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E-Payment: Prospects, Challenges and Solutions in KRG Public Sector

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Abstract:

In this paper we propose a design solution to address the challenges of e-Payment in Kurdistan Regional Government's public sector.
The reality of globalization is upon us due to the advancement in new technologies and telecommunications. The advancement is more apparent in areas such as e-payment that has opened a wide door for service provision regardless of time and location. Kurdistan region is a newly recognized region of Iraq that has made real progress in many areas of governing with some real challenges left to address. Due to the political and economical situation in the country, e-communication infrastructure is not well established and this has caused real problems to many e-services including e-payment.
In this paper we investigate the main challenges and obstacles facing e-payment service provision and propose a design solution that will help KRG to overcome some of these challenges.
The findings of this paper will contribute towards speeding up the progress that KRG is currently achieving as well as providing alternative strategies for the future.

Keywords: e-payment, Kurdistan Regional Government (KRG).

1. Introduction

Kurdistan Region of Iraq (KRI) is a federal region of Iraq that exercises executive power according to the KRI laws as legislated by the Kurdistan Parliament [1]. Due to the political and economical situation in the country, e-communication infrastructure is not well established and this has caused real problems to many e-services including e-payment [2]. E-Payment is the money transfer in an electronic form from payer to a payee using e-payment mechanisms in the way that customers can manage their transaction and account remotely through using technologies such as web-based application [3][4][5]. In this paper we investigate the main challenges and obstacles facing e-payment service provision in Kurdistan and propose a design solution that will help the Kurdistan Regional Government (KRG) to overcome some of these challenges. Provision of e-payment services is directly affected by the state of banking infrastructure i.e. well established banking system can facilitate the provision of e-payment service more efficiently [6] . The state of banking infrastructure is not well established in KRI, currently there are two branches of Central Bank of Iraq (CBI) in KRI which are based in Slemani and Erbil governorates. The CBI offices in KRI are responsible for bank regulations in their respective governorates [7]. According to the official CBI website there are more than 56 banks in Iraq which are categorized into four categories, State Banks, Private Banks, Islamic Private Banks, and Foreign Banks. The majority of the banks have branches in KRI and the head quarter of 15 of them is in KRI [8][9]. For the purpose of e-payment there are currently some systems that have been established by CBI such as Real Time Gross Settlement system (RTGS), Automatic Clearing House (ACH) and Government Securities Registration system (GSRS) [10] . Although there are 44 banks registered RTGS system, 17 banks registered ACH, 11 banks registered CEP, 25 banks registered GSRS among all the banks in Iraq including KRG banks, RTGS is the only actively used payment system in Iraq [16]. It is important to mention that RTGS system is for managing settlements between CBI and other banks in Iraq not for public use. The Information Technology departments of KRG has been trying since 2005 to establish e-government that includes e-payment facilities, the process has cost the government millions of US dollars and so far they have failed to implement it [11] . In the absence of a good banking and e-payment infrastructure we believe KRG should look for quicker alternatives for now that enable citizens and businesses to pay the government electronically. Bearing in mind that services such as electricity and water is provided by the government, in this paper we propose a system that KRG can implement for its citizens to pay for utility bills, government fines and other governmental related payments electronically. We advocate that our proposed system is easy to implement, efficient, and can make the life of citizens more fulfilling. The system enables citizens to save time and help them in going through less bureaucracy when paying their bills and fines.

A general aim of any research is to investigate issues and provide solutions to address them, having this in mind; the

main contribution of this paper is to provide the KRG with a quick and implantable e-payment system alternative that can help the progress of the region.

The reset of this paper is organised as follows, in section 2 we provide a brief background and related research, in section 3 we describe our proposed system, in section 4 we discuss our proposal and finally we conclude in section 5.

2. Background and Related research

In this section we provide a brief background information in section 2.1, a brief account of related researches in section 2.2 and the steps we have used to carry out this research in section 2.3.

