E-Banking: Modelling An Efficient Bank Tellers Monitoring Agent for the banking Industry in Nigeria

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ABSTRACT

Bank tellers are core in the operations of banking institutions. Interestingly, their efficiency and effectiveness are critical to the success and sustainability of banking institutions. It is therefore pertinent that tellers are not distracted while carrying out these sensitive tasks. Unfortunately, existing strategies are yielding minimal results with respect to checkmating this all important cadre of staff that interfaces directly with bank customers. This work designed a web-based remote monitoring system for tellers' operation to enhance their uptime, improve bank's quality of service and increase customer satisfaction.

Keywords: Monitoring software, software Agents, intelligent software agents, remote monitoring system,

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1. INTRODUCTION

The banking system is one of the most critical and delicate institutions in every nation. It is the bedrock for the economic activity and growth of an individual, organization and nations. The continual reliance on banks by these stakeholders depends on the quality of service delivered by the staff of this institution, especially the tellers, to their various customers that patronize the banks. Tellers are very crucial in the banking system, and their operations or duties include counting the cash in their drawer at the start of their shift; accepting cheques, cashing, answering questions from customers about their accounts; preparing specialized types of funds, such as traveler's cheques, savings bonds, and money orders; exchanging money for foreign currency ordering bank cards and cheques for customers; recording all transactions electronically throughout the shift, and balancing of accounts at the end of work day. Currently, inefficiencies exist with the teller system in the Nigerian banking system. A number of them include:

a. Visibility and Customer contact volume

An area of the bank that can cause a great deal of frustration is the teller line. Everyone wish they would act more enthusiastic and friendly, and without flaws. They are expected to be more initiative and had fewer errors. Often it is said, the teller is the most important job in the bank. Maybe, maybe not, it just depends on what gauge you are using. If you were to use a gauge associated with visibility and customer contact volume the needle on the gauge would swing toward high importance. If the gauge was reading internal value it is highly possible the needle would barely make a move.

b. Outages, Attendance and Errors

Often, the only thing measured or tracked regarding a teller are outages, attendance and errors. And, those responsibilities definitely warrant tracking. Most banks track teller turnover. Good tellers do something about the turnover issue. They have to remind the customer what services are available. Reinforce the image the bank wants projected; save a relationship when the customer is dissatisfied; ask for more business or solicit a referral; resolve a complaint by cross-selling a product; thank customers for their loyalty; refer customers to a profit center .

c. Effective and Continuous System utilization

In times of narrow profit margins the teller area has undergone increased scrutiny. Bankers are often well versed on the cost associated with the teller line but wear blindfolds about the real value of the teller line. Financial institutions put a lot of thought and effort into the products and services they offer in hopes of attracting long-term depositors and substantial deposits. As emphasized by Osang and Umoren (2018), for any optimum performance to be achieved using any information system, such system must be put into effective use. Therefore, the same thought and effort needs to be focused on the effective and continuous utilization of the system for quality and timely service delivery.

d. Attitude and Personality

A bank who strives to establish a standard of excellence on the teller line will need to install methods to hold the teller accountable in all aspects of the job. Account holders are greatly affected by the way a teller handles everyday deposits and withdrawals. A teller's work habits also affect customer satisfaction with the institution, as well as the teller's own job satisfaction. Handling transactions efficiently, timely and accurately ensures long-term customer relationships that benefit the account holder, the institution, and the teller. Traditionally more attention is paid to an outage or a returned item than is ever paid to a teller who excels at the job. As Shepel (2015) literates, today's teller must know services available to the account holder and be aware of specific laws and regulations applicable to those services. In addition to technical knowledge, he argues that the teller must present a professional image to the customer, dress appropriately, have a pleasant speaking voice, and represent the institution in a manner that assures customers' transactions are processed promptly and accurately. It is important to respond quickly, efficiently and courteously to customers. Their perceptions of the institution are based on the attitude and personality of the person in the teller window.

e. Job Acquaintance

Michael (2015) notes that, customer service is the primary responsibility of the teller department. He emphasizes that, long lines and lengthy waits evoke the most customer complaints. The teller must be familiar with the numerous forms and documents required to serve a customer effectively. This is a major problem one experiences in our banks. According to Scott (2015) assertion, the professional teller is one familiar with the important features of services offered by the institution, including service charges, current fee schedules, interest rates, types of accounts offered, and other information regarding the maintenance and servicing of accounts. Answering customers' simple questions and directing them to the proper department for more complex inquiries is the mark of a professional teller. This issue is far from the tellers in our local banks. They have to shout at the customer and even call security personnel for customer who might not have the patient to wait the whole day.

