IMPROVING MUNICIPAL MANAGEMENT ASSOCIATED WITH THE RESOURCES COLLECTION THROUGH IT: CAASIM CASE IN **MEXICO**

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Abstract:

The study presented is research based on the impact of the pay stub in the management of the Water Commission (CAASIM), an institution that works in some municipalities that belong to the state of Hidalgo in Mexico. Largely, the findings show significant changes such as reduced operating costs, increase in the amount of revenue, decrease in the volume of water consumed per household, reduced staff dedicated to bill collecting and the use of a convenience store as a principle payment

The findings in this research, considering data over several years, completely refute the belief that people in Latin America are seeking to evade the payment of their obligations to the government, but that there is a need for more efficient administrative mechanisms in order to provide adequate service for citizens.

Key Words: E-government, payment slip, efficient municipal management, Mexico

Introduction

The analysis of the impact of technology can be measured through different aspects, however one should be careful to create a framework so that the findings obtained are consistently expressed.

This paper seeks to frame the answer to the research question: What impact has the implementation of the pay stub payment system had for CAASIM service? In a deductive manner, improving public administration electronically arises from how the expansion of e-government initially serves and as an ulterior goal. We also refer to the factors affecting the adoption of technologies, depending on the level of economic development of the country. We show some recommendations made in previous studies on models that can effectively promote the adoption of information and communications technologies in developing countries, as in the case of Mexico.

The idea of e-government has been preceded by the structure of electronic commerce and for this, without a doubt, the main motivator is to reduce transaction costs and increase the speed with which these are made possible by the digitization of information. The literature supports the implementation of technology through the Transaction Cost Theory by Ronald Coase². This study seeks to confirm said theory with information from CAASIM. We've added to this document some cases and effects of e-government in the Caribbean and finally, we describe the technology used in the CAASIM payment system as well as their processes and those persons involved.

CAASIM uses barcode technology, which can be scanned and read directly into a computer. Thus the data is instantaneously interpreted, virtually and without errors, by a bar code reader. A payment system has been developed which involves a pay stub and is a standard that can be used in retail stores, banks and privately-owned billing establishments.

The companies that provide utilities (electricity, gas, water) and other providers (insurance,

² Ronald H. Coase es ganador del Premio Nobel de Economía en 1991 por su aportación del significado de los costos de transacción en 1961.

government agencies) have sought to improve customer service through an automated payment system. This requires that the information that all parties involved in the payment process must have be such that it can be captured electronically. One of the most effective methods to do so, from the standpoint of cost, is the method implemented by CAASIM: the barcode.

The flow of information accompanying the physical payment requirement is communicated between business partners in various ways. EDI (Electronic Data Interchange) is the optimal way to convey that information.

This case is considered to be an example of how information and communication technologies, in a simple way, can help improve the quality of people's lives. This is also an example of how a municipal e-government begins to change the way the government administration or its agencies deliver some services to citizens. It is also determined in the investigation, how other government agencies tend to offer similar options for the government's own services in a growing stage of e-government at the local or municipal level. Finally, thanks to these findings, we can conclude that people in Latin America (specifically in Mexico) are not necessarily looking to evade their responsibilities to the government, but there is an urgent need to improve services so that the payment of utilities is more accessible to society in general.

Literature Review

Because the application of IT by CAASIM can be catalogued as e-government, we must look further into the literature on the subject. E-government, is an agent of change, Prins (2001) defines e-government as the delivery of online government services, reducing government bureaucracy, increasing access to democracy and reinforcing agencies' accountability towards citizens' needs. For the European Union, e-government is "the use of information and communication technologies in public administration, combined with organizational change and new skills to improve public services and democratic processes, strengthening support to public policies." (European Information Society, 2004) The implementation of e-government has different applications either to automate and integrate different information spaces in order to simplify and maximize the benefits of technology, or to modernize public services and provide services to citizens. (Navarra and Cornford, 2003) Aside from specific objectives, the transfer of public administration processes from a manual format to an electronically automated format in real time engages, in some countries, a radical redesign of processes at local and national levels.

According to the company Accenture (2004), e-government allows for high performance as it provides better results at lower costs and maximum value for each resource used.

