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Efficacy of Real-Time Transaction Processing System

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Abstract: Real-Time Transaction Processing System (RTTPS) is a type of e-government that processes documents using electronic communication technology. In this time of the pandemic, the study contributes to the necessity to perform more processing online and less face-to-face. In terms of retrieving information, a comparison between Porter's Stemming algorithm and this study was performed. The study aims to design a database that will serve as a repository of information in retrieving information and also to examine the efficacy of the real-time process in securing the government requirements using the Technology Acceptance Model. The respondents of this study have perceived ease of use and usefulness on the impact when securing the community tax certificate.

Keywords: Efficacy, real-time transaction, e-government.

1. Introduction

The Internet, ICT, and the mobile revolution have all revolutionized the way we do things. Communication, vital and non-essential services, bills, and food delivery have all become more accessible and engaging thanks to mobile apps. A mobile application or perhaps a web application can then be used to perform nearly every single transaction. For a range of factors, users or customers prefer mobile applications or web applications, and businesses and government agencies are increasingly developing mobile applications to better serve them.

Paying taxes is a hassle when everyone complies every first quarter of the year and obtains the local tax certificates as part of the requirements to avoid fines. Tax certification, is a legal identification certificate as well as a necessary document required by the government in the Philippines. It's a certificate issued by the Local Government Unit (LGU) to individuals and businesses that have paid their community taxes. 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. Still, this led to a problem in terms of poor services for not meeting the taxpayers' needs. As a result, improving government service delivery has been a priority for most governments. The efficient supply of internet services has become an increasingly important indicator of effective government 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 [1]. Sufianti (2007) [2] said that the adoption of online services does not inevitably transform the serving culture of public organizations. According to Lueth (2018) [3], the number of Internet of Things (IoT) devices in use has increased to 7 billion. Governments adopt electronic governance (e-government) to accomplish this goal.

The researcher 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 certificate. Moreover, considering the streamlining of reconciliation on taxpayer information

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and the different government services processes, especially on issuance of certificate. In accomplishing this online issuance of a 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 certificate again. All taxpayers above 65 years can still be stored in the database for any government requirement which requires a 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 [4]. AlShihi, (2005) [5] 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.

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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 design a database that will serve as a repository of information in retrieving information and also to examine the efficacy of the real-time process in securing the government requirements using the Technology Acceptance Model.

2. Materials and Methods

The researcher 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 Certificate 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 Real-Time Transaction Processing. 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 Real-Time Transaction Processing System: Intranet account for printing individual and corporate account for the Clerk Account; Testing the proposed 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 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 [6]. 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 [7]. 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 × 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

3. Results and Discussion

The system generates the taxpayer's repository of information as the central database in issuing a certificate. The individual and corporate taxpayers will register the information to the 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.

The design and development of this system integrate the phases. Fig. 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.

