The Case of the Mexican Mobile Government: Measurement and Examples

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ABSTRACT

The mobile government has become a reality in a large majority of countries around the world. The use of apps to link government websites and information is a recent trend that is capturing citizens and public officials. The uses, advantages and disadvantages have recently become a study field for several scholars around the globe. The mobile government is not new for e-government scholars; however, the explosion of apps and the increase of smart phones have created a new trend in the mobile government field. In order to understand these phenomena in the Mexican society we have gathered data from different sources: government, companies and citizen organizations. Based on this information, we analyzed the impact of apps across the country and suggest a classification method that can be used for a better understanding of this new field. We finish with five small case studies, which we consider good examples to be followed by different government organizations. To accomplish this objective we divided this chapter into seven main sections: this first section is the introduction. The second section includes a literature review. The third section describes the method

we suggest to classify the apps. The fourth section discusses the findings with the model application. The fifth section presents the case studies we suggest for government apps. The sixth section discusses future research on government apps. In the seventh section, we present some remarks and the conclusion of this topic.

KEYWORDS

Open Data, Government Apps, Mobile Apps, Transparency and Accountability

INTRODUCTION

The electronic government has become widely accepted for most governments around the world. The use of technology for public administration processes, tax processing systems and political participation such as discussions, feedback and openness has become a constant transformation at different government levels.

Software applications are better known as "app". Apps have become a disruptive technology for governments. The commercial use of this technology in smartphones has increased exponentially and its numbers are astonishing; even though the government's adaptation has been slow.

In July, 2013, Apple celebrated five years of the iTunes App Store with 850,000 apps available in the store and counted more than 50 billion of apps downloads, over 800 per second (Apple, 2013). Android, with 700,000 apps available in the Google Play Store, counted more than 1.5 billion apps' monthly downloads (Developer, 2013). The digital ecosystems, promoted by Microsoft, Apple, Amazon and Google, are increasing their content into islands that threat the internet freedom and the governance of the net (Berners-Lee, 2010; Iansiti & Levien, 2004).

These new challenges menace neutral networks but provide great opportunities to create competition among companies and improve communication with companies-consumers and citizens-government. In this area of opportunity, new paths of research have been made along the way. One of them is the use of mobile devices that are linked with government apps to share, to exchange and to collect information.

The use of mobile devices has increased in the last years and governments around the world take advantage of this kind of features and communication possibilities (de Kool & van Wamelen, 2008; Sandoval-Almazan & Gil-Garcia, 2012). At the same time, the information wave has emphasized the need of a more open and transparent government (Hans J. Scholl & Luna-Reyes, 2011). For example, the US government has made available about 75,718 data sets of raw data and 68,147 geospatial datasets to the public through the data.gov website. Many other states are following the US initiative, making raw data available to the public (Amaravadi, 2005).

The incorporation of new technologies, smartphones and computers has made information to be distributed faster at a very low cost and with a great range in all segments of the population. Small applications running on web pages or in mobile devices (mobile apps) have become a wide-adopted way of interaction. It is expected that mobile computing will replace desktop computing by 2015 (Milam & Avery, 2012). Again, just in data.gov of the U.S., about 1,500 web and mobile applications (apps for short) have been developed, more than 200 by citizens themselves. We believe that these trends together have the potential to transform the relationships between government and the public.

Major changes in technology, citizens and politics are changing behaviors. They are also changing the process of doing politics and the relationship between politicians, public servants and citizens (Geiger & von Lucke, 2012).

Despite this emerging context, we still know very little about the level of adoption of apps in government websites and their uses. The purpose of this paper is to provide a methodology for the categorization of government apps, looking for an initial categorization of practices among top-rated governments in terms of the use of information technologies, as well as to provide some examples of current app uses in the Mexican government.

In the Mexican case, the publication of government information through electronic media is mandatory by law since 2002 because of the "Transparency and Access to Public Government Information Law", which focuses on providing a secure access to everyone to federal, local and municipal government information. They handle the information and they need to support this information in order to accomplish this objective. Our research is taking advantage of this official policy and we tried to collect our data – apps – from the government and companies related to government functions.

We divided this chapter into seven main sections. This introduction constitutes the first section. The second section includes a literature review. The third section describes the method we followed to classify the apps. The fourth section presents our findings. The fifth section introduces several case studies of different apps in the Mexican government. The sixth section addresses future research in this field of mobile government and apps. Finally, we make some remarks and conclusion of this topic in the seventh section.

2. LITERATURE REVIEW

The purpose of this literature review is to introduce previous knowledge and research about the evolution of mobile apps and mobile government through the last years. We divided this section into three subsections: apps or software app; technology for government and mobile government. Finally, we support the research model with some theoretical ideas in the last section.

The term "software application", better known as "app", was coined in 1985 (Holwerda, 2011). The principles and basics of this kind of small software comes from the need of reducing battery use and the optimization of computational processes (B P Lientz, Swanson, & Tompkins, 1978; Bennet P Lientz & Swanson, 1981). Later, this idea of computational processing was used for the interfase and users tasks (Beath & Walker, 1998; Kersten, Kersten, & Rakowski, 2001). Despite the shy start of apps' software, a new trend was launched with the rise of the Web 2.0 that included the interaction and user relationship with websites (O'Reilly, 2005).

This evolution into a new version of interactive websites - Web 2.0 - enabled the use of more technology such as the apps. Most of them evolved into mobile apps because of their size which allowed them to be display using mobile phones or the new tablets (Lugano, 2008; Yamakami, 2007). Mobile internet has changed consumer habits and the behavior of the final user allowing instant connectivity and immediate update of information (Johnson, 2010). Later on, the development of mobile learning applications started (Pocatilu, 2010). The next stage was the development of apps for commerce and gaming, creating a new market environment for all kind of purposes (Anthes, 2011), and leading the change for more content sharing, content creating and content delivery for governments (Murugesan, Rossi, Wilbanks, & Djavanshir, 2011).

The use of technology in governments has a long history (Garson, 2003). However, the use of apps is more recent. Yamakami (2007) discusses this change of perspective and the possible evolution of apps in the new government environment. Other studies from different scholars have taken several directions (Herrick, 2009; Woods, 2009). One of the most important contribution comes from de Kool & van Wamelen (2008) who explore the context of this evolution of the government to mobile devices and their relationship with the society and the government impact, through their analysis of the Web 2.0 tools in the Netherlands. This study highlights the new face and the change of the government using this kind of interactive tools, later on focused on mobile devices.

