

UNIVERSITY OF MACEDONIA
DEPARTMENT OF APPLIED INFORMATICS

Ph.D DISSERTATION

**MOBILE GOVERNMENT MODELS AND APPLICATIONS OF THE
MUNICIPALITIES INFORMATION SYSTEMS SERVICES**

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Στους γονείς μου

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Abstract

The mobile local government services topic is an area that needs relentless attention and continuous steps towards its improvement taking advantage of the new technologies. Mobile technologies help in advancing municipal information systems, providing the citizens with the opportunity to perform easily routine transactions through their mobile devices anywhere-anytime.

In order to have sustainable and useful mobile G2C information systems services, there is high need to successfully integrate the mobile government concept with the business model concept; such concepts could harmonically co-exist and yield fruitful results.

This dissertation attempts to provide guidelines that could be used to highlight key tasks, which can steer successful development path through strategic steps and stages integrated into a theoretical framework, the GoMobi framework. To reach this point, there is a number of secondary objectives accomplished including: literature review of the concepts of mobile government and of business models, mapping of existing services, forming of a typology of mobile G2C services, and analysis of their value propositions. The theoretical model (GoMobi) is, finally, validated through case studies conduction.

The findings of such dissertation contribute valuably to both theory and practice. The comprehensiveness of the mobile G2C services value propositions and barriers grounded theories, the inclusiveness of the mobile G2C services typology, the completeness of the mapping of the provided mobile G2C services in Greece, the integrity of the conceptual review of the business models dimensions, and the fruitfulness and flexibility of the GoMobi framework development, are innovative aspects in the academic environment. Finally, practitioners interested in entering the mobile government sector can be aware of the sector's demands, additionally to having a holistic view of how to design, create, communicate, compare, analyze, evaluate, and modify their existing and future business dimensions of provided mobile information systems services.

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List of Abbreviations

APIs- Application Development Platforms
BM- Business Model
BPR- Business Process Reengineering
CDMA- Code Division Multiple Access
EU- European Commission
G2B- Government-to-Businesses
G2C-Government-to-Citizens
G2E- Government-to-Employees
G2G-Government-to-Government
GPRS- General Packet Radio Service
GPS- Global Positioning System
GSM- Global System for Mobile Communication
ICT- Information Communication Technology
LCM- Life Cycle Management
MIS- Management Information Systems
MMA- Mobile Marketing Association
OS- Operating System
PC - Purchasing Consortia
PDA- Personal Digital Assistant
PFI - Private-Finance Initiatives
PPP -Public-Private Partnerships
PVT- Public Value Test
RFID- Radio Frequency Identification
SMS- Short Message Service
WAP- Wireless Application Protocol
WiMAX- Wireless Metropolitan Area Networks
WLAN- Wireless Local Area Network
WOM- word of mouth
www- World Wide Web

Chapter 1.

Introduction

This research aims to investigate the design and construction dimensions related to the information systems mobile services provided by the municipalities to the citizens. The issue is mainly tackled from a business perspective. This chapter introduces the research by first explaining the motivations and discussing the domains that form the research context. Next, the research aim and objectives are identified based on the established definition of the research problem and motivations. An overview of the approach that has been followed to conduct the research and accomplish the objectives is presented for each stage of this study. Contributions to theory and practice are particularly mentioned. Finally, the structure of this dissertation is presented in order to provide a clear picture of how each chapter contributes to the research.

1.1 Research Motivations and Context

A number of surveys, so far, have focused on a value-based analysis of the mobile services and the consumers' reaction towards these added-value services (Anckar & D'Incau, 2002a; Anckar & D'Incau, 2002b; Kim et al., 2007; Pedersen, 2005), showing encouraging results for the mobile services future. Being positively influenced by the private sector, the local authorities start implementing mobile services aiming to ease the interaction and communication between public authorities and citizens (Zeferrer, 2011).

The mobile local government services topic is an area that needs relentless attention and continuous steps towards its improvement taking advantage of the new technologies. M-government has been considered either as an additional new channel that complements the existing e-services, or as a response for the creation of new services that exploit the benefits of mobility (Ostberg, 2003; Gorlenko & Merrick, 2003; Fidel et. al, 2007). The fast and efficient citizens' satisfaction through the implementation of costless service solutions, transforms the municipality sector from a complex unmanageable system, to a healthy and self-sustained organization. Mobile technologies help in making progress in this domain

providing the citizens with the opportunity to perform easily routine transactions through their mobile devices anywhere-anytime.

Many examples from abroad are success stories of citizens using governmental mobile services. Buying bus tickets, paying fees, ordering official papers, or just getting information about accidents on the roads, the weather, municipalities' events, etc. are just a few such examples. By using mobile services, not only are the citizens better served, but also the municipalities as an organization can have direct, fast and ubiquitous communication with the citizens (Kushchu & Kuscu, 2004). The m-services are a new mean for making festivals, guests' speeches, or new products widely known. Moreover, the municipalities could use mobile marketing techniques for dissemination and promotion of their own services and events.

However, the mobile government services by the local authorities are not yet extensively implemented. In Greece, for example, there are only some scarce, spontaneous projects conducted in just a few municipalities (Ferraïos, 2013). But, why these municipalities in specific? How did they choose the type of the service? How did they overcome infrastructure and development issues? Who were their partners? Did they meet any regulation obstacles? How could more municipalities be encouraged and apply mobile government trends?

It is established by literature that new products/ services or technological innovations require an organization, to adopt new ways, incorporating configurations related to key business model aspects and components (Yovanof & Hazapis, 2008). In line with Teece (2010) and Al-Debei (2010), this research deems that *"service/product or technological innovations do not promise success to the business, unless they are equipped and supported by innovative and powerful business models"*, as illustrated in Figure 1.1.

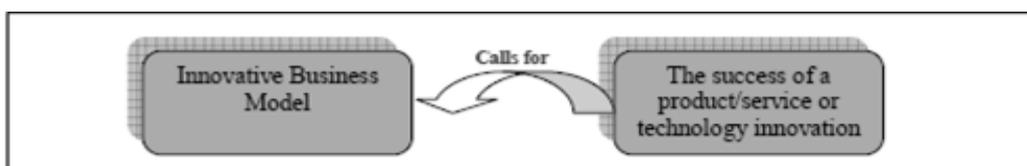


Fig. 1-1 Business models and service technology innovation (Al-Debei, 2010)

The literature review, however, shows that there is a gap regarding the mobile services design of innovative business models in the governmental sector. There are studies about research frameworks describing generally sustainable mobile business models, or/ and evaluations of various frameworks (Ballon, 2007; Walravens, 2012). However, designing frameworks focusing on their usage and implementation on the specific needs of the local authorities are shortly approached by academic and industry sources. There are inadequate efforts of standardizing the mobile service delivery to the citizens and the necessary moves towards accomplishing it.

Lack of strategic planning and standardized guidelines for organizing the process of mobile government services implementation, might lead to low adoption of the mobile services by both the municipalities and the citizens. Municipalities might be unaware of the benefits of such services; or, maybe, they are overwhelmed by the risks they might encounter while constructing such services. The cost, the access, the security, the equipment and infrastructure requirements are some concerns that usually hinder the implementation and further adoption of mobile G2C services (El-Kiki, 2007; Kushchu & Kuscu, 2004; Zeferrer, 2011). The local authorities, possibly, could not know the way to make them work successfully and cost-effectively and the citizens have not the chance to get acquainted and encouraged to use them.

Hence, motivated by the aforementioned, this dissertation attempts to provide guidelines that could be used to highlight key tasks, that can steer successful development path through strategic steps and stages. These logically sequential stages can be followed by various municipalities that need to construct new mobile services satisfying their citizens' needs, or by municipalities that need to reform their current mobile business model in order to improve their existing m-services. The study aims to improve mobile efficacy of the municipalities, by making propositions on:

- a) Identifying suitable applications:
 - Targeting citizens' urgent needs
 - Targeting municipalities' structural needs
- b) Successful managerial suggestions, regarding resources and development activities for:

- Integrated services that break down the barriers of government structure (new value propositions and technologies)
 - Better accessibility for constituents to government services (technology & infrastructure)
 - Qualified personnel for the developing of the services
 - More convenience from the citizens' side through a communicational & transactional mobile medium and faster delivery of the services and direct informative ways
 - Establishing partnerships
 - Wider choices of government services and delivery channels (new channels)
 - Meeting new revenue streams and low-cost solutions
 - Recognizing the social and legal obstacles
- c) Move and sustain applications into mainstream:
- Increased reachability & communication of the municipalities' services/news/events to the citizens disseminate knowledge of m-services (mobile marketing of the local authorities)
 - Encourage citizens' take-up of the m-services
 - Provide incentives for further development by the municipalities

1.2 Research Objectives, Questions & Contribution

Within the context described above, the current study focuses on exploring how the local authorities can provide innovative mobile services, by successfully modernizing their information systems. The provision of the services exceeds the narrow limits of the organization itself; it demands the possible co-operation of third-party companies, regulatory permissions, secure access to wireless nets, managerial change, the citizens' participation, etc. There is a high need of a successful integration (figure 1.2) of the mobile government concept and the business model concept, in order to harmonically co-exist and yield fruitful results, regarding the provision of the mobile services to the citizens by the local authorities.

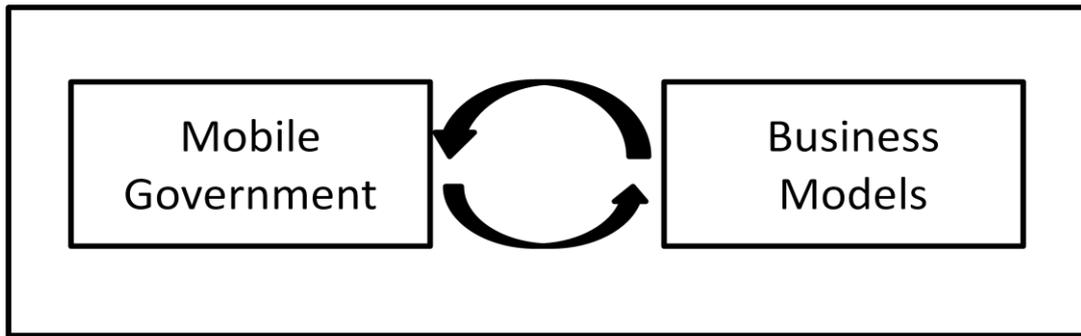


Fig. 1-2 Integration of mobile government and business models

Hence, the necessary stages until accomplishing the m-G2C services provision have an essential role in this study, and the main research question is formulated as following:

To combine the appropriate elements into a strategic framework for the selection, design, implementation and sustainment of mobile services provided by the municipalities to the citizens, by transforming the information systems and helping with the transactions between citizens and local authorities.

In order to fulfill this research aim, there is a number of secondary research points that should be examined in the dissertation. These are deduced into the following objectives:

- Objective 1:** Explain the research motivations, research paradigm, methods and techniques that fit the current research objectives and lead to valid research results
- Objective 2:** Analyze the value proposition of the m-services for the municipalities
- Objective 3:** Analyze the value proposition of the m-services for the citizens
- Objective 4:** Identify the barriers in implementing mobile services
- Objective 5:** Record the most crucial and popular public services examples provided worldwide, and classify them based on their type of function
- Objective 6:** Provide a typology of possible municipal mobile services
- Objective 7:** Imprint the current situation in Greece regarding the municipal mobile services provisions, using the proposed m-services' typology

Objective 8: Identify the main business model components along with their implementation in line with the concept of mobile government

Objective 9: Develop the theoretical framework for the strategic planning of the mobile services on a municipal level, synthesizing the business model components and the services' value propositions

Objective 10: Explain the research methodology that fits the testing of the theoretical model and leads to the final artifact of this research

Objective 11: Case studies research in order to test the theoretical framework

Objective 12: Evaluate the research conclusions in terms of their significance to theory and practice and identify future research directions that are important to continue refining this important area of research.

The accomplishment of these research objectives would reflect high value contributions to both theory and practice. To be more specific, the contributions made to theory could be summarized to the following points:

- Comprehensiveness of the mobile G2C services value propositions and barriers grounded theories
- Inclusiveness of the mobile G2C services typology
- Completeness of mapping of the provided mobile G2C services in Greece.
- Integrity of the conceptual review of the business models and ontology dimensions
- Research innovativeness, fruitfulness, and flexibility of the development of the GoMobi framework

On the other hand, the typology of the mobile services would provide the practitioners with ideas of mobiles services construction that are in demand by both the municipalities and the citizens. The description of the existing situation, additionally, would reflect the room left for the mobile services growing opportunities. The numbers of the mapping and the final results would be valuable data at the hands of those in the mobile community interested in emerging sectors. Finally, the GoMobi framework would have a high practical value itself; its unified character enhances municipalities' ability to design, create,

communicate, compare, analyze, evaluate, and modify their existing and future business dimensions of their provided mobile information technology services.

1.3 Research Methodology & Design

In the previous paragraph, the objectives of the study and its desired outcomes are clearly stated. The synthesis of a standardized framework of modeling mobile services in the government sector should be based on existing business models dimensions, critical success factors and citizens' adoption models taken from academic sources and inter-municipalities' documents. Gained knowledge, on the other hand, by previously implemented projects regarding the mobile G2C services provided by the local authorities and the opinion of specialized employees in the municipalities' IT sector can shed light on tricky and vague spots of the mobile service planning, implementation and dissemination process. Hence, the research also needs techniques that help in extracting meaningful hints of real-life experiences.

Therefore, there is need for a mixed methodology design until the various research objectives are reached and unified into the same study framework. Palvia et al. (2007) highlight thirteen different methodologies ranked as the most popular methodologies for information systems research topics employed by the leading authors in the area. Eight of the thirteen methodologies are retained here as it is seen in Table 1.1.

Table 1-1 MIS methodologies retained for this research (source: Palvia et al., 2007)

Methodology	Definition
Speculation/ Commentary	Research that derives from thinly supported arguments or opinions with little or no empirical evidence
Frameworks and Conceptual Models	Research that intends to develop a framework or a conceptual model
Library Research	Research that is based mainly on the review of existing literature
Literature Analysis	Research that critiques, analyzes, and extends existing literature and attempts to build new groundwork, e.g., it includes meta analysis
Case Study	Study of a single phenomenon in an organization over a logical time frame

Interview	Research in which information is obtained by asking respondents questions directly. The question may be loosely defined, and the responses may be open-ended. It is often met as a supportive tool for other methodologies
Secondary Data	A study that utilizes existing organizational and business data, e.g. financial and accounting reports, archival data, published statistics, etc.
Content Analysis	A method of analysis in which text (notes) are systematically examined by identifying and grouping themes and coding, classifying and developing categories

The category *speculation/commentary* refers to articles and researches that are not really based on hard evidence. They largely reflect the knowledge and experience of the author. By definition, they tend to be somewhat visionary in nature. Typically they signal the arrival of new trends and directions in the technology, its management or application. In this dissertation speculation/ commentary has triggered the initial questions about the lack of mobile services provision to the citizens by the Greek municipalities. It is somewhat visionary wanting to formalize guidelines in order to improve the municipalities' IT sector and citizens' convenience.

Library Research summarizes and synthesizes past research, and highlights some of the important conclusions. *Literature Analysis* goes a step further and examines many (perhaps all) past studies in a particular area and conducts a scientific meta-analysis of the cumulative knowledge, in effect treating each study as one data point. These two methodologies embody the basis for the design of the m-G2C services provision strategy. In order to conclude to this strategy, extensive library and literature research is conducted regarding mobile government and public services, mobile applications and techniques, and business models.

Frameworks & Conceptual models are defined by Palvia et al. (2007) as very useful procedures especially for attempts of developing theories. Frameworks helped guide the work of many Management Information Systems (MIS) researchers over the years. In this dissertation, conceptual research in the form of municipalities' business model framework is the central idea of the research; the final outcome shares business model dimensions for the municipalities' strategy regarding the m-services implementation.

Content Analysis as a method of identifying and grouping themes, and classifying and developing categories of different notes is not very popular in the IS research field. In this study, however, content analysis of government services is a necessary step while developing the theoretical approach of the examined topic. Grouping the public services available worldwide in terms of their functionality or technology, and classifying the content of services that are in favor of the citizens gives a strong argument for the municipalities to support the correct selection of the services that are worth examination and implementation. Additionally, municipalities' websites are extensively analyzed regarding their provided mobile services mapping the current situation in Greece.

Secondary Data as a research methodology is most commonly used in financial and business disciplines (e.g. in Finance where company financial performance data and stock market data are analyzed frequently) (Osterwalder, 2004). However, this dissertation uses secondary data collecting and analyzing them from company websites (e.g. telecommunication and wireless network providers, mobile device providers, etc.), municipalities' websites, statistics of mobile applications users and publicized case studies, in order to evaluate theoretical factors when necessary.

Case study Research has been established in MIS as an equally rigorous methodology to the quantitative studies since 1989 (Lee, 1989). A case study generally refers to the in depth study of a single phenomenon (e.g. one application or a new technology) over time in a single organization (Palvia et al., 2007). The case study research is the heart of this PhD thesis; the outcome of the study is based on data collected through in depth interviews of several Greek municipalities regarding the selection, design, development and maintenance of m-G2C services.

Finally, *interview research* is the last methodology type applied in this dissertation's methodology mix. It is usually considered as part of other methodologies, such as case studies and qualitative research, but Palvia et al. (2007) list them as a separate category. The reason of doing that is that the latter find interviews repeatedly mentioned- either by itself or in combination with other methodologies- as the primary method of data collection. Sekaran and Bougie (2010) also consider interviews as a method for data collection. In this PhD thesis, the interviews are the primary tool to conduct the case studies. Through interviewing the appropriate people from within the municipalities the case study evidence is collected to be further analyzed.

Figure 1.3 below represents the methodology mix used in the separate stages of the research. Various methodologies have been used in order to cover the study needs. Many of them are repetitively used in many study iterations (e.g. literature review and secondary data), whereas others (speculation) are superficially used. Each methodology approach serves different objectives in order to reach the desirable deliverables.

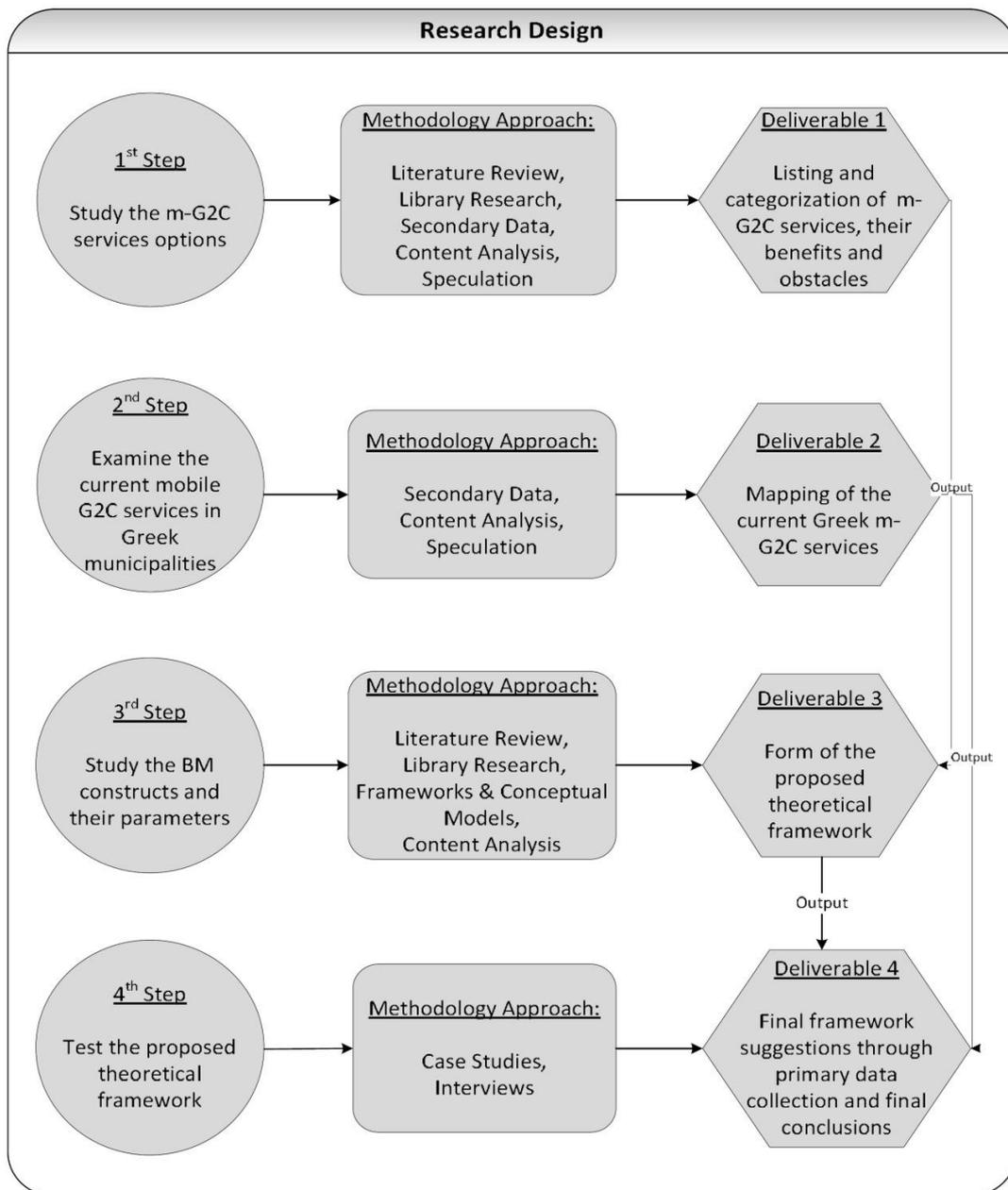


Fig. 1-3 Methodology mix of the research design procedure

1.4 Dissertation Structure

This PhD thesis is structured around eight chapters achieving the several research objectives and constructing the whole puzzle of the entire dissertation. A graphical representation of the thesis layout is available in figure 1.4. For ease of reference the research objectives are mapped to the structure of the dissertation.

Chapter 1 provides an introduction and background of this research. It explores the underlying motivations for researching governmental mobile services designing constructs and discusses the research context by providing a concise theoretical background of the research related domains. Further, the main research question and the partial research objectives are presented orienting the study towards specific scientific areas and explaining in brief the contribution of such research. Then, the research approach is mentioned, exhibiting the necessary methodologies followed in order to achieve the research objectives. Finally, the chapter ends with an overview of the dissertation structure.

Chapter 2 is dedicated to a thorough review of the literature related to mobile government. There is a complete presentation of the grounded theories from definitions and fundamental specifications of the mobile character to analysis of m-government services classifications (e.g. based on used technologies, types of functions, involved entities, etc.). Additionally, there is a comprehensive analysis of the benefits and the barriers of the m-services implementation; this gives an analysis of possible value propositions of m-services for both the citizens and the municipalities and identifies the impeding factors blocking the m-services wide implementation. Finally, some of the most popular mobile public services offered worldwide are gathered and presented as examples, classified based on their type of function.

Chapter 3 gives a full picture of the offered services by the Greek municipalities after having concluded to a typology of the mobile services. Initially, there is a brief description of the situation regarding the traditional and electronic G2C services offered by the local authorities. Furthermore, mobile services (suggested by theoretical sources or successful implemented examples) are classified into a typology based on their type of function. Finally, there is a complete mapping of the offered mobile services by the Greek municipalities guided by the suggested typology.

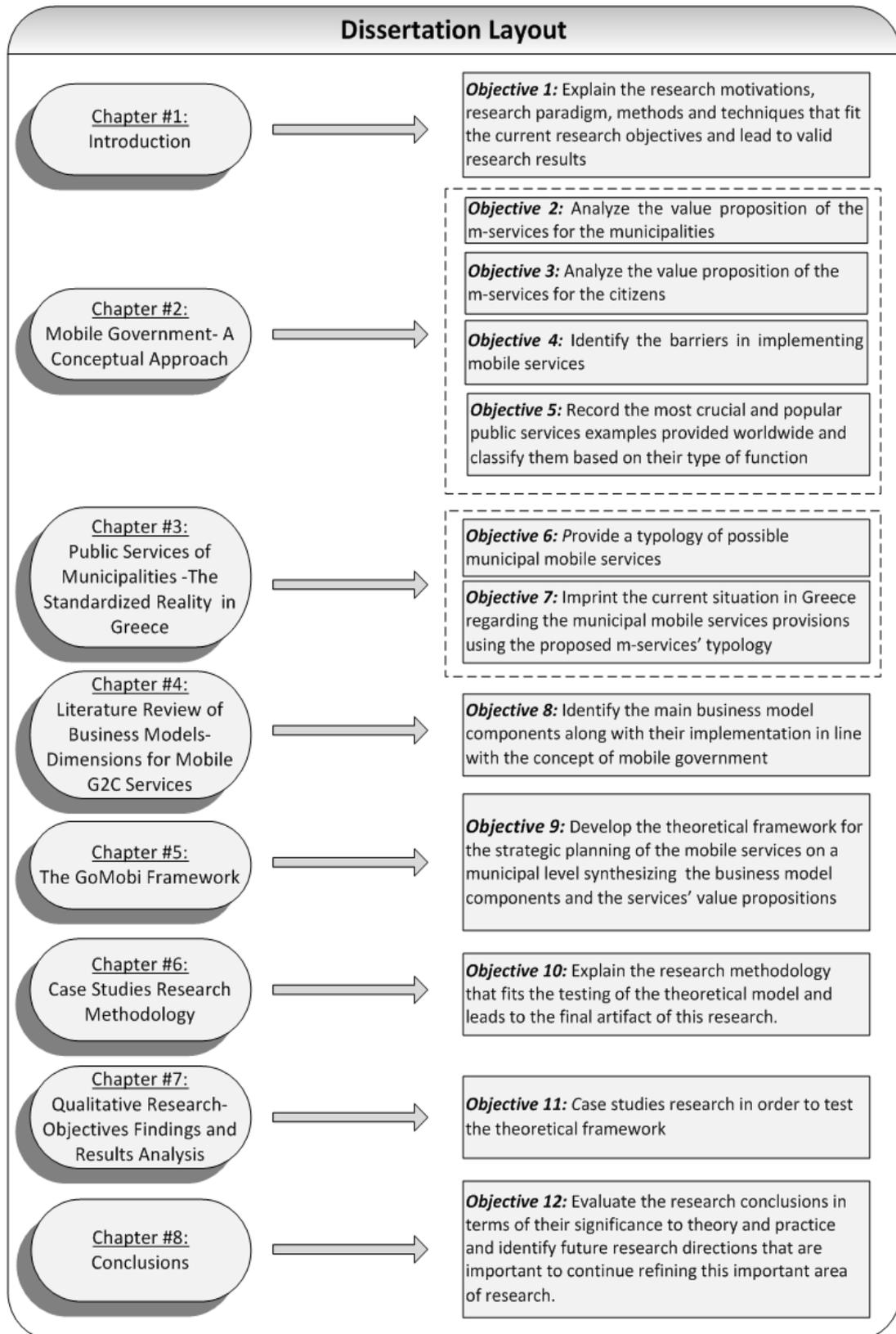


Fig. 1-4 Dissertation layout

Results regarding the current situation of the mobile services tendencies are of high importance.