2.1 E-payment

The idea of electronic payment to buy goods or services started in the late 1970 and early 1980; the first actual e-payment system was released in 1997 [12]. The availability of internet and technology in the form that allows accessing the information around the world, drive the e-payments and e-commerce simultaneously into a powerful and effective system. E-payment at the early stages started in Business to Consumer (B2C) e-commerce through online capturing of payment information from the web and completing the transaction off-line [12]. Later the importance of e-payment in Business to Business (B2B) and Consumer to Consumer (C2C) e-commences became apparent. The rapid growth of e-commerce forced the development of different types of e-payment methods.

Generally, there are two types of e-payments, the first require physical payment device with internet access such as Electronic Point of Sale (EPOS) and the second does not require physical payment device such as e-cash, and virtual credit cards which requires the internet only [13]. [5] Has categorized e-payment system into five categories which are e-cash, credit cards, debit cards, prepaid cards, and electronic checks. Most of the e-payment systems are widely used for B2C and C2C e-commerce and others like e-checks are used for B2B e-commerce [5]. Despite the importance of these systems their implementation faces many obstacles and challenges some of which are identified bellow:

- **Security**: refers to a set of processes and methodologies that are applied to guarantee the integrity, privacy, availability, access control, confidentiality, authorization, and authentication of the information exchanged during e-payment. The automation of transaction without direct contact from payer and payee makes e-payment vulnerable and provide an environment for security leaks [14]. To avoid this issue e-payment system should provide all the necessary mechanisms to deal with expected security breaches.
- **Infrastructure**: lack of infrastructure is the most daunting problem that confronts e-payment system. Most e-payment systems depend on communication infrastructure such as computer networks and the internet to connect banks with financial institutions for automation and completion of payment transactions.
- **Regularity and low issue**: for the pursuit and prudential supervision of e-payment and e-commerce businesses, a set of laws and regulations have to be considered in order to provide financial integrity, stability, soundness, and competitiveness [15]. The most noticeable rules for e-payments are: Anti-money laundering, supervision of commercial banks and e-money institutions, central bank laws for payment systems, security and protection laws and cooperation and competition laws [16].
- **Society's culture**: Culture is a collection of characteristics, human capabilities, habits, knowledge, belief, art, attitude, morals, law, custom, and any other capabilities of an individual or group [17]. The differences in culture of payment have direct reflections on the scope of establishing e-payment system [18].

2.2 Related Research

Many researchers have recently focused on the EPS (Electronic Payment System) for developing countries. Peter M Ogedebe with his colleagues worked on an EPS for Nigerian government with the aim to reduce corruption in the public sector; additionally they claim that their system can help the Nigerian government to speed up payments to its contractors and employees [19]. [20] Address the challenges for an electronic payment gateway from both the customers' and the merchants' point of view in a way that it can provide security and privacy for users in developing countries. [4] Aims to identify the issues and challenges of electronic payment systems and offer some solutions to improve the e-payment system quality. The focus of [21] is to identify and explain different methods of e-payments and the authors analyse the challenges of electronic payments from different perspective and provide preliminary security countermeasures for each of the issues.[22] Outline issues that should be tackled in order to facilitate the development of EPS in Costa Rica and it present ways to enhance e-payment systems in the country.

All of the researches mentioned focus on providing an advanced e-payment system usable in all kind of transactions; however our proposed system is designed to facilitate e-payments for public services provided by KRG. The proposed system can also be beneficial to developing countries that have the same conditions as KRI.

2.3 Research Steps

For the purpose of this paper we have used a simple methodology that can be summarised in the following steps:

1. Research available literature about e-payment in general
2. Investigate available e-payment systems in use in KRI and identify issues
3. Gather generic requirements based on step two
4. Design a simple and implementable solution that can address the identified requirements
5. Evaluate the design solution for strengths and weaknesses

3. Proposed e-Voucher System

We present our proposed system in section 3.2, explain the

current system in section 3.1 and the working steps of the system in section 3.3.