f. Understanding of Questionable Transactions

However, the most important role of the teller shall always be "customer service." This service must fulfill the customer's needs and also protect the institution from loss due to fraud or error Osang (2017). Operating within the established procedures of the financial institution, the teller politely develops a clear understanding of questionable transactions without offending the customer. Most transactions require positive identification, but sometimes a customer balks, feeling perhaps his integrity is questioned or that the teller should already know him. A professional teller should be able to handle this type of situation leaving both themselves and their customer happy with the resolution Shepel (2015). The aim of this study is to develop a remote monitoring software agent that crawls through the bank's network system which will guide banks' management in the proper assessment of teller's operation during official working hours. The specific objective of the study is to model a remote monitoring software agent for assessing teller's operations in Nigerian banks.

2.0 LITERATURE REVIEW

As front line workers, bank tellers put a human face on the products and services the bank sells. Their approach to customers, professionalism and welcoming attitude all add to the bank's overall image. Their work is therefore an important part of customer satisfaction and customer retention that will keep account holders coming back to the branch when they choose to purchase new banking and investment products. At various points throughout a shift, long lines, quick switching between multiple requests, back-to-back phone calls and distractions can reduce a teller's productivity and increase stress. This implies that, tellers and their operations remain very vital in the successful delivery of quality and timely services to customers in commercial banks. Based on the above, this literature will be reviewed under the following;

2.1 Remote monitoring software system

Remote Monitoring and Control System (RMS) is an easy to use and highly reliable facility, enabling the efficient monitoring and management of a wide range of banking activities (Poole, 2012). The system features an advanced installation, which allows operators to appreciate the status of all monitored equipment or persons at a glance, using a fully user customizable map-based display. Remote Monitoring System (RMS) provides the optimum solution for monitoring applications. The system also offers the option of a fully featured, entry level control system, employing dial-up links for the most efficient coordination of transactions and detection of crimes. Remote Monitoring System (RMS) may also be used for the remote control of various equipment including variable signs. As purports by Ogaochuele (2013), remote monitoring system is designed to monitor and manage the operations of network sites to keep a continuous network session. It was posited that Remote Monitoring System (RMS) is designed with an aspect of monitoring and performing all the remote operations, and that it uses a combination of hardware & software to measure different parameters. The measured parameters are used to analyze the performance of the cell site and keep a track on them.

In his own point of view, Poole (2012) says that the system consists of self-service bank remote monitoring system, management center, computer network, video capture card, and so on. Remote monitoring software systems are of different kinds and perform a whole lot of functions. They include the Close Circuit Television (CCTV) system, access monitoring system, shock sensor monitoring system, fire alarm system, burglar alarm system, lighting control system, sound and light alarm system, and Automated Teller Machine (ATM) monitoring system.

High-definition video cameras are installed separately at the entrance of the self-service bank and in each Automated Teller Monitoring (ATM) to record video. The video acquisition card acquires video signals. The local monitoring station saves video signals in Moving Picture Expert Group (MPEG-4) format. Each person entering the self-service bank and each transaction at the Automated Teller Machine (ATM) are recorded in full detail. At the same time, Pan Tilt Zoom (PTZ) is used to remote control the video cameras away from the field, allowing video recording in different angles and improving video quality (Wu, Osama, and Phu-Dung, 2006). The foremost advantage of the remote video monitoring system lies in long distance information transmission and control. The remote video control system has evolved from traditional image application system into the integrated application of network and digital media (Poole, 2012).

All access controllers can work independently from the monitoring host computer, guaranteeing the security and stability of the access system. They can work in coordination with video cameras. The entrance of anyone will be snapshot and video-recorded in the hard disk for easy retrieval (Zoran, Ognjen, and Dragan, 2007).
Infrared microwave double probe can be installed to monitor the people in the self-service bank. The lighting control system is used to monitor lighting and it helps dictate power failure in any section of the bank. Sound and light alarm system signals when light goes off in the bank (Jawahar, 2015).