In the case of a municipality, certain resistance has been identified in the adoption of e-government in various countries; these factors recognize some limitations, such as lack of awareness (Reffat, 2003), lack of confidence (Navarra and Cornford, 2003), lack of strategy and infrastructure. (Reffat, 2003)

Chen, et. al. (2007) generated recommendations after a comparison of the state of e-government among developed and developing countries. According to the authors, financial problems are prevalent in developing countries and can be resolved by a strict tax structure. To improve infrastructure, outsourcing is an option that needs to be carefully considered due to lack of internal, technical team. Technicians are a major issue in the implementation of e-government in developing countries

Another item to consider is collaboration, where the removal of borders between different government agencies is the biggest problem in e-government. Government departments should first define their structure, then the transactions need to be simplified and the decision-making process must be known. Simplifying transactions, citizens are more likely to access the site. Before any underdeveloped nation can intend to change its public administration structures to a technological infrastructure, they must first determine to what degree the population has access to internet.

Until now, the implementation of e-commerce confirms Coase's theory, which states that the more people and entities transacting (applied to this case, electronically), the less the individual cost will be, and the transactions will be faster and more frequent. Coase believed that the circumstances of some transactions could make the government a more efficient participant than those private firms affected by market forces. The primary goal of e-government is "the gradual transformation of government business at many levels." An important example of the results of e-government in developing countries is the case of the Caribbean, where he stressed that the e-government project can be a

tangible driver in the reduction of the digital divide in the region.

A reduced digital divide can result in a wider range of services available via e-government because a higher proportion of the public would have access.

Some more developed nations in the region, such as Brazil and Mexico, have reported success in infrastructure development projects in e-government. In the case study presented, we analyze the impact generated when a public service organization includes technology in the payment made by customers. In order to understand this, we must consider the definition of the payment system implemented by CAASIM.

An electronic payment is defined (Raja & Velmurgan 2008) as a paid service that uses information and communications technology including an integrated circuit card, cryptography and telecommunications networks. The activities needed to design the infrastructure for payment systems become more complex, since competition and innovation constantly promote the search for better combinations of efficiency, reliability, security and system stability, in order to provide payment services to a number greater of individual users and institutions. (Raja & Velmurgan 2008)

On a pay stub you can find the following information, which can be read by barcode (Rosario, 2008): customer information, supplier information, a detailed invoice of the services provided, a reference number, the amount payable and payment terms (deadline or place of payment).

Furthermore, it is important to mention the key steps for using coded pay stubs:

Table 1: Adapated from Rosario, 2008

Step 1: The billing entity and payment receiving agency must enter into an agreement to work within the appropriate, legal framework regarding the payment receiving system, considering the agency.

Step 2: The payment receiving agency informs and empowers all receiving points regarding the processing of

Step 3: The billing entity emits coded payment stubs for their customers.

Step 4: These customers (invoicees) take the coupon to the agency receiving payments. They scan the pay stub, payment is made and a receipt is issued.

NOTE: the working agreement between the billing entity and payment receiving agency should consider what would be an appropriate action if the deadline has passed.

Step 5: The payment receiving agency files all pay stubs received. The information is collected, organized, and then transmitted to the party issuing the relevant invoice or through the banking system, after an agreed upon period of time. The funds are then transferred to the bank account assigned.

Step 6: The billing entity updates its database.

This table (Rosario, 2008) clearly shows the flow of information and transactions involving the use of the pay stub for services. The technological infrastructure and administrative processes should adjust effectively, in view of the benefits that customers require and that the competition demands.

Methodology

In this study we have agreed to use the case method (Yin, 1994) to address the situation, because the strategy of approaching the phenomenon is very important in analyzing the different characteristics. According to scientific methodology, research is descriptive, suggesting a depth characterized by collecting data that allow the researcher to identify what is being observed, as a first approximation to the phenomenon. This is because there is no other similar study to the case of Mexico. For Hernandez (2010), descriptive studies are used to analyze how a phenomenon and its components manifest. The purpose of the research is to describe situations and events. He seeks to specify important properties of individuals, groups, communities or any other phenomenon that is under analysis. Various aspects are measured or evaluated, as well as dimensions or components of the phenomenon to be researched. For its interrogative purpose a nonexperimental investigative line must remain for the study, since none of the variables are manipulated by the research team (Hernandez, 2010). The approach from which the study will be addressed is quantitative, therefore deductive (Kerlinger, 1988), because it uses the collection, analysis and interpretation of data to answer the research question.

It should also be considered that a clear quantitative approach does not limit the case study technique (Eisenhardt, 1989), but strengthens it by extracting specific information (questionnaires, document analysis, observation) which can be reviewed and assessed in the analysis unit chosen. In this case, because the information is not public, it was necessary to carry out personal visits in order to obtain the information presented here.

