Community Tax Certificate Real-Time Transaction Processing System

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Abstract:- **This Community Tax Certificate (CTC) Real-Time Transaction Processing System is a form of e-government that use electronic communication technologies in securing identity document in Iligan City, Lanao del Norte, Philippines. The study speeds up the processes and procedures whenever the taxpayers from the forty-four (44) barangays request a cedula at Treasurer's Office to comply with securing government requirements. A presentation of Porter's Stemming algorithm was presented and compared in terms of retrieving information. The ultimate objectives of this study are to design and create a central database that would act as the repository for all taxpayers' data (individual and corporate). Individual taxpayers have perceived ease of use, usefulness, and intention to use the CTC Real-Time Processing to secure community tax certificates. Corporate taxpayer's attribute on the usability of technology is affected by their perception towards its use of the system. Both individual and corporate respondents of this study have perceived ease of use and usefulness on the impact when securing the community tax certificate.**

Keywords: *Community Tax Certificate, E-Government, Real-Time Transaction.*

I. INTRODUCTION

Information and Communication Technology (ICT), the Internet, and the mobile revolution have changed how we do things. Apps made communication, essential and non-essential services, bills, and food delivery accessible and engaging customers. Almost all kinds of transactions can be done using a mobile application and web application. Users or customers prefer mobile applications or web applications for many reasons, and more so, businesses and government agencies are increasingly developing mobile applications to serve them better.

Paying taxes is a hassle when everyone complies every first quarter of the year and secures the community tax certificate as part of the requirements to avoid penalties. This community tax certification or cedula is a vital document and also a legal identity document. It is a document issued by the Local Government (LGU) to individuals and corporations upon community tax payment.

Usually, applying for this certificate will take approximately 20 to 30 mins to complete, excluding waiting time. These create bad waiting hours for taxpayers to be served even if there is a priority number to be done. However, this led to a problem in terms of poor services for not meeting the taxpayers' needs. With this, enhancing government services' delivery is becoming an essential agenda for most governments. The efficient delivery of internet services has increasingly become a necessary indicator of efficient public sector management. The governments have steadily implemented ICTs (such as email, online chatting, and servers to engage citizens and disseminate the newest news or updates during the last decade (Holzer, 2015).

Lueth (2018), the growth of the Internet of Things (IoT) devices in use to 7 billion. The spread of mobile phones, communication systems, and internet infrastructure significantly impacts trade and development. Governments adopt electronic governance (e-government) to accomplish this goal. Sufianti (2007) claims that the adoption of online services does not inevitably transform the serving culture of public organizations.

The researchers intends to develop e-government for the local government of Iligan City, which is situated in Northern Mindanao. The land area is 81,337 hectares (813.37 sq. km) and has 44 barangays. With this study, the electronic issuance of Community Tax Certificate will extend a unique approach to proficiency on taxpayer's engagement, data transparency, and accuracy for all taxpayers when securing the cedula.

Moreover, considering the streamlining of reconciliation on taxpayer information and the different government services processes, especially on issuance Community Tax Certificate (CTC). In accomplishing this online issuance of a community tax certificate, taxpayers' listing is registered in the CTC Real-Time Transaction Processing system. The system will require all taxpayers to register both for individual and corporate tax certificates in this system. In this way, all information will be gathered, saved, and stored in the database. Users may update the information the following year for securing the community tax certificate again. All taxpayers above 65 years can still be stored in the database for any government requirement which requires a community tax certificate.

This study is anchored on e-government services using information and communication technologies. The Technology Acceptance Model (TAM) is a model proposed and developed by Davis (1989). This application model evaluates information technology utilization in terms of perceived utility, ease of use, and subjective quality. Subsequently, adopting e-government services using Technology Acceptance Theories and Models and the Theory of Reasoned Action (TRA) of Fishbein & Ajzen (1975) focuses on a person's intention to behave a certain way. Theory of Planned Behavior (TPB) of I. Ajzen (1991) postulates that behavior, subjective norm, and perceived behavioral control influence behavioral intention. The Technology Acceptance Model of Venkatesh & Bala (2008) scrutinizes individual technology acceptance behavior in various information systems.

