

ANALYSIS OF THE EFFECTS OF INFORMATION SYSTEM ON SERVICE DELIVERY AT DVLA

¹Akwetey Henry Matey, ²Wolali Ametepe, ³Isaac Asampana and ⁴Hillar Addo

^{1,3}University of Professional Studies P.O. Box LG 149
Legon-Accra Ghana

²School of Computer Science and Communication Engineering,
Jiangsu University, 212013 Zhenjiang, China

⁴Lucas College

¹hmateyakwetey@upsamail.edu.gh, ²wolajsu@outlook.com, ³isaac.asampana@upsamail.edu.gh

⁴h.addo@lucas-college.net

Abstract- An Information System (IS) offers various benefits in managing transactions between an organization and its customers. Lack of Information system purely oriented to customer satisfaction leads to long waiting lines by customers in service delivery. It will influence negatively on-expected revenue and profit to various establishments in the long term. With recent trends in specific IS applications, expectations are that if waiting lines are not eliminated, perhaps may be reduce drastically in service delivery. Several steps were taken in putting measures in place by expanding facilities, providing timely and periodic maintenance, yet waiting lines are observed in places like; Bank Automated Teller Machine(ATM) (as an extended banking services), Electricity Company pay points, Clinics and Hospitals etc. These reviews seek to focus on Driver and Vehicle Licensing Authority (DVLA) in Ghana since long waiting line is much associated with their service delivery. Using Convenience sampling technique, questionnaires were administered in eliciting data from staff and clients of DVLA. Final data was analyzed using Statistical Package for Social Science (SPSS); with the support of Microsoft Excel 2010 in depicting the results in frequency tables, percentages, charts etc. The trends in the results show evidently that even though Information Systems was used in the services delivery process; there are prevailing waiting lines, which were observed. It was also established that services delivery processes are not electronic at DVLA, resulting in the formation of the longer waiting lines.

Indexed Terms-: Information system, services delivery, waiting lines, Automated Teller Machine.

I. INTRODUCTION

The focus drive of most Information System (IS) [1]are built on the basis of prompt customer service satisfaction. According to Rob Kling in [2], “when a specialist discusses computerization and work, they often appeal to a strong implicit image about the transformation of work in the last one hundred years and the role technology in bringing about such transformations.” In view of this, it is quite imperative to relate this with the Driver and Vehicle Licensing Authority (DVLA), and in taking actions aimed at guiding against the problems associated with information systems. The DVLA has witness a significant reform in recent times; all in an effort to maximize profit reduce cost and satisfy customers in a generally acceptable international standard. Despite these efforts, one observable fact remains inevitable; that is long waiting lines.

Routinely, the formation of long waiting lines of customers to be serviced at DVLA [3, 4] though similar waiting lines are formed in places like the banking halls, Electricity Company pay points, Shopping Centre’s like the Mall etc. Bakari, Chamalwa, & Baba[5] argued that queue is a general phenomenon in everyday life. Queues are formed when customers (human or not) demanding service have to wait because their number exceeds the number of servers available; or the facility

does not work efficiently or takes more than the time prescribed to service a customer. Some customers wait when the total number of customers requiring service exceeds the number of service facilities; in some cases service facilities stand idle when the total number of service facilities exceeds the number of customers requiring service. Even with that sometimes intermittently or occasionally do experience long queues in service delivery. Bakari et al.,[5] defined queue as simply a waiting line, while Kleinrock[6] also address it in a similar way as “a flow of customers from infinite or finite population towards the service facility form a queue or waiting line on account of lack of capability to serve them all at a time.” Waiting line management has the greatest dilemma for managers seeking to improve on investment in their area of operation; since customers cannot endure waiting intensely.

Whenever customers get depressed and leave the queue to get the service at some other service facility, the organization loses the customer loyalty or the customer may not come back to the facility when they need the same kind of services. This in the long term impact negatively on customer demand on services and also would affect the [7] expected revenue and profit of an organization in a fiscal year. In spite of these negative impacts, majority of organizational management do deem it fit to resolve the issue of routine waiting lines they experience in their services delivery, by expanding facilities. This always results in an additional cost of operation to management.