In the mobile government research path, wireless technologies and the Web 2.0 started to develop the basic form of the mobile government. The preliminary work of Townsend (2002) developing government opportunities for this technology unfolded this ignored path of research. On the other hand, research from Kushchu (2003), (2007) has become a starting point for analyzing this topic. Kushchu's book (2007) introduces the e-government research. Different authors and perspectives of the book - mobile city, usability, strategy, design and business models - determine some trends of the present challenges. A complementary perspective of this field of research is the Mobility Response Model developed by Kushchu and Borucki, and validated with five case studies (four in the UK and

one from Hong Kong). They show a more efficient government process using this mobile technologies (Borucki, Arat, & Kushchu, 2005).

One step forward in the m-government research is the work of Trimi & Sheng, (2008) analyzing the consequences of this new trend on leading governments around the world. The contribution of Traunmüller (2011) adding the social media and innovation into the framework of m-government increases the potential and locates the discussion and use of this field in a different dimension. The idea of a more user friendly government, personalized services and knowledge management available from a cell phone is placed and analyzed in this stage (Sandoval-Almazán, Gil-Garcia, Luna-Reyes, Luna-Reyes, & Murillo, 2011). Some consultants and scholars have started to look at the m-government as an important place to make business and develop new ideas including apps, strategies and software (Eggers & Jaffe, 2013; Eggers, 2013; OECD & ITU, 2011).

A first attempt to develop a theoretical framework for the mobile government comes from Antovski & Gusev (2005). It incorporates five principles: interoperability, security, openness, flexibility and scalability. The following year, a more refined model was presented by Antovski & Gusev (2006). More research has been made to introduce different models and frameworks (Fidel, Scholl, Liu, & Unsworth, 2007; Maumbe & Owei, 2006; Sheng & Trimi, 2006). Another framework for the implementation of m-government was developed by Emmanouilidou (2010) incorporating the W3C mobile best practices. The implementation of the incorporation of specific issues on the mobile government increased the use and perspective, such as security (Athanasios Karantjias, Spyridon Papastergiou, 2009), enterprises and rural efforts (Ntaliani, Costopoulou, Manouselis, & Karetsos, 2009) and software development (Kesavarapu & Choi, 2012).

In the case of Seattle, the implementation revealed that the implementation of an m-government represented several challenges in the organizational front (Fidel et al., 2007; H.J. Scholl, Fidel, Mai, & Unsworth, 2006). An important issue for the m-government is security and the case of Agroportal established some risks and challenges on this topic (Chatzinotas, Ntaliani, Karetsos, & Costopoulou, 2006). A different perspective is the Greek case that links government and business cooperation using m-government (Kapogiannis, Touzos, & Kreps, 2006). Finally the work of Walravens, using the m-government implementation in cities such as New York, developed a complementary perspective of this tool on governing cities and increased efficiency (N. Walravens & Ballon, 2011; Nils Walravens, 2012).

From the perspective of the apps world, these new mobile technologies have invaded all platforms: such as the IOS, Android and Microsoft Windows (Johnson, 2010). Many similar devices have revolutionized the way information can be distributed (Hosmer, Jeffcoat, Davis, & McGibbon, 2011). Smartphone users are increasingly shifting the use of apps as "gateways" to Internet services rather than traditional web browsers (Xu et al., 2011) creating an impact on citizens, business and governments (Murugesan, Rossi, Wilbanks, & D Javanshir, 2011). Mobile technology offers many advantages for governments over the traditional methods of information dissemination. The offer of apps grew with the Apple-iTunes Market, the Android market, the Windows Phone Marketplace and the Blackberry App World (Anthes, 2011).

Many governments are encouraging their agencies to write their own applications in areas of impact focused on topics such as feedback from citizens for administration, citizen participation (Traunmüller, 2011), G2G inter-agency collaboration (Beer, Kunis, & Runger, 2006), public services (Estevez & Janowski, 2007) and privacy (King, Lampinen, & Smolen, 2011).

The use of mobile apps has promoted research in different areas such as user behavior (Xu et al., 2011), feedback and usability (Fu et al., 2013; Tang, Hsiu, Huang, & Chen, 2013), user characteristics (Wu, Ozok, Gurses, & Wei, 2009) and citizen engagement (Raths, 2011). Also the promotion of competition of quality apps (Carlson & Eyler-Werve, 2012) and different platforms implementation for government apps (Wei, Gao, Jia, & Yang, 2010).

Mobile applications have the potential to improve service delivery, as well as efficiency and efficacy in government operations. Furthermore, mobile applications create the capability of interaction,

participation and transparency (Wamelen & Kool, 2008) providing the ability to access critical operational information regardless of location (Hosmer et al., 2011).

Most government apps need to identify goals: transparency by making open data accessible with the possibility of report flaws in data sets, allowing feedback from citizens regarding administration, collaboration among agencies, delivery of government services in a more efficient way and businesses innovation (Carlson & Eyler-Werve, 2012). User-friendly design (user view also an adequate restructuring and a consistent outline), knowledge enhancement (facilitate orientation in public life based on life events), knowledge collection (collecting parts of the knowledge which are implicit) and information about the data source (Traunmüller, 2011).

Apps could expand the potential for e-government to allow citizens and businesses to access content, create content, send communications to government agencies, adding in some cases knowledge enhancement and allowing citizens to create ecosystems interested in solving important public problems (Sandoval-Almazan, Gil-Garcia, Luna-Reyes, Luna, & Rojas-Romero, 2012). The government repositories such as Data.gov - in US, UK, India, Spain - and IT Dashboard or Challenge.gov are examples of open government data and the use of data for government. However, they need a way to be advertised and spread. A solution is to develop an app and share it with citizens (Goggin, 2011).

Apps are related to government repositories, open government ideas and democratic principles (O'Hara, 2012). The group Apps for democracy is an example of this idea, when developers and programmers help governments to achieve their purposes using application technology and delivering information through cell phones and internet (Labs, 2012). This effort is combined with citizen contests in order to develop apps for certain purposes such as public services, public transportation or government organizational problems (Carlson & Eyler-Werve, 2012; Milam & Avery, 2012). Finally the combination of social media and apps have become the perfect combination to promote, exchange and collaborate between citizens and governments (Abramowicz et al., 2005; Lerman, 2007; Traunmüller, 2011).

Along this literature review, we can find some links among the application technology - apps - with the e-government field of research and the mobile government dynamic field. Most of these connections are specifically related to develop tools and frameworks to communicate, share and promote collaboration among government information and citizens. We found that this connection has three common aspects, 1. Apps research and development refer to government efficiency and accountability; 2. Apps for mobile government refer to specific issues such as economy, development and citizens problems and 3. Recent apps development is focused on open government and transparency. We are going to consider these links in our research model in the following section.