Unified Theory of Acceptance and Use of Technology (UTAUT), predictable performance, expected effort, and social impact was theorized and found to influence behavioural intention to use technology. In contrast, behavioral purpose and encouraging conditions are decided using Technology (Venkatesh, Morris, Davis, et al., 2013). AlShihi, (2005) examined the factors that determine people's adoption of e-gov services in developing countries by adapting the UTAT model. For this reason, the researcher reviewed the aspects of the perceived usefulness, perceived ease of use, and the intention to use this study.

Furthermore, the creation of this system will be tested by actual users based on its reliability. The information system experts will check the model specification of ISO 9126 for software quality characteristics.

The ultimate objective is to develop an individual and corporate community tax certificate using real-time transaction processing. Further, this study aims to develop a central database that would act as the repository for all taxpayers' data (individual and corporate).

II. MATERIALS AND METHODS

The researchers will use the Software Development Life Cycle (SDLC) using the Rapid Application Development (RAD) Model to provide a basis for designing and creating the proposed system. First, for phase 1 on requirement planning, the researcher considers identifying the objectives of the system. To further focus on solving business problems, defining, preparing, integrating, and coordinating the various procedures and other relative activities involved in formulating the issuance of individual and corporate Community Tax Certificate (CTC) for Real-Time Transaction Processing. Second, phase 2 on user design is a continuous interactive process in formulating the proposed system. Further, the researcher interrelates with the software model to understand, modify the system, and satisfy the methodology first phase that meets the needs and requirements. Third, phase 3: Construction phase, the researcher mainly focuses on the program and application development task of the CTC Real-Time Transaction Processing for Iligan City. Other functions will also be considered, such as the software coding and implementation, application development, unit integration, and system testing to be transformed into actual code.

Moreover, in this phase, the researcher considers the steps below in the creation, progress, and phase 2 of this proposed CTC Real-Time Transaction Processing System: Intranet account for printing individual and corporate account for the Clerk Account; Testing the proposed CTC Real-Time Transaction Processing System for Iligan City-based on the system significant functionalities and procedure, as mentioned in the prior section. The system prototype will be modified upon user's request to fulfill their needs and requirement. Hence, the developed system should be friendly to the user. The next phase will be conducted at each user level to demonstrate each available module's functionalities if the objectives have been met. Finally, the last phase of implementing the developed system will have a CTC Web Site to register and secure the City Treasurer's Office's issuance.

Meantime, this study will use the standard questionnaire from the Perceived Ease of Use (PEU), and Perceived Usefulness (PU), and Unified Theory of Acceptance Use of Technology (UTAUT) model to explore the factors that determine the implementation of e-government services.

The System Usability Scale (SUS) is a standardized questionnaire on perceived usability evaluation (Brooke, 1996). SUS is also a Technology independent of a quick and dirty usability scale to evaluate practically any system with a sample of ten (10) questions relating to hardware, consumer software, websites Lewis, J. R., & Sauro, J. (2009). The system requires the following hardware and software in developing the entire system. These will include:

➤ *Software*
- Windows 7, Windows 8, or Windows 10
- XAMPP
- PHPMyAdmin
- Sublime

➤ *Hardware*
- Processor (CPU) with two gigahertz (GHz) frequency or above
- A minimum of 2 GB of RAM
- Monitor Resolution 1024 X 768 or higher
- A minimum of 20 GB of available space on the hard disk
- Internet Connection Broadband (high-speed) Internet connection with a speed of 4 Mbps or higher
- Keyboard and a Microsoft Mouse or some other compatible pointing device

III. RESULTS AND DISCUSSION

The system generates the taxpayer's repository of information as the central database in issuing a community tax certificate. The individual and corporate taxpayers will register the information to the CTC Real-Time Transaction Processing System using smartphones, desktops, and other