In any queuing system, [8-10] we have an input that arrives at some facility for service or processing and the time between the arrivals of individual inputs at the service facility is commonly random in nature. Similarly, the time for service is commonly a random variable depending on the needs of the individual customers from that service facility. Adlsak et al.,[11] conducted a study on three Hospital Outpatient Departments. The activities in the service pattern are all the same, but the processes within individual departments are different in each hospital studied. It is evident that the medium-to-large sized hospitals have empowered the outpatients' departments by setting up work cells within one area. The study indicates that there is much opportunity for improvement in patient flow, especially reduction in waiting time. Indicating that the application of techniques from “lean manufacturing” may allow hospital to serve more patients through productivity improvement. However, applying lean concepts may cause inconvenience to the patient's welfare. Reducing service times may also result in more errors in diagnosis and treatment. Patients may take longer to recover and, consequently placing workload demands on the hospital over a longer period. As contribution to the problems of waiting times, Mark and Chamboon [12] also added that health care providers can emulate efforts of what other corporations are putting into streamlining processes and should be harnessed by health care in order to reduce the bane of many health systems' waiting times, everything from the extra hour with the doctor to an extra six months waiting for a procedure that is in limited supply. He further stated that in an effort of improving access, the following should be considered as principles such as understanding the balance between supply and demand, recalibrating the system, applying queuing theory, creating contingency plans, influencing the demand, and managing the constraints. Bakari et al.,[5] also conducted a study on queuing process and its application to customer service delivery with specific focus on the banking sector. The study indicates high utilization of the system and shows the average number of customers in the system to be 22 and the average number of customers in the queue is 21. A customer spends an average of 1.15 hours before he or she is serviced by the system while a customer is likely to spend an average of 1.10 hours in the queue waiting for service. This

study seeks to examine the issues of waiting time associated with services delivery from the perspective of both operators and users and mainly on Information System in general.

Our research aim at assessing why there are long queues associated with information system applications in services delivery with specific focus on Driver and Vehicle Licensing Authority (DVLA) in Ghana with the following specific focus objective:

- a) To identify the challenges affecting business transactions in the use of information system.
- b) To investigate the relationship associated with queues, service delivery, and information systems

With the problems identified in the previous study and with careful observation from other Information system implemented informed the purpose of our current study to investigate why there are long queues associated with information system in service delivery. As a result, the following research questions were examined:

- a) What are the challenges affecting business transactions in the use of information system?
- b) What are the relationship associated with queues, service delivery, and information systems?

II. LITERATURE REVIEW

The Driver and Vehicle Licensing Authority (DVLA) is a semi-autonomous public sector organization under the Ministry of Transport. Their mandate as an authority is to promote good driving standards in the country, and ensuring safety of vehicles on our roads together with other related matters. Because of the technological advancement and in their quest to meet their mandate objectives, the authority seeks to implement measures with the aim of transforming their service delivery processes to their numerous customers within the country. Aferi et al.,[13] “DVLA launched an automation platform in 2014 to offer its cherished customers a means to sit in the comfort of their homes and offices to access services. Apart from reducing the turnaround time for accessing services, the program is targeted at reducing the incidence of 'goro' activities which has often been blamed on prolonged procedures and processes for accessing services at DVLA”. The authority made a move by introducing information systems in their services delivery to specific functional units of the authority; such as the unit in charge of issuing and renewal of driving licenses. Despite the interest demonstrated by the authority in automating issuance and renewal of its driving licenses to its customers, its operations have been deviled with the existence of long waiting lines. This gave rise to the activities of ‘goro boys’ prompting the Transport Minister Hon. Kwaku Ofori Asiamah to declare [14] in an interview with the media to pledge his full support for the complete automation of activities at the Driver and Vehicle Licensing Authority (DVLA) to eliminate the ‘goro boys’ menace.

According to Agarwal et al.,[15] “the Growth of Operations Research to a large extent, the result of the widespread availability of computers”. Most Operations Research involves carrying out a large number of numeric calculations and without computers this would simply not be possible”. During the past decades, an explosive growth in the number of institutions and organizations that provide different kinds of services delivery such as maintenance activities resulted in waiting lines. For instance at the DVLA, vehicles could be in waiting lines for re-examination and certification.