3. RESEARCH DESIGN AND METHOD

The purpose of this research is to understand the use and evolution of e-government apps in the Mexican case. Several scholars are starting to understand the impact of apps in society and specifically in the government field. Even though, this kind of research needs a different focus to design, collect and analyze data (Thomas & Streib, 2005). In order to conduct this exploratory research we follow the approach of Internet-Mediated Research (IMR) which consists of "the gathering of novel, original data to be subjected to analysis in order to provide new evidence in relation to a particular research question" (Hewson, 2008 p. 58). One of the problems of doing internet research is to define the sample, especially when the object of study is as new as the apps development (Jones, 1999). A combination of systematic research along with the data collection and rigorous analysis can develop a more accurate design of research for the internet field (Estalella & Ardevol, 2011).

We divided our research into three main stages. The first stage was to develop a model to classify and understand the Mexican apps; the second stage was to collect data and the final stage was to analyze and discuss data. For the purpose of this chapter, we chose the most relevant cases, which we present as examples.

3.1. Research Model

The first stage was to develop a model in order to classify and determinate if the found apps contributed to the mobile government. We combined two models, the civic apps model (Carlson & Eyler-Werve, 2012) and the model of m-government implementation (Antovski & Gusev, 2006). The first model has three main goals: accountability, government efficiency and economic development and is summarized in seven components. The second model consists of five principles: interoperability, security, openness, flexibility and scalability. We combined the principles and components to create a model of apps and mobile government that allowed us to assess the Mexican case, adding one additional component and some aspects that we could evaluate. A combined model allowed us to create a more integrated perspective of the mobile government. We choose the objectives of the civic apps models as aspirational and long vision goals. We achieved these goals with the principle applications – security, openness, flexibility – in order to create a model that measured and promoted a mobile government. The combination of principles to promote goals is a logical path for expanding and understanding such phenomena. The result is on Table 1, showing the components of the model and the variables.

Components	Variables
Accountability	1. Raise awareness of available open government data sources 2. Focus energy on building apps on open data 3. Security
Government Efficiency	1. Inter-collaboration 2. Apps that benefit people and businesses 3. Crowd source data publishing priorities 4. Knowledge enhancement and collection 5. Interoperability
Economic Development	1. Drive innovation 2. Build a community of practice around 3. User-friendly design
Transparency/Openness	1. Reports a data flaws & feedback from citizens 2. Open data accessible 3. Flexibility 4. Interoperability

Table 1. Model of Mobile Government Apps

3.2. Data Collection

The problem of apps data collection is that most of them are disperse in the Mexican government or in the market. There is no single place to find out about apps and to determine if they match the criteria to be considered as government apps. In order to find out about this application software in a systematic approach, we follow three main steps:

1. We decided to look for current applications in the 31 portals of the Mexican state government and in the federal entity websites of the Mexican Republic.

2. We visited and analyzed the federal government portal www.gob.mx that offers a search service specialized on Mexican government and the personalized access to procedures and services.

3. Finally, we performed a search on the iTunes App Store and on the Google Play Store.

We collected data from February to July 2013 and created a database with the cases. Finally, we found 320 apps. We analyzed the apps but not all met the necessary criteria to be considered in our sample. In order to determine whether we could consider them as government apps, we decided to evaluate them one by one.

We found 74 apps, which were developed by the government, independent agencies and secretaries. They are published in their own sites and available for downloading in the apps marketplaces such as iTunes App Store and Google Play Store. We found 49 apps were available in the iTunes App Store and 25 apps in the Google Play Store.

3.3. Data Analysis

In order to classify and categorize the 74 apps available in the Google Play and iTunes App Store, we evaluated one by one according to our model. We created an array of components and aspects to be evaluated, giving one point for every complied feature and a zero if it did not comply with the feature to be assessed. We added the scores of each of the targets by component, first individually and then together. The results are shown in Figure 1. Our results were that the 74 evaluated apps met an average of 6.2 of the 14 evaluated variables. Only 12 apps gathered all the evaluated points representing the 16.21% of the total number of apps. We describe our main findings in the following section.

4. MAIN FINDINGS: MEXICAN GOVERNMENT APPS

This section presents an overview of the use of apps and some examples of apps available for citizens in Mexico. We collected the 74 apps for this survey from February to July 2013. We present our findings using the previous model description: the first section describes the accountability component and the apps related to this component; the second section presents the government efficient component; the third section addresses the economic development apps and the final section describes the transparency and openness apps. We present a summary of the 74 Mexican apps we collected in the sample in Table 2. A summary of the whole findings can be seen on Figure 1 at the end of the section.

App Name	Agency - Organization	Federal	State	Short Description
Info DF Movil	Mexico City Government		x	Information about city services
ICAP	Government of Coahuila & ITELTEQ		x	Electoral college system of citizen participation and monitoring, Coahuila trainers, Coahuila state election
GuíaPemex	Petróleos Mexicanos	x		It will find information about 10 thousand Pemex gas stations in the country in which gasoline and diesel is sold, as well as 644 restaurants, 268 hotels and 44 spas selected by experts
Agente Vial Movil	Government of Jalisco		x	Relevant information about offenses listed in Highways and Transportation, Act of Jalisco
Jalisco Móvil	Government of Jalisco		x	Virtual window of procedures and related information, the Government of Jalisco
Ayuntamiento de Merida	Government of Merida Yucatan		x	Mission, Vision and Values of the City of Merida, Yucatán