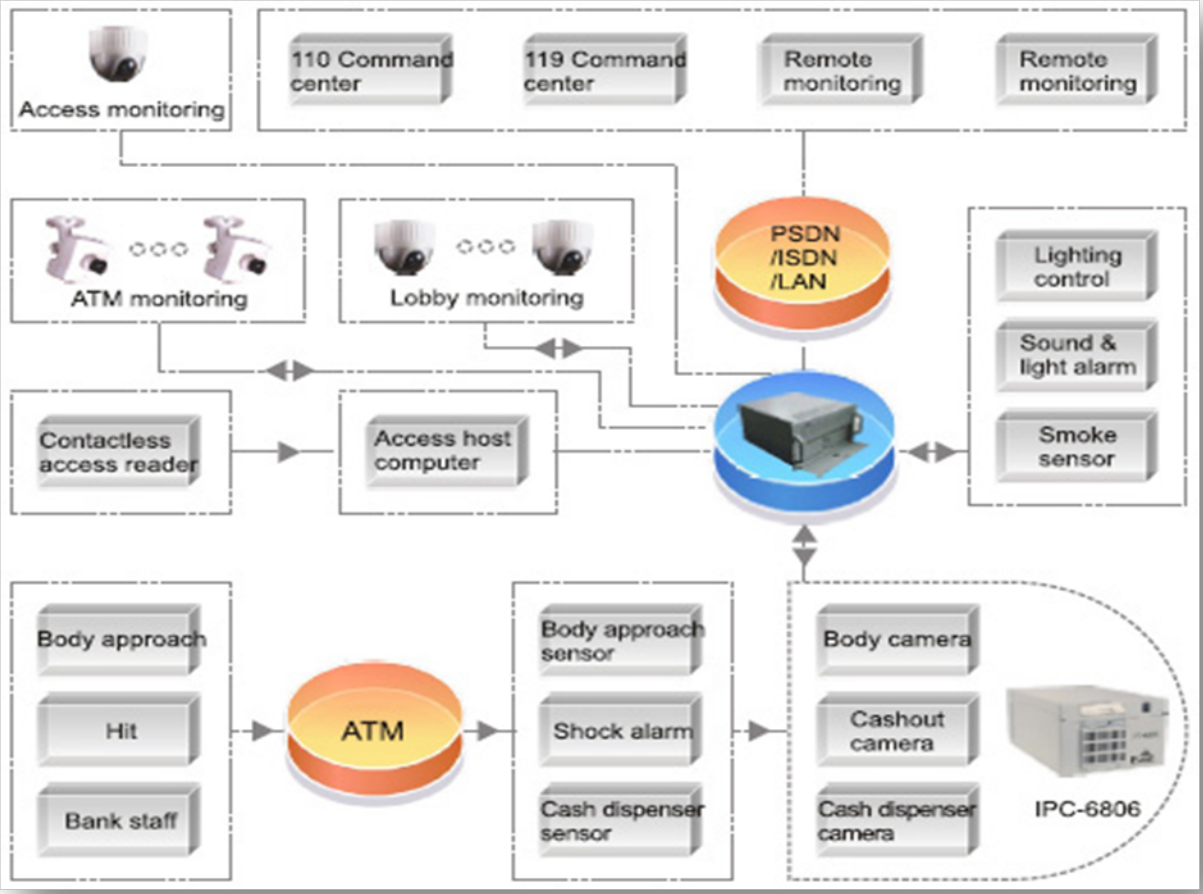

Figure 1: A typical block diagram of software remote monitoring system
Source: Adapted from Poole, 2012.

2.2 Software agent teller operations

A software agent in computer science is a computer program that acts for a user or other program in a relationship of agency (Schermer, 2007). The concept is derives from the Latin word “agree”, which means to do. It is an agreement to act on one's behalf. Such "action on behalf of one" implies the authority to decide which, if any, action is appropriate. Related and derived concepts include intelligent agents (in particular exhibiting some aspect of artificial intelligence, such as learning and reasoning), autonomous agents (which is capable of modifying the way in which they achieve their objectives), distributed agents (being executed on physically distinct computers), multiple agent system (distributed agents that do not have the capabilities to achieve an objective alone and thus must communicate), and lastly, mobile agents (agents that can relocate their execution onto different processors).

The basic attributes of a software agent presents by Schermer (2007) are that agents are: not strictly invoked for a task, but activate themselves, may reside in wait status on a host, perceiving context, may get to run status on a host upon starting conditions, do not require interaction of user, may invoke other tasks including communication. The categories of software agents are presented below to demonstrate how they interlink with one another to produce the desired result.