Chapter 4 examines the second pillar of this study: the mobile business models. It provides in-depth analysis of the business model state of the art literature conceptualizing the business model ontologies within the context of business in general and mobile government in particular. The chapter concludes with the main business model components that are suitable and necessary to be integrated into a strategic framework for the governmental mobile services planning businesswise.

Chapter 5 composes and analyzes the proposed strategy framework- the GoMobi Framework- consulting the municipalities with strategic stages contributing to the process of modernizing the G2C services using the new opportunities of the mobile era. All the stages of the theoretical model are extensively explained as well as the particular dimensions of each stage.

Chapter 6 discusses the aspects related to the followed empirical research methodology for the testing of the suggested, theoretical framework. Case studies theory is presented explaining the suitability of this methodology for the research purposes of this study. Additionally, the chapter elaborates on dimensions and specifications of the way the case studies are planned to be conducted in this study to achieve the research goals.

Chapter 7 there is a presentation and analysis of the data collected through the case study research. Such data collected through current and real-life applied conditions give food for discussion and validation of the GoMobi model.

Chapter 8 summarizes the research findings and conclusions. It classifies the research contributions in two categories: contributions to theory and contributions to practice. The limitations of the study are also mentioned. Finally, suggestions for future research initiatives and expansions of the existing research are provided at the end of the last chapter.

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Chapter 2.

Mobile Government: A Conceptual Approach

In this chapter, there is an analytic introduction regarding the concepts of mobile government and its implementations. There is a presentation of an extended literature review around this topic in order to achieve high comprehension of the mobile government research domain concluding to a perceptive analysis of the m-G2C services value propositions and the barriers impeding their implementation. Additionally, the chapter records the most crucial and popular public services examples worldwide collected through case studies examination and scientific papers negotiating m-government best practices.

Literature sources contributing to the aforementioned objectives are carefully gathered after searching among databases with scientific recognition worldwide (Google Scholar, Scopus, Elsevier, IEEE Xplore, Science Direct and Business Source Complete) with keywords such as "mobile/m- services", "mobile/m- government", "smart city services", etc. The returned results are filtered and chosen to be studied under the conditions they are:

- written in English
- peer-reviewed journal articles by authoritative publishers
- peer-reviewed papers of authoritative conferences published in proceedings
- published researches by authoritative corporations (e.g. Capgemini, the Forrester Group, etc.)
- white papers by governmental organization with an international presence and influence.

2.1 Background & Definitions

2.1.1 *E-Government*

In the decade of 1990s, the rapid evolution of the Information Communication Technology (ICT) gave a boost to the electronic applications implementation in various sectors. Among others, experts in the governmental sector seized the chance to improve the public services

provision through the World Wide Web (www) and the Internet. That gave birth to the term of “e-Government”. E-government, according to El Kiki & Lawrence (2006), refers to *“the online delivery of information and services related to a government entity, through the Internet or another digital outlet such as a public kiosk”*. Many other researchers have tried to define e-government with their own words giving various perspectives and attributes to this term. For instance, Trimi et al. (2008) state that *“e-government refers to the use of wired Internet technology by public-sector organizations to better deliver their services and to improve their efficiency”*. Holden et al. (2003) add to this definition that the electronic services are 24x7 available, whereas Carroll (2005) expands more by highlighting that *‘e-government may refer to activities at federal, regional and local government levels’* and that *‘it may also refer to internal activities (within government), and external relations’*. However, one of the most accepted definition world-widely is the one given by the European Commission (EC); according to EU, e-government is *“the use of ICTs in public administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies”*.

Emphasis has been given on the evolvement of e-government services due to its beneficial character. It serves the improved interaction between government and citizens, business and industry, the citizens’ empowerment through access to information, and the more efficient government management, that reflects less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions. This is accomplished through the computerization of the existing paper-based procedures that can prompt new styles of leadership, new ways of debating and deciding strategies, new ways of transacting business, new ways of listening to citizens and communities, and last but not least, new ways of organizing and delivering information (El Kiki & Lawrence, 2006; Fidel et al., 2007; Georgiadis & Stiakakis, 2010).

2.1.2 M-Government

Upgrading the electronic provision of governmental services and taking advantage of the new service delivery channel- the *mobile* channel, the mobile government has been the new trend during the last decade. Researchers all over the world talk about m-government integration, m-government optimization, new m-government services and m-government architecture. But, what exactly is mobile government?

The general idea of m-government is to make use of mobile and wireless technologies in order to enhance existing governmental procedures and services and to develop new mobile approaches in this field of application (Zeferrer, 2011).

The most commonly used definition about mobile government has been given by Kuscchu (2003), who claims that m-government *“as a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units”*. Antovski & Gusev (2005) provide a less strict definition; they simply state that *“m-government is largely a matter of getting public sector IT systems geared to interoperability with citizen’s mobile devices”*. Similarly, Misra (2010) provides a short and concise definition of m-government by stating that *“m-government is public service delivery including transactions on mobile devices like mobile phones, pagers, and PDAs”*. Carroll (2005) states simply that *“m-government involves the provision of public sector services via mobile technologies”* but completes it by saying that *“m-government involves interaction where the contexts are unknown, where accessing government services might be one of several activities being undertaken and where the physical constraints of interacting with mobile devices limit the amount and type of information that might be located and access”*. Finally, Ostberg (2003) gives a general and brief definition claiming that m-government stands for *“the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms”*. All the definitions are organized in Table 2.1 below.

Table 2-1 Various definitions of m-government throughout the years

Definition	Source
<i>“m-government is a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units”</i>	Kuscchu (2003)
<i>“the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms”</i>	Ostberg (2003)
<i>“m-Government is largely a matter of getting public sector IT systems geared to interoperability with citizen’s mobile devices”</i>	Antovski & Gusev (2005)

<p><i>“m-Government involves the provision of public sector services via mobile technologies”....“m-Government involves interaction where the contexts are unknown, where accessing government services might be one of several activities being undertaken and where the physical constraints of interacting with mobile devices limit the amount and type of information that might be located and access”</i></p>	<p>Carroll (2005)</p>
<p><i>“m-Government is public service delivery including transactions on mobile devices like mobile phones, pagers, and PDAs”</i></p>	<p>Misra (2010)</p>
<p>The general idea of m-government <i>“is to make use of mobile and wireless technologies in order to enhance existing governmental procedures and services and to develop new mobile approaches in this field of application”</i></p>	<p>Zeferrer (2011)</p>

Regardless of the several slightly different definitions of m-government found in literature, there is common consent by many researchers that m-government is no replacement or successor of e-government; it aims to enhance existing e-government services using new mobile technologies and to extend the set of offered service (Zeferrer, 2010). M-government can be viewed as an emerging trend in public service delivery, which guarantees mobility and portability for the government and is part of a broader phenomenon of mobile enabled development (m-development) (Kim et al., 2004). Ishmatova & Obi (2009) highlight the difference between e-government and m-government, due to the very specific characteristics of the mobile services' nature.

Kumar & Sinha (2007), on the other hand, give a different perspective claiming that m-Government is a sub-category of e-government regarding the technology being used. According to this point of view, the same authors establish the existence of other similar sub-categories, such as u-Government (Ubiquitous Government) or g-Government (GIS/GPS applications for e-government). El Kiki & Lawrence (2006) amplify this position by saying that: *“ m-government should not be viewed as a new type of government, rather a new 'tool' for government”*. It is a mixture of complex strategies viewed as a new approach for improving efficiency of the traditional governmental processes. It just causes changes in the working style of the government and triggers the establishment of personalized relationships between the government and the citizens.

Hence, although there are many slightly differing definitions of the term m-government, there are two different interpretations of these definitions; two controversial principles are accepted in the literature depending on the point of view of the researcher:

- 1) m-government is not a subset or extension of e-government. M-government is not a successor of, or replacement for classical e-government approaches, but aims to enrich the set of offered governmental services by means of mobile and wireless technologies.
- 2) m-government denoting the utilization of mobile and wireless technologies for electronic governmental services focuses on the enrichment and optimization of existing e-government services and the development of new techniques as new approaches of electronic government provision.

In the dissertation herein, mobile government is viewed as a new type of governmental services provision, which might or might not overlap with e-government (Figure 2.1). Local

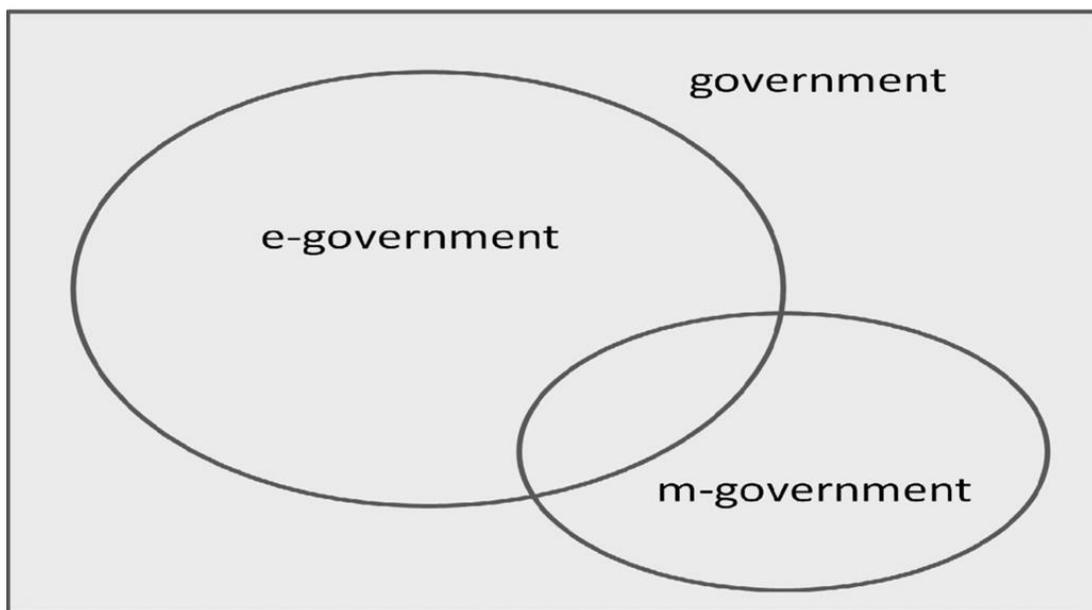


Fig. 2-1 M-government complements e-government and provides new service possibilities

Authorities might utilize the mobile channel as a complementary way of delivering the existing e-services or they might take advantage of the unique characteristics of the mobile character and conceive ideas of new services that can be delivered no other way than the mobile. Hence, the mobile services are viewed in line with Borucki et al. (2005) and Gorlenko & Merrick (2003) and are separated regarding their mobile suitability in:

- 1) adapted, which are exclusive neither to the wireless connectivity nor to the mobile environment and exist in a different form elsewhere, e.g. the web

- 2) essential, which are those services that can be delivered mainly through mobile and wireless devices.

2.2 The Mobile Character and its Special Features

No matter what the area of mobile marketing and mobile business implementation is, the mobile and wireless technology still projects its special characteristics giving a lot of food for thought and research. The mobile devices, the mobile applications and the wireless connections share some features in common building their own theory regardless of the industry field where the mobile service is delivered (e.g. in the health sector, m-learning, m-government, m-tourism, etc.)

According to Roggenkamp (2004), mobility in a general sense is introduced as a form of being mobile. The adjective “mobile” goes back to Latin word “mobilis”, meaning movable. However, in the literature (Kakihara & Sorensen, 2002; Roggenkamp, 2004), there are mainly three types of mobility explaining the term differently:

- spatial mobility, which refers to the extensive movement of people and the mobility of objects, symbols and space itself
- temporal mobility, which refers to the moving of time slots according to a flexible and dynamic prioritization of tasks, and
- contextual mobility. While spatial and temporal mobility cover the aspects ‘where’ and ‘when’ of an interaction, contextual mobility refers to ‘the modalities, in which and how this interaction occurs’.

A first attempt of categorization keeps its roots back in 1998, when Kristoffersen et al. talked about local, regional and global mobility. Roggenkamp (2004) continues conceptualizing further the theory of mobility splitting it up into three different sets:

- device mobility, which refers *“to the continued access to services with a device while moving”*
- user mobility, which depicts the *“location- and device independent service access apart from the mobility without physical constraints”*, and

- service mobility, which is defined as “*the capability to provide a certain service irrespective of device and user*”.

As both Roggenkamp (2004), Trimi & Sheng (2008), and Steiakakis & Georgiadis (2010) highlight, it should be clear that the interchangeably used terms “wireless” and “mobile” are distinct. While “mobile” basically describes the ability to communicate anytime and anywhere, “wireless” just refers to the fact that a device is without wires; it depicts the method of transmitting information between a computing device and a data source without a physical connection. All mobile devices are wireless, but not all wireless devices are mobile (e.g. a PC that connects to the internet cordlessly, but it is not portable).

Due to this portable and wireless character of mobility, the mobile services are typical for being:

- ubiquitous: the user of the mobile services can receive and send information or act transactions from any location on a real-time basis. The user can complete his tasks while on the go having no geographical restrictions. The advantages presented from the omnipresence of information and 24/7 access to bureaucracy & business can be of exceptional importance in emergency or job critical cases (Clarke, 2001; Kannan et al., 2001; Yunos et al., 2003; Giaglis, 2004; Gouscos et al., 2005; Nysveen et al., 2005; Rossel et al., 2006; Ntaliani et al., 2008; Zarpou et al., 2010)
- convenient: The agility and accessibility provided from wireless devices will further allow m-services applications. The limitless access to mobility provides the user with the opportunity to conduct his m-commerce activities having no access or duration restrictions. People should not be concerned, for example, about being home in order to have access to the Internet as the e-services users would be. This feature can be translated as a special comfort which could lead to an improved quality of life (Clarke, 2001; Balasubramanian et al., 2002; Nysveen et al., 2005; Zarpou et al., 2010)
- personalized: Given the fact that the mobile devices are used by a single person, the mobile services are ideal for personalizing the services. Personalized services from a technical point of view refer to the information systems and platforms that allow the users to set the interface according to his designing preferences or prioritize the content of the application according to his needs and routine activities. From a

marketing point of view the mobile services are individual-based target marketing; mobility gives the chance to personalize the messages according to time and location, by altering both sight and sound. The content of the advertising messages is tailored based on a personalized vendors' database disseminating information on an individual base (Clarke, 2001; Doyle, 2001; Watson et al., 2002; Giaglis, 2004; Nysveen et al., 2005; Carroll, 2006; Trimi & Sheng, 2008; Zampou et al., 2010)

- localized: Through GPS technology, service providers can accurately identify the location of the user as long as the mobile devices are almost always-on. Utilizing this technology, m-services providers will be better able to receive and send information relative to a specific location (Clarke, 2001; Giaglis, 2004; Gouscos et al., 2005; Ntaliani et al., 2008; Trimi & Sheng, 2008; Zampou et al., 2010). This leaves room to mobile marketing stakeholders for targeted promotional actions, advertising appropriately offers, for example, or events in a municipality. Some people might be skeptic or annoyed by this feature of mobility concerning about their personal rights and freedom; it could be, however, seen from a positive point of view adding a key value proposition over the traditional electronic commerce by supplying information depending on the specific geographical position of the user (especially while being on a trip) (Doyle, 2001; Giaglis et al., 2002; Watson et al., 2002)

2.3 M-Government Services Classification

The mobile services can be studied under multiple points of view depending on several criteria. In this section there are different taxonomy suggestions of the mobile government services available in the literature. Various researchers have tried to categorize the m-government services based on their various characteristics; such characteristics are the stakeholders involved in the service conducted, the type of function that the m-service is addressed to achieve, the referred m-government domain, the technology being used and the degree the services exploit the unique mobile characteristics.

2.3.1 Involved Parties

The services provided by the government are mainly used by the citizens, the businesses, the employees of the governmental organizations or the organizations themselves. Mobile

government services are most commonly classified based on the interactions of the participants and their possible relations (Kim et al., 2004; Kumar et al., 2008; Stiakakis & Georgiadis, 2011).

Table 2-2 Classification according to the participants

	Government	Business	Citizens	Employees
Government	G2G	G2B	G2C	G2E

In table 2.2 above, there are the following types of m-government services:

- m-government-to-government (mG2G), referring to inter-agency relationships and the interactions between government agencies
- m-government-to-employee (mG2E), also known as internal effectiveness and efficiency (IEE), concerning the government and its employees
- m-government-to-citizen (mG2C), which refers to the interaction between government and citizens, and
- m-government-to-business (mG2B), describing the interaction between government and businesses

Some researchers distinguish the tourists from the citizens and create a separate group of services, the Government-to-Tourists (G2T) services (Carroll, 2006; Mobi Solutions, 2010; Zefferer, 2011). In this dissertation, however, no such discrimination is being followed; the citizens in one town might be tourist in another town, as well as every citizen could be tourist in his own area. Hence, under the assumption that the touristic services are also services for the citizens, services provided by the government for the tourists are included in the m-G2C services.

2.3.2 Type of Function

When talking about e-government services, there is a kind of standardization regarding the functional type of the public service and the level of its progress. As it is analyzed in few sections above, according to Capgemini (2007), there is a five-stages categorization of the e-services on a municipal level regarding their advance of the functional type.

Regarding m-government the functional processes of the services are not so clearly and officially defined. Three different types of classification, however, have been proposed by

Norris et al. (2005), which have later been adapted by Hassan et al. (2009) and Sheng & Trimi (2008). These types are the:

- Informational transactions, which are basically used to broadcast messages to end-users. In the context of m-Government, this includes for instance the sending of alert messages to citizens by governments in case of emergencies. Informational transactions are one-way; hence, there is typically no possibility for receivers of published information to reply or to directly interact with the sender
- Transactional services, which are usually bi-directional. Citizens are able to interact with the particular authority directly. Using this type of service, users are able to carry out governmental procedures completely mobile
- Operational services, which refer to operations that take place within a governmental authority. An example in the field of m-government is a police officer being equipped with appropriate mobile devices that allow him or her to connect directly to the police's central databases and services (Zefferer, 2011).

2.3.3 Purpose

Zálešák (2003) proposed another classification of the m-services based on the intended purpose of the m-service. Wu et al. (2009) and El-Kiki & Lawrence (2008) also follow the same categorization.

- M-communication: they refer to services that improve the communication between government and citizens. Providing information to the public is a prerequisite for confronting critical issues. In addition, it enhances transparency and accountability (Georgiadis & Stiakakis, 2010)
- M-services: they are a number of government services referring mainly to m-payments and m-transactions. M-Services extend the scope of m-Communication to higher level of interaction with the citizens allowing the processing of transactions between them and governmental organization (Zefferer, 2011)
- M-democracy: refers to those services that promote the active, democratic citizen's participation via the mobile channel. M-voting and m-participation comprise the most popular actions of this m-government domain. M-democracy is critical to be achieved as long as it engages citizens into public policies and enhance democratic processes and public decision making. According to Lallana (2007), m-Government

can “strengthen existing democracies by enhancing existing representative institutions” and “can help create a more vibrant civil society”

- M-administration: refers to back office processes and functions, which are not accessible or visible to the general public. The existence of such services helps with the improvement of the internal operations of public sector agencies. As it is mentioned in paragraph 1.4.1, the focus of this work is exclusively on m-G2C services. These services by nature exclude the m-administration part of m-government, since it refers to interorganizational processes having no interaction with the citizens. Hence, in this study m-administration services are not in-depth analyzed.

2.3.4 Used Technologies

While classical e-government services mainly rely on web technologies, m-government services usually make use of a broader spectrum of technologies being available on mobile phones. Thus, a classification of m-government services according to their technology being used in order to interact with the citizens seems reasonable. Zefferer (2011) refers to this criterion of classification as “*User Interface classification*”.

Misra (2010) distinguishes between web-based m-Government services and non-web m-Government. Web-based services are already known from e-government, where interaction between authorities and citizens usually occurs through a web browser running on the citizen’s client system and displaying content like web forms. This could, also, be accomplished through mobile and wireless solutions. It is quite simple and convenient since the majority of modern smartphones or other comparable mobile devices are usually equipped with a browser and wireless connection capabilities through WAP, 3G, Wi-Fi, etc.; the content of appropriately built sites can be thus displayed and transactions can be conducted through the mobile browsers.

The limited hardware resources, however, of these devices (reduced screen- and keyboard size) make the interaction with web sites through mobile web browsers troublesome. Many m-government services, instead, make use of other mobile technologies being available on mobile devices. For instance, various services – especially in developing countries – currently rely on Short Text Message service (SMS) only and can thus be classified as non-

web m-government. Other examples for these kinds of services are those relying on voice-based input and output (Zefferer, 2011).

Furthermore, the Mobile Marketing Association (MMA) (2008) refers to mobile applications as the hottest trend in mobile technologies for delivering various services (mainly advertising services). The mobile applications are software built according to the specifications of different mobile devices so that can be executed either on native platforms and operation systems of the m-devices, e.g. Android, iOS, Windows Mobile, Symbian , or on other Application Development Platforms (APIs) and virtual machines such as J2ME, BREW, Flash Lite and Silverlight (Tarnacha & Maitland, 2006). They are intended to cover multiple needs either for entertainment, for communication, for transactions, or just information (Zarmpou et al., 2011) depending on their content. Such applications can also be created for governmental purposes covering citizens' and municipalities needs.

2.3.5 Mobility Exploitation Degree

In ICTD (2007) a classification of the m-government services is proposed based on the *"phase of development"*. The authors separate the services in two categories:

- the 1st phase services, which are the services that are developed to *"provide through mobile devices what is already available through a computer based application"*, and
- the 2nd phase services, which are developed to *"provide those services which are only possible through wireless and mobile infrastructure"*.

The goal of the 1st phase services is to free the citizen's from the dependency on a desktop computer, laptop, or similar device when executing an existing service. On the contrary, the authors claim that 2nd phase services are actually in the more crucial phase in the development of m-government.

This classification reminds of the services separation mentioned in section 1.1.2. Borucki et al. (2005) and Gorlenko & Merrick (2003) distinguish the services between the adaptive services (they are not exclusive to the wireless connectivity or to the mobile environment and are also provided, for example, through the web) and the essential (delivered mainly through mobile and wireless devices taking advantage of the unique characteristics of the mobile channel such as location awareness, personalization, etc.).

2.4 Enablers, Benefits and Obstacles of M-Government Services

This paragraph initially explains the driving forces that lead to m-government services adoption. There is, also, an analysis of both the benefits that encourage the interest towards the m-G2C services and the barriers that hinder their implementation.

2.4.1 Enablers

There are multiple driving factors that preview a mature age forcing the mobile penetration in various sectors including government. The trend towards m-Government has been facilitated by the growing capabilities of mobile technologies and their associated infrastructures, devices and systems and their acceptance in both developed and developing countries (Mengistu et al., 2009)

The advances in mobile technology make it easy for people to handle the mobile devices and transactions giving a real push in adopting mobility. Stronger computing devices, evolution of mobile Internet technologies, standards and protocols towards faster and more sophisticated applications lead to higher adoption of mobile Internet applications (Kushchu, 2009).

More specifically, manufacturers have emphasized on larger screens of mobile devices and smartphones while keeping the overall size of the device small, the inputting keypad is replaced by touch screens and the processing power is continuously enhanced. Apart from the improved quality of existing components, such as camera resolution and wireless range, manufacturers also incorporate new technologies into their offerings like Radio Frequency Identification (RFID). Finally, the mobile operating systems and the application stores provided by handset makers and operators become more and more popular worldwide encouraging the development of mobile applications and services. (Gasimov et al., 2010). The ongoing demand for mobile applications/ services is imposed by the statistic surveys; In-Stat estimated that the total number of worldwide users of mobile applications will reach 975 million by 2012, generating potential revenues of USD 2.2 billion (In-Stat¹, 2008).

¹ In-Stat provides up-to-date market analyses, reports and statistics, and consulting services about hot technologies since 1981 having a large client list of market leaders (www.in-stat.com)

The telecommunication companies, in their turn, press to increase profits through distribution of more content on their networks (Carroll, 2006).

The wireless and mobile infrastructure has its own advantages giving a mobile business boost. M-technology helps remove infrastructure constraints for countries with poor or nonexistent wired infrastructure. For example, in Africa, cell phones accounted for 90% of all African phone subscribers in 2007 (El-Kiki & Lawrence, 2008; Trimi & Sheng, 2008). Moreover, wireless network appear to be a more cost-effective solution over the wired networks for countries with dense populations and difficult terrain (Patel & White, 2005; Trimi & Sheng, 2008). For example, Macedonia will build a Wi-Fi mesh network that will cover 1,000 square miles of difficult terrain and its service will reach more than 90% of its population for a planned price of \$12 a month (Trimis & Sheng, 2008).

In any case, the mobile penetration in Europe and the world is already high (Kushchu, 2009). Surveys show that the mobile device owners are more as many as the fixed computer owners (Vincent & Harris, 2008). Additionally, the mobile subscriptions in the universal market are steadily increasing (Zefferer, 2011) having reached 83% in 2007 getting ahead of the landline subscriptions (Antovski, 2007). Visually the comparison between the mobile cell phones subscriptions and the fixed line subscribers until 2008 is presented in figure 2.2.

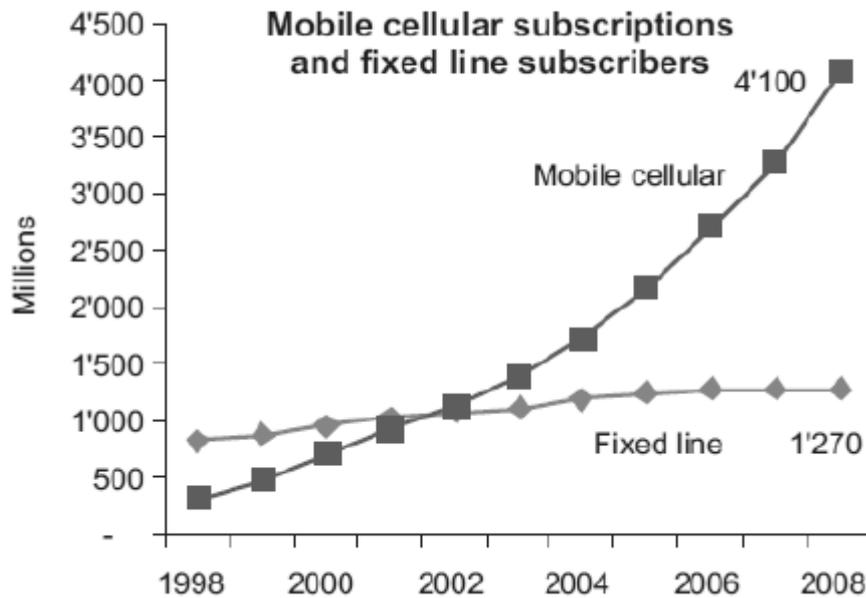


Fig. 2-2 Comparison between mobile cell phones subscriptions and fixed line subscribers (International Telecommunication Union, 2011)

The situation in Greece follows the global pace of mobile business pressures. Statistics show that the mobile phones in Greece have a high penetration degree (146%) (Athens University of Economics and Business & ICAP GROUP, 2008). A very recent survey conducted by Kalogirou et al. (2012) on citizens and business about electronic government services concluded that 67% of the online users in Greece are positive to use more services in the future especially under the condition that these services decrease the bureaucratic processes (90%) and help in saving time (88%) and money (86%).