Drivers waiting to be served by staff of DVLA in relation to their license renewal; of which the DVLA have implemented information system to handle majority of this services they render to the public. In this consumer driven market, manufacturers are making every conceivable effort to please their customers, take their wishes and concerns seriously, anticipate market trends, and respond swiftly. To this reason Wolfsburg, Germany-based Volkswagen AG, as part of Volkswagen Group, decided to implement the Customer Relationship Management (mySAP CRM) solution. The solution allows their prospective car buyers to change the way they interact with the motor industry. Manufacturers have experienced a dramatic increase of inbound contacts from customers who wish to communicate directly, rather than through

dealership. They inquire about financing options, service matters, and vehicle information, and they voice complaints. The popularization of the Internet as a convenient information and communication platform has contributed to this intensified direct dialogue. In response, the car industry needs to have efficient systems for supporting customer dialogue and ensuring customer satisfaction of which the company is gaining huge value from having full visibility of each client. In the case of Driver and Vehicle Licensing Authority (DVLA) even though similar systems (information system) have been implemented, its various services delivery is flout with waiting lines (queues). Waiting lines are not only the lines formed by human beings but also the other things like railway coaches waiting at outer signal for green signal, vehicles waiting at traffic signal, material awaiting processing in the manufacturing industries etc. To every waiting line, the following must be considered service, (customer or element) and services station.

- customer or element represents a person or machine or any other thing, which is in need of some service from service facility or station
- Service represents any type of attention to the elements or customer to satisfy it need.
- Customer or elements will arrive and waits to receive the service at service station.

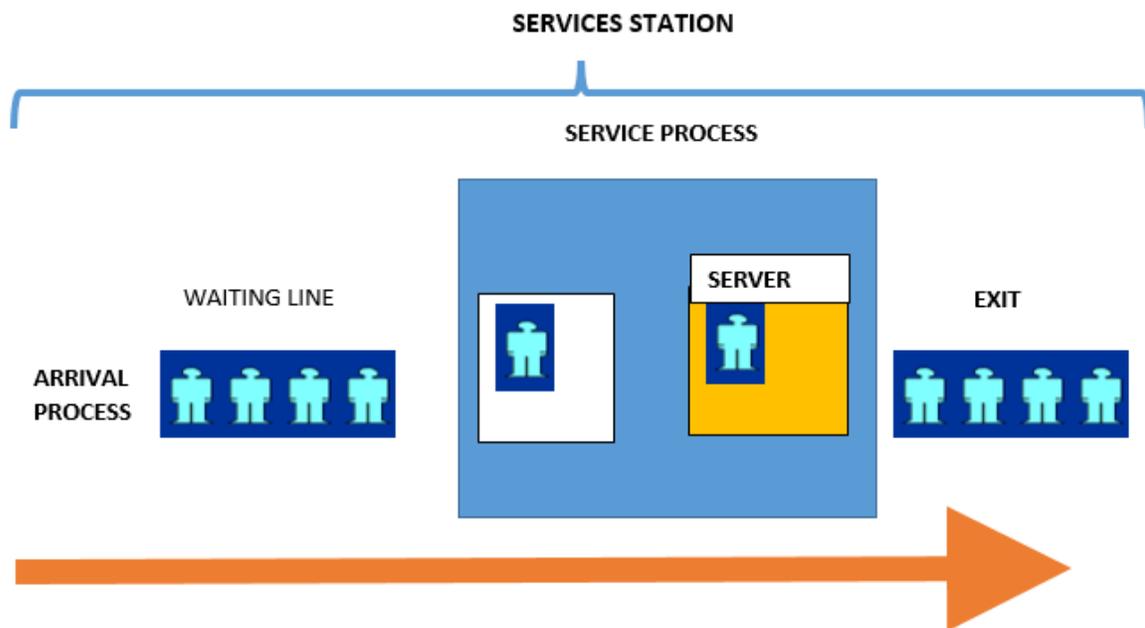


Figure 2.1: Proposed Diagram Showing Part of Queuing System

Arrival Process

This refers to the pattern at which the customers or elements usually arrive at the queuing system at the services center, considering the distribution of arrival time, batch arrivals, finite population and finite length of the queue and the Poisson arrival process can be modeled in many real world arrival processes.

2.1. Measuring Waiting Line

This is considered as the average number of customers waiting in line. The number of customers waiting in line can be interpreted in several ways. Short waiting lines may result from relatively steady customer arrivals without major demand from the DVLA having excess server's capacity opened. Again, long waiting lines could result from poor server efficiency, inadequate system capacity, and major surges in demand.