App Name	Agency - Organization	Federal	State	Short Description
Congreso Estado de San Luis P.	Government of San Luis Potosi & yellowlink		x	Information about the congress and legislature of the government of San Luis Potosi
Profeco en 30	Procuraduría Federal del Consumidor	x		A tool designed by the Federal Consumer Protection Agency and available for consumers in order to report non-compliance from the service providers with the provisions of the Federal Consumer Protection
Jalisco Móvil_	Government of Jalisco		x	Virtual window procedures and related information, the Government of Jalisco
Diputados	Federal Government of Mexico	x		This application is intended to educate the public by providing access to information through Liaison Units Obligees by the Federal Law of Transparency and Access to Public Government
Huixquilucan	Government State of Mexico & IBloomMx		x	City Information Huixquilucan, Mexico State.
Sefiplan David	Government of Veracruz & omnius		x	This is an example of the basic course in Android Sefiplan Veracruz
JaliscoFactBook	Government of Jalisco		x	Information on development indicators, and public investment projects Jalisco state and its municipalities. Besides data on population and housing census 2010 of all federal entities Mexico.
SIAM - Estatus tramites	Ministry of Economy	x		Mining System Administration - Consultation procedures
SIAM - Act y recargos	Ministry of Economy	x		Mining System administration of the Ministry of Economy - actualiaciones calculator and surcharges.
COPAES Móvil	Autonomous University of Chihuahua		x	You can check in a practical and simple individual accredited academic programs in Institutions of Higher Education in Mexico face modalities, semi-presenial and virtual.
CARNET Móvil	Autonomous University of Chihuahua		x	You can make your attendance records valid event for the cultural card "Universidad Autonoma de Chihuahua" very simple and dynamic.
Cuajimalpa de Morelos	Government of Morelos & IBloomMx		x	Official bulletins, notices and news of this delegation.
Descubre Puebla	Government of Puebla & Estrategia 360		x	This is an application where the Government of the Municipality of Puebla, invites you to visit the main tourist attractions of the town, this guide covers everything a traveler needs to know: museums, galleries, cultural venues, restaurants, hotels, shopping options, nightlife and more.
Revista Enterate	Government of Mexico & CFE	x		The ENTTÉRATE Magazine is an internal publication of CFE, the Peninsular Division, which disclosed the most important events related to this dependence, without any political, social or financial gain.
Durango Turistico	Government of Durango & FIPADE		x	Secretary of Tourism of the State of Durango offers the application that will touch your instincts and take him to a bleak journey through the beautiful and morepicturesque places in our state, a beautiful place where time embellishes things, where modern merges with the story, the real heart of Northern Mexico.
Adeudo Vehicuar	Government of Veracruz & omnius		x	App vehicular query Debit Sefiplan Veracruz
Partido Verde Ecologista	iBloomMx		x	Check out latest news from the Green Party. Watch videos with official content of the Green Party. Be informed about who the Green Party. Exclusive downloads, maps and locations of ecological sites in the country.

Table 2. Sample of 74 Mexican Apps

App Name	Agency - Organization	Federal	State	Short Description
SNIIM Móvil	Ministry of Economy	x		Mobile version of the National Information System and Market Integration. It is an application of the SE to help us get the price and presentation of agricultural, livestock, fishery, etc products. by different price points.
Fernando Mayans	Daniel Islas Rodriguez	x		Information about Senator of the Republic. John Graham Casasús Clinical Hospital. General Medical Specialty in gastrosurgery. Politician. I have been Local and Federal Deputy for the state deTabasco.
Aire DF	Government of Federal Distric & Jorge Cornejo Martínez		x	Application Air DF is designed to present information in air quality in Mexico City. Uses data Air Monitoring System of the state of air quality and the intensity of ultraviolet radiation.
Consulta de Licencia Federal	Ministry of Communications and Transport	x		Implementation of Consultation of Federal Licenses. With it you can check the validity of any federal license issued in Mexico checking the QR (QR Code) code printed on the back (for printed licenses 2011 onwards) or the number thereof (for ALS to 2011). Using the camera on your computer, scan the code to verify identity and data specific to the person carrying license, and you can even verify photography, ensuring 100% identity of the person.
Senador Isaias	Nuvolsoft	x		Official Application of Isaiah Gonzalez Cuevas, Senator of the Republic by the state of Baja California Sur
I Informe Gobierno	Goverrnent of Veracruz & Rafael Alejandro Ballester Diez		x	Government Information
CONARTE	Government of Nuevo Leon & CONARTE		x	CONARTE is theater, cinema, music, dance, literature, photography, visual arts, popular culture and cultural heritage enjoy!
ZacatecasTravel	Government of Zacatecas & CEOS New Media Agency		x	This is the official app of the Ministry of Tourism of the State of Zacatecas Travel Guide that provides for everyone.
Isseg Móvil	ISSEG GUANAJUATO		x	You can view: Out, offers and promotions ISSEG Pharmacy. Location of Parking ISSEG. Balance, deposits and withdrawals of voluntary savings. Balance and movements CREDISSEG. Simulators, notices and contributions ISSEG.
Cédula Móvil SEP	Ministry of Education	x		The new application consultation on the National Register of Professionals on the Mobile version, administered by the Directorate General of Professions is of a public nature under Articles 25 and 32 of the Rules of the Regulatory Law of Article 5 concerning the constitutional exercise of professions in the Federal District and aims to expand the search criteria of professionals who register their titles and feature professional license with effect paten
Unidad del Vocero de QRoo	Goverrnement of Quintana Roo &Rex Systems Software Developer		x	Spokesman QRoo is the official app used by government spokesperson unit of Quintana Roo, for social communication.
Traza tu ruta	Ministry of Communications and Transport	x		The official Android application for the site of the Ministry of Communications and Transport, Mexico. Trace any route between two cities - the application will provide mileage, estimated fuel consumption, toll cost and average travel time.

Table 2. Sample of 74 Mexican Apps

App Name	Agency - Organization	Federal	State	Short Description
Cumbre Tajín	Governemnt of Veracruz		x	Cumbre Tajin is an annual festival around the spring equinox. Collect art, ceremony, music, reflection, dance, healing and multiple expressions of artistic creation and ritual. The Totonac culture is the hostess and hosts over 5000 artists from Veracruz, Mexico and the world, who for five days offer five thousand activities in three offices: Takilhsukut Park, El Tajin archaeological zone and town of Papantla.
Bus Sonora	Government of Sonora		x	The Government of the State of Sonora is the mobile application for you Bus Sonora.Monitors paths and drives known point of the city are transiting.
redarbol	Mexico Inteligente		x	Red Tree is a digital platform that allows citizens of the City of Mexico record and document the tree species in the city. As a citizen, through this application you can make reports to find trees near your home, neighborhood, work, parks, medians or any other place in Mexico City to visit.
Conaculta-Mexico Es Cultura	Conaculta	x		Meet and cultural activities located in Mexico and make your own cultural agenda. Also, you can access our toll free number 01 800 CULTURE (01 800 2 85 88 72)
Mi Policia	SSP-DF		x	Application that approaches the citizen to information interactively their respective Quadrant, providing a quick way to call in an emergency and the location of graphically Quadrants Federal District.
Taxiaviso	Soluciones en Tecnologia Devfactor	x		Taxiaviso is a service that relies on technology, citizens and government to offer security and help to distinguish good from evil taxis. Taxiaviso helps you check all taxis operating in Mexico Airports, as well as taxis in Mexico City, Sinaloa and Nuevo León.
Ecobici	Epic Win Solutions S.C			Allows to see the nearest station where you find. Search cicloestaciones stations and public transport within the perimeter of Ecobici.View Full map and availability cicloestaciones. Draw strokes you make on Ecobici and know the distance, time and speed of each.May. In case of an accident or event, you can use the shortcut to call the callcenter Ecobici
IEPC	Publiapps		x	Coahuila IEPC aims to improve the process of the upcoming elections in the state of Coahuila.
UTCV Móvil	CEDESOFT		x	Formal implementation of the Technological University of Central Veracruz where students can check scores, news, and information specific to each of the races that are offered in the UTCV.
Programa Compras de Gobierno	Ministry of Economy	x		Search Tenders and Business Opportunities. Simply enter the name of the product or service you want to sell, is the recruitment procedures and business opportunities.
Veracruz Comercio	Ministry of Economic Development of Veracruz		x	The application is an effort by the Ministry of Economic Development and Port of Veracruz, to provide users with information to help them physically locate the companies that make commercial infrastructure and services of the State of Veracruz.
Reporte MH	Del. Miguel Hidalgo		x	This APP you can help report problems: Moguls.Street lighting broken. Leakage of water. Garbage collection on public roads. Desilting drainage network. Tree pruning.
Chihuahua en tu móvil	Chihuahua Municipality Coordination Systems		x	Chihuahua on your mobile is an application that allows citizens and visitors of the City of Chihuahua, interact with the city. The application allows you to report problems such as potholes, street lighting and garbage collection at no cost, directly, in addition to feedback information if necessary and provide timely follow.