These numbers reflect a positive attitude towards a modernized government and especially local authority's services. There is need for transforming public organizations given the fact that citizens' expectations have increased demanding more participation and quality of transparency (Kushchu, 2009). According to Borucki et al. (2005) and Sandy & McMillan (2005) the governmental needs for providing efficiently (in a timely and low cost manner) and effectively are always present. The goal is the achievement of "one-stop" government harnessing multiple delivery channels (SMS, MMS, WAP, etc.) on multiple devices (Gerrmanakos et al., 2005).

It is obvious that there is fertilized ground for the mobile government growth and acceptance. There are, however a number of reasons reflecting the beneficial as well as the

challenging character of the local authority's mobile services development and adoption analyzed in the following paragraphs.

2.4.2 Benefits

The usage of mobile technologies in the provision of public sector services by default increases the channels for service interaction. More specifically, there is a shift from the traditional service delivery channels- such as the face-to-face interaction, post, information kiosks and fixed phones- to the 24x7 mobile internet access to information, SMS and call centers using mobile technologies. This new delivery channel adds value with instant updates to information, faster service delivery for citizens and improved access to data from public servants in the field (Heeks & Lallana, 2004; Sandy & McMillan, 2005).

Kushchu (2009) separates the benefits of mobile government in: 1) social/ individual benefits, and 2) government organizations benefits. They are more analytically presented in table 2.3 below.

Table 2-3 Benefits of mobile government services (Kushchu, 2009)

Benefits of Mobile Government Services	
Social/ Individual Benefits	Economic and social welfare
	Information access equality
	Participation in local policies
	Democratic governance
	Transparent governance
	Less bureaucracy
	Ageing well
	Senses of belonging of belonging to a city
Organizational Benefits	Cost reductions
	Efficiencies
	Direct contact with citizens
	Wider reach to citizens
	Inclusive policies
	Transform and modernize business processes

Al-khamayseh and Lawrence (2006) claim that the factors contributing to the spread of mobile government are categorized in three types: a) the Technological factors, b) the Human & Socio-Economic factors, and c) the organizational factors. The variety of the mobile technological choices enables the easy use of the mobile services- from the mobile data transferring to mobile payments. The new generations, on the other hand, are “Digital Natives”- a term used by Prensky (2001) to describe the bondage between the digital technology and the young people since their birth. So, the Governments that would like to attract the young people would need to utilize the mobile services. From the organization’s point of view, a well-prepared plan is needed when it comes to the offering of m-services. Cost/ Benefits analyses are needed, as well as organizational readiness and business process understanding. All the contributors of each of Al-khamayseh and Lawrence (2006) category are analytically presented in table 2.4 below.

Table 2-4 Factors contributing to the spread of mobile government (Al-khamayseh & Lawrence, 2006)

Technological Factors	Technology	Example
	Radio Based	Two Way Radio
	Cellular Phone Based	Mobile Voice
		Short Message Service (SMS)
		Wireless Application Protocol (WAP)
		General Packet Radio Service (GPRS)
		Universal Mobile Telephone Services (3G)
		UMTS
		Code Division Multiple Access (CDMA)
		Enhanced Data for GSM (EDGE)
CDMA2000 1xEV (Evolution)		
I-mode		
Mobile Device Based	Notebook Computer	
	Tablet Computer	
	Personal Digital Assistant (PDA)	
	Bluetooth	
	Global Positioning System (GPS)	
	Pager	

	Network Based	Wireless LAN
		WiFi
		Voice over IP
		Satellite
		Wireless Sensor Networks
Human & Socio-Economic factors	Traveling citizens and mobile workers	
	Many citizens cannot afford to buy computers and subscribe with an Internet service providers ISP to access the internet, while majority can afford to own a mobile device	
	Number of wireless internet users around the globe is exceeding the number of wired internet users	
	Young generation prefer to do everything with the wireless mobile device	
	Demands for efficiency, reduced cost, increased revenue, improved mobile services and better delivery of government services	
Organization Factors	Organization Type	Reasons
	Businesses	Improve business productivity and workforce efficiency
	Government	Instant access to critical information for decision making
		Cost cutting
		Enhance citizen relationship and satisfaction
	Lessen corruption in government	

More researchers have analyzed the benefits of the m- G2C services provision by the municipalities. It is common ground of all such studies that the objectives when adopting such services are at least (Kushchu, 2009):

- To improve business processes in public sector organizations in dealing with domestic issues (improving themselves)
- To serve citizens and businesses better (improving citizens' service).

Based on the literature and keeping the above two separate objectives in mind, this section gathers beneficial reasons of the m-government services implementation from various sources providing an extensive lists for both sides: the municipalities and the citizens. These

lists are presented in tables 2.5 and 2.6. The detailed factors are grouped in representative categories so that the benefits can be clustered using general terminology leaving room for taxonomies creation. These tables are used later on in the second part of this study, which is the empirical approach.

Table 2-5 Benefits of mobile G2C services- The municipality's perspective

Categories	Benefits/ Motives	Sources
Changing work environment	Changing role of staff	Borucki et al., 2005;
	Reducing time demands on staff	Borucki et al., 2005; Heeks & Lallana, 2004; Sandy & McMillan, 2005
Cost saving	Reduce the municipality's employees	Al-khamayseh & Lawrence, 2006; Borucki et al., 2005; Kushchu, 2009
	Reduce the administrative costs	Al-khamayseh & Lawrence, 2006; Kushchu, 2009; Zefferer, 2011
General Efficiency	Making processes more efficient	Al-khamayseh & Lawrence, 2006; Borucki et al., 2005; Carroll, 2006; Heeks & Lallana, 2004; Kushchu, 2009; McMillan, 2009
	Improving the existing processes (faster services for the citizens)	Al-khamayseh & Lawrence, 2006; Zefferer, 2011
	Disseminating information to a large number of people at a very short time (enlarged accessibility & transparency)	Kushchu, 2009; Zefferer, 2011
Improving the image of the municipality	Formulating high standards of the municipality's profile to earn citizens' trust & loyalty	Prensky, 2001
	Impress the foreigners and attract tourists	
	Attract entrepreneurial activities and investments in the area	
	Aiming to co-operations with other municipalities for European development projects/ Giving the infrastructure to attract European projects	

Entrepreneurial activities	Increase non-tax-based revenues	Moon, 2002
	Paid advertising on the mobile	Moon, 2002

Hence, the benefits for the municipalities can be grouped in changing the working demands, cost saving, general efficiency and entrepreneurial activities. Although the factors helping to improve the image of the municipality are not commonly met in the literature, are here included in order to investigate their beneficial character while conducting the empirical research.

Regarding the citizens' benefits, they are summarized in time and cost saving, availability & convenience, and relationship management.

Table 2-6 Benefits of mobile G2C services- The citizens' perspective

Motives	Definitions	Sources
Time Saving	Providing faster access to documents and forms	Kushchu, 2009; McMillan, 2009
	Processing transactions speedily	Borucki et al., 2005; Heeks & Lallana, 2004
	High speed accessibility	Meng et al., 2011
	Reducing citizens' time spent travelling to government offices	Al-khamayseh & Lawrence, 2006; Borucki et al., 2005
	Decrease citizens' queuing time	Al-khamayseh & Lawrence, 2006
	Reaching more information in less time	Zefferer, 2011
	Having a quicker response time to queries	Borucki et al., 2005
Cost Savings	Saving transaction costs	Borucki et al., 2005; Carroll, 2006; Zefferer, 2011
	Saving parking & petrol cost	Al-khamayseh & Lawrence, 2006; Borucki et al., 2005; Carroll, 2006; Zefferer, 2011

	Saving postage costs	Carroll, 2006; Zefferer, 2011
Availability & Convenience	Reducing the number of customer visits to government offices	Meng et al., 2011
	Being user friendly and easy to use	Ishmatova & Obi, 2009
	Easy to find information	Meng et al., 2011
	Convenience and Availability (24/7 from everywhere)	Heeks & Lallana, 2004; McMillan, 2009; Zefferer, 2011
	Making interaction with government less bureaucratic	Kushchu, 2009
	Providing up-to-date information	Sandy & McMillan, 2005
	Keeping citizens informed about the news (& emergency news)	Carroll, 2006; Heeks & Lallana, 2004; Sandy & McMillan, 2005; Zefferer, 2011
	Location awareness	Borucki et al., 2005
Relationship Management	Decreased face-to-face interaction	Borucki et al., 2005; Kushchu, 2009
	Encouraging higher & active participation from citizens	Carroll, 2006; Heeks & Lallana, 2004; Kushchu, 2009
	Communicating in a modern way attracting more and young citizens	Prensky, 2001
	Providing personalized services	Carroll, 2006; Zefferer, 2011
	Keeping citizens' data private	Meng et al., 2011
	Increasing citizen loyalty and encouraging repeat visits	Meng et al., 2011

2.4.3 Challenges

Since 2004, when the concept of mobile government was in its infancy, Kushchu (2004) refers to many types of barriers that impede the actual implementation of m-government including infrastructure development, privacy and security, legal issues, mobile penetration rate, accessibility and compatibility. Almost none of these challenges are overcome through the years; some of them still exist in a higher or lower degree, and some others have been

changed or substituted by new challenges that have risen via the technological and societal evolution.

For example, the citizens' lack of trust in secure payments and private processing of their personal data when giving their credit card is a very commonly used argument not only in the m-government literature, but also in the literature of m-commerce and m-business (Aldosari & King, 2004; Al-khamayseh & Lawrence, 2006; El-Kiki, 2007; Gefen & Straub, 2003; Min et al., 2008; Pavlou, 2003; Suh & Han, 2002; Wei et al., 2009; Zampou et al., 2012; Zefferer, 2011).

The same happens with various legal and regulation issues; Kushchus' (2004) point that many countries around the world have not yet adopted the Law of Fair Information Practices. The non-existence of laws clarifying the rights of citizens and the responsibilities of the data holders (government), recognizing the mobile documents and transactions and accepting online signings are still very contemporary (El-Kiki, 2007; Zefferer, 2011).

The infrastructure issues regarding the equipment, the software and the networks have progressed sufficiently. There are, however, speed limits while accessing the mobile applications or data transfer (Kushchu, 2004), as well as technological restrictions on the mobile devices, new software incompatibilities and lack of standardized interfaces (Al-khamayseh & Lawrence, 2006; Carroll, 2005; Trimi & Sheng, 2008; Zefferer, 2011) giving a slow bent in the curve of the m-government progress. Emphasis has been given by various researchers on the integration and interoperability problems of the new mobile systems with the legacy systems (Kushchu, 2004; El-Kiki, 2007; Trimi & Sheng, 2008; Zefferer, 2011).

The governmental organizations often set obstacles in developing mobile services for the citizens themselves. Not only do they have insufficient sources for the development of a platform/ software/ application (in personnel, know-how and decision-making), but they also lack in a sustainable business model to ensure the regular operation of the services after the end of the project. Business models for the planning and design of multi-channel services are essential to estimate investment and expected result for all stakeholders. They are also critical for indicative governmental "businesses" and public private- partnerships (Peinel et al., 2005). Apart from accurate analysis of return on investment models, governments should consider the added value of the service, which is what the citizen needs. M-government reality is hindered, because governmental organizations fail in

getting the pulse of the era and do not follow a citizen centric strategy (Al-khamayseh & Lawrence, 2006). As Tarek El-Kiki (2007) characteristically says *“the offered service is structured by the goals of the administration, not the goals of the citizen users”*.

It is obvious that the government should be prepared to spend an amount of money before the m-service starts getting deployed. Such services are likely to be cost-addition rather than cost-substitution initiatives for the government (Heeks & Lallana, 2004). Al-khamayseh & Lawrence (2005) say that allocating and raising sufficient funds for the project is one of the important steps in the planning phase towards a successful m-government service. Reduced budgets in public IT services are a problem in times of cutbacks of public expenditures, and hardly any revenue generating projects can be found. El-Kiki (2007) also refers to economical factors as barriers of m-government services. His survey suggests that the high development costs as well as the absence of a uniform model of charge by the telecom operators are preventative parameters for the citizens' mobile services usage.

There are more challenges that citizens should need to overcome in order to embed the mobile services in their interactions with the municipalities. For instance, many individuals are either completely unaware of the mobile technologies use or they are just unfamiliar (El-Kiki, 2007; Kushchu, 2004; Zefferer, 2011). Some others are afraid of the abuse receiving inappropriate and tedious updates and information (Heeks & Lallana, 2004).

The most popular challenges and barriers mentioned in the mobile government literature are gathered in detail in table 1.7 below. They are categorized following up to a point the separation proposed by El-Kiki (2007); he suggests, that the identified barriers by his examined mobile projects can be grouped in social, technical, organizational and governance barriers. In table 2.7 financial factors are also included in the barriers list.

Table 2-7 Barriers of mobile government services

Categories	Barriers	Sources
Behavioral/ Social	Lack of transactions security (e.g. secure payment)	Aldosari & King, 2004; Al-khamayseh & Lawrence, 2006; El-Kiki, 2007; Heeks & Lallana, 2004; Kushchu, 2004; Zefferer, 2011
	Lack of trust in using m-services concerning low privacy	Aldosari & King, 2004; Al-khamayseh & Lawrence, 2006; El-Kiki, 2007; Heeks & Lallana, 2004; Kushchu, 2004; Zefferer, 2011

	Fear of receiving spam messages	Heeks & Lallana, 2004
	Lack of familiarity with mobile technologies/ Lack of awareness	El-Kiki, 2007; Kushchu, 2004; Zefferer, 2011
	Difficulty of citizens in learning how to use m-services	El-Kiki, 2007
Technological	Lack of interoperability and backend process integration	El-Kiki, 2007; Kushchu, 2004; Trimi & Sheng, 2008; Zefferer, 2011
	Lack of mobile technology standards	Al-khamayseh & Lawrence, 2006
	Inconvenient user interface	Al-khamayseh & Lawrence, 2006
	Lack of network connection	Kushchu, 2004
	Low data transfer speed	Kushchu, 2004
	Tech-limitations of mobile devices	Al-khamayseh & Lawrence, 2006; Carroll, 2005; Trimi & Sheng, 2008; Zefferer, 2011
Organizational	Lack of sustainable business models related to m-services	Al-khamayseh & Lawrence, 2006; El-Kiki, 2007; Kushchu, 2004; Peinel et al., 2005
	Reluctant of authorities to alter traditional ways of dealing with citizens (<i>Top Management Commitment</i>)	El-Kiki, 2007
	Lack of managerial innovative decisions for m-services	El-Kiki, 2007
	Lack of infrastructural investments and low budget for m-services	Al-khamayseh & Lawrence, 2005; El-Kiki, 2007; Heeks & Lallana, 2004
	Lack of technical knowledge among IT personnel	El-Kiki, 2007; Zefferer, 2011
	The services are structured by the goals of the administration, not the citizens	Al-khamayseh & Lawrence, 2006; El-Kiki, 2007
	Weakness in reorganizing the work context with the workers (<i>BPR</i>)	Pateli & Philippidou, 2011; Trimi & Sheng, 2008; Zefferer, 2011
Financial	High telecommunication costs	El-Kiki, 2007
	High development costs	El-Kiki, 2007

Governance- Regulation/ Legal	Lack of laws related specifically to the unique aspects of mobile government services	El-Kiki, 2007; Kushchu, 2004; Zefferer, 2011
	Lack of combined m-governance/m-business models	El-Kiki, 2007; Kushchu, 2004; Peinel et al., 2005
	No authorized electronic signature	El-Kiki, 2007; Kushchu, 2004

2.5 Current Practices

This section gives real-life examples from the various sectors where the mobile government services can be applied.

2.5.1 M-Government Sectors

Gouscos et al. (2005), following the general taxonomy of e-government sectors by Seifert and Bonham (2003) regarding G2C services, declare that the most common m-sectors are: health, transport, tourism, commerce, learning, payments, emergency services, voting and local wireless networks for public use (hot-spots). In their research the authors add m-weather and m-welfare on their application areas list and give examples for each of such area.

Kuschchu (2004), similarly, highlights that some of the early adopters of m-government services include law enforcements and fire fighting (Easton, 2002) emergency medical services, education, health and transportation (Zalesak, 2003).

An explanation of the classes where the m-services can be categorized is given by Zeferrer (2011) in his extended report about mobile government. The researcher concludes to the following classification:

- Health: The m-health projects are essential for underdeveloped, developing and developed countries. They are mainly focus on increasing citizens' awareness about serious diseases (e.g. HIV) and contributing with health advice broadcasting via SMS

- Education: The projects using mobile technologies for educational reasons usually help with the advanced communication between students, schools and parents. They can also help with material delivery or with taking exams from distance
- Agriculture: The communication between farmers and consumers can be easier and faster through the mobile channel. The producers, additionally, can receive emergent, critical info (e.g. the weather) in order to save their yield
- Security Alerts and Disaster Management: SMS messages are most commonly used to immediately notify citizens about imminent dangers such as warnings against natural disasters (e.g. tsunamis or storms), as well as warnings against terror attacks. In the aftermath of disasters, the mobile communication is the only solution, while the wired communication lines are often destroyed
- Financial Services: m-Banking is a crucial example of implementing the mobile technologies for financial services. Additionally, mobile payments via SMS are very hot especially in the developed countries, where the states try to improve fees payment. Finally, m-taxes projects have attracted the interest of public in order to accomplish their tax duties via mobile earning time, collecting information easily and avoiding bureaucracy
- Transport: In several European countries, parking fees can be paid using mobile phones and SMS messages. Several public transportation companies offer customers to purchase tickets for public transportation via mobile phones. Again, in most cases SMS is the technology of choice
- Mobile ID and Mobile Signature: Mobile ID and mobile signature are relevant topics especially in Austria, Scandinavia, and the Baltic countries. Several solutions exist in these countries that enable citizens to reliably prove their identity or electronically sign documents using their mobile phone. Secure user authentication based on qualified electronic signatures is especially important for governmental processes on the transactional level. Hence, mobile ID and mobile signature are important enabler technologies for transactional m-Government.

2.5.2 Examples of m-Government Services

Governments in both developed and developing countries make efforts to expand the use of mobile services for citizens' sake exploiting the benefits of mobile and wireless

technologies. Trying to identify the high impact services implemented worldwide, an online search in literature and various relevant electronic sources has taken place. It is found that the implemented projects globally are not infinite.

The mobile Government Consortium International conducted a relevant research for all the European countries (2011). They had 100 entries of governmental mobile services used by the local authorities in their database. It is concluded that the UK, Estonia, Germany and Spain are the leading countries regarding the mG2C services implementation, whereas from a city-level perspective, Tartu and Stockholm are the cities with the more accumulated services (five and four in response). The services refer to various fields as it is shown in figure 2.3 below. Similar results draw various academic sources (Huijnen, 2006; Vincent & Harris, 2008; Mengistu et al., 2009).

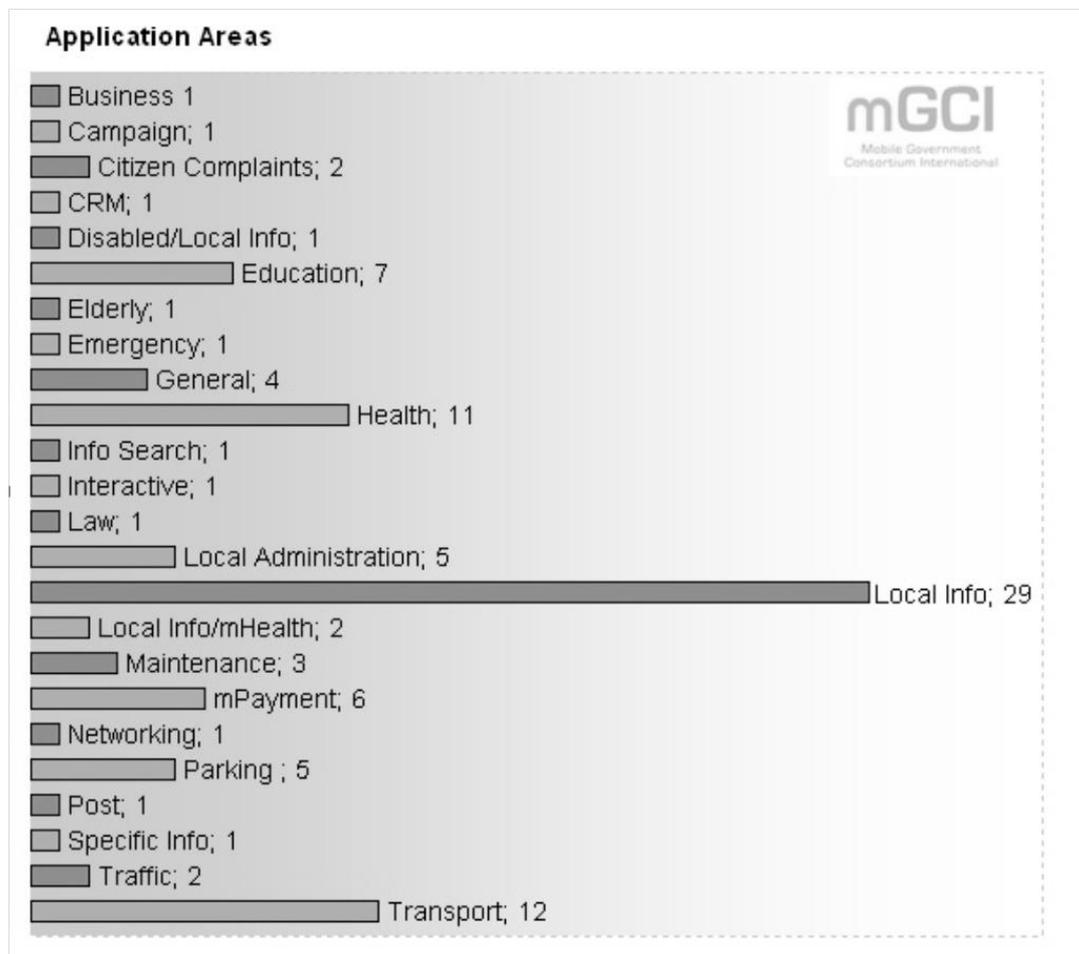


Fig. 2-3 Application areas of m-G2C services in Europe (mGCI, 2011)

Table 2.8 summarizes examples of implemented mobile G2C services globally. The examples are firstly chosen based on their popularity (the frequency they are met in

literature, studies reports and white papers or the frequency they are cited in such documents). Secondly, they are chosen as representative examples in order to cover as many fields the services can be applied and add value as possible. In table 2.8 the services are grouped based on these application fields. A short description of the services' way of function, the used technology and the country/ city that delivers each service are mentioned in separate columns of the table complementing the mobile services' presentation.