2.2. The Average Time Customers Spend Waiting, and Average Time Spent on The System

We usually link long waiting lines to poor-quality service. When long waiting times occur, one option may be to change the demand pattern. That is, the company can offer discounts or better service at less busy times of the day or week. For example, an airline reservation offers early-booking discount so that demand is more level. One would expect that the discount would move some demand from prime-time booking hours to the less desired booking hours. If too much time is spent on the system, customers might perceive the competency of the service provider as poor. For example, the amount of time customers spend in line and in the system at a retail checkout counter can be a result of a new employee not yet proficient at handling the transactions.

2.3. The system utilization rate

Measuring capacity utilization shows the percentage of time the servers are busy. Management's goal is to have enough servers to assure that waiting is within allowable limits but not so many servers are considered cost efficient.

2.4. Models and Modeling in Operations Research

Agarwal et al., [15] A model is defined as the approximation or abstraction, maintaining only the essential elements of the system, which may be constructed in various forms by establishing relationships among specified variables and parameters of the system. A model does not, and cannot, represent every aspect of reality because of the innumerable and changing characteristics of the real life problems to be represented. Modeling is the essence of an Operation Research approach. By building model, the complexities and uncertainties of a decision-making problem can be changed to logical structure that is amendable to formal analysis. In short, a model provides a clear structural framework to the problem for purposes of understanding and dealing with reality. Below is the type of model use; in considering the kind of services delivery processes the customer is expected to go through to archive his or her need the best queue model that will suit DVLA services delivery processes is the multi-server waiting line model or the multichannel constant server.

III. RESULTS AND DISCUSSION

3.1. Procedure for Data Collection

Questionnaires were sent to staff and clients of DVLA personally just to ensure the safe delivery and mutual understanding between the respondents. Since most of the clients do have usual business and spend some time in the premises of DVLA branch offices, a selected number of staff were given the questionnaires as they walked in and were collected before or after they had received their various services with DVLA.

3.2. Method of Data Analysis

The final data was analyzed using Statistical Package for Social Science (SPSS) as the main statistical tool. Microsoft Excel 2007 was used in presenting the final data in frequency tables, percentages, charts and graphs. These helped to portray a vivid, easily readable and understanding graph of data obtained and analysis performed. The data was also analyzed qualitatively as well because of its appropriate measure of feelings, ideas and behavior of the respondents.

3.3. Gender Profile of Respondents

Table 3.1: Gender Profile of Respondents (customers)

GENDER	NUMBER OF RESPONDENTS	PERCENTAGE (%)
MALE	29	50.0
FEMALE	29	50.0
TOTAL	58	100

(Source: Field Data, 2016)

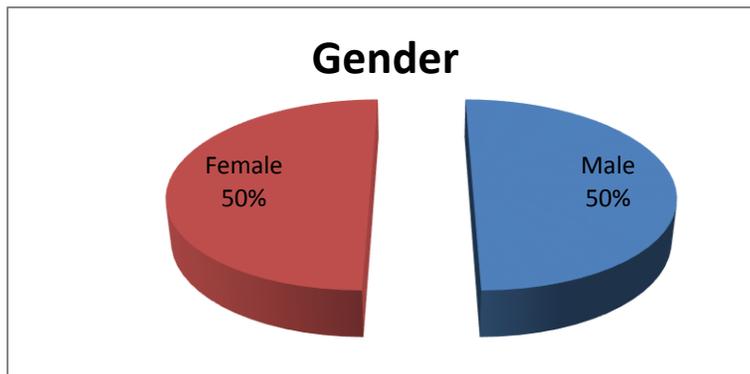


Figure 3.1: Gender Profile of Respondents (customers) (Source: Field Data, 2016)

Gender distribution, was considered as an important demographic indicator. The frequency distribution of this is given in Figure 3.1, which was considered the general profile of respondents of DVLA customers. From **Table 3.1** and **Figure 3.1**, 29 of the respondents, representing 50.0% and 29 of the respondents, representing 50.0% of the population were males and females respectively. There is an even distribution of the population studied in terms of the male and female.