Table 2. Sample of 74 Mexican Apps

App Name	Agency - Organization	Federal	State	Short Description
Quién es Quién en los Precios	Federal Consumer	x		Who's Who is a program developed by PROFECO that will help you stay informed about the prices of products and services for smart consumption decisions and improve your family finances.
Reporte Vial Puebla	Government of puebla		x	Fasting use phones and other devices while driving.Report lights, potholes and other services for the Municipality of Puebla with this application. Operates 24 hrs. 365 days a year, the pages are generated on weekdays.Road Report information module is that you can be aware of closures of roadways in the city of Puebla to help you plan your route in advance and avoid congestion.
CEIGQro	CEIGQro		x	Implementation of the State Commission on Government Information where all information concerning the CEIG available. They may check stats, news, laws and regulations. The application will also allow requests for information.
072Móvil	Government of Federal Distric & Arbiec		x	Implementation of the Federal District to request Urbana Citizen Service infrastructure (potholes, water leaks, Pruning, Urban Cleaning)
Mérida es cultura	Directorate of Culture Merida		x	Mobile Application billboard activities and events of the Cultural Department of the Municipality of Mérida 2012-2015

Table 2. Sample of 74 Mexican Apps

Table 2 describes the 74 collected apps for this research. Several comments arise from this initial exploration: Municipalities have not developed any apps and the federal or local government (state governments) uses most of them and they interact with citizen using this kind of resources to reduce time and costs for government services.

4.1. Accountability

This component is the lowest one from the entire model. It only reached 69 points, divided by 24 apps that rose awareness on open data sources and just 45 apps are focusing their energy to build open data in the government. There are no apps related to interoperability nor flexibility or reusable information for the government. Some examples of this component are the following apps: Quién es quién en los precios (Who is who on prices) and 072 Movil (Emergency mobile number 072).

4.2. Government Efficiency

The aspect of government efficiency is one of the most covered aspects in the assessment of the apps reaching 180 points. Specifically, it is the factor that allows people and businesses getting a benefit: tourism, hotels and restaurants. The inter collaboration principle reaches 44 apps that have developed some features related to this effort. An interesting point, the crowdsourcing and data publishing could have been the most relevant one but it only reached 31 apps data that are close related to this idea. Finally, the apps related to knowledge are 41. Some examples of Mexican apps for government efficiency are Bus Sonora; Reporte MH (Miguel Hidalgo, Mexico City delegation report for public services), Reporte Vial Puebla (traffic report of the state of Puebla).

4.3. Economic Development

In addition, the 134 points covering aspects such as the user-friendly design and the drive innovation are involved in the economic development. We found 48 apps related to innovation and 52 apps with a user-friendly design. Finally, we only found 34 apps of the category "bulding community of

practice". Examples for this component are Conaculta Mexico (App for the Mexican Cultural Office); Taxiaviso (Taxis warning for Mexico City); Reporte Vial Puebla (Puebla`s traffic report).

4.4. Transparency / Openness

We only found 47 apps related to open data and 36 apps able to report data flaws or problems on building apps. We did not find any app related to government security so far. The best examples for this component are Gobierno Movil (M-government local app), Senador Isais (Apps from a member of the senate) and Chihuaha en tu móvil (Chihuahua State App).
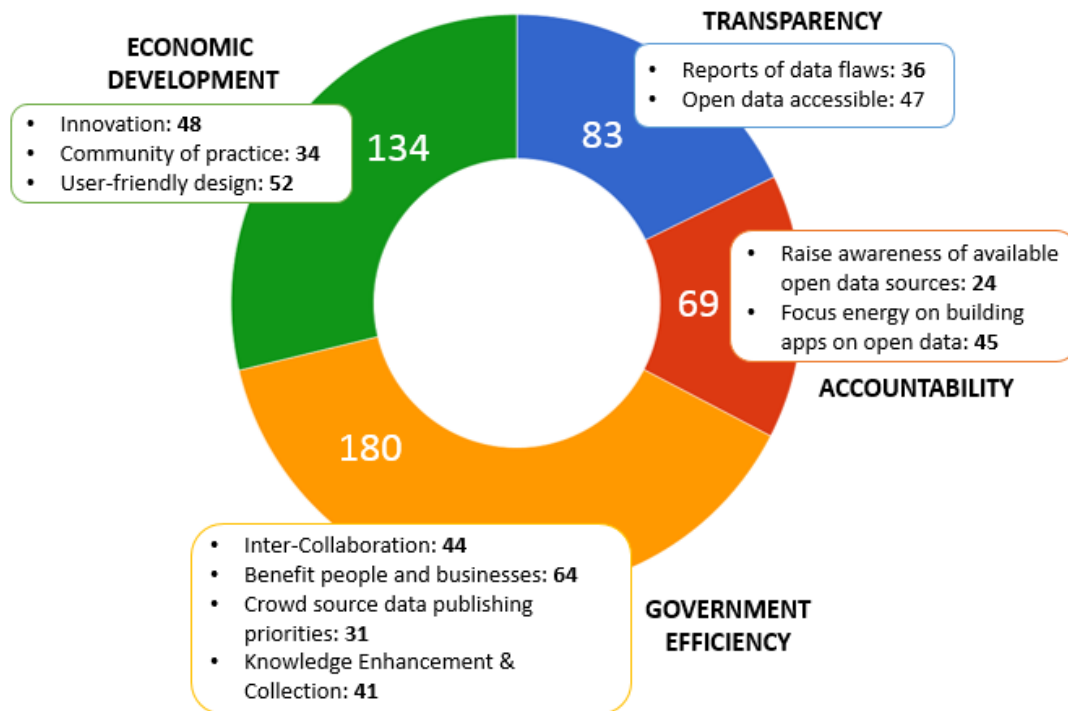

Figure 1. Main Findings Mexico App 2013

Some of this apps share common features. In order to classify them, we considered the most predominant feature or objective of the apps. Table 3 shows the apps and their classification in the component. We found that 12 apps accomplish all the components in our model, with a different degree of compliance. Such apps are GuiaPemex, IEPCC; Agente Vial Movil; Jalisco Móvil; Ayuntamiento de Mérida; Congreso Estado de San Luis P.; Profeco en 30'; Diputados; Guía Pemex; Jalisco Móvil; Agente vial; IEPCC. We are going to analyze some of them in the case studies in the following section.