Table 2-8 Examples of implemented m-G2C services worldwide

Type of Function/ Sector	Name of Service	Description	City/ Country	Technology	Source
health	Simpill	A service about a sophisticated pill container that automatically delivers an SMS to a central server instance when being opened. If no SMS is received, a text message with a reminder notification is sent to the patient or to the patient's family	various countries	SMS	Simpill, 2008
	Ask Brook	It provides free and confidential information on topics related to sexual health in UK. After sending a text message with a defined content to a certain phone number, senders immediately receive information regarding sexual health services in their area. Furthermore, standardized responses to questions about pregnancy, contraception, and similar topics can be selected	UK	SMS	Brook for young people
	Text4Baby	It is a maternal health. It aims to provide young mothers with relevant information by SMS. Informative text messages such as reminders to get flu shots are sent three times a week before the birth. After the birth, further reminders about vaccinations and similar issues are sent frequently	USA	SMS	Text4Baby
	HealthyToys	People can send a text message with the text 'healthytoys' followed by the name of the toy to a predefined number. Hence, the sender can verify whether the particular toy contains toxic chemicals or not	USA	SMS	Zeferrer, 2011
	HIV Infoline	People can send an SMS with the text 'HIV' and their home town to a predefined phone number. An automatic service then responds with locations of near HIV testing centers	South Africa	SMS	Zeferrer, 2011
a)m-ticketing/ m-transport	Tartu mCity	A multi-function service that includes: a) tickets for public transport can now be purchased using mobile technologies, thanks to a co-operation with all three Estonian mobile	Tartu, Estonia	SMS	Mobi Solutions Ltd., 2010

& b) emergency & c) education		operators. b) m- neighborhood watch. In case of events and issues such as missing persons, in which many eyes are required, the police control center sends out SMS notification to taxi drivers, bus drivers, and other companies and individuals participating in this project c) public library uses SMS notifications to inform customers about the availability of books and other media. People in waiting lists are notified immediately as soon as the book they want to borrow becomes available			
a)emergency & b)education	USE-ME.GOV	An open service platform that can be shared by networked authorities and institutions on a regional scale. The project has run as pilot services for four cities offering different usabilities. For instance, in Bologna the "City Information Broadcasting" part of the project offers up-to-date information in domains the citizens have chosen themselves. In Bandajoz, Spain, parents can receive info from school about their children	Bologna, Italy & Bandajoz, Spain & Gydnia, Poland & Vila Nova de Cerveira, Portugal	SMS	Abramowicz et al., 2005; IOS Press, 2005
emergency	SMS security alerts	In London, UK, businesses can register at a SMS service offered by London's Metropolitan police. For instance, in case of incoming bomb alerts or similar security threats, registered businesses are informed and warned immediately by SMS	London, UK	SMS	Zeferrer, 2011
	Disaster alert system	It is a SMS-based disaster alert system allowing the broadcast of text messages to all mobile phones in one GSM cell and has been used in parallel to other warning systems such as sirens and broadcast messages on radio and television	Netherlands	SMS	CNN.com
	Flood warnings	Venetians frequently suffer from floods in the city of Venice. Therefore, the city government has launched an SMS-based service that informs citizens when high tides are to be expected	Venice, Italy	SMS	User First Web, 2008
citizen complaints/ communication	BuitenBeter	A smartphone app for iPhone and Android smartphones that offers a direct communication channel between citizens and local governments. Issues in the public space such as destroyed or malfunctioning	Netherlands	Mob App	BuitenBeter

		infrastructure components can be easily reported by citizens using BuitenBeter			
agriculture	Agroportal	Agroportal aims to supply its target group with recent related news, frequently asked questions, and a list of useful links. It generally helps with the communication between the farmers and the authorities	Athens, Greece	Mob Browser	Ntaliani et al., 2008
	Collecting & Exchange of Local Agricultural Content	SMS messages with valuable farming tips and related information about growing lucrative export crops can be sent out. The exchange of information between farmers in Uganda shall also help them to specialize in new and potentially more lucrative ventures	Uganda	SMS	Zeferrer, 2011
education	Mobile Examinations	It is a mobile exam system. The system allows students to answer questions through a mobile phone. The questions are automatically generated and asked by a so called robot, which saves time for teachers and allows for efficient examination processes	New Zealand	Mob Browser	BBC News
finance (m-taxes, m-ticketing, m-parking)	mHITS	the mHITS micropayment service enables citizens to transfer money using their mobile phones. The transaction process itself is based on SMS messages that are interchanged between mobile phones and hence allow for direct person-to-person payments. It can also be used to buy goods from online merchants and to pay parking fees or taxi fares. In general, mHITS based transactions are possible between individual users, users and POS merchants, and between users and online merchants	Australia	SMS	mHits
	PAYBIR	This service allows citizens to pay their taxes through mobile phones. Initially being developed for business registrations, the service has later been extended to cover a broader set of taxes. PAYBIR makes use of G-Cash technology, a micro payment service that turns a mobile phone into a virtual wallet	Philippines	GCash (use of SMS)	Cellphonesetc; Globe
	Tax Return	Norwegians receive a prefilled tax form every year per post. In many cases, this tax form is returned unchanged. The SMS based service allows Norwegians to notify the responsible administrative agency if	Norway & Sweden	SMS	Textually.org, 2003; We make money, 2004

		there are no changes to be applied to the prefilled form			
	Mobile Tickets	<p>In Spain, mobile tickets are received with and stored on mobile phones. The ticket price is charged from the customer's phone bill or deducted from a pre-paid phone card.</p> <p>In Austria, train tickets can also be bought by mobile phone (ÖBB). The ticket is sent to and directly stored on the mobile device.</p> <p>These are only two examples for countries where m-ticketing has been applied successfully. Other countries do so as well</p>	Austria & Malaga, Spain	SMS	MMA; ÖBB
	Mobile parking fee payment system	Several cities in Europe offer their citizens mobile parking fee payment systems. These systems enable car drivers to pay for parking simply by sending an SMS	Austria & Estonia & Sweden & Trikala, Greece	SMS	HandyParken, 2012; Mobi Solutions, 2010; Trimi & Sheng, 2008; e-Trikala
tourism	BlueTo	A location based m-Government service based on Bluetooth technology has been established to provide citizens and tourists with information related to their current location. In total, three applications have been developed that are accessible to users at different locations. For instance, the 'Welcome Application' is an introductory tourist guide for visitors of Torino	Torino, Italy	Bluetooth & Mob App	Carcillo et al., 2006
information	Job Acquisition	In the city of Stockholm, Sweden, a SMS based system has been set up to acquire temporary workers. Whenever a temporary worker is needed, SMS messages are sent out to registered will-work-temps. The one who answers first acquires the job	Sweden	SMS	The Postdam eGovernment Competence Center, 2004
	Government of Canada Wireless Portal	Canada offers a portal for several mobile services that has been developed in the 'Government of Canada Wireless Portal' project. Service and information currently available include border wait times, Canadian company capabilities, a currency converter, current exchange rates, and many more	Canada	Mob Browser	Government of Canada
m-coupons/	World Food	The World Food Program has launched a mobile phone based pilot	Syria	SMS	m-GovWorld

m-donation	Program	project to distribute food to Iraqi refugees living in Syria. Text messages containing so called virtual vouchers have been sent to refugees. These vouchers can be used to obtain food such as cheese and eggs, usually not being included in conventional aid baskets			
	Donation	By sending a SMS with a predefined key word to a given number, customers were enabled to easily make a donation of \$5.00. In the US an SMS based donation system has been established in the aftermath of Hurricane Katrina by the Wireless Foundation and the American Red Cross. Similar systems in other countries facilitate the process of making donations during humanitarian relief campaigns significantly	various countries	SMS	Text Messaging as a Violence-Prevention Tool
m-banking	m-Pesa	It is a mobile phone based noncash money transfer system for people with low income, who cannot afford their own bank account, or for those who have no access to financial infrastructures. For each m-Pesa user, a virtual account is electronically maintained. So called m-Pesa agents act as interface between users and their accounts. Agents are for instance supermarkets or gas stations and allow users to deposit or withdraw money from their virtual account. Furthermore, m-Pesa enables its users to transfer money to other users, to pay bills, and to purchase prepaid airtime. Transactions are basically carried out by exchanging SMS messages between users or between users and agents	Kenya	SMS	Saraficom

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Chapter 3.

Public Services of Municipalities: The standardized Reality in Greece

As long as there are no standardized guidelines for the m-services that a municipality should provide to the citizens, there is high motivation for the author to take the initiative and gather all possible municipal mobile G2C services. Such services are collected using suggestions from theoretical sources, as well as successful implemented examples. Additionally, traditional and electronic G2C services offered by the local authorities are used to inspire for possible services that could be extended and be provided via mobile.

The collected services are intended to be organized and classified into a typology based on their type of function, which is planned to be used in the rest of the research while constructing a theoretical framework as a business development tool in the municipalities. Finally, the gathered mobile services are examined with regard to their adoption degree by the Greek municipalities. In specific, based on the proposed typology of the services, this chapter depicts the reality in Greek municipalities regarding the availability and provision of m-G2C services.

The reason to conduct such research is twofold. First of all, the proposition of a complete list of the mobile services determines the concept of the mobile government; the mobile government theory specialized on a municipal level is incomplete without specifying the mobile services possibilities or alternatives. Furthermore, a standardized typology of the mobile services with regard to their types of function is the first step when talking about strategic frameworks of municipal mobile development. A framework about how to implement mobile services would have no value, if there was no awareness of which the mobile services are. The existence of a services' typology, apart from its contribution to the inadequate literature sources about the mobile G2C services, has fundamental importance for accomplishing the rest of the goals of this dissertation; knowing what the possible services are and the needs they can cover is essential for further researching of why and how the services can be implemented.

On the other hand, examining the current situation by checking out the mobile services that are already provided by the municipalities could test the proposed typology. Such investigation could enrich the typology with new services or detest the classification. Looking at the bigger picture, though, examining the provision of mobile services by today's municipalities, even limited to a specific country (Greece), could verify the need of a strategic framework, and, hence, the need of this thesis. The reality could contradict the existence of scarce literature about m-G2C services and prove that the mobile development of the municipalities is fully organized. In any case, mapping the current situation in Greece could have valued contribution to the international literature of mobile government providing data for its adoption and comparative information for cross-country and cross-cultural studies.

Apart from contributions to theory, investigating what is provided by the Greek municipalities could have great contributions to practice. Entrepreneurs and stakeholders in the mobile industry interested in emerging the public sector would have valuable data about the missing services in demand.

3.1 The Evolution of Municipality Services

3.1.1 *Traditional Services*

The Greek municipalities are in charge of providing very specific services to its citizens (G2C services). These services are clearly defined by the Greek law (Law No 3463, article 75, 8-6-2006), which describes the obligations of the cities authorities towards the citizens. For example, the law describes the obligation of the authorities to be in charge of roads and public building constructions, of citizens' records management (marriage licenses, birth registrations, etc.), of kindergartens' smooth functioning, and of hearing the citizens' demands (via complaint forms and letters).

After 2011 elections of the local authorities, many Greek municipalities are emerged. This leads to way fewer in number municipalities (around 325), but bigger in geographical areas and stronger in economical power. Their obligations towards the public remain the same, but enriched with more responsibilities. There is a recent part of the law (No 3852, article

94, 7-6-2010) adding more concrete duties to the municipalities regarding mainly the environmental conditions of their citizens.

3.1.2 Electronic Services

The EC has developed and published a list of 12 online public services for citizens constituting a basis of benchmarking the progress of the EU member states in the sector of e-government. The level of progress of the public services is measured in 5 stages. More specifically, according to Capgemini (2007):

- On the **1st stage** (information) the government provides only informative material about a service transaction
- On the **2nd stage** (one-way interaction), apart from information, users can download official documents, whereas
- On the 3rd stage (two-way interaction) online forms for completion and emailing are also provided. Furthermore,
- The **4th stage** supports functions which allow the user to complete the financial part of the service (transactions) and, finally,
- the **5th stage** comprises the proactive service delivery, meaning that the governmental service provider pro-actively performs actions to enhance the quality of the service (personalization).

On a national level, there is an official decision by the Minister of Internal Issues (FEK B 2147/26-9-11) stating that all the Greek municipalities are obliged to own and manage a website. This part of law sets rules regarding organizational issues such as the responsibility of the site's content or restrictions about the domain names. As far as the e-services are concerned, it is only demanded that every municipality should provide services at least of 1st level (informational).

The Greek Central Association of Municipalities and Communities (KEDKE, 2011) initiates a typology of 18 e-G2C services. The proposed services and their definitions are presented in Table 3.1. Kalogirou et al. (2006) have, also, attempted to gather in an organized way the electronic services that the municipalities should provide. Their report analyzes further each of the 18 service types in table 3.1.

Table 3-1 Definitions of municipal e-G2C services (KEDKE, 2011)

Services	Definition
1.Payment of Taxes – Fees – Fines	Payment via Web Banking/ (No) Debt - arrears certificates
2. Job Searching Services	Demand - offer job announcements/ Job search with specific criteria
3.Reg./Modification/Deletion of Personal Data	Data management in municipal records, civil & male registry
4.Certificates Issuing	Application for certificates issuing/ request application status
5.Certificates& Permissions of Building topics	Issuing of certificates & permissions about building topics
6.Training and Vocational Education Services	Adults and special population groups' education programs/ borrowing books from the public library
7.Health-related and Social Care Services	Registration to municipal kindergartens and camps, appointments for health services, etc.
8.Public Transport and Road Services	Parking cards, purchase of season cards for public transport, etc.
9.Environmental, Lighting, Cleaning and Recycling Services	Household waste or recycling bins/ street lighting installation, etc.
10.Sports, Culture, and Entertainment Services	Online tickets purchase/ book, cultural/ entertainment activities etc.
11. Entrepreneurship and Local Development Services	Information on entrepreneurship, local development and job searching issues
12. Cemetery Services	Concession (of a family tomb, ossuaries space and exhumation, etc.
13. Water Supply and Sewerage Services	Connection to water supply and sewer network, applications for troubleshooting
14. Foreigner Services	Acquisition of nationality/ citizenship and residence permission
15. Requests / Complaints	Requests/ proposals submission, complaints regarding omissions and erroneous municipality actions
16. Electoral Catalogues Searching	Location of citizens' polling place
17. Municipal Council's Decisions Searching	Access to the decisions of the municipal council
18. General Information Services	General information searching

There has been a recent attempt to measure the impact of the electronic services provided by the Greek municipalities to both individual citizens and entrepreneurs (Kalogirou et al., 2012). The statistics showed that 24% of the individual adopters of e-government services use a big portion of the e-services provided by the municipalities; the rest of the users are specifically interested in services regarding the tax office (37%). On the other hand, 55% of the sample is not even aware of the available e-services. The numbers regarding the entrepreneurs participated in the survey are quite similar.

Greek municipalities in turn, have been also recently investigated about their ICT Capacity Building (Kalogirou et al., 2011). The results regarding the e-services provided are reported in association with the municipalities human resources, infrastructure and funding.

3.1.3 Mobile Services

Regarding the m-government services there is no standardized typology suggested by official organizations, either Greek or international. As presented in chapter 2 above, there have been only few researches about governmental mobile services, limited to describing various examples and case studies of services, analyzing their pro and cons, attempting to propose ways of classifications, or measuring the citizens' acceptance in restricted geographical points. There is a literature gap, however, in suggesting typologies of municipal mobile services, in providing standards and planning frameworks of what and how to implement, and in picturing the adoption degree of such services by current municipalities.

The next section attempts to collect, organize and classify possible municipal mobile services in order to propose a complete typology of the mobile services based on their type of function. Then, there is an attempt to apply this theoretical typology in municipalities' offered services (limited to the Greek municipalities) and formulate results reflecting the current situation regarding the mobile services adoption reality in Greece.

3.2 Proposed typology of mobile G2C Services

In order to reach the point of proposing a typology of the municipal mobile G2C services, the first step is to search among the relevant scientific and academic sources. Such sources

are carefully gathered after searching among databases with scientific recognition worldwide (Google Scholar, Scopus, Elsevier, IEEE Xplore, Science Direct and Business Source Complete) with keywords such as "mobile services in municipalities", "mobile government services", "smart city services", etc. The returned results are filtered and chosen to be studied under the conditions they are:

- written in English
- peer-reviewed journal articles by authoritative publishers
- peer-reviewed papers of authoritative conferences published in proceedings
- published researches by authoritative corporations (e.g. Capgemini, the Forrester Group, etc.)
- white papers by governmental organization with an international presence and influence.

Particular emphasis has been given to sources about researches and mentions to the Greek situation. Specifically, there is a limited number of studies about the governmental m-services. In particular, Kapogiannis (2004) examines the reasons why m-services are required in businesses and points out m-Taxis as the most useful m-service to be implemented helping Greeks to deal with their taxes through mobile. According to Karadimas & Papantoniou (2008) and Ntaliani et al. (2008) m-government in Greece is still in its infancy and they propose some additional future m-services that could improve the governmental organization and citizens' satisfaction; such services are mobile transport ticketing, m-parking and sending time critical notifications. Vrechopoulos (2009), finally, writes about factors predicting the m-services adoption by the Greek citizens.

Capgemini (2007) distinguishes the public services by activities and suggests the following clusters that could also apply to mobile services:

- income generating: taxes, social contributions, VAT, customs
- registration: car, company, certificates, moving, statistical data
- returns: health, libraries, procurement, policing, job search, benefits
- permits and licences: building, passport, education, environment.

Having taken into consideration the suggested services by the above literature, the next step to enrich the mobile services list and the proposed typology is to collect all the

traditional and online services that are meaningful to be additionally conducted via the mobile channel. Hence, the e-government services found in official documents and academic studies (as they are analyzed above) are examined with regard to their potential extension to mobile services (Exarchou et al., 2012). As a final step, examples of innovative mobile services that have already been implemented worldwide (case studies and best practices) are also included on this list.

The m-services are finally grouped based on the type of their function trying to keep consistency with the suggested clusters of services as proposed in the literature (e.g. Capgemini, 2007), as well as with the main traditional service categories under the municipalities responsibility as defined by the Greek law.

Table 3.2 summarizes the final m-G2C services proposed, classified based on their type of function. This typology is going to be used from further on in this study for the research and the results analysis.

Table 3-2 Typology: Mobile services under investigation

Type of Function	Service Type	Type of Function	Service Type
Information Dissemination	Time critical public information (traffic & road info, police info, earthquakes & floods)	Issuing papers	Sending signed personalized verifications (personal or family credentials & certifications, construct licences, permanent residency permit etc.)
	News (changes in buildings, employees, new services, new infrastructure)	Wireless Access	Wi-Fi Spots
	Process stages about the citizens' requests & evaluation of time of completion		WiMAX -free internet access all over the city
	Where, how and what are the necessary papers for submitting an application, registration, request, etc.	Traffic	Parking payment (payment method based on the time someone has been parked)
	New Job positions (esp. in the public/ municipality sector)		Parking places information (nearest parking, availability, cost, etc.)
	Minutes & decisions of local authorities' councils		Mobile transport ticketing (buy bus, train, metro)
	News & events regarding schools, libraries and training programs (for children or adults)		Updates about bus/ metro/ train routes/ delays & costs, etc.
	Broadcasting about the formulation of voluntary teams (for lifeguards, firefighters, planting)		Tracking of the public vehicles (fleet management)
	Participation in local events/ competitions/ projects (under request)	Forums	Local Social Network (for information, m-participation in dialogues, commenting on news/ events/actions/ opinions)
	Businesses' and citizens' informing about price lists, invoices breakdown (under request)		Participation in established, well-known social networks and forums

Payments	Traffic fines	Tourism	Guiding the travelers around monuments, museums, visiting places of the area/city
	Council Tax		Providing maps & information about the POI of the city (how to go to restaurants, cinemas, banks, pharmacies, petrol station, etc.)
	Tickets for sports & cultural activities/ manifestations of the municipality	GIS	Data Management System regarding the digital mapping of the geographical area helping out the constructions, measurements of plots, engineering and geology projects, etc.
Applying Submissions/ Statements	Participating in local social, educational, cultural and sports teams	Promotion	Accepting advertisements/banners in the m-applications, m-browsers, etc.
	Complaints/ Suggestions		Advertising the municipalities events/ actions, etc. through the mobile channel
	Certificates (birth certificate, marital status, etc.) & Licenses & Permits (getting married, permanent residence)		
	Updating data/ deleting/ registering in the citizens' records		
	Registrations (in the kinder garden, parking permission, etc.)		
	Lawsuit of a robbery, incident, etc. to the police		
	Vital constructing provisions of the municipalities' organizations (electricity, water and drainage supply)		

3.3 Mapping the m-G2C Services in the Greek Municipalities

This section presents an investigation conducted in all the Greek municipalities regarding the mobile G2C services they provide. Explanations about the methodology of collecting the data, as well as a presentation of the results are available on paragraph 3.3.1. Paragraph 3.3.2 discusses the results and draws final conclusions about the current situation in Greece.

3.3.1 Examining the existing m-G2C services in the Greek Municipalities

In order to reach the point of having an exhaustive list with the m-G2C services provided by the Greek municipalities, there should be an assiduous research to all the municipalities' websites examining the offered mobile services.

The website of the Ministry of Interior² provides a catalogue with all the Greek municipalities (325 in total) and their official websites. The author borrowed the addresses to visit the websites. Unfortunately, there are many inaccuracies with these links; either a few websites are out of function and under construction (12 in total) or there are two entries as official websites for the same municipality. In such cases, the research conducted via phone call. The IT headers provided information through the phone regarding possible existence of mobile services and details about their functional nature. The research last from September 2012 to November 2012.

The official websites in function are thoroughly visited searching for possible mobile services of any technology (Wi-Fi, SMS, mobile application, etc.) and any type function. The research gave that many municipalities (51) are found to provide Wi-Fi access in various and multiple spots around their areas. Putting out the wireless access services, however, there are only nineteen municipalities providing mobile services other than the Wi-Fi spots.

If any of the nineteen municipalities provide inadequate information online about the mobile services, the researcher contacted the municipalities' person in charge collecting further details about the way the m-services operate and about their functional cost.

² <http://www.ypes.gr/en/Regions/>

Table 3.3 below shows the nineteen municipalities that offer mobile services. The m-services are presented with their name, the type of function they offer, the technology they use, their cost and a short description of their operation.

Table 3-3 Mobile services provided by the Greek municipalities

Municipality	Service Name	Section/ Type of Function	Technology Used	Cost	Description
1. Thessaloniki	"Municipality of Thessaloniki"	GIS/ Tourism	Mobile Application (iOS & Android)	Free Download	Digital map of the city, with POIs and navigation towards city addresses. The citizens can retrieve city information from a database.
2. Thermi	"Veltiwnw tin poli mou"	Information Dissemination & Submitting requests/complaints	Mobile Application (Android)	Free Download	The citizens can upload a specific requests or complaint regarding the municipal area (broken lamp, bad street condition, etc.). A digital map is provided and the citizens can upload a photo on a specific spot of the map relative to their complaint/request. The users can have information about the process of their requests and, also, comment on others requests.
3. Ioannitwn	"SMS Info"	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code asking for getting back on his mobile specific information (night hospitals, current events, etc.). He can also send a complaint.
4. Kifissia	"Kifissia"	Information Dissemination	Mobile Application (iOS)	Free Download	The application provides useful information about the municipality, the services, the schools, news, etc. It's like a mobile portal. Using GPS, the application can also navigate somebody to a specific POI.
5. Elefsina	"ERMIS"	Information Dissemination	SMS (only Vodafone)	Free	The citizens can send SMS to 1325 (Vodafone code) and get back the latest results of the measurement of the electromagnetic radiation in the area.
6. Milos	"Milos Travel Guide"	Tourism	Mobile Application (iOS & Android)	Free Download	The user has access to tourism information (beaches, food places, accommodation, etc.)

7. Volos	"Volos Tourist Guide"	Tourism	Mobile Application (iOS)	Free Download	The user has access to tourism information (beaches, excursions, food places, accommodation, etc.). Additionally, using GPS the application can navigate the user to a specific POI. Finally, there is share possibility of the information to the social networks.
8. Acharnwn-Asterousiwn	"Request Process Tracking"	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) asking for getting back on his mobile information about his request's stage of process. Additionally, the citizens can optionally leave their phone numbers and receive massive informative SMSs about general cultural, educational, etc. issues.
9. Heraklion	"SMS Notifications"	Information Dissemination	SMS	Free	The municipality sends SMS notifications to the citizens informing them that their requests are complete and ready to be collected.
10. Ierapetra	"Electronic Information"	Information Dissemination	SMS	Free	The citizen has the option to receive SMS informative messages about general cultural, educational, etc. issues.
11. Sitia	"SMS Requirements"	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his request by texting to the same code.
12. Milopotamos	"SMS Requests"	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his

					request by texting to the same code.
13. Rethymno	“Mobile Map Guide”	GIS/ Tourism	Mobile Application (compatible with Java-MIDP 2.0-CLDC-1.1 platform)	Free	Digital map of the city and the around area and POIs. GPS can show the current position (but not navigate so far)
	“SMS Requests”	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his request by texting to the same code.
14. Kissamos	“SMS Requests”	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his request by texting to the same code.
15. Platanias	“SMS Requests”	Information Dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his request by texting to the same code.
16. Chania	“SMS Requests”	Information dissemination & Submitting requests/complaints	SMS	0,25 €/ SMS (+taxes)	The citizen can send an SMS to a specific code (54260) complaining or requesting something. When the request is complete, the municipality informs the applicant through SMS. Meanwhile, the applicant has the option to check the processing stage of his

					request by texting to the same code.
17. Gortinia	“Discover Gortynia”	Tourism	Mobile Application (Android)	Free Download	The user has access to tourism information (excursions, food places, accommodation, etc.)
18. Agrinio	“mobiPARK”	Traffic/ Parking	SMS	0,1071 € / SMS	It’s a system charging for the parking time. The drivers buy a pre-paid parking card (10 €) and then they can send SMS with the time of parking their car (with the card number, the car number and the parking place) and another SMS with the time taking the car. Hence, they are charged for this duration.
19. Trikala	“Xenagos”	Tourism	PDA application	Free	It is a touristic platform providing tourist information and information related to any event or activity taking place within the city. The most important aspect of this project is that, the Municipality of Trikala has the opportunity to provide tourists with special PDA’s connected to the Municipal free Wi-Fi network, downloading all the information requested. The pilot project is already running and the platform is constantly updated.
	“GIS”	GIS	Mobile Browser	Free	Digital map of the city.
	“Citizen’s Information”	Information Dissemination (from the water supply organization)	SMS	Free	The water supply organization of the municipality informs the citizens about future water supply interruptions or relative information
	“mobiPARK”	Traffic/ Parking	SMS	0,1071 € / SMS	It’s a system charging for the parking time. The drivers buy a pre-paid parking card (10 €) and then they can send SMS with the time of parking their car (with the card number, the car number and the parking place) and another SMS with the time taking

					the car. Hence, they are charged for this duration. (OUT OF FUNCTION since 2010)
	"e-Care Health Center"	Health	Special Devices sending data either through Internet, GPRS or Bluetooth	(no value)	Tele monitoring services are provided to individual citizens with Chronic diseases: Individuals are equipped with light-weight handheld devices and record their vital signs at home which are then transferred (via the Telehealth center) to the municipality hospital over internet or GPRS and Bluetooth for review and feedback by the doctors. The project started in 2007 and is funded by the 3th Community Framework Support. It is conducted in cooperation with the Medical school of AUTH and Dept of BA of UOM.

3.3.2 Discussion & Conclusions

The Greek municipalities have been examined regarding the mobile G2C services they provide. The municipalities are 325 in total and all their websites have been visited searching for interesting information regarding the mobile services. The websites of 12 municipalities (3,6 %) are out of function or under construction until November 2012, when the examination ended. Telephone contact showed that obviously the municipalities, which do not even have a fully functional website, do not provide any mobile service.

The explorative study has given that:

- 51 out of 325 municipalities have established Wi-Fi networks and, in many cases, even at more than one spots around their municipality areas. That gives 16,3 % of the municipalities, whereas
- Excluding the Wi-Fi networks, only 19 municipalities (5,8 %) provide mobile services to the citizens. Only two of them (Rethymno and Trikala) provide more than one m-service
- The total number of services provided by all Greek municipalities is 24.

Taking into consideration the typology proposed in paragraph 3.3.1, the 24 available m-services are assigned to the cluster of the type of function they match. The results are presented on figure 3.1 below.

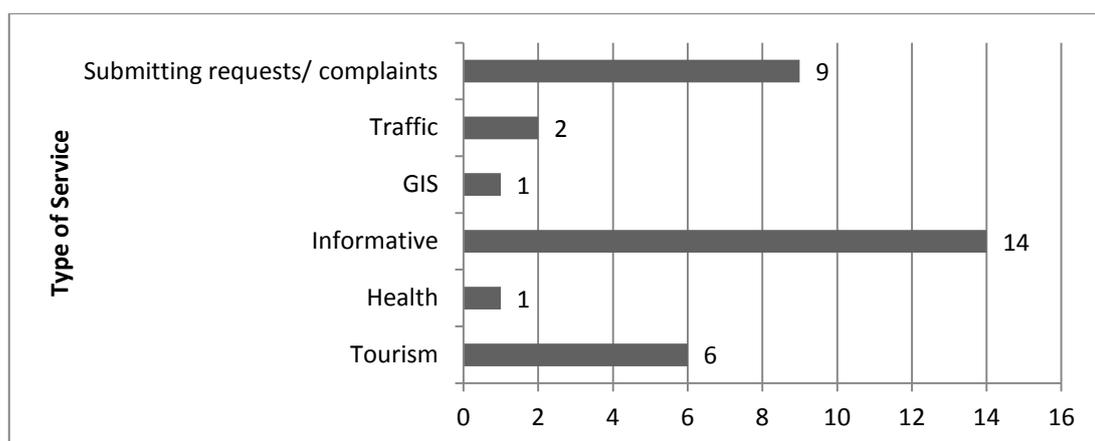


Fig. 3-1 Type of function of the available m-services in Greece

In some cases, the services could be assigned to two groups. For instance, a mobile application, which provides tourism services including digital map of an area, and, hence, using GIS services, could belong to both tourism and GIS categories. The author, however, follows the convention that purely GIS services should be separated by the services, which use GIS technology as a mediator to build an enriched service intending to propose different value (e.g. help the travelers). So, the GIS group includes only services that satisfy only GIS needs and nothing further; the enriched service in that case is assigned to the tourism services group. Some other services, however, can be used for two different purposes supporting multiple functions; for example, the same service can be used by the citizen for both submitting requests/ complaints and for receiving information sent by the local authorities. In such cases, the m-services are assigned to two or more categories.