It is important to mention that the case study method does not compromise its value because it exhibits a specific study, rather because of the depth with which said case is researched. (Pettigrew, 1997) The case study method associates the broad collection of evidence, which supports science to develop theories (Eisenhardt, 1989) bringing together the knowledge in areas in which there is no clear consensus. The researcher assumes that there is an external, complex reality, knowable only through observation and triangulation of information (and that observation is fallible). In addition, realism supposes the possibility of assessing the reliability and validity of the knowledge, something that is not so evident in constructivism and critical theory (Craig, 1990). The choice of unit analysis corresponds to the characteristics found in e-government at the municipal level, where the importance of the study lies. An example of the implementation of the pay stub, for the collection of a public service and their respective revenue in concentrated areas and accessible measurement.

Mexican Water Works: CAASIM (Comisión de Agua y Alcantarillado de Sistemas Intermunicipales)

CAASIM is a public agency of the State Public Administration (Hidalgo, Mexico) called the "Commission of Water and Inter-municipal Sewer Systems." The Commission's Mission Statement is "To provide well-being to society through quality water services, with efficiency and optimization of agency resources through advanced technology, implementing a water culture in accordance with global needs." (CAASIM, 2011)

The legal nature of the decentralized municipal management in the state of Hidalgo comes from the publication of the National Water Act (1992), which grants jurisdiction to the municipalities to operate and run for public urban use. In the state of Hidalgo, the commission was established by Government Decree published in the Official Journal of the State on March 19, 1992, but changes on May 17, 2010, established the objectives to be fulfilled by said institution. Among these is the obligation of "Providing public services: water supply, drainage, sewer treatment, disposal and reuse of wastewater in the population where solicited."

Also attributions are granted to allow for optimum performance, these include:

- I. Plan, schedule, budget, study, proyect, build, rehabilitate, expand, operate, manage, conserve and improve systems for drinking or treated water, sewage, water treatment, disposal and reuse of wastewater: in terms of the law;
- II. Charge for the service under the terms of the State Water and Sewage Law, its Regulations and other applicable norms, contributions as rights, exploitation and their accessories, or other to be perceived through providing public services;
- III. Apply dues and fees that correspond to each of the activities or actions to be made for the provision of public services.

Similarly, the official document illustrates the organic statute which details the administrative structure and includes General Management, Technical Secretariat, Directorate of Legal Affairs and Communications Technology Directorate, Directorate of Administration and Finance, Supply Management, Commercial Management, User Support, Comptroller Division, Directorate of Construction and Hydraulic Operations Directorate. The situation which precedes access to drinking water in urban and rural areas of the state of Hidalgo suggests shortcomings in distribution and fluid loss, but not in the supply of the resource (Amaya, 2010). Similarly, the water problem in this area has been characterized as a state of exhaustion and over-exploitation of aquifers exacerbated by financial problems and limited administrative capacity, as is stated by Amaya (2010), in his study of intermunicipal water management models in Mexico.

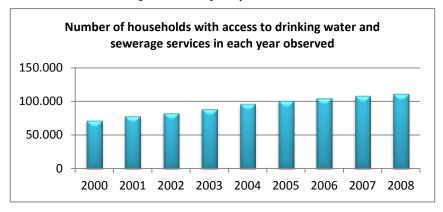
To approach the fulfillment of their duties, CAASIM has deployed the instrument that is the subject of this study, a pay stub with barcode technology, implemented as a means of payment that is accepted in various retailers, unrelated to the Water Commission. It is worthwhile to mention that certain convenience stores have an agreement with the Water Commission and there are at least 73 locations within the state of Hidalgo for the collection of these payments.

The collection of data in the Water Commission went on for two months with documents provided by the institution and the review of external sources that allowed comparison and objectivity. The formats used include the measurement year and the spaces where you put the information residing in the information systems of the Commission.

Findings

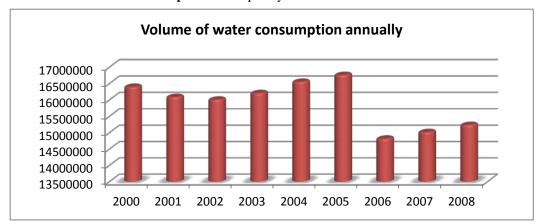
In the section below, the compendiums of information are displayed, after the data collection originating in CAASIM where we obtained the following comparative, in which the period from 2000 to 2009 is the most complete.