3.4 Age Profile of Respondents

Table 3.2: Age Profile of Respondents

AGE (IN YEARS)	NUMBER OF RESPONDENTS	PERCENTAGE (%)
18 – 23	5	8.6
24 – 26	15	25.9
26 YEARS & ABOVE	38	65.5
TOTAL	58	100

(Source: Field Data, 2016)

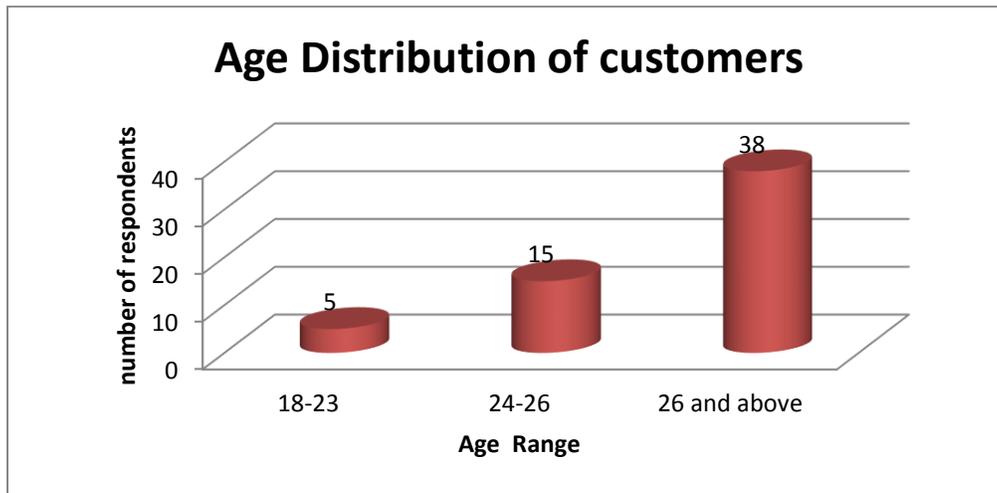


Figure 3.2: Age Profile of Respondents (Source: Field Data, 2016)

Age distribution in years was considered an important demographic indicator. The frequency distribution of this given in Table 3.2 and Figure 3.2 shows that, 5 of the respondents representing 8.6% are between the ages of 18 – 23 years, 15 of the respondents representing 29.9% are between the ages of 24 – 26 years, and the remaining 38 respondents, representing 65.5% are 26 years and above. This is an indication that majority of the respondents are matured with enough experience in driving with the possibility of doing business with DVLA more than two years.

3.5. Which Management Level or Department

Table 3.3: Which management level or department are you

CATEGORY	NUMBER OF RESPONDENTS	PERCENTAGE (%)
Top level	3	11.5
Middle level	8	30.8
Operational level	15	57.7
TOTAL	26	100

(Source: Field Data, 2016)

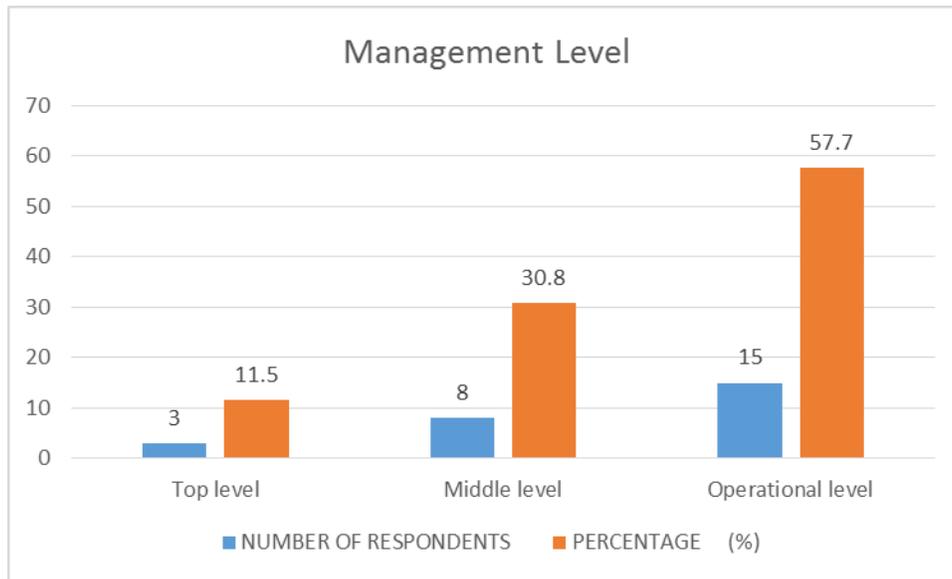


Figure 3.3: Which management level or department are you (Source: Field Data, 2016)

A total of 26 employees of DVLA responded to the question, which management level or department they belonged. 11.5% (3) of the respondents were top manager, 30.8% (8) were middle managers and the remaining 57.7% (15) were operational managers as shown in table 3.3 and figure 3.3. Which gives an indication that majority of the respondents are much into the day-to-day activities.