3.1 Current System

Currently the KRG straggles with unpaid utility bills which are estimated in millions of dollars according to [23] . There are a number of reasons as to why KRI residences are slow in paying or not prepared to pay the government for the services they receive one of which is lack of modern payment system. The current billing system works in the following steps:

1. Different ministries (ministry of electricity for example) send a representative to all households to record their meter readings
2. The collected data is entered into a local database of the ministry
3. Household usage is calculated based on the recorded data
4. Bills send to households manually
5. House residence take the bill to the nearest payment point and in majority of time residence have to travel for some times to get there
6. Customer pay in cash and their bill is stamped as proof of payment

The current system is very old and has not been updated for years and there are several issues in the system which can be summarised as the following:

1. Utility meters are read manually human error results in reading variation which intern increase customer complaints and dissatisfaction. If customers believe they are billed wrongly they may not be prepared to pay it.
2. Once a bill is received customers have to travel to a few number of payment points to make their payments. This clearly is time and resource consuming for people in today's fast pasting life.
3. After payment the system is still open for errors since the payment is made manually by clerks on a later date and no confirmation is sent to the customer

One obvious way to improve the system is to install electronic payment into the system where people can view their utility bills and pay online, but many obstacles in the way of implementing such a system as explained in section 2.1. There are two major issues in particular that need to be addressed in order to pave the way for an electronic payment system to be widely available, the first is legal issues and the second is electronic and banking infrastructure. Addressing these issues may take years considering current governing style and there is no guaranty that it will succeed.

3.2 Proposed e-Voucher System

As a quick solution we propose an e-Voucher Payment System (EVPS) which can provide the KRG with a tool that is easy to implement within the current infrastructure. We propose a web based payment system where customers can pay their bills using pre-bought e-Vouchers. The system consists of two main subsystems which we call *Web Service* and *System Manager*; figure 1 shows an overview of the main components of the system. The Web Service subsystem deals with user requests such as payment processing and report generation; and the System Manger subsystem manages governmental departments and customer accounts. Each sub system consists of a number of components, table 1 summarises the functions of each component.

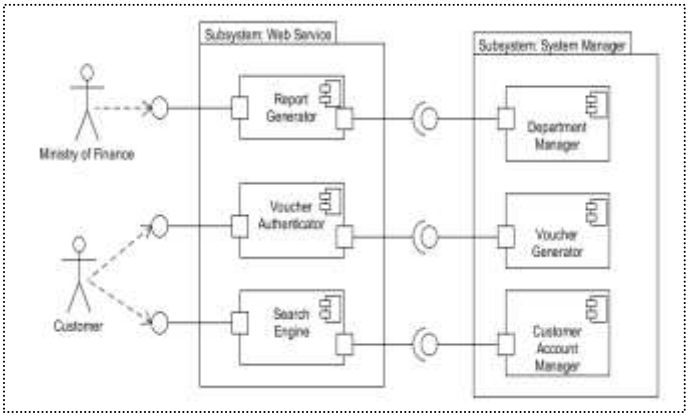

Figure 1: UML component diagram of the e-voucher system

Table 1: Component Functionality

No.	*Component name*	*Component functions*
1	Report Generator	Deals with all report requests made by the Ministry of Finance and governmental departments such as a list of house hold that have not paid electivity bills in a specific area
2	Voucher Authenticator	Accepts and authenticates all voucher codes entered by Consumers
3	Search Engine	Deals with all search requests made by both consumers and concerned departments such us looking a water bill using house a number
4	Department manager	Manages all aspects of individual departments such as allowing record update, and delete
5	Voucher Generator	Generates stores and validate all voucher codes. This part is managed by the Ministry of Finance
6	Customer Account Manger	Manages consumer accounts and is responsible for sending payment confirmation messages

The functionalities of the system we propose should be simple, inclusive and capable of dealing with the aim of the system. The simplicity of the system also helps in implementing the system fast and help maintaining it easily after implementation. Figure 2 shows a UML use case diagram of the system that shows all the main functionalities of the system as well the actors involved. Technologies to implement web based systems are widely available namely HTML, PHP, MySQL, ASP.NET, HTTP, Javascript and CSS. In our design we explain and show the proposed system in an abstract level without committing to how the system is implemented technically.