Initially statistics are established on the number of households with access to drinking water and sewerage services in each year observed (INEGI, 2009). The trend in the growth of the number of connections per year is shown in the graph below, suggesting a parallel impact on the productivity of CAASIM:



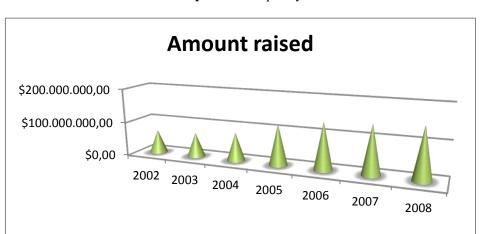
Graph 1: Developed by the authors

Similarly, the concentration of information to determine the volume of water consumption annually suggests a steady decline, as shown in the following table and graph:



Graph 2: Developed by the authors

We overwhelmingly assert a substantial increase in the amount raised by the Water Commission during the periods observed:



Graph 3: Developed by the authors

In the final review of each of the documents obtained and summarized in the tables and charts here presented, we can see that despite the increase in the number of connections, some interesting indicators clearly manifest, which are as follows:

- The annual water consumption decreases: The consumer has more access to information use and makes monthly payment. It can be noticed that this impacts water consumption.
- The amount collected increases: Because the options of places to pay have increased, the amount collected has as well.
- There is a decrease of 62.9% in costs associated with the collection payment.
- It has been proven that the collection staff decreased from 35 to 13 individuals: The change in the payment system allowed for eliminating costs associated with the place and the people who did this work

The primary place of payment is the convenience store. It has been determined that the use of the pay stub along with the convenience store chain has been a success, and the consumer has established it as the preferred means of payment.

This is evident in the following tables:

Table 1 Developed by autors	Associated Collection Costs	
Year	Amount	
2006	\$6,650,000.00	
2007	\$2,470,000.00	
Savings	62.90%	

Table 2 Developed by authors	Associated Collection Personnel	
Year	Personnel	
2006	35	
2007	13	
Personnel reduction	22	

Table 3 Developed by authors	Mean of payments, Commissions and Number of locations	
Means of Payments	Commission Value	Locations
Bancomer	\$5.00	8
Banorte	\$5.00	3
Banco del Bajío	\$5.00	1
OXXO	\$2.00	40
CAASIM office	N/A	6

Analysis and Discussion

After observing the results of the investigation, we can confirm that the view from the Transaction Cost Theory is found in the case of CAASIM, not only by reducing operating costs, which Coase emphasizes in his theory, applied also to government transactions-(Fenwick, John & Stimac, 2009) and personal transactions, but because the consumer has been able to adapt to this innovation, for several reasons, among which the most important is the fact that the convenience store is a known and accepted as a safe, trustworthy context for the customer.

The customers' benefits are represented by the amount of payments made by users now have a greater number of points of payment and the convenience this generates. For invoicing, payment is made in a timely manner, resulting in increased income for CAASIM. The results together promote the service of the Water Commission, as a service with added value. Another impact discovered in the study is the presence of movements in the relationship consumption-payment, since the greater the use, the more the household must pay, which allows to consider the user's awareness of use when he periodically registers the payments and receives specific information about his consumption on the pay stub.

It is clear, from another perspective, that the implementation of the pay stub suggests an economic recovery for the Water Commission, which has been among other things, presumably used in the development of municipal infrastructure in the regions for which it is responsible, so that the number of households with access is greater. Within the multidimensional assessment of the information gathered, there is a stronger sense of poverty rates in those who manifest shortcomings and limitations of access to basic services in local populations, with respect to the supply of drinking water. (CONEVAL, 2010) From the perspective of the impact of the use of information technology some

authors (Srivastava, & Teo, 2007) have mentioned that it is possible to analyze how e-government can help nations achieve their social and economic goals. Specifically, they explain the significant relationships between the degree of development of e-government and administrative efficiency and location of resources, which affects the social equity and business competitiveness of a country. Equally, this paper shows that those benefits which locally promote a decrease in the gap among the social groups most deprived of public services.