3.6. Frequency of level of usage of software application

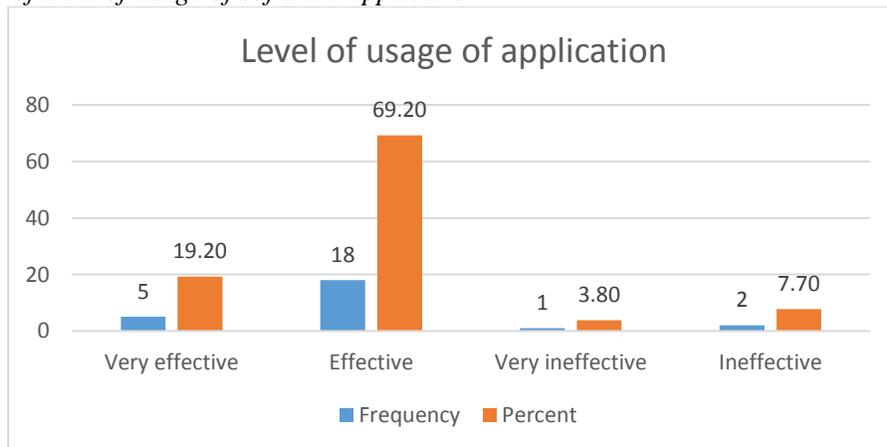


Figure 3.4: Frequency of level of usage of software application:

The figure 3.4 above shows the level of usage of information systems by employees in the discharge of their duties. 19.2% of the respondents said they are very effective in using information systems in the discharge of their duties, 69.2% said effective, 7.7% ineffective and the remaining 3.8% very ineffective in using the systems.

3.7. Application acquisition

Table 3.4: Software application acquisition

CATEGORY	NUMBER OF RESPONDENTS	PERCENTAGE (%)
In-house Design	1	3.8
it was purchase (off-the -shelf)	6	23.1
Local outsourcing services	19	73.1
TOTAL	26	100

Source: Field Data, 2016

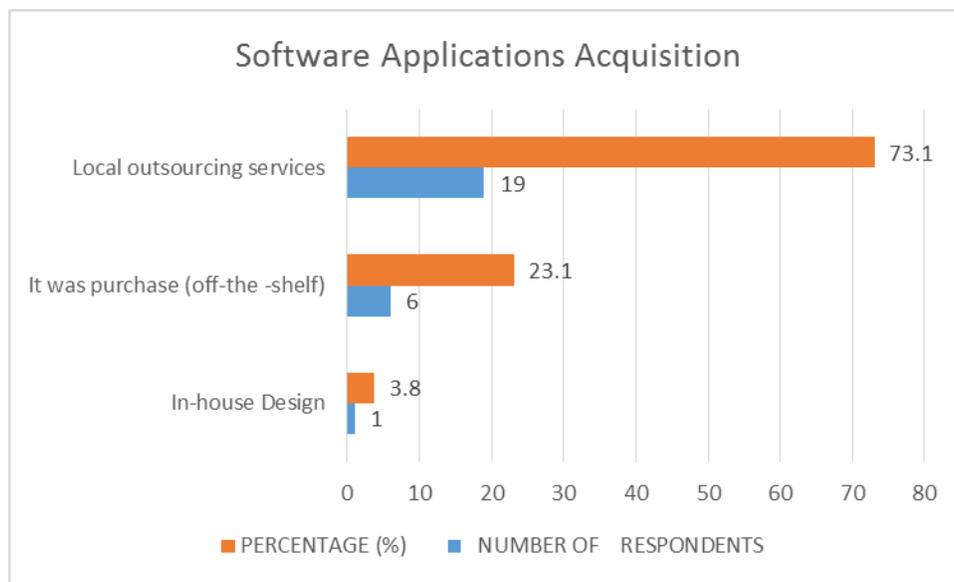


Figure 3.5: Software application acquisition

Table 3.4 and figure 3.5: show that majority of the respondents (73.1%) of the staff indicated that the software application is acquired through locally outsourcing services, while 23.1% and 3.8% also indicated that the software was acquired through outright purchase (off-the-shelf) and in-house design respectively, although organizations view outsourcing as a cost-effective means which turn to recruit experts with deeper experience for the core competency of the business model. Meanwhile outsourcing I.T turn to reduces or eliminate direct communication between organizations and clients.