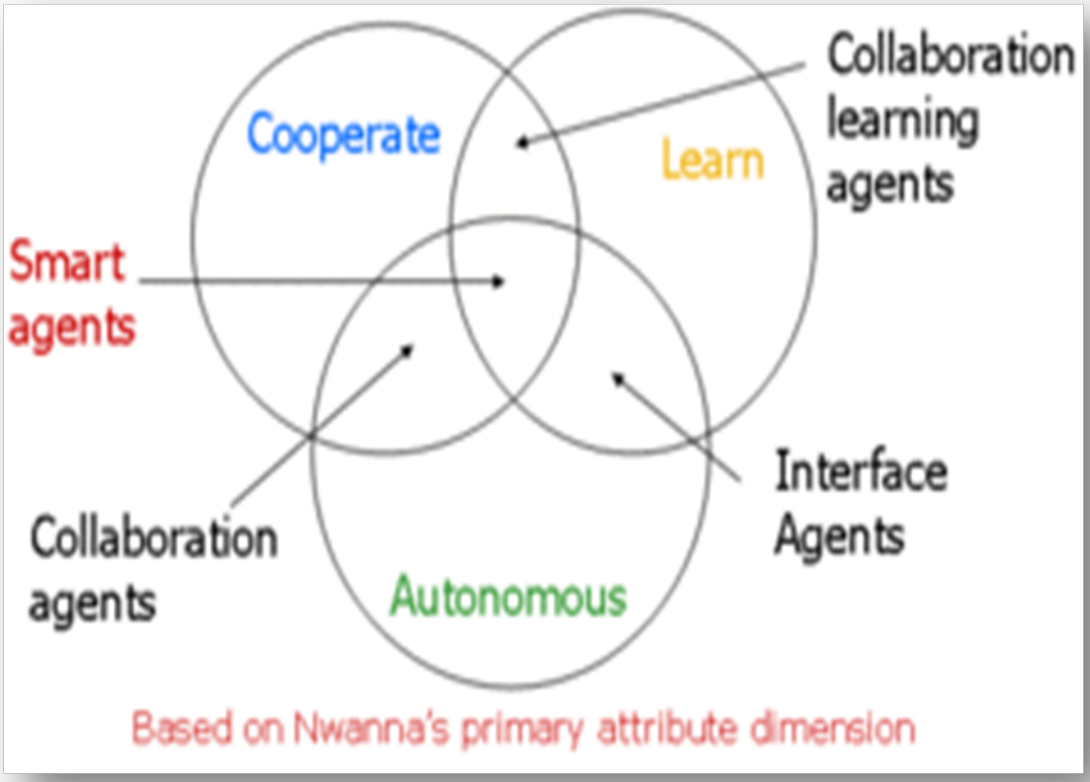

Figure 2: Nwana's Category of Software Agent (1996)

What is then the meaning of agent? The term "agent" is used to describe a software abstraction, an idea, or a concept, similar to OOP terms such as methods, functions and objects (Nwana, 1996). The concept of an agent provides a convenient and powerful way to describe a complex software entity that is capable of acting with a certain degree of autonomy in order to accomplish tasks on behalf of its host. But unlike objects, which are defined in terms of methods and attributes, an agent is defined in terms of its behavior.

The term agents have been used differently by different authors. The commonly used ones are based on:

- their persistence (code is not executed on demand but runs continuously and decides for itself when it should perform some activity)
- their autonomy (agents have capabilities of task selection, prioritization, goal-directed behaviour, decision-making without human intervention)
- their social ability (agents are able to engage other components through some sort of communication and coordination, they may collaborate on a task), and
- their reactivity (agents perceive the context in which they operate and react to it appropriately).

Agents can be distinguished from programmes. Contrasting the term with related concepts may help clarify its meaning. For example, Franklin and Graesser (1996) give four key notions that distinguish agents from arbitrary programmes. According to them, they are reaction to the environment, autonomy, goal-orientation and persistence. It is also important to also distinguish agents from mere objects.