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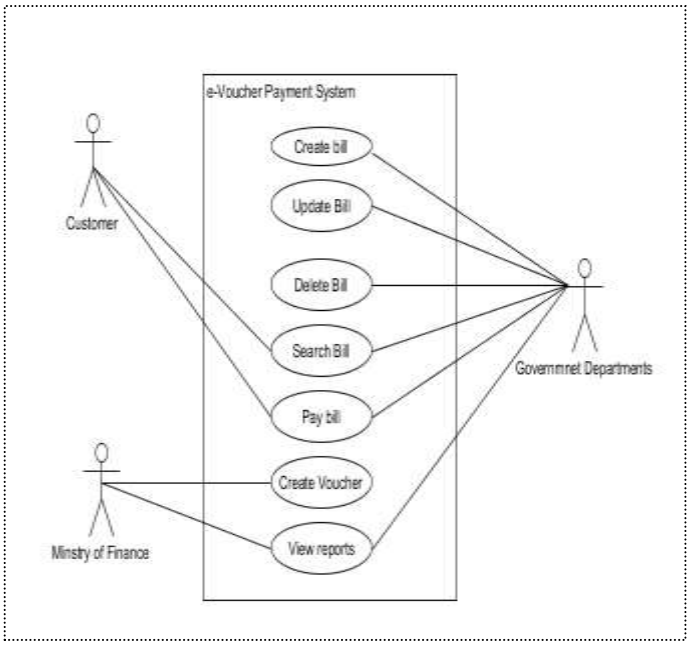

Figure 2: UML use case diagram of the e-Voucher System

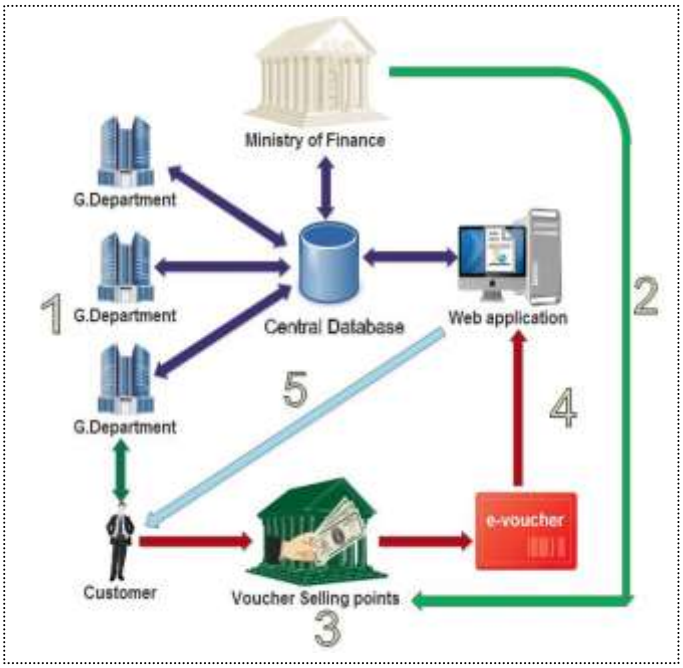

Figure 3: The e-Voucher System working steps

3.3 How the System Works

As explained the e-voucher system we have proposed can be implemented by KRG to collect utility bills, fines and other governmental payments. The system is very simple, consists of a simple web based interface connected to one central database where the data of all the governmental departments can be recorded. The system should be accessible by all the departments and customers anywhere anytime. We abstract away from all the implementation technicalities and explain the processing cycle of the system in the following steps as illustrated in figure 3.