As it is obvious from the figure (3.1), most of the services support the information dissemination by the local authorities (14/ 24) and the complaints/requests submission by the citizens (9/24). Furthermore, a quite popular m-services function is the cluster of tourism (6/24). Distinguishing further the informative services following the m-services' typology, the most commonly met kinds of information disseminated through the services are:

- Information about the process stage of the citizens' requests, e.g. "the request is complete" (10 services out of 14).
- Time critical public information (e.g. interruption of the water supply next morning and measurements about electromagnetic radiation in the area) (1 out of 14).
- Information about local events (cultural, educational, etc.) and local news of general interest (2 out of 14).

It would be interesting to keep track on the mobile technology used by the m-services. It is easily to notice that the most popular channel up today is the usage of SMS (14 out of 24 services), whereas the mobile applications start to aggressively appear among the newer services (7 out of 24 services). The graphical representation of the results regarding the used technology for the services implementation is available at figure 3.2 below.

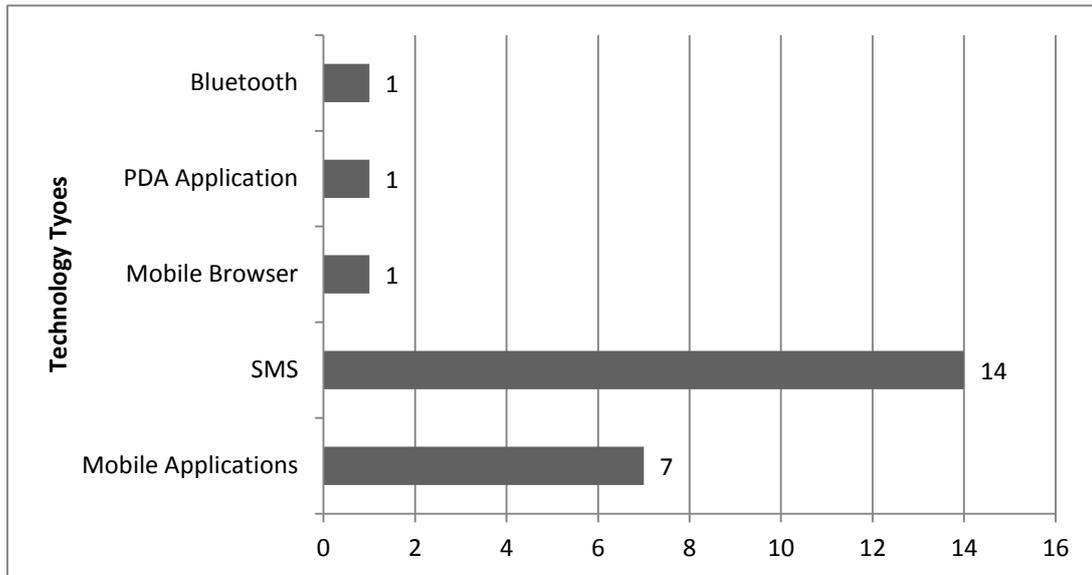


Fig. 3-2 Type of technology used by the m-services

Trying to relate type of function and type of technology, it is noteworthy that the tourism services are all provided through mobile application (5 for smartphones and 1 for PDA), whereas the majority of the informative information and the complaints submission is mostly conducted via SMS (there is only one exceptional case, where the citizens can submit requests and complaints through a mobile application built for smartphones).

It is quite disappointing the fact that the “mobiPARK” service in Trikala has already been out of function since two years ago. Similarly, the same service in Agrinio is in discussion whether it is going to continue or not (such information are known after the interview conducted for the case studies purposes described in chapters 6 and 7). Unfortunately, citizens have not been widely using it.

Additionally, the phone contact with many municipalities and many of their secondary data lead to the conclusion that many other attempts for mobile services implementation have been noticed. Such attempts by various municipalities (e.g. Lesvos, Salamina, Metsovo) cannot be mentioned herein, because they still remain unofficial and unfinished projects. It seems that some platforms and applications have been built but never used (Ferraio, 2013); this possibly happened due to inadequate employees, maintenance problems and cost miscalculations.

As a general conclusion of the whole m-services mapping procedure in Greece, somebody could remark that the mobile services are not widely adopted. The interest towards the Wi-

Fi spots establishment, is quite encouraging, but the percentage of the municipalities offering other type of mobile solutions (excluding the Wi-Fi networks) is too low (5,8 %) and might be even lower, if services stop being up and running. It seems that there is concern towards the mobile development and evolution of the services. There is, however, only spasmodic attitude towards the mobile direction; there are implemented m-services with no consistency on a national level and based on jerky initiatives of the local authorities in each municipality separately. No standardized patterns or plans seem to have been followed so far. This situation verifies the necessity of further research towards a unified business model and common strategic dimensions that could be followed as a tool for a safe future development of mobile government on municipalities' level.

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Chapter 4.

Literature Review of Business Models: Dimensions for Mobile G2C Services

This chapter describes the concept of business models elaborating on their suitability for the mobile sector. More specifically, emphasis is given on the mobile business models concepts that could be applied by the municipalities in order to deliver successful mobile G2C services projects. In order to cover the topic, the chapter tries to answer the following questions:

- a) The need of the business model concepts prior to implementation of mobile services by the local authorities
- b) The modeling principles of business models; i.e. what guidelines organizations need to draw upon when modeling their business models, what is typical in business models, and which features are included
- c) The modeling principles of mobile business services; i.e. what are the specific needs when designing a mobile service and how the business model components change when it comes to mobile
- d) The modeling elements of mobile government services; i.e. what the attributes of governmental organizations are regarding business model dimensions and how they can be integrated into a mobile service development framework.

4.1 The Need of a Unified Business Model Framework for the Mobile G2C Services Design

The business model is fundamental to any business organization (Magretta, 2002), because business models provide powerful ways to understand, analyze, communicate, and manage strategic-oriented choices (Pateli & Giaglis, 2004; Shafer et al., 2005; Osterwalder et al., 2005) amongst business and technology stakeholders (Gordijn & Akkermans, 2001). From an information technology point of view, the concept is quite important as it supplies the design of information systems supporting an organization's business model and its products

and services (Eriksson & Penker, 2000). Consequently, no organization can afford “fuzzy thinking” about this concept (Magretta, 2002) including the governmental organizations.

Regardless of the increased interest by the researchers, there are still scarce sources integrating the ideas of business models into the design strategies of mobile services by the municipalities. This is quite rational, because, as Al-Debei (2010) first said, the BM concept is deemed immature and needs further exploration, because:

- a) The BM concept has only recently appeared frequently in scholarly reviewed journals (see Osterwalder et al., 2005)
- b) It is hard to combine and embed influences from multiple sectors, such as strategy, information systems, business administration, mobile commerce and mobile business, economics and technology
- c) The mobile government sector, within which the BM concept is being investigating, is quite new. New technological ventures and their particular specifications/ characteristics are still under examination. Additionally, their rapid evolution through time justifies the lack of governmental frameworks and models, while developing mobile services.

Municipalities’ lack in designing frameworks adds value to building a viable, unified and sustainable model research. Al-khamayseh & Lawrence (2006) highlight the need for project plan that starts with a vision, which should encompass the citizens’ concerns. The governments should, also, decide on their constituents concerns, prioritize them and identify the key players (e.g. government agency willing to implement m-government services, wireless carriers & robust mobile operators, IT infrastructure manufacturers, and business application developers). They continue by claiming that governments should create robust strategies and prepare multi-year plans based on accurate analysis of return on investment models, cost and benefits. Compiling interests and roles of relevant stakeholders, and correlating their roles and interests in distinct service and business scenarios leads to comprehensive business models for mobile government; it is a necessary stage for achieving m-government platforms that support usability, sharing, openness, interoperability and scalability (El-Kiki, 2007; Kushchu, 2004; Peinel et al., 2005).

The telecommunication world from the other side faces problems, when it comes to service design and engineering of mobile data services (Bullinger et al., 2003). Al-Debei and Fitzgerald (2010) attribute this problem to the following reasons:

- a) *The absence of a coherent framework.* Telecommunication services are not clearly defined; there is no unequivocal, comprehensive identification of the service related issues such as content, associated values and benefits, needed resources, target segments, financial designs, etc.
- b) *Inappropriate organizational design.* The structure, infrastructure, and/or technological architecture of telecoms are not designed to enable efficient development and launch of new services
- c) *Weak alignment among all organizational layers.* The service model is not tightly consistent with the strategic objectives of telecoms or their operational processes, including their information systems.

Taking all the above into consideration, this chapter focuses on business models concepts adapted to the mobile services needs and specificities. One step forward is viewing these mobile services business models concepts from a more restricted point of the governmental organizations environment and how they can be implemented by the local authorities to provide sustainable mobile services to their citizens. In order to achieve this, there is high need for creating a reference model shared among a specific community of practice – the community of municipalities- in the form of a common language. Until the reference model is synthesized appropriately for the mobile G2C services of the municipalities, the domains, concepts and relationships addressed in the business model field need to be identified.

4.2 Business Models: Grounded Theories

4.2.1 Background & Definitions

The term “Business Model” (BM) is surprisingly popular within the scientific community. The popularity of the term is shown by a simple keyword searching in various electronic databases of academic sources, scientific journals and conference studies. More specifically, Google scholar (accessed in July 2012) yields approximately 478,000 results

including relative books and patents. A more thorough search in EBSCO database filtering scholarly peer reviewed journals (Business Source Complete, Regional Business News, Scopus, IEEE Xplore, Information Science & Technology Abstracts) returns 3850 full text articles containing the term “business model” out of which 378 contained the term in their title.

The “Business Model” concept exists for over 50 years (Osterwalder & Pigneur, 2005; Sakellariadis & Stiakakis, 2011). Particularly, it was first appeared in an academic article in 1957 (Bellman et al., 1957) and it was first used in the title of an academic article in 1960 (Jones, 1960). It got widely used, however, after the 1990’s internet boom; it is back then, when the entrepreneurial world needs transformation integrating the new technology in its businesses (Pateli & Giaglis, 2003; Sharma & Gutiérrez, 2010; Sakellariadis & Stiakakis, 2011).

Over a period of time, scientists have recommended various definitions to explain the role of business models. However, they have not managed to reach a point of consensus; they do not all of them attribute the same meaning to this terminology (Seddon et al., 2004; Seppänen & Mäkinen, 2007). The existence of business models can be viewed from a multi-perspective angle as long as it mingles central ideas of business strategy and its associated theoretical traditions (Morris et al., 2005). According to Porter (1985), it builds directly upon the value chain concept and the extended notions of value systems and strategic positioning (Porter, 1996). The concept of business model, also, encompasses competitive advantage contributing to resource-based theory (Barney et al., 2001), as well as larger value creation network advantage relating the model to strategic network theory (Jarillo, 1995) and cooperative strategies (Dyer & Singh, 1998). Furthermore, the model involves choices about corporate boundaries (Barney, 1999) and relates to transaction cost economics (Williamson, 1981).

Hence, somebody can easily realize that defining the Business Model concept is not a simple case. From a firm’s operational-level viewpoint, the model represents an architectural configuration focusing on internal processes and design of infrastructure, so as the firm creates value. On the contrary, from a strategic-level point of view, the model emphasizes on the firm’s market positioning, interactions over firm’s boundaries and growth opportunities, like stakeholder identification, differentiation, networks and alliances.

Summarizing the sources of available definitions, Sakellariadis and Stiakakis (2011) try to give an answer to the question of what a business model is. As Table 4.1 shows, researchers quote the BM in various ways, such as a plan, an architecture, a system, a description, a logic, a method, a set, an abstraction, a story, a way, a conceptual tool, a reflection or a configuration (Sakellariadis & Stiakakis, 2011).

Table 4-1 How researchers see a business model

Business Model is a...	Source
Architecture	Timmers, 1998; Dubosson- Torbay et al., 2001
Plan	Venkatraman, 1994
System	Tapscott et al., 1998; Tikkanen et al., 2005
Description	Petrovic et al., 2001; Weill & Vitale, 2001; Auer & Follack, 2002; Demil & Lecocq, 2010
Logic	Linder & Canterll, 2000; Baden-Fuller & Morgan, 2010; Casadesus-Masanell & Ricart, 2010
Method	Afuah & Tucci, 2003; Rappa, 2001
Set	Seelos & Mair, 2007; Doz & Kosonen, 2009
Abstraction	Betz, 2002; De Reuver et al., 2009a
Story	Magretta, 2002; Tavlaki & Loukis, 2007
Way	Faber et al., 2003; Voelpel et al., 2005
Conceptual tool	Osterwalder, 2004
Reflection	Teece, 2009
Configuration	Santos et al., 2009

Regardless of what a business model is, there are many attempts throughout the years to define the content of the business models, and, particularly, their constructs. On one hand, a business model is presented as an organization's core logic for creating value (Linder & Cantrell, 2000), whereas, on the other hand, it is defined as a story that describes how a business works (Magretta, 2002). Timmers (1998) indicated that a business model is an outline of the products and the services, along with the business actors and their roles, the potential benefits for the various actors and a description of the flow of revenues of each of them. Another part of the literature conceptualizes the business model as a blueprint of the techniques that a business follows, and captures value from emerging services and/or products. An evolutionary list of indicative definitions over the time is presented in Table

4.2. Some of the most frequently cited definitions in the literature are included so as to cover as many aspects of the BM concept as possible.

Table 4-2 Business model definitions

Definition	Source
<i>“The totality of how a company selects its customers, defines and differentiates its offerings, defines the tasks it will perform itself and those it will outsource, configures its resources, goes to market, creates utility for customers and captures profits”</i>	Slywotsky (1996)
<i>“Definition of a business model: - An architecture for the product, service and information flows, including a description of the various business actors and their roles; and - A description of the potential benefits for the various business actors; and - A description of the sources of revenues”</i>	Timmers (1998)
<i>“The design of key interdependent systems that create and sustain a competitive business”</i>	Mayo & Brown (1999)
<i>“A statement of how a firm will make money and sustain its profit stream over time”</i>	Stewart & Zhao (2000)
<i>“A business model is concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets”</i>	Morris et al. (2005)
<i>“We define Business Model as a representation of a firm’s underlying core logic and strategic choices for creating and capturing value within a value network”</i>	Shafer et al. (2005)
<i>“A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with which financial consequences”</i>	Osterwalder et al. (2005)
<i>“Abstract representation of an organization, be it conceptual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial arrangements designed and developed by an organization presently and in the future, as well as all core products and/or services the organization offers, or will offer, based on these arrangements that are needed to achieve its strategic goals and objectives”</i>	Al-Debei et al. (2008a)

4.2.2 The Role of Business Models in an Organization

Having a more holistic view of how a business model could be defined, what now needs to be clear is that a business model is not a strategy (Shafer et al., 2005; Sharma & Gutiérrez, 2010). Although the concepts of “Business Models” and firm’s “Strategy” are similar and they are usually confused, in reality they are not mutually substitutional (Magretta, 2002). The business models include the process of analysis, testing, and validation of strategic choices (Shafer et al., 2005). As Figure 4.1 depicts, the business model’s position in an enterprise is somewhere between business’ strategy and its structures and systems (including Information Technology Systems) bridging their gap and providing a spin of ideas and relationships from which an organization could create market values. The BMs take into account the external factors that could possibly mislead the way to achieving the strategic goals, such as social and technological change, or legal and competitive forces, and provide a building plan whose implementation would materialize each of the firm’s strategy steps (Osterwalder et al., 2005; Sharma & Gutiérrez, 2010).

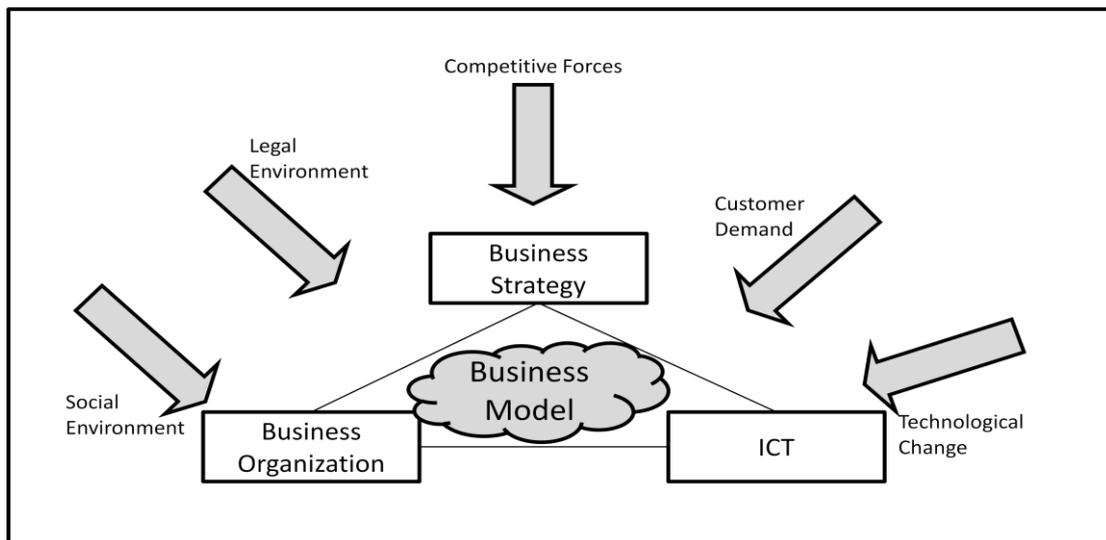


Fig. 4-1 The business model’s position in an organization (Sharma & Gutiérrez, 2010)

The increased literature interest in both business and information systems verifies the importance of the business model concept to the success of ICT implementations. Examples of the domains where the concept has been utilized include mobile technology (e.g., Al-Debei & Avison, 2011; Al-Debei et al., 2008b; Bouwman et al., 2008; Maitland, 2005), eBusiness and eCommerce (e.g., Afuah & Tucci, 2003; Gordjin & Akkermans, 2001;

Osterwalder et al., 2005), and other emerging industries where IT innovations and technologies are of importance (e.g., Ballon, 2007; Hedman & Kalling, 2003; MacInnes, 2005).

The underlying principle behind this increasing interest is the conception that it is not the technology itself, but rather the design of the business model, that actually determines success (Yuan & Zhang, 2003), and allows high-technology companies to achieve their strategic outcomes by developing relevant and desired services and applications. Besides, Osterwalder et al. (2005) justify that a business model conceptual approach is indispensable to designing new computer-based business model tools and the business models can contribute to requirements engineering. Capturing, mapping and following the business model of a firm is a form of knowledge management about the value creation logic of the company. Understanding a company's business model facilitates its choices regarding IS role and structure and creates a common language and shared comprehension between business and IT.

In reality, business models do not last long due to their dynamic nature (De Reuver et al., 2009a). Enterprises should adjust their business models frequently according to the changes in their business environment regarding new technologies, processes, customers' requirements, etc. Market rollout and commercial exploitation impose changes in the existing rules of current business (Bouwman et al., 2008). Therefore, a sustainable business model is the one that is flexible enough to emerge new innovations based on technology alternatives. The search for a viable business model creates a continuous learning framework and a foundation for economic success in the venture (Chesbrough & Rosenbloom, 2002).

4.2.3 Business Model Concept Evolution in Literature

The abstract nature of the business model concept and the width of its application give a variety of studies from multiple different angles. The motivation behind each researcher to investigate the business models depend on his science background and his concrete scientific objectives he is in charge to accomplish. As it is shown in figure 4.2, there are a few different approaches through the years regarding the evolutionary process of the business models studies in the academic literature.

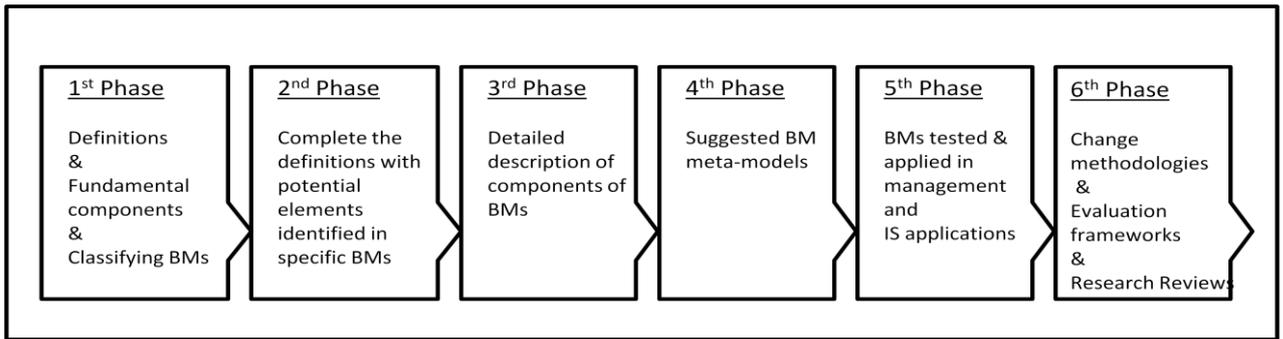


Fig. 4-2 The process of business model concept evolution

On a first stage, early researchers gave particular emphasis on trying to define the BM concept and attempting to explain the essence and purpose of business models. Understanding the key elements and the various components, as well as the possible relationships among them, is the first step while exploring a new field, or a new angle. Trying to manipulate the new definitions and the components of the business models various taxonomies and classifications are suggested for later enrichment and adoption to new dynamics. In the following phases, authors started to complete the definitions of business models by adding potential elements identified in a specific business model to the initially simple propositions.

Later on, the researchers attempt to decompose the business model into its components and analyze them in detail. Although many authors name the components in a different way, such as elements, functions, attributes or pillars, there seems to be an agreement on most of the basic elements constituents of business models like the value proposition of a product, the financial units exchange, the necessary partnerships, the key activities, the resources and the target market. Many BM components integrated into ontologies are analytically presented in the following paragraphs of this chapter.

In the fourth stage of business model analysis process, researchers tend to describe in a logical way the relationship of these factors. They visualize in models the interrelationships of the components under specific dimensions and aspects; this leads to the formulation of business model meta-models in the form of reference models and theory.

As it is expected, the business models concept after this analysis started being applied mainly in the field of management and information systems. Testing and exploiting the

studies gives a more practical feedback to theory pushing forward the models to initial verbal levels to further upgraded ones.

Finally, there is work done in the areas of change methodologies, evaluation frameworks and research reviews. Change methodologies refer to the attempt of providing guidelines indicating actions to be taken for either changing existing business models or choosing new ones to adapt to a business or technology innovation. Evaluation frameworks, in turn, provide criteria to measure or predict the feasibility and profitability of a proposed business model; many studies have focused on searching the success factors of making the business model viable under specific geographical, time or cultural conditions. Table 4.3 concentrates representative sources of the above BM literature analysis phases.

Table 4-3 The business model concept evolution through literature

1 st Phase	2 nd Phase	3 rd Phase	4 th Phase	5 th Phase	6 th Phase
Rappa, 2001;	Chen & Zhao, 2008;	Afuah & Tucci, 2003;	Al-Debei & Fitzgerald, 2010;	Camponovo & Pigneur, 2003;	Bouwman & MacInnes, 2006;
Shafer et al., 2005;	Chesbrough & Rosenbloom, 2000;	Alt & Zimmerman, 2001;	Faber et al., 2003;	Chen & Zhao, 2008;	Bouwman et al., 2008;
Timmers, 1998;	Linder & Cantrell, 2000;	Hamel, 2000;	Gordjin & Akkermans, 2001;	Cortimiglia et al., 2011;	De Reuver et al., 2009b;
Wang (2009)	Magretta, 2000;	Weill & Vitale, 2001	Hedman & Kalling, 2003;	Janssen et al., 2008;	De Reuver & Haaker, 2009;
	Methlie & Pedersen, 2007;		Osterwalder & Pigneur, 2002;	Liu et al., 2011;	Pateli & Giaglis, 2003;
	Morris et al., 2003;		Osterwalder et al., 2005	Schubert & Hampe, 2006;	Pateli & Giaglis, 2004;
	Petrovic et al., 2001			Xia et al., 2010	Sharma & Gutiérrez, 2010

In order to accomplish the objects of this study, the findings of studies of the fourth phase are of particular interest; meta-models, conceptual models, ontologies or any other term the scientists use to describe their propositions, are important tools to be used as reference models and build on them. Rigorously defined meta-models of business models in the form

of formal reference models or ontologies can help in developing new software based management and IS tools (Osterwalder et al., 2005).

4.3 Business Models Ontologies Review

In the following paragraph there is a literature review presentation of the most popular business model ontologies discussing their various components. Tracking literature from traditional business model ontologies to mobile business model and governmental mobile business ontologies, there is an attempt to realize the established theories regarding the mobile business models on the municipal level.

4.3.1 Traditional business model ontologies

Ontology is a term that has originated in philosophy and refers to the systematic explanation and study of the nature of existence (Al-Debei & Fitzgerald, 2010). The term has been borrowed by the information systems and computing sciences (e.g., Guarino & Welty, 2002; Wand & Weber, 1990) and has been used widely. Nevertheless, the term has no universal definition; one of the most cited definitions of ontology is given by Gruber (1993), who defines it as an *“explicit specification of a conceptualization”*. Al-Debei & Fitzgerald (2010) refer that *“Conceptualization is what makes ontologies shareable as it refers to the meanings captured through concepts, not the terms themselves. Furthermore, conceptualization implies abstraction, which signifies that ontology represents only knowledge regarded as core in the specific domain”*.

The primary purpose of a conceptual model is to specify dimensions of business model analysis, identify the main components that are relevant to each dimension, and provide an illustration for each level. According to Pateli and Giaglis (2004), the research about conceptual models follows two approaches. The first one focuses on a specific level of analysis, which is studied in depth presenting the appropriate representative textual or graphical results. The final research “product” of this case is a business model ontology dealing with definitions, terms and relationships of business model concepts (Jasper & Uschold, 1999). The second approach, on the other hand, identifies all the levels of business model analysis and has a more integrative viewpoint binding these levels through

conceptual models. The components of each level and their interrelationships are varying in each study providing multiple conceptual models.

Popular ontologies and conceptual models in the scientific community are the following (popularity is based on how often the studies are met and cited while researching):

Gordijn & Akkermans (2001) identify three levels of analysis: the strategic level, the value exchange level and the operational level. The first one targets board-level management addressing the needs of business analysts, the second defines the strategies and the relations of the value-exchange, whereas the operational level is more related to the needs of system developers. Their research is popular after their proposed e-business ontology also known as “e3-value ontology”.