devices that could access the Internet. The system requires users to use the Internet for the primary data collection in creating this program. Mobile technology utilizes to access this program. The information given by the taxpayers will be stored in a cloud server using the XAMPP, an open-source software cross-platform web server solution developed by Apache Friends. The researcher also applied Porter's Stemming Algorithm in a pseudo code that will take suffix substitution rules that enhance and recall a text retrieval system. This stemmer method evaluates a list of groups morphologically related words, and each group must be stemmed from the same root.
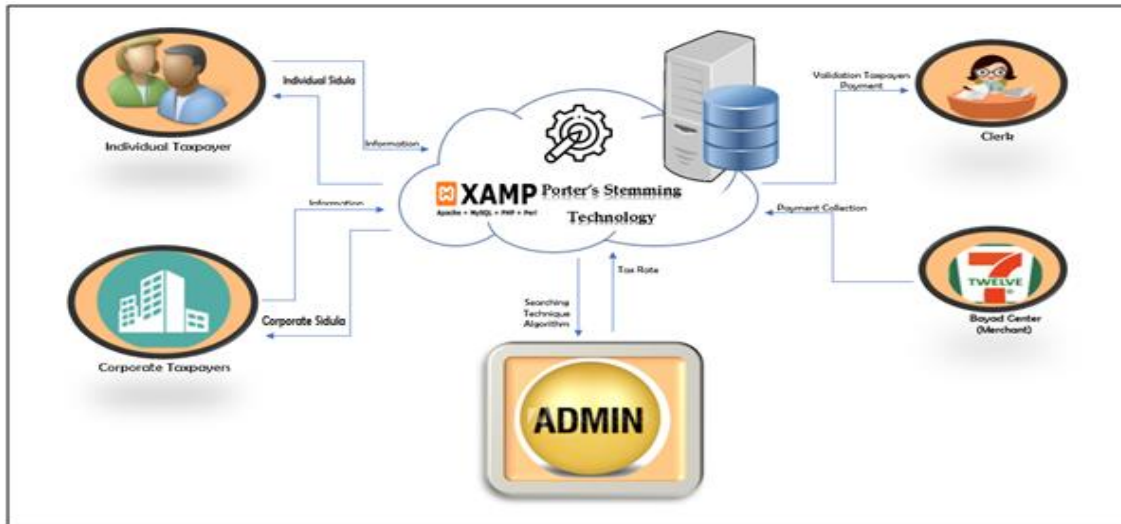

Fig 1 Context Diagram of CTC Real-Time Transaction Processing System

The design and development of this system integrate the phases. Figure 1 shows the context diagram on how the CTC Real-Time Transaction Processing system users and the taxpayers' repository and data reconciliation are managed. There are five (5) users in this system: the Admin, Individual, Corporate, Clerk, and a Cashier/Bayad Center account. The information requested by the Admin account for querying taxpayers' information from the source file or document will then be processed. The flow lines indicate the movement and the interaction of data in this system.

Raman, S., Kumar, V., & S. Venkatesan (2012) claimed that tokenization identifies tokens/topics within input documents when retrieving the information. It helps to reduced search to a significant degree. Tokenization is for breaking a stream of text into words and keeping the terms in a list called the word's list. Wong, M. *et al.* (1985) claimed that the secondary benefit of tokenization is the effective use of storage space, reducing the storage spaces required to store tokens identified from input documents.

The search word is stemming is considered on the frequency counts of letter or character and the information retrieval. Each letter has been used to set a value word count, which can be used as an indexing/ranking method. Moreover, information retrieval models many years back to the beginning of written language. Information processing applies to knowledge stored in textual form. The indexing algorithm uses word count, either a word count or token count, from the tokenization. Quality data refers to error-free data when following specific steps on retrieving. Al-Amin, Ovijit Roy, Md. Alomgir Hossain (2019) claimed that the process of starting with raw data from one to more sources and maintaining reliable quality for applications and that cleaning strategy needs to be performed consists of developing a data quality plan, standardize point of entry, validate the accuracy of data, and lastly on identifying the duplicates and append on data.

In support of the study, the research considered the tokenization process of Vikram, S., and Balwinder, S. (2014).

Enhanced Porter's Stemming Algorithm (EPSA) is the original porter rule. These new rules can solve previous errors in information retrieval. This algorithm also holds an excellent stemming weight that improves the information retrieval system's performance, respecting the recall and precision measures. The EPSA improves the precision over the porter algorithm by about 2.3% while realizing approximately the same recall percentage. Indexing and terms weighting is the process of describing or classifying a document for index terms. These index terms are the keywords that have meaning for their own and were grouped in an indexer. Then, the stemmer is a service by improving the group of these keywords in the indexer. The user's query is matched with the index terms to get the relevant documents from the database. The documents are then ranked using ranking algorithms according to the most pertinent to the user's query.