3.8. How have queues prevailed after the use of the system

Table 3.5: Queues after the use of the system

	NUMBER OF RESPONDENTS	PERCENTAGE (%)
Not every day	6	23.1
Once a every week	7	26.9
Throughout the day	11	42.3

Throughout the month	1	3.8
Not at all	1	3.8
TOTAL	26	100

Source: Field data, 2016

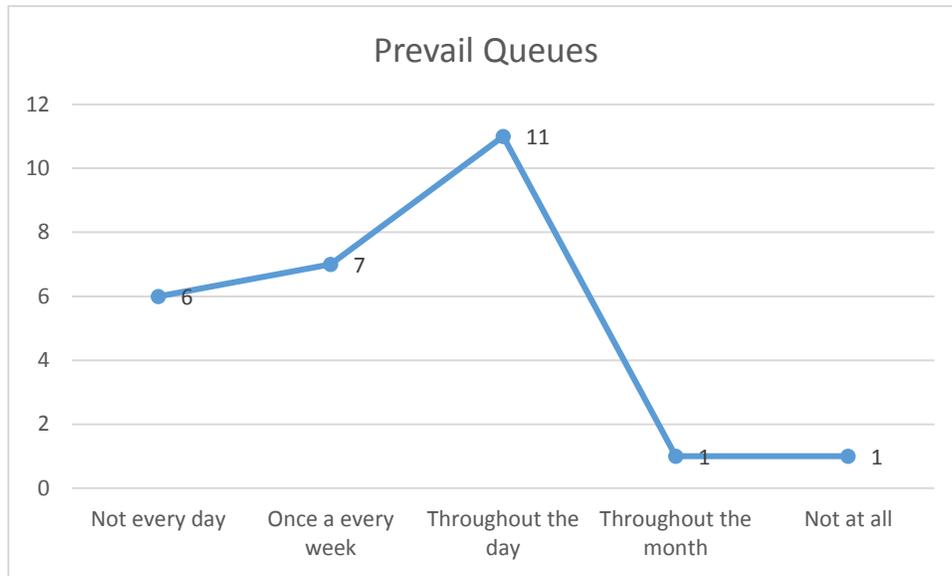


Figure 3.6: Queues prevail after the use of the system (Source: Field data, 2016)

Out of the 26 respondents, 11 of the respondents representing 42.3% have witness the prevalence of queues throughout the day. Another seven respondents representing 26.9% had also witness prevalence of queues once every week; further six respondents representing 23.1% also indicated that there are queues but not every other day. The remaining two representing 3.8% for each respondent either have witness queues throughout the month or have not witness queues at all as shown in both table 3.5 and figure 3.6 above.

3.9. The system electronic or electronic and manual

Table 3.6: The system electronic or electronic and manual

CATEGORY	NUMBER OF RESPONDENTS	PERCENTAGE (%)
Full electronic	6	23.1
Manual	3	11.5
Manual and electronic	16	61.5
I don't know	1	3.8
TOTAL	26	100

Source: Field Data, 2016

From the 26 respondents, 16 respondent represent 61.5% indicating that the processes in services delivery is not fully electronic, meanwhile 6 and 3 respondents representing 23.1% and 11.5% respectively also indicated that the services delivery processes are either full electronic or manual. The remaining 3.8% representing one respondent indicated I do not know.

IV. COMPARATIVE ANALYSIS

Research as shown that application of information systems promotes work efficiency and effectiveness thereby increasing productivity as indicated in table 3.7 below. In spite of its applications, unfortunately, various studies had not critically examined the application of this system in relation to the formation of waiting line in service delivery processes. Our present study seeks to identify why there are formations of waiting lines. Our quantitative data analyze from customer's perspective observe frequent waiting lines formations in spite the applications of information system and in addition the study also shows that the services delivery processes are not fully made electronic at the service station.

