseudo R2 0.8753  

Source: Field Survey, 2015  
*Significant at 10%  
** Significant at 5%  
*** Significant at 1%

Conclusion and Recommendations

This study dealt with policy options for growth and development. It examined the contribution of e-ticketing on the performance of public transport operation in south western Nigeria. Using the regression model, the research analysed the determinants of e-ticketing on the performance of public transport operation in south western Nigeria. It identified that e-ticketing on the performance of public transport operation is influenced by gender, age, education and marital status. That the increasing use of the Internet by women, their growing economic power and their dominant influence on household shopping behaviours have made them a market segment to be targeted in the future.

The population sampled was predominantly middle aged. This age – groups are known to be energetic and more importantly the younger adults, those under 25 years old are more interested in using technologies like the Internet to find out about new products, search for product information and compare and evaluate alternatives.

The distribution clearly reveals that, all the respondents (100%) had acquired one level of education or the other. This shows that education has helped the respondents to understand the important use of e-ticketing which enhance the efficiency and effectiveness of the online purchases. Li et al. (1999) suggested that the reason for this is that education is often positively correlated with an individual’s level of Internet literacy. Higher educated consumers are found to be more comfortable in using non-store channels, such as Internet to shop.

It was also believed that income has a strong impact in that consumers with higher household incomes tend to shop more online compared to lower income consumers. Moreso, consumers with middle-income groups are most likely to shop using Internet as a medium. The explanation of these
findings could be that higher household incomes are often positively correlated with possession of computers, Internet access.

Based on the findings and conclusion of the crucial role played by e-ticket factors in public transport organization, there is need for policy measures to increase workers’ morale in public transport organization to achieve the objectives of the organization at large;
The workers should be encouraged to be dedicated to the work assigned to them and to work together for the development of the organization;
It is therefore necessary to provide a policy environment that affords the necessary incentives for workers to grow and developed.

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transporte público da região metropolitana de Porto Alegre. Revista Redes (Santa Cruz do Sul), 14, p 1-25.