In this context, the researcher compared the EPSA and the CTC Real-time algorithm to search and retrieve the taxpayer's information. The presentation of this table 1 will give understanding and analysis on searching or retrieving information by the first name and beginning with the first letter. Further, searching first name and last name could take a more extended period when there are duplications. As such, designing an algorithm and is very important to achieve the system objectives of this study.

Table 1 Comparison of Enhanced Porter's Stemming Algorithm (EPSA) and CTC Real-time Transaction Algorithm

Enhanced Porter's Stemming Algorithm (EPSA)			CTC Real-Time Transaction Algorithm		
If the word:			*Searching the taxpayers first name:*		
ends with "e", function must keep e at the end of the word	ends with 'ize' m=2, keep it m>1, "ize" removed	**ends with "er" after it constant then delete "r"**	first name begin with "f" function must keep f at the start of the first name	Begin with "flo" n=3, hold it n>1, "flo" display	**begin with "fl" after it search next letter consonant "l"**
ends with "ches" or with "shes" …remove "es" only	Ends with "ive" m=1 keep it m>1 "ive" removed	**If end" es" Removes "s", keep "e"**	begin with "flor" or with "four", n>1 hold "fl"	begin with "flor" n=1 hold on letter n>1 "flor" display	**if begin "flor" display "f", keep "l" and "o"**
ends with "is", don't delete	ends by "iral", m=2, start with vowel, keep it	**If end "en", keep "e"**	begin with "lo", display	begin on "lor" m=3, begin with next letter	**if start "flo", display**
ends with "ying" → i& "yed" → y	Ends "all, m=2 delete "al" and add "e"	**If the word end by "y", Replace it with "I"**	begin with "flor" → l & "our" → o	begin "flord", n=2 display "fl" and add "o"	**if the first name starts with "f" add with letter "l"**
M=2, consonant, vowel, consonant, vowel then remove "al"	Ends -knives, -knives → knife	**Ends "ed" or "ing" keeping "e" while removing "ed" or "ing"**	N=4, consonant, consonant, vowel, consonant then display "flor"	starts -flor, flur → flor	**start "flo" or "flor" keeping all letters while display "flo" or "flor"**

Table 2 presents the individual taxpayers' acceptance level of real-time processing in securing the community tax certificates using the Technology Acceptance Model regarding perceived ease of use. Mean and Standard Deviation was used to determine the level of acceptance of real-time processing in securing the community tax certificates. Results have shown an overall mean of 4.38 with a standard deviation of 0.57. This implies that the individual taxpayers highly accept the real-time processing in securing the community tax certificates in terms of their ease of use. Thus, the respondents believe it will be easy to use real-time transactions to process community tax certificates.

Table 2 Acceptance Level of the Individual Taxpayers using the Technology Acceptance Model in terms of Perceived Ease of Use

	Mean	Standard Deviation	Verbal Description	Qualitative Interpretation
Perceived Ease of Use on Real-Time Transaction				
1. Learning to interact with real-time transactions would be easy for me.	4.27	0.64	*Strongly Agree*	*Very High*
2. I believe that interacting with the real-time transaction would be a clear and understandable process.	4.40	0.50	*Strongly Agree*	*Very High*
3. I believe I find the most real-time transaction to be flexible to interact with.	4.40	0.56	*Strongly Agree*	*Very High*
4. It would be easy for me to become skillful at using a real-time transaction.	4.43	0.57	*Strongly Agree*	*Very High*
Overall Mean	*4.38*	*0.57*	*Strongly Agree*	*Very High*

Legend: 5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree, 1-Strongly disagree

In an attempt to comprehend the efficient use of the online tax scheme by self-employed taxpayers in Nigeria, Mustapha and Sheik Obid (2015) studied the mediating impact of perceived ease of use on the connection between the quality of services and online tax. Table 3 presents the individual taxpayers' acceptance level of real-time processing in securing the community tax certificates using the Technology Acceptance Model in terms of perceived usefulness. Mean and Standard Deviation was used to determine the level of acceptance of real-time processing in securing the community tax certificates. Results have shown an overall mean of 4.61 with a standard deviation of 0.52. It implies that the individual taxpayers highly accept real-time processing in securing the community tax certificates in terms of usefulness.