Table 3.7: Comparing information system, service delivery and waiting line formations

Measuring schemes	Otchere- Ankrah, B. [16]	Leyland F. et al., [17]	Culnan, M. J. [18]	Hwang et al., [19]	Our schemes
Service automation	✓	✓	✓	✓	✓
Queuing formation					✓
Information system application	✓	✓	✓	✓	✓
Service delivery/quality	✓	✓	✓	✓	✓
Software application acquisition					✓
system fully electronic or electronic and manual					✓

V. CONCLUSIONS

The study shows the acquisition of software applications is outsourced. Meanwhile outsourcing IS systems do create direct communication gap between organizations and clients. Therefore, immediate steps should be taken by DVLA to undertake a full-scale automation to eliminate the intermediating men activities as known as 'goro boys' menace in their services delivery process. From the analysis, the trends in the results also depict services delivery processes are not electronic, which could be a contributing factor towards the formation of the long waiting lines. It is evident that even though Information Systems are used in the services delivery processes, there are prevailing waiting lines, which were observed. The study could not identify other possible causes that underpin the formations of long waiting lines; this can be explored in further study.

REFERENCES

- [1] G. A. Gorry and M. S. Scott Morton, "A framework for management information systems," 1971.
- [2] E. Henry, "The Effects Of Computerizing Banking Operations," *arXiv preprint arXiv:1308.0503*, 2013.

- [3] B. Finn, "Market role and regulation of extensive urban minibus services as large bus service capacity is restored—Case studies from Ghana, Georgia and Kazakhstan," *Research in Transportation Economics*, vol. 22, pp. 118-125, 2008.
- [4] D. Vale, "Hanging on the telephone," 2004.
- [5] C. Bakari, H. Chamalwa, and A. Baba, "Queuing process and its application to customer service delivery (A case study of Fidelity Bank Plc, Maiduguri)," *International Journal of Mathematics and Statistics Invention (IJMSI)*, vol. 2, pp. 14-21, 2014.
- [6] L. Kleinrock, *Communication nets: Stochastic message flow and delay*: Courier Corporation, 2007.
- [7] S. Ganesan, "Determinants of long-term orientation in buyer-seller relationships," *the Journal of Marketing*, pp. 1-19, 1994.
- [8] P. J. Burke, "The output of a queuing system," *Operations research*, vol. 4, pp. 699-704, 1956.
- [9] L. Kleinrock, *Queueing systems, volume 2: Computer applications* vol. 66: wiley New York, 1976.
- [10] M. Andrews, K. Kumaran, K. Ramanan, A. Stolyar, R. Vijayakumar, and P. Whiting, "Scheduling in a queuing system with asynchronously varying service rates," *Probability in the Engineering and Informational Sciences*, vol. 18, pp. 191-217, 2004.
- [11] A. Sakphisal and P. G. Higgins, "Studying the existing service process of three hospital outpatient departments," *International Journal of Health Management and Information*, vol. 1, pp. 111-130, 2010.
- [12] M. Mark, N. B. Ghyselinck, and P. Chambon, "Function of retinoid nuclear receptors: lessons from genetic and pharmacological dissections of the retinoic acid signaling pathway during mouse embryogenesis," *Annu. Rev. Pharmacol. Toxicol.*, vol. 46, pp. 451-480, 2006.
- [13] E. E. Arhin, "Economic Determinants of Non-Performing Loans among Nine Banks In the Ghanaian Economy," Institute of Distance Learning (IDL), Kwame Nkrumah University of Science and Technology, 2016.
- [14] K. Oppong Asante and A. Meyer-Weitz, "Using reflective poems to describe the lived experiences of street children and adolescents in Ghana," *International journal of adolescence and youth*, vol. 20, pp. 148-150, 2015.
- [15] S. Agarwal, Y.-H. Loh, E. M. McLoughlin, J. Huang, I.-H. Park, J. D. Miller, *et al.*, "Telomere elongation in induced pluripotent stem cells from dyskeratosis congenita patients," *Nature*, vol. 464, p. 292, 2010.
- [16] B. Otchere-Ankrah, "Managing Organisational Change: The Experience of Driver and Vehicle Licensing Authority (DVLA) of Ghana," *International Public Management Review*, vol. 16, pp. 1-22, 2015.
- [17] L. F. Pitt, R. T. Watson, and C. B. Kavan, "Service quality: a measure of information systems effectiveness," *MIS quarterly*, pp. 173-187, 1995.
- [18] M. J. Culnan, "The dimensions of perceived accessibility to information: Implications for the delivery of information systems and services," *Journal of the Association for Information Science and Technology*, vol. 36, pp. 302-308, 1985.
- [19] J.-S. Hwang, S. H. Kim, and H. Lee, "Breaking the myths of the it productivity paradox," *KSII Transactions on Internet & Information Systems*, vol. 9, 2015.