APPS	Transparency	Accountability	Government Effiency	Economic Development
072Móvil		x	x	x
Adeudo Vehicuar	x			
Agente Vial Movil			x	
Aire DF		x		
App de Desarrollo Económico SLP	x			
Ayuntamiento de Merida			x	
Bus Sonora			x	
CARNET Móvil			x	
Cédula Móvil SEP			x	
CEIGQro	x	x		
Chihuahua en tu Móvil	x			
Conaculta-Mexico Es Cultura				x
CONARTE				x
Congreso Estado de San Luis P.	x			
Consulta de Licencia Federal	x			
COPAES Móvil			x	
Cuajimalpa de Morelos		x		
Cumbre Tajín				x
Descubre Puebla				x
Diputados	x			
Durango				x
Durango Turistico				x
Ecobici	x			
Fernando Mayans		x		
Gobierno Móvil	x	x		x
Huixquilucan		x		
I Informe Gobierno	x			

APPS	Transparency	Accountability	Government Effiency	Economic Development
ICAP			x	
Info DF Movil		x		
Jalisco Móvil_		x		
JaliscoFactBook		x		
Mérida es cultura	x			
Mi Policia	x		x	
Partido Verde Ecologista		x		
Profeco en 30	x			
Programa Compras de Gobierno		x	x	
Quién es Quién en los Precios	x	x	x	
redarbol				x
Reporte MH			x	x
Reporte Vial Puebla		x	x	x
Revista Enterate				x
S. de Desarrollo Económico SLP	x	x		x
Sefiplan David				x
Senador Isaias	x			
SIAM - Act y recargos			x	
SIAM - Estatus tramites			x	
Sitios Turísticos	x	x		
SNIIM Móvil		x		
Taxiaviso			x	x
Traza tu ruta			x	x
Unidad del Vocero de QRoo	x			
UTCV Móvil				x
Veracruz Comercio			x	
ZacatecasTravel				x

Table 3. Mexican Apps and Categories of the Model of Analysis

5. SOME CASE STUDIES OF MEXICAN APPS

Several government apps are created every day to match government data or activities and are used by citizens. We chose some case studies from the Mexican government to present a degree of compliance and focus on the model we developed. We decided to choose an example of each: transparency, government efficiency and accountability. Also on this section, we present a novel app – Mujer Migrante (Migrant Woman) – that was not included in our previous sample. This is an important example of this kind of software since it has a direct social impact. On the other hand, we noticed that the government and federal agencies have developed some apps but they are registered with the name of the developer. We found a kind of applications that involve apps addressing the needs of individuals to search and manage information. They even allow users to denounce irregular practices from the public and private sector. This accountability problem is directly related to

corruption. Our example for the Government Efficiency is the Federal Consumer Protection Agency (PROFECO) in Mexico. PROFECO has developed "Profeco en 30" in order to solve this problem and help citizens to start claims.

"Profeco en 30"

The function of the Federal Consumer Protection Agency in Mexico is to allow consumers to complain about products, bad services or frauds. This agency uses social media and communication technologies very often. This agency has a blog, a website in Facebook, Twitter and also YouTube accounts, as well as a printed magazine. A natural ecosystem to create an app that links all the related content.

The recent PROFECO's platform "Profecto en 30" is a tool that allows consumers to report the failure of compliance from service providers. It is a mobile application where consumers can make comments and complaints that will be handled by the verification and monitoring staff of PROFECO. Figure 2 shows some screen shots of this app.
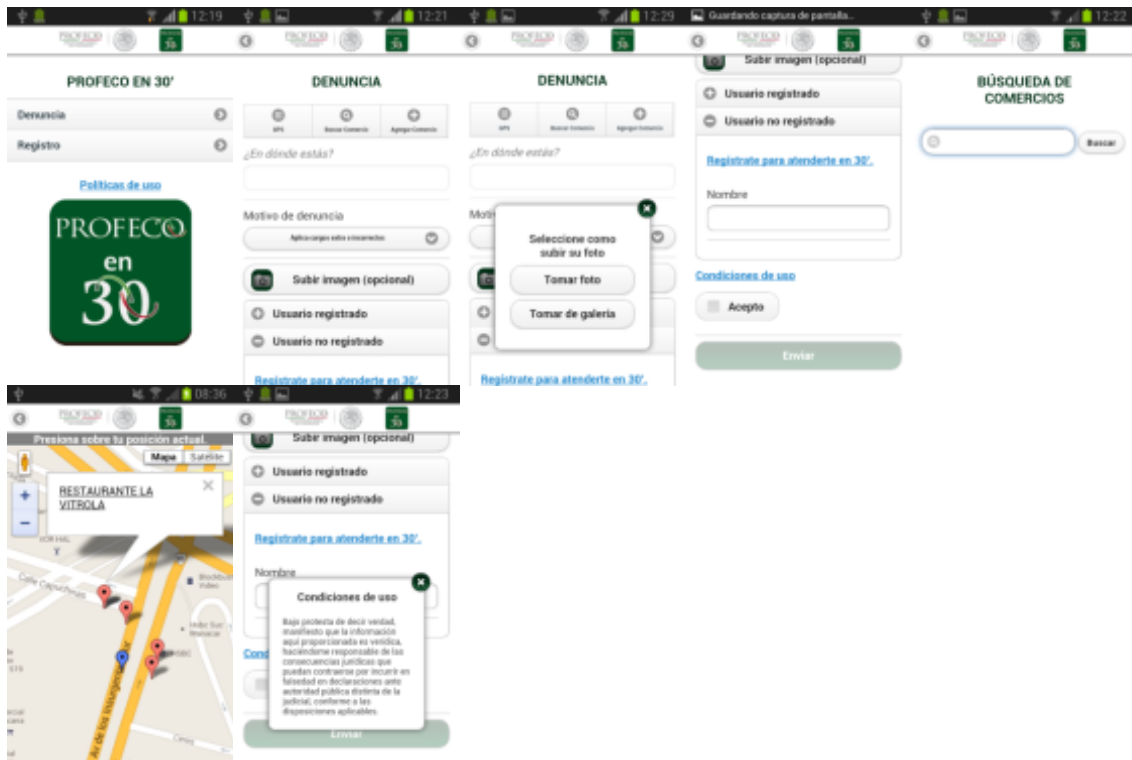

Figure 2. Profeco at 30 App

This app accomplishes our idea of open government and transparency but it is also linked to government efficiency - less than 30 minutes response - and it also helps the economic development because the claims can be from the public or private sector. There were 1,000 apps downloads in July 2013, during the first week that it was launched. In October 2013, the download account reached 5,000. It is important to mention that it became one of the most downloaded apps in Mexico. An important difference of this app is the interaction among citizens and the government agency. Only one more app presented this characteristic. Most of the apps are informative.