1. Governmental departments collect relevant data and enter it into the central data base
2. Ministry of Finance produce e-vouchers and distribute it to retail shops and selling points where customers can buy it
3. Customer by e-vouchers from a selling point, the e-voucher should be reusable as long as credit remains to be used
4. Customer uses the web application to search for the bill they want to pay (e.g. to pay for electricity bill, customer enters house number on the bill). Once the bill is found customer enters e-voucher details and make the payment
5. A bill payment confirmation code is produced for the customer

4. Results and Related Research

Establishing a fully functioning e-payment system in KRI faces many challenges including the lack of adequate IT infrastructure, baking system and laws and regulations. This has caused problems for KRG, Citizens and businesses in making payment fast and efficiently. To address the problem we have proposed an e-voucher based payment system that KRG can implement for collecting utility bills and other governmental payments. The system can be implemented using the current IT and banking infrastructure as well as within the current laws and regulation since there are telecommunication companies using voucher based top up systems for their customers. The system is cheap to implement because internet exist in the majority of households and easy to use since there is no need for registration and user authentication. The system can save times for customers and reduce bureaucracy and human error by enabling customers to view their bills and pay for them electronically. However the proposed system is partial and designed for a limited purpose which is making payments for public services. The system is not suitable for business payments and money transfer locally or internationally, this means it is a temporary solution that can be replaced by a more advanced system when the required infrastructure in terms of IT, banks and regulations is in place. As a result of our investigation we have found the following obstacles in the way of implementing an e-payment system that can be used in all areas of life in KRI.

1. Lack of adequate information technology infrastructure: the current communication and network infrastructure in KRI is not well established to permit the implementation of a fully inclusive e-payment system as explained in [2]
2. Lack of banking infrastructure: most of the public banks use paper-based processing techniques to manage their

operation and they don't have adequate networks between their branches.

3. Conflicting rules and laws between KRG and central government of Iraq. KRG claims independency in legislating laws for the region but when it comes to electronic payment according to article 27 in Electronic signature and electronic transactions Law No. 78/2012 and cabinet decision No. 3/2014 in Iraq all the e-payment system and e-payment transaction must be executed through the CBI [24].Therefore any attempts to establish e-payment systems in KRI banks must have approval from the CBI, and all transactions and transferring should be run by CBI payment systems. This means that e-payment system in KRI confronts the same problems and challenges that face implementing e-payment systems in Iraq.
4. Lack of passion by the banks for establishing e-payment systems: the majority of the banks in KRI are run traditionally and they lack the passion for modernization. This is one of the main reasons that most of the banks don't possess IT aided processing system including e-payment system.
5. Cultural attendance to use cash instead of e-money: traditionally people tend to keep their money with them and very few are prepared to deposit it in a bank. The recent political situation in the country is one of the causes of this mistrust. In 1991 after the first golf war and in 2003 after the second golf war people lost their money that were deposited in the public banks and they have not been compensated yet.
6. Lack of customer's awareness: banks in KRI so far have not advertised effectively for the services they can offer; this has limited the awareness level of people regarding available banking services.

5. Conclusion

Kurdistan Regional Government (KRG) is a newly established federal region of Iraq that made real progress economically in recent years, but there are many obstacles that has slowed the regions progress one of which is the absent of e-payment systems. Due to the lack of adequate IT, banking, and regulatory infrastructures it is difficult to implement a fully functioned e-payment system capable of facilitating all kinds of e-payment transactions. In this paper we have proposed an e-payment system that can be implemented by KRG to collect utility bill payments and other governmental related payments such as fines. We have explained the main components of the system and the processing cycle of the system. The system is simple and effective and it can be implanted within the current infrastructure. We have also identified a number of obstacles that need to be tackled to pave the way for implementing a fully functioned e-payment system|

Finally we intend to implement the proposed system and presented it to the KRG for use; it is worth mentioning that the basic idea of the system presented in this paper has been discussed with KRG officials and has an initial approval.

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