According to Wooldridge (2002), agents are more autonomous than objects. He argues that, agents have flexible behavior, such as reactive, proactive and social. Finally, he puts forward that, agents have at least one thread of control, but may have more. Wooldridge (2003, 1995) distinguishes agents from expert systems. He notes that, expert systems are not coupled to their environment; not designed for reactive, proactive behavior, and do not consider social ability. Rusell and Norvig (2003) further distinguish intelligent software agents from intelligent agents in artificial intelligence. He observes that, intelligent agents, which are also known as rational agents, are not just computer programs but, may also be machines, human beings, communities of human beings, like firms or even anything that is capable of goal directed behaviour.

The software agents offer various benefits to their end users by automating complex or repetitive tasks. However, there are organizational and cultural impacts of this technology that need to be considered prior to implementing software agents (Schermer, 2007). The software agent is very significant in an organization. Haag (2006) recognizes that, organizational impacts of software include the transformation of the entire electronic commerce sector, operational encumbrance, and security overload. Franklin and Graesser (1996) maintain that, software agents are able to quickly search the Internet, identify the best offers available online, and present this information to the end users in aggregate form. Therefore, they argue that, users may not need to manually browse various websites of individual merchants; but they are able to locate the best deal in a matter of seconds. At the same time, this increases price-based competition and transforms the entire electronic commerce sector into a uniform perfect competition market (Serenko, Detlor, 2004). The implementation of agents also requires additional resources from the companies, places an extra burden on their networks, and requires new security process (Haag, 2006).

Adonisi (2003) observes that software agents enhance work contentment and job satisfaction. He posits that, people like to perform easy tasks providing the sensation of success unless the repetition of the simple tasking is affecting the overall output. In general implementing software agents to perform administrative requirements provides a substantial increase in work contentment, as administering their own work does never please the worker. The effort freed up serves for higher degree of engagement in the substantial tasks of individual work. Hence, software agents may provide the basics to implement self-controlled work, relieved from hierarchical controls and interference (Adonisi, 2003). Such conditions may be secured by application of software agents for required formal support (Nwana, 1996).

The agent uses its access methods to go out into local and remote databases to forage for content. These access methods may include setting up news stream delivery to the agent, or retrieval from bulletin boards, or using a spider to walk the Web (Schermer, 2007). The content that is retrieved in this way is probably already partially filtered – by the selection of the newsfeed or the databases that are searched. The agent next may use its detailed searching or language-processing machinery to extract keywords or signatures from the body of the content that has been received or retrieved. This abstracted content (or event) is then passed to the agent's Reasoning or inferencing machinery in order to decide what to do with the new content. This process combines the event content with the rule-based or knowledge content provided by the user. If this process finds a good hit or match in the new content, the agent may use another piece of its machinery to do a more detailed search on the content. Finally, the agent may decide to take an action based on the new content; for example, to notify the user that an important event has occurred. This action is verified by a security function and then given the authority of the user. The agent makes use of a user-access method to deliver that message to the user. If the user confirms that the event is important by acting quickly on the notification, the agent may also employ its learning machinery to increase its weighting for this kind of event (Haag, 2006; Nwana, 1996).

3. METHODOLOGY

The teller performance measurement system will be built using the agile software development method. The agile software development methodology is focused around a short iterative software release cycle. This design is geared toward heavily involving the stakeholders and constantly showing them demonstrations of the current state of the software. This allows for the stakeholders to make recommendat0ions and suggest changes while the software is being actively developed so that the software can track what the customers actually desire. Agile also helps software projects improve the expectations of when software will be completed, determine what items can feasibly go into a release cycle, and provide the ability to easily track overall project progress.

Netbeans Integrated Development Environment (IDE) will be used for implementation phase of the software development process. Netbeans IDE (current version is 3.6) is an open source Java development tool (current Java version is 1.4.2). The application is designed and developed to run on all windows operating system. Since the application (which includes graphical display and sequence analysis algorithms implementation) is written using Java programming language (version 1.4.2), it can be run on any computer platforms which has a Java Virtual Machine (JVM) installed.

4. DISCUSSION ON THE IMPLICATIONS OF THE SYSTEM

No matter the circumstance, the teller in a commercial bank is expected to be accurate in their performance. Accuracy is the most important aspect of the teller position. The bank customers rely on the accurate and timely posting of transactions to their accounts so that they can depend upon the bank to be a sound institution which can meet their financial needs and provide them with the financial services they require. The teller position is responsible for all cash transactions at banks and therefore it is expected that tellers must exercise caution and prudence when handling cash (Basri, 2014). With all the discussion about the future of branches and declining transaction volumes, tellers are still an important part of most branch operations. Teller performance management or assessment is important for variety of reasons.