Jalisco Móvil

The state of Jalisco is in the northern part of Mexico. A well communicated local government that developed a number one government website in recent years (Sandoval et. al, 2011). It links the content with several mobile apps. This is another example of a government efficiency component and can also be linked to openness and accountability. The government of the State of Jalisco developed an app, which links most of the government services. The consultancy provides different features such as the "click-to-call" function for a free access to procedures and related information to the government of Jalisco.

This app has become a one-stop window for government procedures. However, it is unable to start any administrative proceedings online. The only interaction that is allowed is to claim about public services solution such as broken lamps or signals, trash on pavement, etc. You can also get information related to debt free vehicles, air quality, Fojal loans among others. This virtual window procedure includes the option of dialing from any part of the state with an 800 no cost line. This app achieved 1,000 downloads until October 2013.

Figure 3. Jalisco Movil App

A similar app in the "Jalisco Móvil" is the Get Community Payback. This free app allows users to submit suggestions for Community Payback projects to their local Probation Trust. Simply take a photo, tag the location on a map and send your suggestion. This will be routed automatically to the Probation Trust responsible for delivering Community Payback in your area. Notifications will be sent to the app when the project is assessed, completed etc., with a link to a website where updates and other Community Payback projects can be found.

"Cédula Móvil SEP"

The Secretariat of Federal Public Education (Secretaría de Educación Pública) also launched an app to improve citizens' services. This app has a search engine for the National Register of Professionals and provides criteria concerning the exercise of the professions in the capital city of Mexico. This solves a problem in two different perspectives. The first one is for companies and agencies that search for valid and real qualified staff. The second one is for people who want to update information about their professional register. This search can be done by entering the professional license number or by detail, entering name, first name, middle name and / or educational institution. The shown data are preliminary. In the event the user requires an official document, he/she must follow the normal procedure of "Professional Background" at the General Directorate of Professions. The information on this application is public and is constantly updated. This app has been downloaded 4,000 times till October 2013. See Figure 4 for an example of screen shots.

Figure 4. SEP Cédula Móvil App

A similar app to Cedula Movil SEP is **Careers@Gov.** This mobile application allows you to browse and apply for jobs in the Singapore Public Service. The Singapore Public Service is one of the largest employers in Singapore, employing more than 136,000 officers in 16 Ministries and more than 50 Statutory Boards.

"Diputados" (Congressmen)

The Congressmen App is a very rare example of accountability app. Normally, citizens develop this kind of apps or other media related companies. However, the Congress itself developed this Mexican app. The kind of information and updates users can find in this application software is remarkable. This app delivers news, events and related information of the Chamber of Deputies of the Congress of the Union, the low chamber of Mexico. The purpose of this app is intended to educate the public by providing access to information through Liaison Unit Obliges by the Federal Law of Transparency and Access to Public Government Information (LFTAIPG). These informative apps allow citizen to know and understand their congress functions and work. However, there is not a possibility of interaction. More than 1,000 downloads were register last October 2013. See Figure 5 for screen shoots.

Some features of this app

- Locate your MP for your GPS

- See your congressman assessment

- See the agenda

- Summary session

- Synopsis of expert evaluations

- Highlights of the sessions

- List of committees

- Voting orientation about deputies

- View the number of initiatives

- View the number of attendances in sessions
- View your Twitter and Facebook
- See the app's own assessment based on your activity
- View your district

Figure 5. Diputados (Congressmen) App

A similar app is the Congress by Sunlight Foundation Follow, the latest from Washington with the free Congress app from the nonpartisan Sunlight Foundation. Learn more about your members of Congress, including their contact information and track activity on bills. Features include:

- Find lawmakers in congress, call them directly and connect with them on social media
- Discover new and active legislation
- Explore legislators for your location and others on an interactive map
- Follow bills and legislators for quick access and updates
- Review a legislator's latest votes and bill sponsorships
- See bill activity with vote breakdowns
- Get directions to a legislator's D. C. office

Chat Mujer Migrante

We did not consider this app in our sample because we did not know about its existence until the World Summit of the Information Society (WSIS) awarded it a prize. The Ministry of Communications and Transport (SCT) in Mexico launched four new applications for mobile devices in favor of migrant girls and women on the International Day of the Girl in the Information Technology and Communication (ICT), celebrated on the fourth Thursday of April (annual event),.

This new project introduces the technological tools in the search for options to improve the communication between migrant women, civilian authorities and organizations. It aims to offer legal and professional advice, prompt and secure, to users of these applications. The new related mobile apps are:

- Chat Migrant Women: Channels for doubts and questions of migrant women to institutions and organizations that can provide support. It also provides access to the online service portal "Migrant Women" from a mobile device either iPhone or Android.

- Help! It offers choice questions about emergencies. The answers provide the functionality of direct calls to emergency phone numbers where migrants can be helped. This is only available for Android.

- Helping Hands: Through this app, you can access the database of the federation. There you can find telephone numbers and addresses of shelters, hospitals, location maps and migrant support centers, among others. It is only available for the Android system.

- Pro Women's Legal Guide: It provides clear and simple information about laws that protect the rights of migrant women in Mexico and contact details if they require support regarding the defense of their rights. Also, it is only available for Android.

Through these case studies, we found that most of the agencies are focusing their efforts to inform, publish and share information rather than creating collaboration or discussion. Nevertheless, some examples, such as Mujer Migrante and Profeco en 30 are important. They imply the first steps on real collaboration between citizen-government. The difference is that these two apps solve citizen needs – information or claims – and they try to link the information to the government or the responsible agencies in order to obtain some responses or obligations.

On the other hand, apps such as Diputados (Congressmen) or Jalisco Movil try to provide legitimation of their actions and results, but unfortunately still do not allow citizens to interact with the information. It is just a matter about government information related to the local government or congress actions. These two examples are different from the other government apps. Further research will provide some guidelines and the future paths of this trend.

6. FUTURE RESEARCH

Mobile government is about to start. In recent years, many developments provided the context - smart phones technology - and the market - citizens and government - to exploit this trend. Besides, the software industry is emerging regarding this trend. The mobile marketplaces - IOS and Android - are growing exponentially and launching new apps every day. Are all these conditions leading to government efforts?