Osterwalder & Pigneur firstly introduced the e-business model ontology (“e- BMO”) in 2002. It is an evolutionary work that reaches until today in the form of the “Business Model Canvas” (Osterwalder & Pigneur, 2010). Their work formalizes the elements, relationships, vocabulary, and semantics of a business model dividing it into four main pillars; these are product innovation, customer relationship, infrastructure management, and financials. These pillars are further decomposed into nine blocks as it is shown in Figure 4.3.

The *value proposition* domain is the first one to be analyzed; it is a core element of the ontology, as it defines the service/ product that adds value to the consumers/ citizens and satisfies specific needs of the targeted customer segment. The *infrastructure* domain refers to who the company's target customers are, how it delivers them products and services, and how it builds strong relationships with them. It contains the blocks of *core capability* (the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer), the *partner network* (a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer), and the *value configuration* (describes the arrangement of activities and resources that are necessary to create value for the customer). The *financial aspect* domain describes the *revenue model* (the cash a company generates from each customer segment usage fees, subscription fees, licensing, advertising, etc. after subtracting the costs), the *cost structure* and the business model's sustainability. Finally, the *customer interface* domain is vital in the ontology since makes clear the *target customer* (a segment of customers a company wants to offer value to), the *relationships* (a type of link a company establishes between itself and the

customer), and the *distribution channel* (the means of getting in touch with the customer).

Key Partners	Key Activities	Value Proposition	Customer relationships	Customer Segments
who are key suppliers? who are key partners? which key activities do suppliers perform?	which key activities do our proposition require? <hr/> Key Resources what key resources do our value proposition require?	what value do we deliver to the customer?? <hr/> which citizens' needs is the municipality satisfying?	which ones have we established? how costly are they? how are they integrated with the rest of our business? <hr/> Channels communication, distribution and sales channels comprise a company's interface with customers	group of people shaping distinct segments with common needs, common behavior, or other attributes
Cost Structure		Revenue Streams		
which key resources are most expensive? which key activities are most expensive?		represents the cash a company generates from each customer segment usage fees, subscription fees, lending, licensing, asset sales, advertising, brokerage fees		

Fig. 4-3 The business model canvas (Osterwalder & Pigneur, 2010)

Hedman and Kalling (2003) follow the second approach and propose a conceptual business model that integrates perspectives from strategy, IT management, and industrial organization. The inter-relationships between business models and strategy are also conceptualized and discussed by Winter (2003), who distinguishes two types of models (the business network model and the business strategy model), each of which employs a different modeling technique for its illustration.

4.3.2 Mobile Business Models Components

When it comes to the mobile sector, the business concepts should be appropriately transformed in order to take into consideration the very specific characteristics of the mobile ecosystem. As long as technology changes, the technical architecture of the services and products provided change too, influencing the stakeholders involved in a project. In addition to that, new revenue opportunities pop up with innovative promoting strategies affecting, also, the total costs of platforms, telecommunication mediators, or marketers. Starting talking about business models in the mobile industry, the first objective is to address the components involved in the company's or organization's trip to successfully choose, produce, promote, deliver and make profit of mobile services.

Trying to help the players- who struggle to establish their most powerful position in the mobile value system overcoming the technology, demand, and strategy uncertainties that the continuously changing mobile business industry educes (Porter, 1980)- Camponovo & Pigneur (2003) provide a market observation tool for the mobile business industry. The authors capture different complementary perspectives and synthesize them into a model covering all such uncertainties. They use the mobile business classification by Müller-Veerse (2001) that discriminates three basic classes: *technology*, *application*, and *network*. They complete, however, the mobile scenery, by enriching these classes with the *regulation*- and the *social* context. At the center of the mobile business framework are the consumers' needs in mobile services. For the needs' fulfillment the framework suggests the following three blocks: a) communication, which includes the various networks offering transmission capabilities, b) technology, which includes the necessary hardware, network equipment, mobile devices, and platforms, c) the services, in the sense of applications, content provision, and supporting services. These blocks are further restrained by rules of the regulation and social environment. This framework is visually presented in figure 4.4.

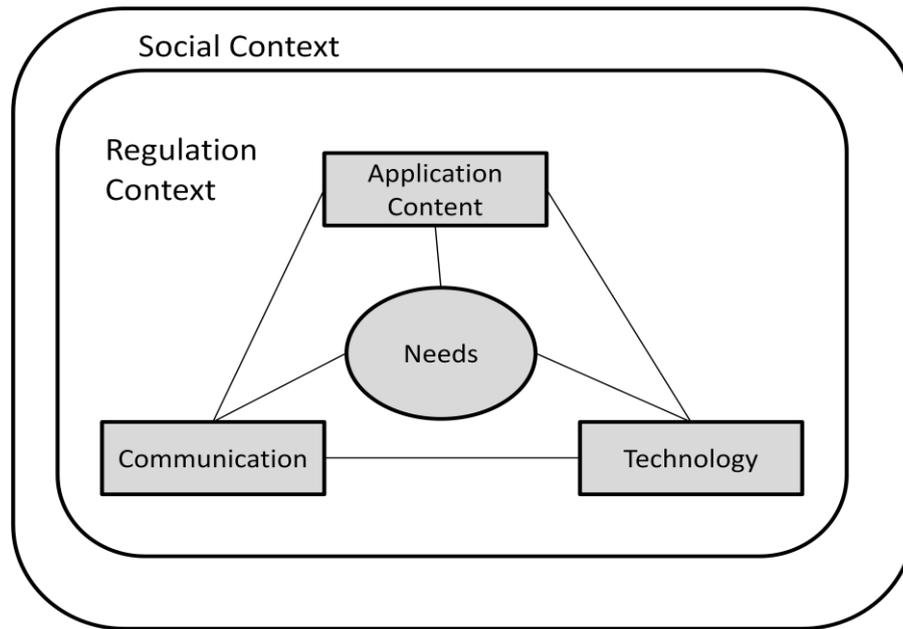


Fig. 4-4 Mobile business framework (Camponovo & Pigneur, 2003)

The impact of the social factor on the success of the business model for mobile services has been, also, proposed by Schubert & Hampe (2006) during their investigation of the leisure industry services. The authors make use of the fundamental business model structure proposed by Stähler (2001), which includes the *value proposition* (the value a customer or a partner receives from the business), the *product/ service* (description of the service or product with which the company is present on the market), the *value architecture* (the architecture of value creation including the value chain, the economic agents and their roles), and the *revenue model* (what the sources of income are). Such business model is mutually correlated to the virtual communities of the buyers and the mobile commerce rules. The social aspects, however, via analysis of success factors of both the virtual communities (socially oriented groups of people sharing their interest around the mobile services (Armstrong & Hagel, 1995; Barnatt, 1998)) and the consumers' attitude towards the actual usage of the mobile services, are the ones that further influence the hybrid community (virtual buyers and mobile commerce users). The social community is differentiated from the commercial and professional community and seems to have a different impact on the business success of the services. The authors believe that the combination between social and financial goals might work along in a frame where social ties between the members are strong and the economic goals are supplementary to the social relationships.

Faber et al. (2003), Ballon (2007, 2009), and Al-Debei & Fitzgerald (2010) take into consideration the mobile characteristics and develop their suggestions for business model ontologies appropriate for the needs of viable business models for mobile services development. More specifically:

Faber et al. (2003) believe that a business model of a cross-company enterprise is successful after having found the balance between the multiple choices of the design and interrelationships of the complex requirements in the technical, user, organizational, and financial areas. Their research concludes to the “B4U conceptual framework” for mobile services, which consists of four main design domains: the service, organization, technology, and finance design. Figure 4.5 presents visually a small description of the concepts of each domain, as well as their relationships with each other.

The service design domain deals mainly with the concept of value. This concept is further distinguished in a) the *expected value* by the customer or the end-user, b) the *perceived value* of the service that he actually receives, c) the *intended value* by the provider, which is summarized in the value proposition of the service, and, finally, d) the *delivered value* to the consumer by the provider.

Regarding the organization design domain, the *value network* is a central concept. It refers to the number of *actors* and the frequency and type of *interactions* contributes to the complexity and density of the value network. These interactions may finally grow into *relations*. Actors, in turn, have *strategies and goals* to participate in the value network and, also, have *resources and capabilities* to be used in *value activities*. *Organizational arrangements* define the value activities, and their combination is the one that connects with the service design since they generate and influence the delivered value of the service. Organizational arrangements, additionally, are part of the *financial arrangements*, whereas the value activity generates the *investment sources* the *costs*, and the *revenue sources*.

The technology design domain includes the concept of *Data* that are used as content in the services and are transferred over networks. The *technical functionality* of the service depends on the technological system and its *technological architecture*. The architecture includes the variables of *backbone infrastructure* (the long- and medium range backbone network infrastructure), *access networks* (first and second mile network infrastructure, e.g. fixed vs. wireless, high vs. low bandwidth), *service platforms* (the middleware platforms

enabling different functions, e.g. billing, customer data management, location information, etc.), the *devices* (the end-user devices providing access to services), and the *applications*, which refer to user applications running on the technological system.

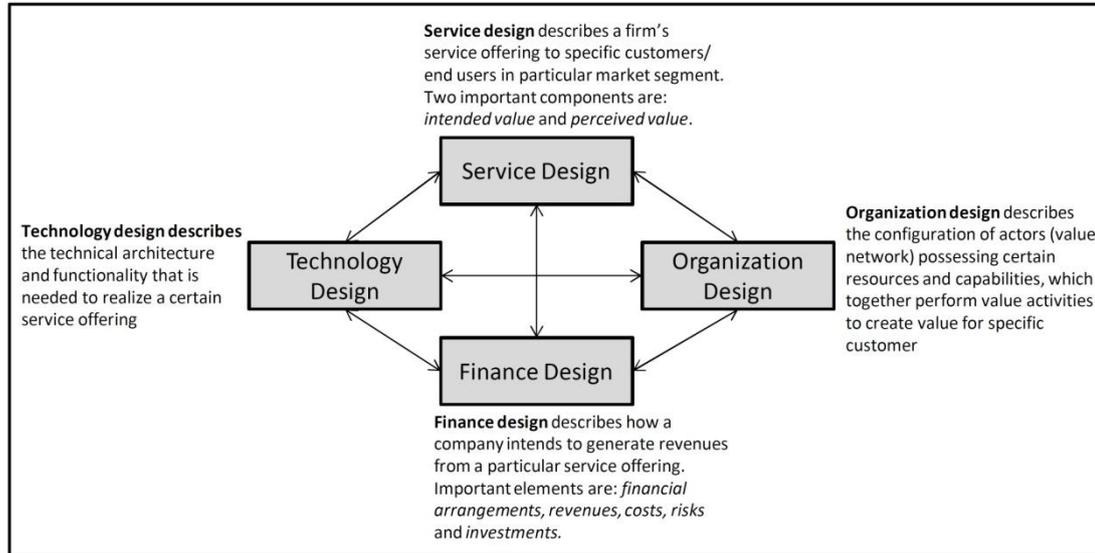


Fig. 4-5 The B4U conceptual framework (Faber et al., 2003)

This ontology is being used by De Reuver & Haaker (2009) as a design guideline in their research to discover new insights about viable business models for context-aware mobile services. The research conclusions about critical design issues differentiate from the original design issues proposed by the ontology, because they are enriched with specification design issues and additional issues due to the special features of the mobile services examined such as the *personalization* and *context awareness* in the value-creating elements when talking about mobile context-aware services.

Ballon (2007, 2009), in turn, proposes a matrix as a business model design tool. It is a validated tool for qualitative analysis after its extensive use in case studies for the mobile services (Ballon & Walravens, 2009). The matrix has a main separation between the parameters: a) the *control parameters*, and b) the *value parameters*. The control parameters are those which refer to the *value network* (the way in which the value network is constructed and how roles and actors are distributed) and the *functional architecture* (how technical elements play a role in the value creation process). The value parameters on the other hand are those which refer to the *financial model* (describing the revenue sharing model including the costs and the profits) and the *value configuration* (describing the user involvement the intended value and the positioning of the final product/ services provided

to the end user). Each of the parameters is further described with three elements as shown visually in figure 4.6 below.

CONTROL PARAMETERS				VALUE PARAMETERS			
Value Network Parameters		Functional Architecture Parameters		Financial Model Parameters		Value Configuration Parameters	
Combination of Assets		Modularity		Cost (Sharing) Model		Positioning	
Concentrated	Distributed	Modular	Integrated	Concentrated	Distributed	Complement	Substitute
Vertical Integration		Distribution of Intelligence		Revenue Model		User Involvement	
Integrated	Disintegrated	Centralised	Distributed	Direct	Indirect	High	Low
Customer Ownership		Interoperability		Revenue Sharing Model		Intended Value	
Direct	Intermediated	Yes	No	Yes	No	Price/Quality	Lock-in

Fig. 4-6 The business model matrix (Ballon, 2009)

Al-Debei & Fitzgerald (2010) examining the designing of business models of mobile data services suggest that telecommunication stakeholders should take into consideration fifteen critical concepts grouped in four dimensions: value-proposition, value-network, value-architecture, and value-finance. These concepts are the core components of their proposed ontology also known as “V⁴ service business model ontology”. The design concepts with all the dimensions and their appropriate interrelationships are graphically described in figure 4.7 below.

The *value-proposition* dimension embraces the first three concepts of designing mobile data services: *product-service* (potential service(s) along with the information provided to target segments, as well as new services), *intended-value-element* (the kinds of value with which telecoms intend to provide customers), and *target-segment* (the nature of the targeted segment by a particular telecom service). The value-proposition requires the *value-network*, is enabled by the *value-architecture*, and generates the *value finance*. Value network includes six design concepts: actor, role, relationship, flow-communication, channel, and governance. The *Actor* component identifies the core actors with whom the companies communicate, collaborate, and cooperate in order to launch and deliver a

particular service, e.g. engineering equipment vendors, IS/IT application vendors, cellular device manufacturers, content providers, content aggregators, telecoms retailers, and ISPs. *Role* refers to the role(s) of each actor, and according to such players' roles the relationships are established. *Relationships* refer to the types of links companies establish with their value-network actors, e.g. strategic alliances, affiliations, strategic partnerships, joint ventures, etc. *Flow-communication* addresses the material communicated among various actors connected in value networks, *channel* describes the communication mediums- electronic or traditional- used to communicate materials among actors as a result of their established relationships, and, finally, *governance* is the concept that describes the powers and controls of each actor within the value networks; it indicates who has which form of control and power over what kind of objects (e.g., data, relationships, channels, functions, and transactions). The value-architecture, in turn, includes the concepts of *core resources* (needed assets and resources to develop new services), *value configuration* (the ability of companies to fruitfully integrate organizational and technological core resources in a way that allows efficient and effective roll-out of successful services), and *core competencies* (what the company can do more efficiently and effectively than its competitors). Value-architecture affects the *value-finance*, which as an ontology component is further decomposed to the concepts of *pricing methods* (what are the pricing and billing methods), *revenue structure* (how the company generates profits through the different service classes across the customer segments), and, of course, the *total cost of ownership* (the overall costs needed to create, provide, market, deliver, and maintain mobile services throughout their life spans).

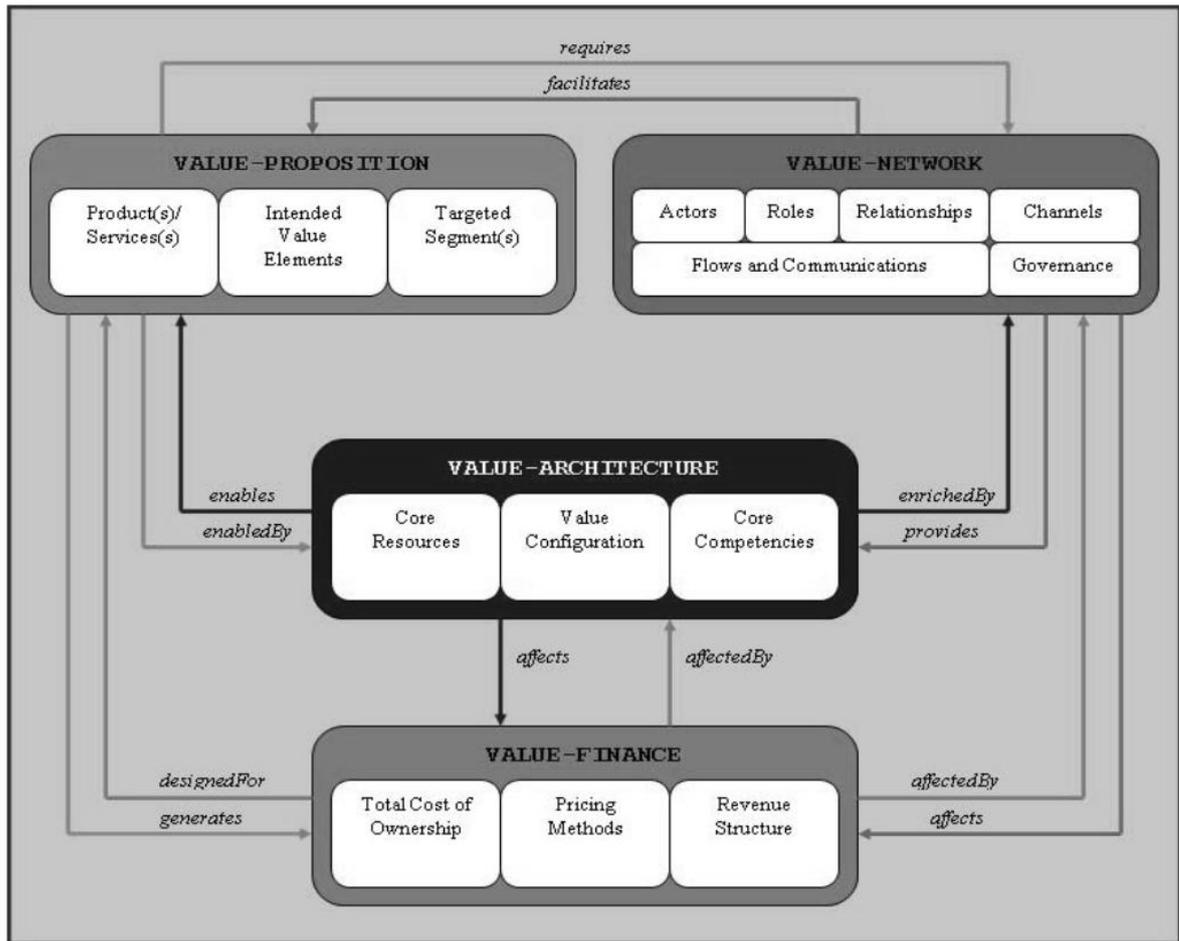


Fig. 4-7 The V⁴ service business model ontology (Al-Debei & Fitzgerald, 2010)

To sum up, Table 4.4 presents the elements and concepts that are mainly used by recent, popular ontologies (either for traditional services or for mobile services). In many cases, various researchers examining BM ontologies and frameworks might use different wording to describe the same meaning, or the same wording to reflect different meanings. For example, in some cases scientists use the term

Table 4-4 Elements frequently used in BM ontologies

	Value Proposition	Stakeholders/ Partnerships	Key Activities	Return/ Revenue	Cost	Target Customer	Distribution Channel	Customer Relationships	Social Context	Regulation	Technological Infrastructure
e3-value ontology (Gordijn & Akkermans, 2001)	✓	✓		✓							
The Business Model Canvas (Osterwalder & Pigneur, 2010)	✓	✓	✓	✓	✓	✓	✓	✓			
Camponovo & Pigneur (2003)	✓	✓							✓	✓	✓
Schubert & Hampe (2006)	✓	✓	✓	✓					✓		
B4U conceptual framework (Faber et al., 2003)	✓	✓	✓	✓	✓						✓
The business model matrix (Ballon, 2009)	✓	✓		✓	✓						✓
V ⁴ service business model ontology (Al-Debei & Fitzgerald, 2010)	✓	✓	✓	✓	✓	✓	✓				

“service/ product” to attribute the meaning of value proposition/ adding value that a new service or product might provide, and the consumers’ needs it might cover. In some other cases, however, this term represents the key activities a company needs to take care of. The columns of the above table represent the meaning of the dimensions that researchers refer to, rather than the exact terminology they use to describe a concept; the elements/ components of various researchers are contextually grouped and do not adhere to the strict wording that each of them uses.

4.3.3 Business Models Components in Government

The question that naturally pops up while reading the above grounded theories and conceptual frameworks regarding both the traditional and mobile business models, is whether such constructs and parameters are applicable in the governmental sector offering sustainable implementation of municipal services to the citizens. And if the answer is negative, then how can the solution be found and offer an integrated framework for successful mobile G2C services provision?

Governmental information services are often accused for staying behind success; they are mainly attached to the demands of legislation rather than the use-oriented and the citizen-centered needs. Could this be happening due to the lack of business perception in municipalities? Is the outdated business thinking about municipality- citizen relationship in charge of such failure? How can the municipal organizations modernize their services, technologies, funding, partnerships and their key business moves?

In the first position of the notorious governmental reality stands the missing value of the services. The mobile government services so far, are rejected by the citizens due to their dull character; they do not seem to entertain, attract and impel the citizens to a more active information exploration attitude. They often require not only pull but also push functionalities, such as sending SMS notifications (Peinel & Rose, 2006).

Nowadays even small towns own web-sites broadcasting general public information, whereas larger cities and institutions tend to offer more sophisticated electronic services (Leenes & Svensson, 2002.) This situation verifies that local authorities try to adopt contemporary technologies for the public good. Outcomes of the research of Government of Malta mGov project (Government of Malta- Ministry for Information Technology and

Investment, 2003) and USE-ME.GOV project (USE-ME.GOV Consortium, 2005), however, showed that information technology initiatives for improving services and businesses are prevalingly promoted and implemented by individual authorities and organizations. This is attributed to lack of technical and human resources, monetary shortcuts, administrative regulations. Adding to these, less experience in interdependencies and commercial complexities of the mobile market makes it even harder for the municipalities (Peinel & Rose, 2006).

Peinel and Rose (2006) exploring the business models for m-government services highlight the need of organizational changes required regarding the administrative efforts and the partnerships. The importance of the partnerships is twofold: First, making the choice for the appropriate partner is important for the development of the service; there are not always high-skilled people employed by the municipalities to deliver a modern and fully-functional platform or application. Second, partnerships that could contribute with the financial resources should by no means be neglected; nowadays, municipalities are usually restricted by low budgets for services implementations. Hence, although negotiations between the public and the private sector are usually avoided due to unsuccessful past experiences, such a partnership should be considered; under the circumstances, the private companies could provide experienced personnel as well as investments with high monetary values. The revenue possibilities, of course, are an issue of high significance in order to sustain both the future of the service and the partners' engagement with the project.

Walravens (2012), conducting a contemporary ongoing research, notifies the shifting of the city governments concerns from simple connectivity projects throughout the cities using modern technologies such as WiMax and WiFi, to more complex mobile data services provision (Charny, 2007; Gardner, 2008; Verbruggen et al., 2008). Such evolution raises the need to answer questions about the emergent players' interactions, the leveraged data in the providing services, the additional value of the newly created public services, and the appropriate platform offered by the municipality. Walravens (2012) in his study in order to answer such questions follows the business model matrix proposed by Ballon (2009) as described in the above paragraph. This matrix, however, needs extension when it comes to mobile public services, in the sense that the involvement of city government or other public entities increase the complexity of the mobile business value chain. Such involvement requires the addition of new design parameters in Ballon's matrix; Walravens (2012) names

these parameters *public design parameters*. The public design parameters are further distinct in the *public governance parameters* and the *public value parameters*. These are still related to the already defined business model domains of value network, technical architecture, financial architecture and value proposition and expand the matrix downwards; they just “*add criteria to reflect the increased complexity when public actors are introduced to the value network*”. The extended matrix is presented in figure 4.8.

The public governance parameters are further separated in parameters that are related to the value network and to the technical architecture. The first ones are *good governance* and *stakeholder selection*, whereas the technical architecture related ones are *technology governance* and *public data ownership*.

Good governance refers to harmonizing the existing policy objectives and regulation. That means that the local authorities should clarify the goals of an initiative taken and examine the burden of their contradiction with existing regulation and political policies; it would be ethically and politically correct for a service under development, to abide by such regulations and policies. Additionally, the concepts of accountability and trust complete the value network governance parameters; the existence of an accountable public entity and a plan of how the citizens’ rights are protected or can be enforced in case of something goes wrong is of high significance.

Stakeholder selection refers, as it is expected, to the right choice of the stakeholders involved in the process of a new services development. Many criteria might define the appropriate choice such as whether these stakeholders should be international, national, regional provincial or local. Additionally, the stakeholders could be selected through various organizational status- public, semi-public, non-governmental, private, etc.

	Value network	Technical architecture	Financial architecture	Value proposition
Business design parameters	Control parameters		Value parameters	
	Control over assets	Modularity	Investment structure	User involvement
	Ownership vs Consortium Exclusive vs other Influence	Modular v integrated	Concentrated v distributed	Enabled, Encouraged, Dissuaded or Blocked
	Vertical integration	Distribution of intelligence	Revenue model	Intended Value
	Integrated v disintegrated	Centralised v distributed	Direct v indirect	Price/Quality Lock-in effects
	Control over customers	Interoperability	Revenue sharing	Positioning
	Direct v mediated Profile & identity management	Enabled, Encouraged, Dissuaded or Blocked	Yes or no	Complements v substitutes Branding
Public design parameters	Public governance parameters		Public value parameters	
	Good governance	Technology governance	ROPI	Public value creation
	Harmonising existing policy goals & regulation Accountability & trust	Inclusive v exclusive Open v closed data:	Expectations on financial returns Multiplier effects	Public value justification Market failure motivation
	Stakeholder selection	Public data ownership	Public partnership model	Public value evaluation
Organisational	Choices in (public) stakeholder involvement	Definition of conditions under which and with whom data is shared	PPP, PFI, PC...	Yes or no Public value testing

Fig. 4-8 The extended business matrix for government cities services (Walravens, 2012)

The technology governance parameter in this matrix (Walravens, 2012) exists to highlight the need of the citizens to actively participate in the democratic public procedures using modern technological platforms and, hence, orient the technological choices to the direction of motivating its usage and including as big citizens' segment as possible (not to prefer, for example, a type of technology that requires special equipment or knowledge excluding a part of the population). Furthermore, the technology chosen should be according to open government and citizen access to information principles, e.g. access, process, awareness, communication and involvement (Okot- Uma, 2000).

Public data ownership is regarded as a technological architecture parameter as long as it refers to what format the data should be provided (e.g. readable by everyone or not), who could have access to it (which parties can start working with it), what type of licensing schemes might be in place, and, finally, its terms of use.