Upon completion of this research and reflecting upon the initial question that asked what would the impact of the implementation of the payment system through pay stubs be for CAASIM, it is feasible to argue that at the municipal level has been a successful transformation payment system to choose outlets such as convenience stores that have a highly valued and privileged presence (i.e., in large quantities and with good location), in addition to charging a fee which is not significant for the consumer. We have also identified that the citizen chooses the means of payment that are most attractive (easy access, minimal extra charges) and this supports the fulfillment of the obligation to pay monthly, an issue which previously, without information systems and electronic collection, for CAASIM, was unthinkable. The decrease in costs for the Water Commission has been instrumental in strengthening and expanding this system in the municipalities of the state of Hidalgo, as the benefits are flattering. The justifications for the dissemination of the issue revised here are based on several studies that address some doubts about the importance of e-government. For example, Lee, et. al. (2008) suggest two primary aspects to understand the benefits of e-government. In the first the transformation of government operations results in benefits for citizens, companies and the government itself. This means that the needs of citizens can be better recognized and can help companies become service providers of both individuals and the government. This will also influence the reduction of operating costs by increasing government efficiency in internal operations. The second aspect is the positive transformation of the relationship between government-subordinates through improved interactivity, making this interaction smoother, faster and more responsive. (Lee, et al 2008)

It is important to recognize that there is no documentation on the effects of pay stub as a system in the public sector in Mexico, and this paper proposes a line of research to put into practice, so that other members of government administration find the application of technology accessible in the context of Mexico. It is worthwhile to remind the reader of the methodological importance implemented, because when you fail to distinguish several sources of evidence and the boundaries between the observable facts and context are not clearly stated, the case study becomes important once again. (Yin, 1994)

This method also allows researchers to use a "controlled opportunism" to respond flexibly to new discoveries while collecting new data. (Eisenhardt, 1989) The methodological approach specifically within the discipline of information technology, analyzing e-government, has expressed greater inclination by observation methods and review of documents, allowing researchers to verify and validate the empirical findings by triangulation. (Sarikas, 2007)

Data analyzes were performed comparing the different discoveries including identifying issues, which are categorized and sorted into various lines. (Sarikas, 2007) Verification and validation of the findings, by triangulating data from primary sources with official documents published and used as secondary sources, were taken up to ensure to avoid any bias that might arise. (Choudri, 2005). For Dhillon, et. al. (2008), the case studies offer the potential to generate alternative explanations of diverse perspectives, making way for the researcher to detect contradictions or misunderstandings. They are also appropriate for review where the goal is to study current events, and where it is necessary to control behavior or behavioral variables, according to Yin (2003).

CAASIM is an example of how the government approaches the citizen and provides more efficient service, changing the business model for the benefit of all involved. With absolute certainty and precision in its analysis, Fenwick, et al (2009) recognized at the conclusion of the study on the economic necessity of e-government that the race for wealth (among countries) will be won by the governments with the best design which will allow millions of transactions, combining efficiency with trust (minimizing transaction costs with information security).

An important part of the findings is the irrefutable proof that the user has not sought to evade payment, but rather the opposite. An increase in payment frequency has been achieved and also encourages the user to be more responsible in water consumption.

Conclusion

The integration of advanced technology tools, with some fundamental processes in the management of government institutions, denote the ability of corporate leaders to adapt to the benefit of citizens, instruments like the barcode, which engaged in a pay stub promotes the respective collection of a public service.

The recognition of various factors, including the degree of acceptance of a new means of payment for services, the expansion of the number of payment points for the water and sewer system in the municipalities of the state of Hidalgo, the certainty of citizens regarding the reliability of this innovation, the relevance in billing information per household, the accuracy in the amount of water used and the appropriate fee, among others, refer to the virtue that local authorities who are in charge of drinking water in many areas Hidalgo have held.

The contribution herein obtained is relevant through the analysis and evaluation of the facts described, not only for the areas who directly benefit, nor for citizens experiencing the changes, but for the country at large, because this line of research, that is: the technology applied to the quality of life of the population, a critical input in the review that is done to the payment of municipal management of water and sewerage services in organisms such as CAASIM. Enthusiastically the Water Commission has engaged in a process of change that, beyond the technological aspect, moves into the cultural range, even where environmental consciousness and narrowing of the governmentcitizen relationship is affected, where improvement in fulfilling the obligations of these institutions has been expressed in order to increase efficiency, giving people a new way of perceiving the public function. It is also a contribution which should encourage the researcher's approach to exercise similar cases for further understanding of this phenomenon (the service payment pay stub), which is increasing in commercial nature, but still is in consolidation in terms of federal, state or municipal public administration.

Finally, the assessment of the consummation of certain economic principles that have value in today's world satisfies researchers, allowing them to accept the successful implementation of theoretical and practical models in real benefit of individuals, with immediate and plausible translation for various socio-economic sectors, demonstrating with greater knowledge the long road yet to be traveled to achieve a more just society for all its members, with precise awareness of the scope and limitations of administrative processes. The will to continue to evolve towards egovernment with high response and without excess, much of the people do not conceive to be part of their reality, but it has been shown, at least in this case, that when citizens receive good service, they are willing to pay for it.

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