Thus, the real-time processing ensures the community tax certificates enable them to do business with the government anytime, not limited to regular business hours.

Table 3 Acceptance Level of Individual Taxpayers using the Technology Acceptance Model in terms of Perceived Usefulness

	Mean	Standard Deviation	Verbal Description	Qualitative Interpretation
Perceived Usefulness on Real-Time Transaction				
1. Using real-time transactions enables me to do business with the government anytime and not to regular business hours.	4.67	0.48	*Strongly Agree*	*Very High*
2. Using real-time transactions enables me to accomplish tasks more quickly.	4.63	0.49	*Strongly Agree*	*Very High*
3. The results of using real-time transactions are apparent to me.	4.60	0.56	*Strongly Agree*	*Very High*
4. Using real-time transactions can cut traveling expenses.	4.53	0.57	*Strongly Agree*	*Very High*
5. Using real-time transactions can lower traveling and queuing time.	4.60	0.50	*Strongly Agree*	*Very High*
Overall Mean	*4.61*	*0.52*	*Strongly Agree*	*Very High*

Legend: 5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree, 1-Strongly Disagree

Table 4 presents the individual taxpayers' acceptance level of real-time processing in securing the community tax certificates using the Technology Acceptance Model in terms of intention to use. Mean and Standard Deviation was used to determine the level of acceptance of real-time processing in securing the community tax certificates. Results have shown an overall mean of 4.50 with a standard deviation of 0.52. It implies that the individual taxpayers highly accept the real-time processing in securing the community tax certificates in terms of their intention to use. Thus, the respondents would like to use the real-time transaction provided over the web. Further, the Technology Acceptance Model was established in terms of the intention to use the system.

Table 4 Acceptance Level of Individual Taxpayers using the Technology Acceptance Model in terms of Intention to Use

	Mean	Standard Deviation	Verbal Description	Qualitative Interpretation
Intention to Use on Real-Time Transaction				
1. I would use real-time transactions in securing government requirements.	4.43	0.50	*Strongly Agree*	*Very High*
2. I would use real-time transactions provided over the web.	4.60	0.50	*Strongly Agree*	*Very High*
3. Interacting with a real-time transaction over the web is something that I would do.	4.53	0.57	*Strongly Agree*	*Very High*
4. I would use the real-time transaction to inquire about government services.	4.43	0.50	*Strongly Agree*	*Very High*
Overall Mean	*4.50*	*0.52*	*Strongly Agree*	*Very High*

Table 5 presents the individual taxpayers' acceptance level of real-time processing in securing the community tax certificates using the Technology Acceptance Model regarding attitude towards using technology. Mean and Standard Deviation was used to determine the level of acceptance of real-time processing in securing the community tax certificates. Results have shown an overall mean of 4.58 with a standard deviation of 0.50. This implies that the individual taxpayers highly accept the real-time processing in securing the community tax certificates regarding their attitude in using the technology. Thus, the respondents find real-time processing in ensuring community tax certificates to be more interesting.

Table 5 Acceptance Level of Individual Taxpayers using the Technology Acceptance Model in terms of Attitude towards using Technology

	Mean	Standard Deviation	Verbal Description	Qualitative Interpretation
Attitude toward using technology				
1. Using real-time transactions is a good idea.	4.57	0.50	*Strongly Agree*	*Very High*
2. Real-time transaction processing will make it more interesting.	4.63	0.49	*Strongly Agree*	*Very High*
3. Working with a real-time transaction processing system is fun.	4.53	0.51	*Strongly Agree*	*Very High*
4. I like working with real-time transaction processing.	4.57	0.50	*Strongly Agree*	*Very High*
Overall Mean	*4.58*	*0.50*	*Strongly Agree*	*Very High*

IV. CONCLUSION

Results showed that as very high and strongly agree, taxpayers accepted the real-time transaction processing system based on community tax certificates. The taxpayers positively respond to the acceptability of real-time processing in securing community tax certificates and with very high and strongly agree adopting and utilizing the CTC Real-Time Transaction Processing System. Respondents have favorable response as very high and strongly agree that the system perceived the usefulness and practicality of online transaction processing for the development of Community Tax Certificate issuance database. Respondents also believe it will be easy for them the system as a repository of taxpayers' data.

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