The public value parameters related to the financial architecture are the *return on public investment* and the *public partnership model*. Both concepts are not newly introduced;

return on public investment refers to the expected economic return on the public investment including usually calculations of the so-called multiplier effects (secondary benefits the government expect to meet regarding economic activities, job creation and so on). The public partnership model refers to the way public bodies can co-operate with private and public participants providing legal construction for the value network. Proposed partnership models are the Public-Private Partnerships (PPP), Private-Finance Initiatives (PFI), and Purchasing Consortia (PC).

Continuing with the public value parameters, Walravens' matrix is completed with the *public value creation* and the *public value evaluation*. The first one refers to the fundamental concept of the value of the delivered service for the end user, whereas the second one refers to whether and how the public value created by a public service is evaluated. There are several frameworks to be used as evaluation tools for the added value, such as the Public Value Test (PVT) organized by the BBC Trust (the body governing the BBC) and Ofcom (the UK media regulator), which includes the following parameters: reach, quality, impact, cost & value for money.

4.4 Proposed Constructs for the Business Development of m-Government Services

Focusing on the mobile government business dimensions and trying to summarize the existing relevant literature sources (as they are analyzed above in paragraphs 4.3.2 and 4.3.3), the authors conclude to table 4.5. The table is an attempt to review theoretical suggested frameworks, models and ontologies around the concepts of mobile services and, in specific, mobile government services.

It is noticeable from the table that most of relevant researches refer to mobile services generally, and only a couple of them examine mobile services in the government sector. In any case, it is easily concluded that literature is short on sources examining municipalities' mobile services provisions. Hence, there is high motivation for the author to take into consideration the special needs of the municipalities' services and integrate them into a theoretical framework for mobile development. In order to achieve this objective, there is need to exclude the indicated business model elements and constructs from the grounded theories examined up to here.

Table 4-5 Mobile government business models researches summary

Researches	Suggested Framework	About
Camponovo & Pigneur (2003)	Mobile Business Framework	The mobile business classification suggested by Müller-Veerse (2001), which discriminates three basic classes: <i>technology</i> , <i>application</i> , and <i>network</i> , is used and enriched by <i>regulation</i> - and the <i>social</i> context
Schubert & Hampe (2006)	Business model structures for leisure industry mobile services	Following the business model structure proposed by Stähler (2001), the authors add on the basic constructs of <i>value proposition</i> , <i>product/ service</i> , <i>value architecture</i> , and <i>revenue model</i> the special need of the <i>social factors</i>
Faber et al. (2003)	The B4U conceptual framework	The conceptual framework suggests <i>service design</i> , <i>technology design</i> , <i>organization design</i> , and <i>finance design</i> , as the basic constructs (with many parameters) of a business model for mobile services
Ballon (2007)	The business model matrix	The business model matrix includes <i>value network parameters</i> , <i>functional architecture parameters</i> , <i>financial model parameters</i> , and <i>value configuration parameters</i> . They are used to describe business model dimensions for mobile services
Al-Debei & Fitzgerald (2010)	V ⁴ service business model ontology	The researchers have developed an ontology including <i>value propositions</i> , <i>value network</i> , <i>value architecture</i> , and <i>value finance</i> (deducted into sub-dimensions). The ontology refers to mobile services
Peinel & Rose (2006)	M-government business model	The study explores the business models for m-government services highlighting the need of organizational changes required regarding the administrative efforts and partnerships
Walravens (2012)	The extended business matrix	The researcher builds upon the “business model matrix” suggested by Ballon (2007), and extends the proposed framework according to needs of government cities services

Concluding this chapter and according to the above scientific propositions about business model elements for traditional and mobile services, as well as the indications for governmental mobile services design, there can be a formalization of the proposed strategy

concepts while structuring a business model for the m-G2C services provision by the local authorities.

Making it more concrete, the authors suggest that the municipality authorities and IT administrators (or people in charge according to the structure of the current administrative system's laws of the country) need to identify the type of the services, which needs to be developed following the citizens' needs and judging its added value and beneficial character either for the municipality or the citizens. Afterwards, various business constructs should be taken into consideration in order to give a sustainable and well-considered planning of the service implementation. Such constructs complement the implementation and dissemination phase of a governmental service.

As it is depicted in figure 4.9, the proposed business constructs are related to the concepts of: technology, personnel, partnerships, costs, revenue streams, delivery channel, communication channel, social context and legal context. Next chapter analytically presents these constructs elaborating on specific parameters that integrate into each of them.

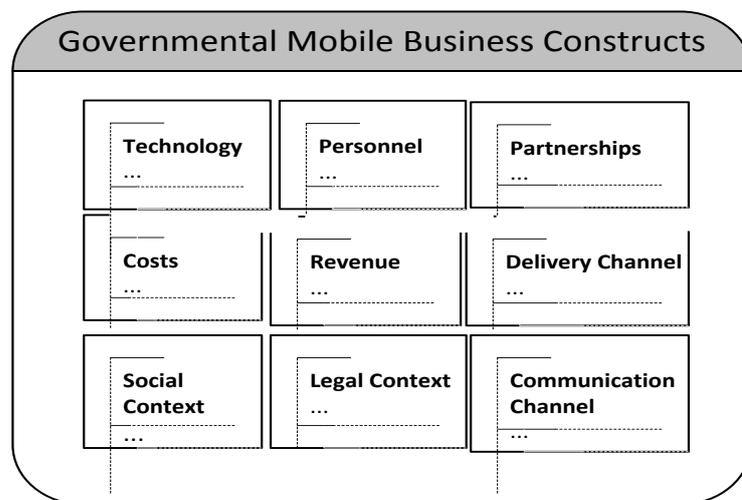


Fig. 4-9 The proposed governmental mobile business constructs

Chapter 5 analyzes the proposed strategy framework- the GoMobi Framework- consulting the municipalities with strategic stages contributing to the process of modernizing the G2C services using the new opportunities of the mobile era as a new technological type of service and communication between the citizens and the local authorities. The proposed framework (the GoMobi framework) is about to be tested and verified via conducting empirical research using case studies (chapters 6 and 7).

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Chapter 5.

The GoMobi Framework

In this chapter, there is an analytic presentation of the proposed strategic framework for the municipalities, named the GoMobi Framework.

The development of such framework provides a complete foundation for researchers, who are looking forward to utilizing the business model concept in further researches. It can be internationally used, regardless of the cultural and linguistic differences between various nations. The content of the proposed mobile services might vary depending on the different needs and cultural ethics, but the GoMobi framework as strategy tool could be customized and adjusted to information systems of multinational municipalities. Additionally, the GoMobi Framework has a valuable contribution to the practitioners. Its unified character enhances municipalities' ability to design, create, communicate, compare, analyze, evaluate, and modify their existing and future business dimensions of their provided mobile information technology services.

The paragraphs below depict each stage of the framework explaining the concepts to be taken into consideration while designing the implementation of a mobile service.

5.1 GoMobi Presentation

GoMobi can be fruitful with the missing unified strategy on a governmental level while planning the implementation of mobile services. It is a useful tool to help out the conceptual phase of a service, providing insights into significant elements that have to be considered when setting up a mobile G2C service in collaboration with public stakeholders. The targeted objective is to provide guidelines that can be used to highlight key tasks that can steer a successful path through the framework.

On the first place stands the choice of the service to be implemented. The framework gives emphasis on the identification of the suitable service, separating it as process stage from the rest of the business model dimensions that facilitate the organized implementation of the service. Having decided on the service needed to satisfy the citizens' and municipalities

requirements, the usage of various parameters comprising different aspects of the business model that can support and sustain the implemented service are available. Multiple combinations of the parameters lead to different results with alternatives from a business model viewpoint; hence, a structural comparison between different models becomes possible. The decision on the optimum model among the business model alternatives gives the solution to proceed with.

GoMobi has a linear, streaming flow organized in four successive stages:

1st: Identification of the Suitable Service

2nd: Examining service implementation & dissemination constructs and defining their parameters

3rd: Synthesis of alternative BMs

4th: Final model proposition

The framework is visually depicted in figure 5.1 and each stage is extensively presented in the following paragraphs of the chapter.

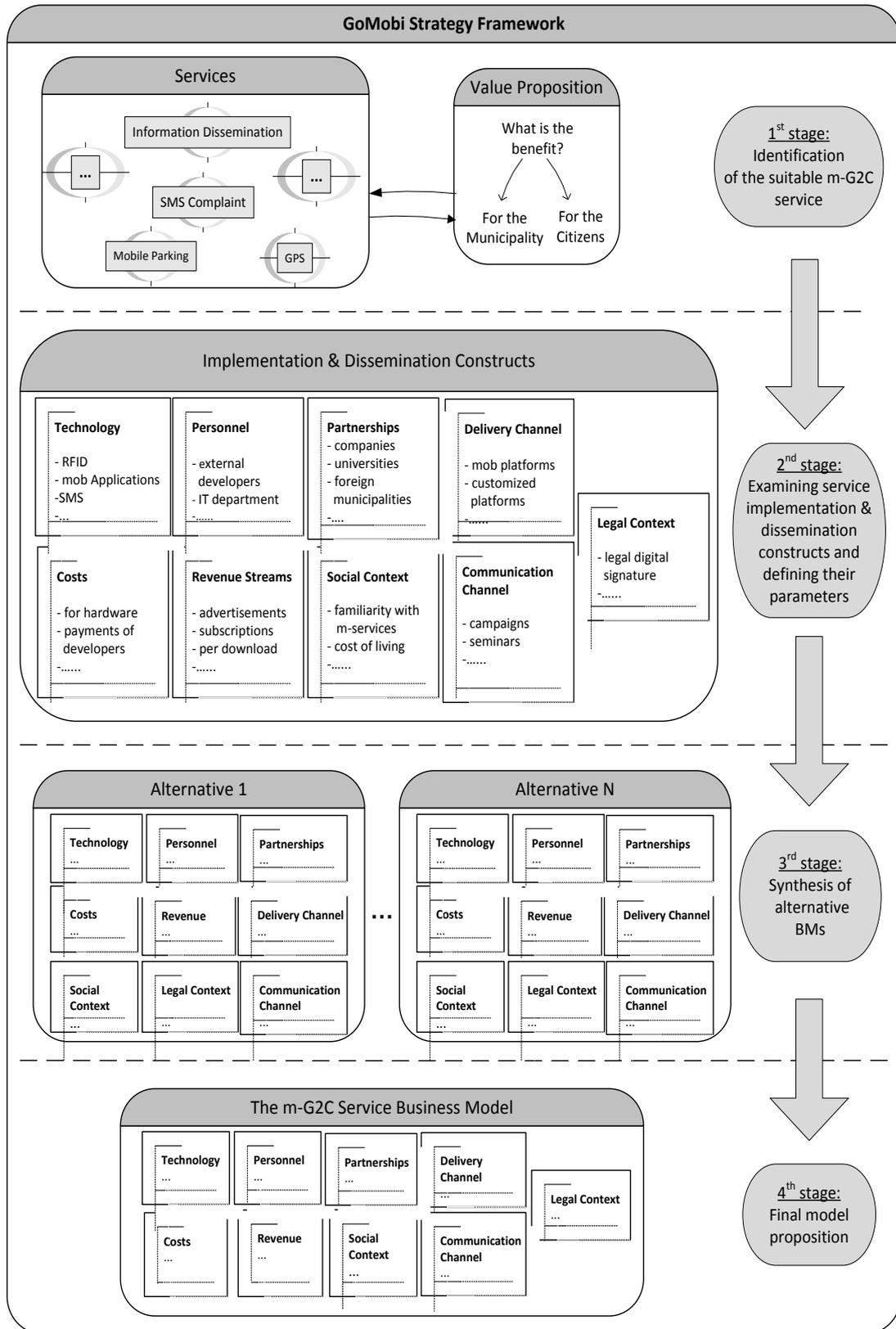


Fig. 5-1 The GoMobi framework

5.2 Identification of the Suitable Service

Since the 1980s, when the Life Cycle Management (LCM) of electronic computer and communication systems started maturing scientifically, special emphasis has been given on planning, monitoring and control regarding the successful development of information systems products. According to LCM, there are three phases prior to the system development: mission analysis, concept development and definition & design (Hammer, 1981).

That implies that the first stage of a new system production answers business questions like what is the contribution of the newly provided product/ service and why it is important to be implemented uncovering its innovative nature. Pyburn (1984) calls this research stage “Intellectual Technology”; it refers to the fact that the physical design of the technology influences how the technological system will be used. The technology, in turn, aims to resolve, up to a degree, the “uncertainties” of a company/ organization. This fact shows a correlation of the chosen service/ product and its design with the way it is intended to be used by the consumers.

Regarding the case of the mobile G2C services provision of this research, the service to be provided by the municipalities is a dependent decision on the service’s design and functionalities, as well as the way and the reason a service could be used by the citizens and the municipalities themselves. Deciding on the service to be implemented is a bidirectional procedure, in the sense that the services choices are eliminated by the citizens’ or the municipalities’ needs and capabilities, whereas these needs and capabilities generate new ideas and possibilities for services implementations. Additionally, the citizens’ and municipalities’ services usage customizes the services’ design. This bidirectional relationship between the services and their values is visually given by the two arrows in figure 5.2.

In essence, this line of thought directs to an extensive exploration of the services’ added value, either for the citizens transactions or for the municipalities’ useful, efficient and effective provisions. Having this happening, citizens’ needs are in the centre of the business model strategy; this comes in accordance with Pigneur & Camponovo’s (2003) proposed strategy (see paragraph 4.3.1). Additionally, it resolves the issue of failed governmental implementations due to emphasis on administration-centered goals rather than citizen-centered ones (Al-khamayseh & Lawrence, 2006; El-Kiki, 2007) (see paragraph 2.4.3).

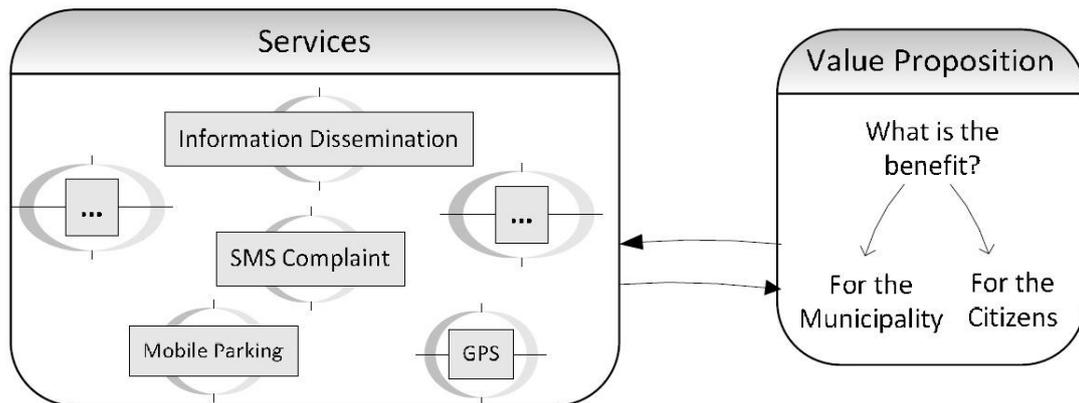


Fig. 5-2 Identifying the suitable service

5.2.1 The Services Options

Part of the first stage of GoMobi Framework includes the services options. Mobile G2C services subjected to be implemented are under investigation for their suitability based on citizens' and/ or municipalities' needs.

The wording "Services" is being used in order to describe the entity under investigation, which adds value to the citizens and covers specific needs. It exclusively refers to the actual product that the local authorities put at the disposal of the citizens. It needs to be clear that it does not reference to the meaning of the value proposition, as it happens with some scientific researches about mobile services and their business ontologies (Faber et al., 2003; Ballon, 2009; Al-Debei & Fitzgerald, 2010).

Possible services ideas are borrowed by successful cases of already finished projects implemented sporadically by individual initiatives of municipalities around the world. Such services options, of course, can be further treated as single cases and be amended according to cultural, ethical or national lines under which the municipalities fall.

Furthermore, some candidate services ideas are extension of existing electronic services; although they are already provided through the web, they are critical to be additionally provided using the mobile channel. These are usually the types of services that are useful to be conducted wherever you are, whenever you need it. For instance, it is helpful to be able to be informed about time critical facts while being on the road; alert messages for coming heavy rains or earthquakes are important to be widely known in a massive and immediate

way. In such cases, people away from their wired desktops would be excluded from the information process, because they would not have access to the local portals and websites.

Last but not least, new possible ideas upgrading the municipalities' quality of services are generated through the extra features of the mobile technology. Providing free internet access to the citizens was impossible before the existence of the WiMax technology, as well as the mobile devices being able to connect with WiFi networks. Tourism mobile applications and navigation systems running on smartphones could not be previously available to people traveling in unknown cities and visiting various monuments.

An extended list including as many m-G2C services options as possible is presented in paragraph 3.2. The current research classifies the services into the following categories based on the type of function:

- *Information dissemination* (about job positions, new offices, traffic conditions, local events, etc.)
- *Issuing papers*
- *Wireless access* (WiFi, WiMax)
- *Traffic* (selling transportation tickets, parking payment, tracking public vehicles, updates about bus/ metro/ train routes/ delays & costs)
- *Forums* (development of local networks or participating in existing forums)
- *Payments* (fines, tickets for local events, council taxes)
- *Applying submission/ statements* (certifications, complaints, registration in local teams, lawsuit of an incident, etc.)
- *Tourism* (guiding the tourists around monuments and providing digital maps)
- *GIS*
- *Promotion* (uploading advertisements on m-applications and m-browsers, advertising local issues and news on popular, commercial applications)

5.2.2 Value Proposition

The terminology "Value Proposition" is being used at the first stage of the proposed framework in order to express the value the citizens or the organizations receive from the available service. It is used to describe the reason why the citizens would be motivated to use it and organizations to develop it. It is supposed to solve specific problems or satisfies

selected needs. As Osterwalder and Pigneur (2010) very aptly depict, value proposition answers questions such as *“what value do we deliver to the customer? Which one of the citizens’ problems are we trying to solve? Which citizens’ needs are we satisfying?”*

The concept of value can be further analyzed in different dimensions borrowing definitions from Faber et al. (2003). This concept could be distinguished in a) the expected value by the customer or the end-user, b) the perceived value of the service that he actually receives, c) the intended value by the provider, which is summarized in the value proposition of the service, and, finally, d) the delivered value to the consumer by the provider.

On the first stage of GoMobi analyzed herein, the concept of value proposition (figure 5.3) encompasses the intended value by the municipality, meaning the added value the municipality intends to deliver to the citizens, and the expected value by the citizens, referring to the value the citizens expect to have from the service usage. After the business model is decided and the service is designed with concrete functionalities taking a final shape, what is finally delivered to the citizens by the local authorities refers to the delivered value. The delivered value can be differently perceived by the citizens according to their competency, education, occupation needs, or other reasons. How the citizens evaluate the received value describes the perceived value. The delivered value and the perceived value give feedback to the initial intended value. The purpose of such feedback is to redesign the chosen service, so as to transform it accordingly, and offer what was initially intended or expected. It could, even, lead to the reevaluation of the suitability of the service for being developed.

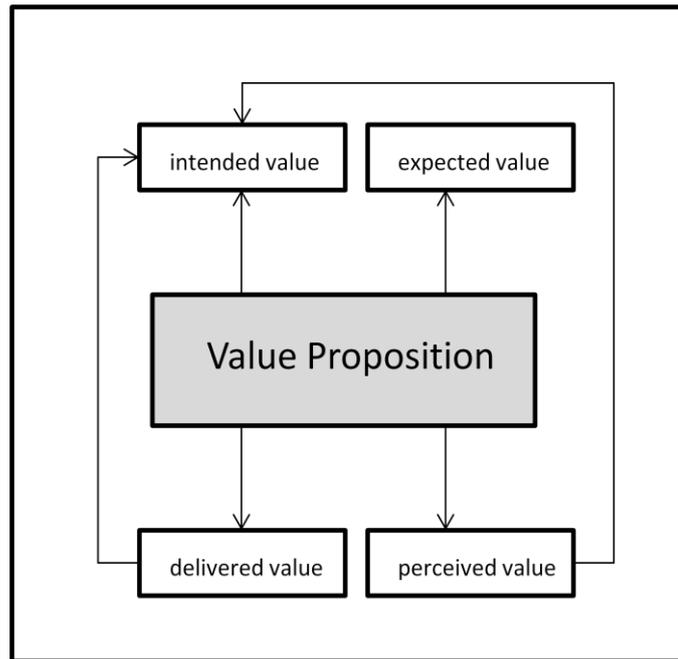


Fig. 5-3 The analysis of value proposition

Generally speaking, some value propositions may be innovative and represent a new or disruptive offer. Others may be similar to existing market offers, but with added features and attributes (Osterwalder & Pigneur, 2010). That means that some mobile services are the way to satisfy needs previously uncovered; this is thanks to the special features of the mobile channel, e.g. ubiquitousness, directness, etc. Some others needs could be satisfied through the web channel; the existence of the mobile service, however, might make it even easier, faster, or more efficient.

The value proposition of the services is basically measured by the degree of their beneficial role in specific necessities. The received benefits could refer either to the citizens or the municipalities themselves. Paragraph 2.4.2 enlists a number of benefits that are considered as the most critical issues, whose solutions would upgrade the quality of the municipalities-citizens interaction. The services that could widely correspond to citizens or municipalities problems (too much time spending for applying a certificate, long queues, multiple visits to the offices, not enough employees for the projects, etc.) and could provide solutions for the enhancement of the current situation are the ones to be selected for implementation.

The benefits, based on which the suitability of the service is judged, are distinguished between the benefits for the municipality and benefits for the citizens. Both categories are

classified into groups according to their type (see paragraph 2.4.2). For example, classification of the municipalities benefits consists of:

- *Changing work environment* (changing role of staff, reducing time demands on staff)
- *Cost savings* (reduce employees and administrative costs)
- *General efficiency* (faster services, more efficient processes, enlarged accessibility & transparency)
- *Improving the image of the municipality*
- *Entrepreneurial activities* (Increase non-tax-based revenues, raise income from paid advertisements on mobile applications and browsers).

On the other side citizens benefits classification includes:

- *Time savings* (high speed accessibility, decreased queuing time, quicker response to queries, speed transaction processing, faster access to documents & forms)
- *Cost savings* (transactions costs, parking & petrol costs, postage costs)
- *Availability & convenience* (user friendly & easy to use, easy to find info, reduced customer visits to offices, up-to-date info provision, 24/7 access, etc.)
- *Relationship management* (decreased face-to-face interaction, higher & active participation, trendy communication way, personalized services, privacy of data, increased loyalty and encouraged visit repetition).

5.3 The Implementation and Dissemination Constructs

At the second stage of GoMobi Framework, there is a presentation of the business model constructs with their parameters. These constructs represent the full decision steps made while planning and designing the implementation and dissemination of a mobile G2C service. The intention is to cover a wide area of processes that can be foreseen minimizing the risks.

In the following paragraphs there is an analysis of the concept of each construct (technology, personnel, partnerships, delivery channel, communication channel, costs, revenue streams, social and legal context (figure 5.4)) and a description of possible constructs parameters, which can be chosen while building the business model of the

service. Different combinations of constructs parameters could lead to different business models.

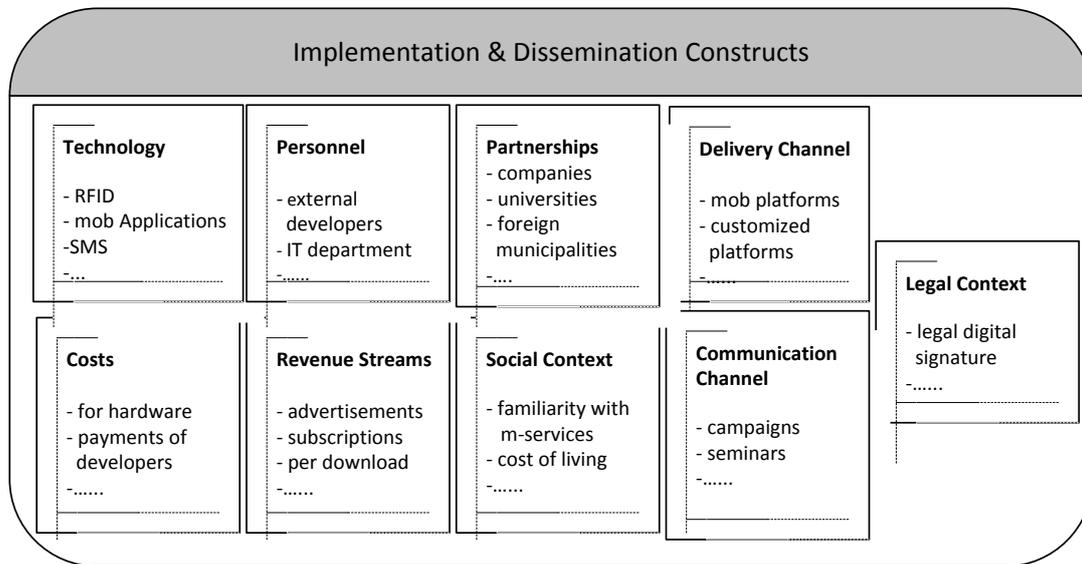


Fig. 5-4 The implementation & dissemination constructs

5.3.1 Technology

The construct of technology exists in order to declare the importance of having cleared the technological-related issues of the mobile service. By definition the mobile services make use of mobile and wireless technologies at least on the one end of the bilateral procedure; at least the transmitter or the receiver of the service should utilize the mobile and wireless channel (Pousttchi & Wiedemann, 2006). The kind of possible mobile or wireless technologies that could be applied varies in a wide range of options. Two services could deliver, more or less, the same value targeting the same citizen's need, but be implemented in a completely different way using dissimilar service platforms, other protocols, and varied types of data.