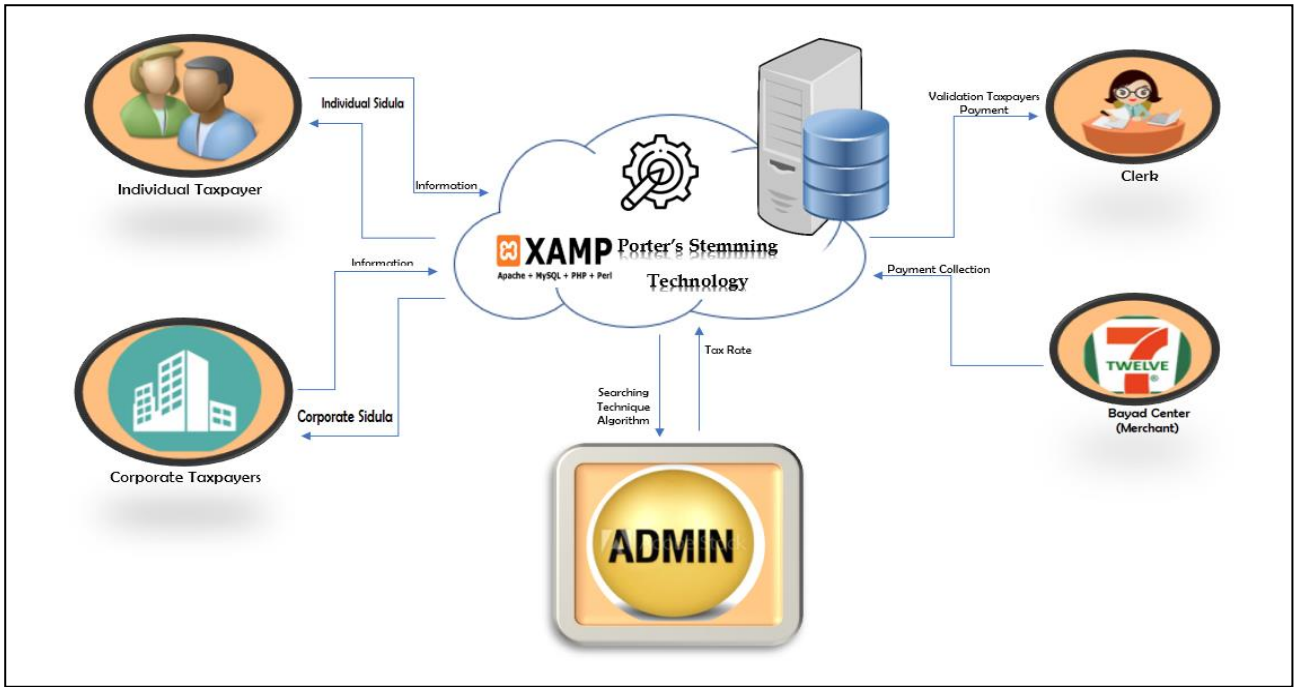

Fig. 1 Context diagram of CTC real-time transaction processing system.

Raman S., Kumar V. and Venkatesan S. (2012) [4] 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) [8] 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) [9] 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 Real-time algorithm to search and retrieve the taxpayer's information. The presentation of 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 2 presents the individual taxpayers' acceptance level of real-time processing in securing the 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 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 certificates in terms of their ease of use. Thus, the respondents believe it will be easy to use real-time transactions to process certificates.

Table 1 Comparison of enhanced porter's stemming algorithm (EPSA) and 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 Acceptance level of corporate 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 operate the e-Cedula of ease of use is a level of easiness when securing a tax certificate.	4.20	0.66	Agree	Very High
2. I would find it easy and convenient in securing an e-Cedula tax certificate	4.20	0.61	Agree	Very High
3. My navigation on e-Cedula would be clear and understandable	4.43	0.63	Strongly Agree	Very High
4. I would find e-Cedula to be flexible, easy for me to become skillful in securing a cedula.	4.23	0.68	Strongly Agree	Very High
Overall Mean	4.23	0.65	Strongly Agree	Very High

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

Table 3 presents the corporate 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 4.45 with a standard deviation of 0.57. It implies that corporate taxpayers highly accept real-time processing in securing community tax certificates in terms of usefulness. Thus, the respondents find real-time processing in improving the yearly issuance of community tax certificates.

Table 4 presents the corporate taxpayers' acceptance level of real-time processing in securing the community tax certificates using the Technology Acceptance Model in terms of the attribute of usability. 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 4.43 with a standard deviation of 0.46. This implies that the corporate taxpayers highly accept the real-time processing in securing the community tax certificates in terms of its usability attribute.

Table 3 Acceptance level of corporate 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 e-Cedula for Corporate taxpayer's enable usefulness to secure tax certificate quickly	4.47	0.57	Strongly Agree	Very High
2. Using e-Cedula for Corporate allow taxpayers to check the information on a payable account anytime.	4.47	0.57	Strongly Agree	Very High
3. e-Cedula for Corporate is useful in the rapid filing of tax certification and updating of information.	4.43	0.57	Strongly Agree	Very High
4. e-Cedula for Corporate will save time	4.37	0.61	Strongly Agree	Very High
5. Using the e-Cedula would improve the yearly issuance of a tax certificate.	4.53	0.51	Strongly Agree	Very High
Overall Mean	4.45	0.57	Strongly Agree	Very High

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

Table 4 Acceptance level of corporate taxpayers using the technology acceptance model in terms of attribute of usability.

	Mean	Standard Deviation	Verbal Description	Qualitative Interpretation
Attribute of Usability				
1. I am satisfied securing a Real-time transaction	4.43	0.57	Strongly Agree	Very High
2. I feel very confident in using Real-time transaction	4.50	0.51	Strongly Agree	Very High
3. I found it easy to update my information using Real-time transaction.	4.40	0.56	Strongly Agree	Very High
4. I want to use this Real-time transaction in securing a certificate.	4.40	0.50	Strongly Agree	Very High
Overall Mean	4.43	0.46	Strongly Agree	Very High

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

4. Conclusion

Results showed that as very high and strongly agree, respondents accepted efficiency in securing the certificate on the perceived ease of use was performed and used the Technology Acceptance Model as the basis. The positively respond to the acceptability of real-time processing in securing certificates and with Very High and Strongly Agree to adopt and utilize the Real-Time Transaction Processing System. Further, the respondents have a favorable response as Very High and Strongly Agree that the system perceived

the usefulness and practicality of online transaction processing to develop the Community Tax Certificate issuance database.

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