According to this research, we see enough conditions to launch a common platform to design government apps. This platform could meet the criteria for m-government models (Antovski, 2006) to become flexible, interoperable and data sharing. Nowadays software applications have spread different conditions and software design. Even though, most of them have problems with security and privacy issues. A single platform could reduce these problems and augment citizens' downloads, because it will not depend on certain operative systems and a single government platform for developing apps. They could accomplish programming and security standards for a single country or worldwide.

The first path of research is to start developing such a trend for a common platform for developing government apps that accomplish m-government features. The second path is directly related to our model of study. We understand that this is a first attempt to test our model, unfolding many advantages and disadvantages. The main weakness is the lack of enough validity. We need to test the model in a different context, with different country apps and refine component descriptions and variables to become more accurate and easy to understand for developers, government officials and scholars related to this topic.

The model for apps classifications focuses on a preliminary idea that measurement can help to improve things. Following this idea, the purpose for classifying and marking apps in certain variable may show the lacks and strengths of those apps and could support some ideas for improvement. We need to work more on this topic in order to provide a practical tool, which improves research and practice.

A third research path, directly related to the previous one, is to focus our research on assessing apps evolution. The maturity level of the apps market and the permanent innovation of apps and software of mobile and internet devices allow us to research on future development paths. Where are the government apps going? What is the next step in the evolution of this market? Which is the operative system is going to be in order to get close to government and citizens? What are the features of the next generation of government apps? What is the future of m-government through the apps? Those questions remain unsolved and require a permanent and close observation.

The last path of research is to understand citizen apps - civic apps developed by experts, groups or single citizen that attempt to use government information resources, transforming them and exposing government failures or contradictions with its own data. Our chapter deals about government-developed apps; even if the government paid a company to develop them. We consider the use of public funding for development as part of the government. At this moment, we suggest a different but complementary area of research: citizen apps for the government. How shall we understand motivations and purposes of citizen apps? Are citizen apps more efficient than government apps? Why is the government allowing the creation of citizen apps? What types of citizen apps are in the market? How is the government influencing this market? Many questions arise from this path of research. Some focus on motivations, others to technical aspects and others to citizen services. We all understand that civic apps are as important as government apps. For the immediate future, the amount of civic apps could be bigger and faster changing than government apps. We must be aware of these changes and try to lead and understand their impact in public policy concerns.

Finally, research in the apps field, for practitioners and scholars, is wide and uncertain. According to all the new technological changes and from an everyday perspective, regarding the software and hardware industry, we think that these four trends allow us to understand key changes for the future.

7. CONCLUSIONS

The purpose of this chapter is to present a classification model for mobile government apps, supported on mobile government fields and apps fields of research. In order to test this model, we collected data from the Mexican government apps and classified them accordingly in our model. This initial research reveals that only nine of the 32 states of the Mexican Republic have adopted this kind of applications. There are 27 apps created by government agencies, 29 apps created by independent agencies and 10 apps were created by private companies with resources provided by the government. Previous research reports that government portals expand their capabilities by using Web 2.0 tools, empowering citizens to collaborate with government and other NGOs to produce relevant information and solve important citizen problems (Sandoval et. al 2011).

As a main outcome of this research, we found out that government apps are difficult to classify. Our model weaknesses are as follows: 1. Some government apps share variables of different components. This transposition of two or more variables makes it difficult to assess. 2. Some components cannot be understood as either complementary or exclusive. We will try to figure this out with clearer

variables. However, the government apps that we measured reveal something different, they are still complementary.

These lessons led us to several reflections about the process of assessment of government apps. One conclusion that we can provide is the difficulty to define boundaries on assessing apps. , We propose a model based on a literature review and our own experience collecting and assessing apps. Definitely, a more empirical research and a systematic approach are required to validate our model.

Another conclusion is to make benchmarking of apps, which could promote their development. For example, we can assess PROFECO App 30. This could be an open government app, with very good points on government efficiency and accountability. So far, this app can be considered as an example to be followed by other apps. We consider this point as a contribution to this research, in order to highlight the good practices and to determine a valid point of view from a benchmarking perspective.

Finally, we consider that benchmarking, using a model for classifying and measuring, can promote research on this field because we can divide the object of study and research about specific topics such as open government or accountability. From this perspective, we can assess if the government apps accomplish their tasks and provide real value to citizens and public officials.

Governments expand their own limits when citizens can send reports of problems with public services or safety problems, allowing government officials to respond faster and better by accumulating information (Nath, 2011). Our research provides preliminary evidence that shows the adoption of mobile apps in Mexico by government entities. This level of adoption is emerging and its use must be promoted by more government agencies. These new ways of communication, collaboration, interaction and coproduction are changing the government direction and the relationships between government, entities and citizen, improving the co-participation and the use of available open information. This chapter is a first step into the direction of understanding the use of government mobile apps, its evolution and impact on government innovation that are largely enabled by emerging technologies.

8. KEY TERMS AND DEFINITIONS

E-government: the use of information and technology to support and improve public policies and government operations, engage citizens, and provide comprehensive and timely government services" (Hans J Scholl & Klischewski, 2007: p.21)

Mobile Government: the use of interactive technologies through mobil devices – smart phones, tablets – to provide services, information and enable citizens to contact government officials.

Mobile Apps: mobile apps create the capability of creating location-based services (LBS), such as traffic, bus or parking applications. (Trimi, S. and Sheng, 2008)

Web 2.0: a network used as a platform, spanning all connected devices (O'Reilly, T. (2005)

Open Government: could be understood as an integrated platform to drive government data into open and accountable information for citizens (Sandoval-Almazan, 2012).

Open data: public access to government data, however, remains challenging largely due to the heterogeneity and complexity of the public information ecosystem that results in high costs for locating, decoding, inter-linking and reusing existing government data to offer an open and incremental ecosystem that interconnects providers, consumers, and contributors of open government data. N. Shadbolt, K. O'Hara, T. Berners-Lee, N. Gibbins, H. Glaser, W. Hall, and M. C. Schraefel, 2012).

Transparency: open data accessible with the possibility of report flaws in data sets, allowing feedback from citizens regarding administration, collaboration among agencies, delivery of government services in a more efficient way and innovation of businesses (Carlson & Eyler-Werve, 2012).

Accountability: Open data needs to be tied up to an accountability "mechanism" in order to achieve accountability. (Carlson & Eyler - Werve, 2012).

Mobile Apps Efficiency: Mobile applications have the potential to improve service delivery, as well as efficiency and efficacy in government operations. (Trimi, S. and Sheng, 2008)

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