Fairness: Much of what tellers do can be quantitatively measured- transactions, cash, accuracy, volume, referrals. These metrics should be the foundation of performance measurement. However, simply counting each teller's metrics is not necessarily fair. According to Basri (2014), tellers in low volume branches will never be able to compete with tellers in high volume branches on numbers of transactions or amount of cash handled. Tellers that handle a high percentage of commercial or complex transactions will not perform the same volume as a teller running a two or three lane drive-up, but may handle many times more cash. This is one of the reasons for remote monitoring software agent for tellers so that their work load can as well be reduce, and efficiency is ensured. Tellers understand there are environmental differences between branches and even within a branch. If performance measurement takes these differences into account, it will be perceived as fair and can have a positive effect. If it does not it will not only have a negative impact on morale, it will encourage tellers to find ways to "game" the system.

Recognition: Recognition is the key to making teller performance measurement both a positive experience for employees and a beneficial program for the organization. Tellers that score above a certain level, or in the top 10%, could be listed in the branch newsletter. There can be a traveling branch-of-the-month or teller-of-the-month trophy. Traveling trophies work well, but need to exist within an area a teller can identify with. If the area is 100 branches, most tellers will never see it and will feel no identity or incentive towards it. Public recognition based on fair and quantitative metrics can have a remarkably positive impact on teller morale, with little cost to the organization (DeGarmo, 2015; Basri, 2014).

Productivity: It is well documented that there are significant differences in performance and productivity between high performing tellers compared with average or low performing tellers (Basri, 2014). High performers consistently perform more transactions, deliver better customer service and make fewer mistakes. Increasing the percentage of tellers that are high performing is perhaps the most important objective of a good teller performance program. High performing tellers, like most high performers, take pride in their work. As with athletes, they also like to keep score. Public recognition of high performance measurement scores can foster a healthy level of competition. By creating recognition at a branch (area level if most branches are small), a sense of competition can also foster teamwork.

It takes very little encouragement to get high performers to begin mentoring average and low-performing tellers to increase the scores for their branch or area. Experience shows that this kind of competition tends to be constructive much more than cut-throat.

Remediation: Another benefit of implementing teller performance measurement is that tellers who need additional mentoring or training are identified early. Any teller can have a month with poor scores, so it is important not to react too quickly or too harshly to one low score. When a teller has consecutive months or average scores that are below acceptable, then training, mentoring or other procedures should be introduced. There may also be a few employees who simply should not be tellers. Performance measurement can be helpful in evaluating teller supervisors even if there is not a set of direct metrics collected. When tellers under a specific supervisor have scores that are consistently lower than similar branches or areas, it is often a supervisory issue. This is particularly true if an unusually large number of tellers need to have retraining procedures applied.

Automation: Teller performance measurement can be beneficial, but it should not add to overhead. A good system will gather data through automated processes, calculate the scores on a schedule and let users access it on demand. Branch personnel will tend to resent rather than embrace a program where their first exposure to it is an increase in workload.

5. CONCLUSION

Tellers are generally responsible for providing negotiable instruments (cashier's checks, money orders, and traveler's cheques), accepting payments (for loans and taxes), and other services, such as redeeming Saving Bonds and processing VISA and MasterCard cash advances. Collection tellers are responsible for sending and receiving collection letters while adhering to the regulations and policies necessary for compliance. The more the teller knows about meeting the financial needs of the customer, the better the teller will be able to answer customers' questions and provide the services they need. A close relationship frequently exists between a financial institution and its depositors.

Thus, the conscientious teller considers confidentiality a sacred trust. Respect for the fiduciary relationship between institution and account holder is foremost in tellers striving for professional excellence. They perform vital services with the greatest possible competence and avoid any action that jeopardizes the well-being of either the account holder or the financial institution. A well designed and implemented teller performance measurement system can bring significant improvements in teller morale and productivity. A poorly designed program will have the opposite effect. Evaluating employees involves more than just an assessment of their immediate performance, particularly when it comes to bank employees. These individuals are responsible for handling large amounts of cash on a daily basis, working with sometimes disagreeable customers and are held to a higher level of ethics and responsibility than employees in many other businesses.

5. FUTURE WORKS

Future works would focus on the implementation of the designed system in this work and its subsequent evaluation with a view to operationalize the modelled system in the Nigerian banking system.

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