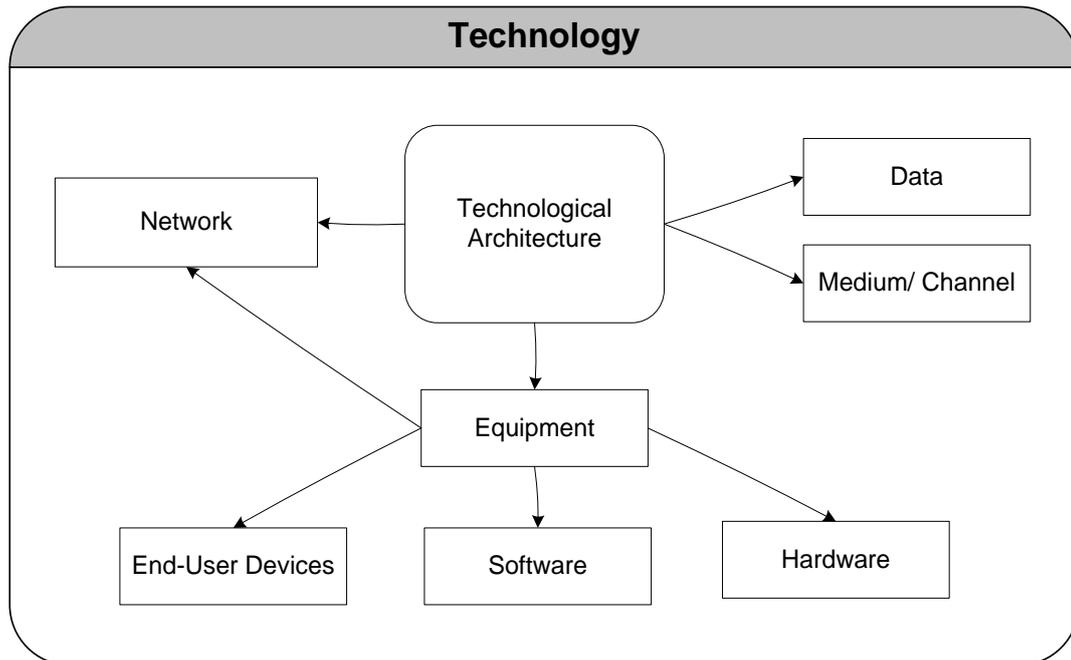


Fig. 5-5 Analysis of the technology constructs

While planning the development of a service the *type of the mobile technological medium/channel* should be decided. This refers to the way of communication between the transmitter and the receiver of the service. Paragraph 2.3.4 describes three such main types: *SMS* (or *MMS*), *mobile browser*, and *mobile application*. Taking into consideration the mapping of the most popular real-life mobile government services presented at Table 2.8 (pp. 44), the SMS usage is the most frequently met, whereas mobile applications are quite trendy and is mostly studied on a theoretical level so far (although private companies already use them mostly for commercial reasons).

The *equipment*, that the municipality needs to deploy and deliver the service, as well as the citizens in order to use it, depends on the chosen platform. The IT departments might need extra infrastructure in software (platforms offering middleware functionalities such as billing, store citizen information, etc.), hardware (extra servers, RAM, processors, routers, cables, antennas, etc.) and network (high or low bandwidth, optical fibers, etc.). The citizens, on the other hand, should be appropriately equipped with devices compatible with the technological generation used by the provided service; for instance, regular mobile devices could be enough for receiving SMSs, but not for executing mobile applications (running on specialized smartphone OSs) or opening mobile browsers.

The *access networks* might, also, vary depending on the service platform. In the common case of SMS sending this could be a direct decision, as long as the usual telecommunication protocols through GSM and satellites (in cellular networks) are easily provided by telecommunication operators. There are, however, other wireless network types that could be exploited by the local authorities for building services. Apart from the well-known WiMAX and WiFi (WLAN) possibilities, there are, also, the RFIDs and the PAN networks that could be used for data exchange through Bluetooth and RFID tags.

Regarding the networks, in recent years, many municipalities have invested in fiber to building infrastructures to enhance the net conditions and increase the broadband situation. Greece seems to rank nineteenth among EU state members with 86 percent broadband population coverage at the end of 2008, while EU average at the time was 92 percent (European Commission, 2005). Realizing the socioeconomic importance of fiber access availability, neighboring cities throughout the country are quickly forming into groups to evaluate collective ways to offer fiber access and services to their citizens. So far, there are three regional groups formed: 1) Digital cities of central Greece led by Trikala, 2) Broadband network of southwest Greece led by Patras, and 3) Ikaros Network, led by Heraklion and municipalities of the Aegean islands. There is no, however, official regulatory protecting developments issues, such as rights of way, acknowledgment and support of municipal role, share of public utilities infrastructure, and in-building wiring (Troulos et al., 2010). Although the municipal networks benefit the citizens, they hide high deployment and operational cost as well as competitive reaction from the private sector.

Regarding the WiFi networks, there are, so far, two emerged business models: the city-owned networks, and the municipal WiFi. In the first case, the municipality owns and manages the network for internal operations and may share a limited amount of excess bandwidth with citizens for internet connectivity, typically, free of charge. In the case of municipal WiFi, local government partners with a private entity, such as service provider. The provider owns and manages the network charging fees for connectivity and value-added services (Vincent, 2007).

The *Data* that are used as content of the services and are transferred over networks might influence the platform choice. This is due to the type of the data and their properties regarding the transferred quality, size, color, etc. For example, SMS do not support

multimedia exchange; hence, images or attached documents could be sent and received from/ by the municipalities for citizens' transactions.

The coordination and combination of all the above technological parameters give the final technological architecture of the service (figure 5.5). Their synthesis leads to the final entity of service, as it is described in the first stage of the framework. Certain requirements regarding technical aspects should be followed; the technological architecture should be designed complying with the principles of interoperability (stipulation of common data models and common protocols for exchanging data), security functions (special care of citizen data and information), openness (open standards, open interfaces, open specifications and open source codes), flexibility, and scalability (support further changes maintaining efficiency and functionality) (Antovski & Gusev, 2005; Peinel et al., 2005)

5.3.2 Delivery Channel

After the technological solutions are decided, the delivery channel should be decided. The existence of such construct depicts how the municipality intends to deliver the service and the value proposition to the citizens.

In many services cases the delivery channel does not require extra consideration; the delivery channel might be the direct service platform, software or network as it is designed while considering the technology used. For instance, in the case of massive SMS sending, there is no delivery consideration, since the SMSs are transmitted directly from the web-based platform of the municipality and are delivered through the telecom operator networks to the citizens' mobile phones.

In the cases, however, that a mobile application is provided, the distribution channel would be selected. Application platform owners provide the whole infrastructure – user interface, server space, etc.- and determine rule for the interaction between the municipalities and the users (Kouris & Kleer, 2012). There should be the decision about the distribution platforms; would it be the branded app store, Google Play, another market place, or all of them? Is there another solution? Could it be the device retailers or the operators' stores? What is the most practical and costless solution? What is the most affordable, user-friendly and compatible with the citizens' equipment solution?

5.3.3 Personnel

The question, that naturally pops up when talking about a service development, is who is going to be the person or team that is actually capable of deploying such a service, and could set it up and running.

The easy answer would be the hired IT employees of the municipalities. Employees- the individuals that are part of an organization- may need to interact with other colleagues or employees of other businesses, as well as they may be at the receiving end of an interaction initiated by both internal and external information systems (Coursaris et al., 2008).

There are a lot of doubts, however, about employees' expertise in modern technologies, and more concrete about their competencies in designing and developing mobile services. It would be expected that, as long as the technology is such a rapidly evolutionary domain, even IT people cannot follow every new aspect of this domain. Additionally, as it described in the technology construct, the development process needs multiple skills of all technology field; from programming to networking, hardware functionalities, and data management.

Even in cases, when there are hired, technical people in the municipalities, who could work on such new projects, there should be appropriate organizational changes regarding their working role. The personnel resources should be transferred from one project to the mobile service development, changing division and, possibly, acquiring new duties and new rights (authentication, positioning, billing, etc.). As Barney's (1991) resource-based research asserts, the resources that are required are not evenly divided among organizations, nor is it possible simply to transfer them from one department to another. That means that there is no single organization that possesses all the resources needed for a typical mobile service offering, and the operators, content providers and application developers need to work together (De Reuver et al., 2009).

After personnel evaluation and needs assessment, it should be decided whether external resources would be allocated for the mobile service provision. It should, also, be decided what kind of expertise the municipality lacks in, how many people should be allocated, and, of course, under which arrangement; would it be more profitable to hire some people, or sign contracts with freelancers and/ or established IT companies from the private sector?

5.3.4 Stakeholders & Partnerships

Apart from the developers under necessity for the intended mobile service in cases of inexperienced personnel of the IT departments of the municipalities, or their insufficiency for the actual service development, there are also other stakeholders in need in the mobile ecosystem while providing a new mobile service. The local authorities could not neglect their role in the mobile G2C production.

Analyzing the mobile environment, and generally speaking, an efficient infrastructure includes device manufacturers and vendors, network service providers, software developers, system integrators, wireless application providers, and content providers (Chen & Zhao, 2008; Xia et al., 2010). In the current research, it is more or less predefined that the content providers are the municipalities themselves; they are the ones that have the content management and decide about information or data that are accessible, manageable or reachable by the citizens. However, who is going to play the role of the rest aforementioned stakeholders is an issue that the principals of the municipalities should take care of.

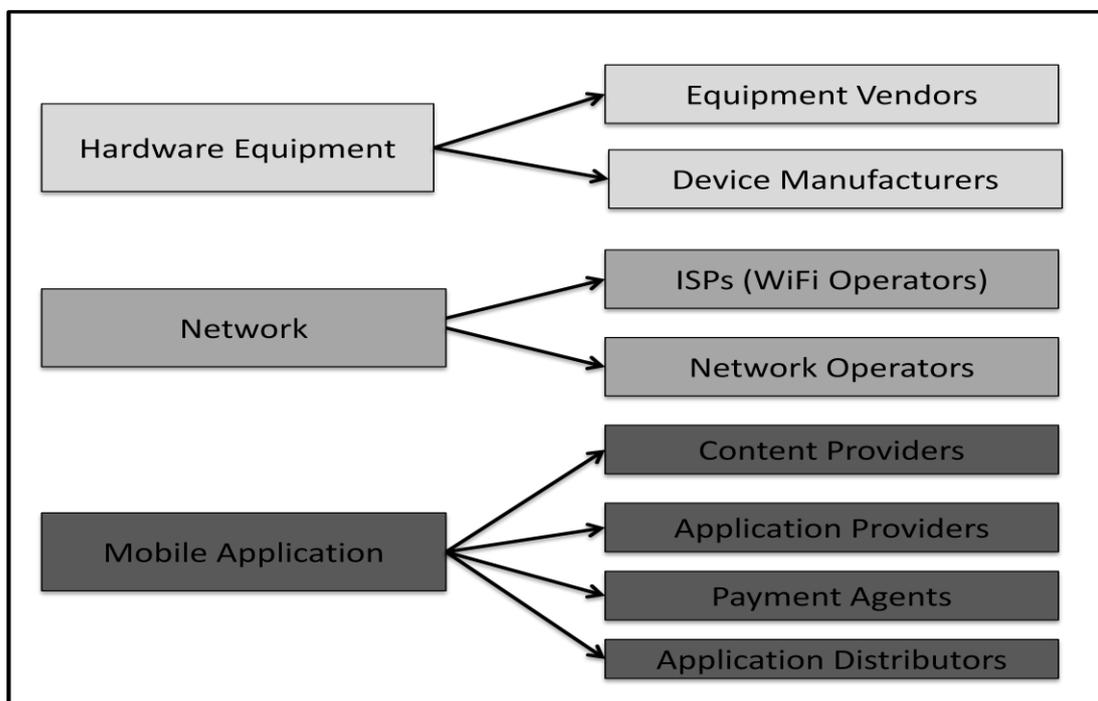


Fig. 5-6 The actors in the mobile application ecosystem

When the mobile application is the chosen technological channel of the service, then the payment agents and the application distributors are extra entities to be concerned. The stakeholders involved are shown in figure 5.6. Bank agencies, PayPal, VISA, etc. are some examples of payment agents when the provided service includes some kind of downloading, subscription or transaction fee. In addition, when the application distributor is needed and an application platform owner is selected, then the model of partnership should be decided. The platform owners usually play the role of the intermediaries having four different forms: dealer (resells goods), platform operator (connects sellers and buyers), infomediary (facilitates information gathering and procession), and trusted third party (certification agent) (Belleflamme & Peitz, 2010). In each of the above cases, the type of partnership with the application platform owner might vary influencing the charge, payment, or revenue of the citizens and the municipality in response.

In any case, the local authorities should keep doors open for partnerships and cultivate their extroversion. Sharma and Gutiérrez (2010) state that *“The capability to enable m-commerce success substantially depends on external collaborations and partnerships, which also extend the consideration of the roles and responsibilities of various actors and value their participation”*. One example of such a partnership model is the public-private partnership (PPP). Partners from private and public sector are by nature differently structured, have a different policy and business aim, and underlie different legislations. They could find, however, common grounds and yield positive results in the governmental information service value chains (Peinel & Rose, 2006). There are three real-life scenarios provided below of possible PPPs:

- The private sector operator is responsible for developing, financing, operating and maintaining the system, and the government starts to pay the transaction fees after the transaction level has reached a pre-agreed volume. The commercial company is allowed to make use of the information infrastructure for advertisements and e-commerce services for additional income. The private sector partner is highly motivated for a wider promotion and usage of the mobile services and, hence, the risk for the government is relatively low (Government of the Hong Kong Special Administrative Region, 2004)
- The commercial company builds and operates the mobile service, and charges the citizen per usage. Revenues can be shared between authority and private partner, or

retained completely by the private company as reimbursement of efforts (implemented in the US by National Information Consortium, Inc.) (Peinel & Rose, 2006)

- The private sector carries the cost of the initial implementation for achieving effectiveness of the technology. Further costs are covered by the government, unless the service is useless (Goldstuck, 2004)

Zhang (2005) highlights critical success factors of PPPs in infrastructure development such as favorable investment environment, economic viability, a strong technical consortium, a sound financial package and an appropriate allocation of risk via contractual agreements.

On the other hand, Peinel and Rose (2006) having studied two mobile government projects in the sector of mobile government- the APNEE³ and the USE-ME.GOV⁴ projects- conclude to the following PPPs problems commonly met:

- Private and public sectors have no objectives and investment in common
- They have different degree of engagement
- The private companies change their business interests and abandon the governmental services
- The competition of the government with the private market is forbidden by law; the government should not monopolize the supply position with regard to distribution, pricing, licensing and competition
- Commercial Companies want to have control over the information flow between citizen and government and, thus, influence and filter content and reach
- There is law concerning of passing the data to external parties
- There is lack in standard contracts negotiating the penalties when content provision fails or is not available in time
- The ownership of documentation in cases when the authorities wouldn't back critical and dangerous for the masses info published by information services (e.g. about air pollution, etc.) is doubtful

³ http://cordis.europa.eu/search/index.cfm?fuseaction=proj.document&PJ_RCN=5685682, accessed in November 2012

⁴ <http://www.formatex.org/usemegov/Paper1.pdf>, accessed in November 2012

- Misuse of individual data of the citizens by external parties intermediate the channel to the citizens

PPPs, of course, are not one-way direction of municipalities' partnerships options. The local authorities often check the possibility of collaboration with universities and research institutes. Students and researchers might find common objectives with municipalities' information technology department; the formers might find the opportunity to put into practice what they extensively study in the name of the public benefit, whereas the municipality could get lacking expertise. The academic labs could provide the society with knowledge and get infrastructure and financial resources from the local government. It's a mutually beneficial relationship that could prove fruitful in cases when funding is restricted and fresh cutting edge technology is in need.

Last but not least, the municipalities could create cooperative relationships with each other. They could cultivate the solidarity spirit on a national level aiming for the better image of the local government as a whole. Municipalities with pilot projects implemented and innovative actions could play the role of the leader transplanting the know-how of specific procedures and technologies. There are, also, business opportunities behind such a co-operation; municipalities-leaders, for instance, could rent specific infrastructure (servers, part of the network, hardware, etc.) or sell acquired knowledge and support for a mobile service implementation increasing achieving increased revenues. Bottom line, municipalities' co-operations and team work could have a positive impact on attracting funds from abroad.

5.3.5 Communication Channel

The communication channel as a construct associates with the meanings of service promotion and its maintenance. The concept behind the promotion strategy is to find the appropriate communicative style to reach the citizens, keep them aware of the new service, motivate them to use it, and engage them with its usage. There must be a strategy to convince the citizens about the service's value (Carter & Bélanger, 2005; Jaeger & Thompson, 2003), and then educate them about the scope and use of the new communication medium.

Various types of promotional media can be used to make the new service provision widely known. Advertising steps in traditional and electronic information channels, or newspaper announcements and word-of-mouth tactics are legitimate methods to accomplish this task.

The convincing methods vary depending on the service, the social and cultural conditions at every time. Services, which have a profound benefit and are easy to use wouldn't even need a promotional strategy. Citizens, also, that adapt easily to changes and follow technological innovations wouldn't be hard to be persuaded about new services' value and usefulness. In any other case, however, there is a two-direction way to attract and increase service's usage: make people use them by force, or reward them somehow after using them. Forcing the citizens to use the mobile service and abolishing the traditional one is a choice of political position. On the other hand, the reward process in case the citizens use the new service comes out after researches, which show that the reward factor affects the usage degree of a mobile service (Zarmpou et al., 2012).

As far as the education process is concerned, organizing seminars is a casual tactic for making people familiar with a type of service, its extra features and technological advances. Free tutorials could be available online, or on any other digital medium that could be easily disseminated (CD, DVD, advertising flash disks, etc.). Such a process would make it easier for the individuals to overcome feeling intimidated by the complexity of new technology. Bottom line, there should be enough incentives for the citizens to keep using the mobile services provided, and hence, encourage the municipalities to keep implementing the new services upgrading quality of public-citizens relationship.

5.3.6 Costs

The construct of cost expresses the total expenses done in order to plan, develop, test and put the mobile service into action. It is measured into monetary value after evaluating the cost of technology (equipment for hardware and software, and investments in network needs), human resources allocated for the project (extra salaries in case of working overtime, hiring new people, or paying the external contractors), the delivery medium (buying, developing or renting a delivery platform, expanding an existing one for extra functionalities support), dissemination and support strategies ("after-sales" support and maintenance, and marketing expenses for promotional and teaching reasons).

The existence of cost as a dimension in the business model development does not imply that the mobile service selection and its implementation process should definitely be cost-driven; the less it costs the better, does not always apply here. The project could be value-driven focusing on the value creation instead of the cost structures.

The existence of such dimension in the business model, however, could be helpful as a control asset to check the affordability of a service provision; it could draw a picture of the budget needed and decide on the feasibility of the project. Additionally, the cost-benefit analysis of the intended service could give a mature measurement of what is worth implementing and, hence, influence the decision process (decision of both the service selection and the implementation moves regarding the technology to be chosen, the key resources and the key partnerships).

5.3.7 Revenue Streams

Osterwalder & Pigneur (2010) claim that *“if customers comprise the heart of a business model, revenue streams are its arteries”*. If “customers” is replaced by citizens, then this saying applies in the research hereby. The organizations of municipalities should consider the value propositions, for which the involved entities would be willing to pay. Revenue streams reflect the cash generated from different segments and different pricing strategies. Costs, as it is expected, should be subtracted from revenues to create earnings.

Such a construct is vital for the financial sustainability and competitiveness of the service provided. Even, if there are initially financial (re)sources for the mobile service’s implementation, there should also be a way for the service’s later support and self-sustainment. Furthermore, revenues creation encourages further investments and leaves greater room for research and development of future similar services raising citizens’ quality of life and municipalities’ income. The revenue generated through a service over a period of time gives an indication of service’s ability to translate the value delivered exploiting technological innovations to financial and economic values. In other words, it indicates the level of the service business model appropriateness at that point in time.

National and international funds extraction for developing and sustaining the mobile services is the primitive goal of the municipalities. Having sufficient funding the service provision for specific needs satisfaction would be accomplished. The ideal case, however,

for the municipalities would be to create profit and achieve raising income through such services.

Based on the literature there are several revenue channels. The most popular one is advertising (Beuscart & Mellet, 2008; Kim et al., 2009; Okazaki, 2005;). Commercial advertisements might take several forms presented as banners on the side of the service's main area, pop-ups, and fly-by advertisements. The mobile operator Amena⁵ conducted a survey to measure the citizens' acceptance degree of advertisements on information services. The results showed that citizens do not expect to get content for free; hence, if they had to choose among (a) paying for the service, (b) advertising as a finance resource, and (c) no service at all, they would definitely prefer the advertisements (Peinel & Rose, 2006). In some cases, though, the authorities set restrictions regarding the type of advertisement; i.e, commercials for unhealthy products and actions (cigarettes, gambling, etc.) are usually forbidden (Peinel & Rose, 2004).

An alternative form of funding is sponsorship. It is about financial support by an external non-public party, with the service in turn showing the sponsor's name on the mobile interface, and/ or mentioning them in other official publications. Sponsor examples could be, apart from commercial companies, unions, chambers, public bodies and societies (Peinel & Rose, 2006).

If the local authorities are not covered with the aforementioned monetary sources, then they could ask for citizens' reimbursement. The revenue model in this case might vary among subscriptions, pay-per-use, pay-per-downloading, or transaction (Cortimiglia et al., 2011; Peinel & Rose, 2006; Xia et al., 2010). Of course, a mixed approach of the above charging models could be followed.

Finally, a new tendency regarding the charges of information systems services that could be also applied for the mobile services is the so-called "freemium" model (Doerr et al., 2011; Pujol, 2010; Riehle, 2012; Teece, 2010)- a word play of the words "free" and "premium". Freemium pricing model includes giving away the service for free for the customers (citizens in our case) to get acquainted with it and starting promoting it, possibly by word-

⁵ Primary Business action in Spain. Now renamed as Orange España after being bought by France Telecom España S.A.U

of-mouth. Then additional charging comes with extra valued services, premium usage, or an enhanced version of the service itself.

5.3.8 Social & Legal Issues/ Context

Practices from the United States have shown that decisions with respect to a system's architectural approach impact the applicability of all the services from a social restrictions context (Moore, 2005; Ogilvie, 2005) and vice versa. Current social situation on the country, where the service is planned to be provided, might restrict its usage and bring up new social problems and disabilities.

The maturity of the population with the mobile technologies and mobile devices usage clearly affects the access capability of the citizens to the services. Lack in familiarity with technical environments that demand deep knowledge of systems operation ends up with limited acceptance of the service. The citizens, as well, might include with ageing and disadvantaged portions of the population with limited computer skills, who may be intimidated by overly complex functional requirements (Rose & Grant, 2010). A lack of access to public services might finally increase the digital divide within the society. Looking at the other side of the coin, however, hi-tech cultural mentality might encourage highly designed services with extra provisions and detailed parameters.

National economical situation is another social factor that affects the choice of the mobile service type, its technical design and the citizens' satisfaction. In austerity times, for instance, transactions that require payments make people skeptic about their usage, as well as they might feel neglected by the government, which provides services affordable only by specific population segment. Additionally, if the mobile services are designed to be compatible only with specific devices, operation systems or platforms, they would force the citizens to spend and buy extra equipment. In such cases, government initiatives would confuse citizens' feelings.

Last but not least, an m-Government services implementation issue in Europe is the legal domain (Antovski & Gusev, 2005). Regulation should be taken into consideration in order to achieve competitive advantage through better management of the mobile services and secure citizens' transactions. McMillan (2010) suggests an indicative regulatory and legal mobile government framework, which includes, among others, the change of existing

service obligations to enable them through a portable mobile platform, the creation of mobile contracts (documents, signatures), the dealing of cross-jurisdictional issues and taxation implications, the consumers' safeguard (e.g. privacy; limiting collection, use and sharing of data), and ensuring financial transaction security.

Due to missing administrative regulations authorities often hesitate to chase mobile government solutions; it might be useless to invest time and money in a service that is, finally, officially unacceptable (Peinel & Rose, 2006). The European countries have not yet adopted the Law of Fair Mobile Information Practices, and in some cases the current legislative does not recognize mobile documents and transactions at all (Antovski & Gusev, 2005).

5.4 Synthesis of Alternative BMs and Final Model Proposition

The business model constructs have been analyzed in the previous sections, as well as the parameters of each construct. The construct parameters provide a variety of options for the nine dimensions (technology, personnel, partnerships, costs, revenue streams, delivery channel, communication channel, social context, legal context), which according to the dissertation herein, cover widely the most critical domains to be considered while organizing a mobile G2C service provision by the local authorities.

Deciding on the parameters of every construct to be followed for the targeted service implementation and dissemination is the process that leads to the business model proposition. Different combinations of the parameters give separate results of business model alternatives. Choosing the most diverse ideas of the generated ones gives various directions that the business model could take. Designing many strategic options representing different implementation and dissemination ways facilitate exploration.

The availability of business model alternatives is a tool for thought reaching the most desirable result to be accomplished. Advantages and disadvantages of a variety of solutions can be discussed until the final business model is shaped. After the synthesis of the alternative business models is complete, then the optimum one could be chosen.

The parameters decision process and the transition from the third stage of the framework to the fourth stage (see figure 5.1)- that is the selection of the optimum business model

among the proposed alternatives- is conducted by the “decision maker”. It is a part of a decision support system and the criteria for making such decisions are a black box for this research. Quantitative data from micro- and macro environment of the services and the municipalities at a given time period should be taken into consideration and, finally, give a criteria framework of how to choose among a variety of business model solutions. There are studies depicting the critical success factors of a service implementation plan, in the sense that satisfaction of specific factors predicts whether the service is going to succeed or not. A regularly cited one (McMillan, 2009) emphasizes on the following factors: education of the citizens, acceptance (in the sense of sharing, managing the new order, process participation and customer support), security (in the context of stability, storage & retrieval, integrity, and transparency of the service’s data), cost, and access (ability to access with no geographical limitations).

This is out of the scope of this thesis; the objective of the proposed framework is to suggest a general and longitudinal strategy tool that could be applied from municipalities without time- and geographical restrictions.

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Chapter 6.

Case Studies Research Methodology

This chapter aims to explain and justify the usage of case studies as the chosen methodology approach in order to conduct the empirical research and reach the objectives as they are set in chapter 1. Sections 6.1 and 6.2 defend for the selection of the specific methodology, presenting its features, its weaknesses, its strong points, as well as key designing issues regarding the implementation of the chosen methodology, particularly on the studied scientific domain. Section 6.3 explains the selection of the empirical research sample and analyzes the research design of the current case studies conduction in the municipalities.

6.1 The Methodology of Case Studies: Grounded Theory

Among the methodologies needed for the completion of this research, the one that is more complicated with regard to the need of the strict compliance with its theoretical principles as well as the proper managements of its conduction in order to provide valid results is the case study methodology. Additionally, case studies methodology requires extra analysis, as long as it is in the centre of the primary research of this dissertation collecting real-life data from the municipalities for further analysis and testing of the theoretical model. The following sections describe the methodology highlighting the advantages and the disadvantages taking into consideration the needs of the specific research aim of this study.

6.1.1 *Description of the Methodology*

The importance and contribution of qualitative research is recognized by multiple experts; Silverman (1993) claims that qualitative research can be used for getting familiarity with the research object before sampling and even before quantitative research. According to Denzin and Lincoln (1994), qualitative research is utilized for the interpretation and understanding of the processes that cannot be counted by statistics and frequencies. Moreover, Alvesson (1996) supports that the strength of qualitative research lies in description understanding

empowering new ideas and theories development coherent to the practical nature of the scientific domains. Case studies methodology belongs within the range of qualitative research types- although it could support quantitative researches in some cases (Yin, 2009, 1981).

As Dubé and Paré (2003) make clear *“Case research is useful when a phenomenon is broad and complex, when a holistic, in-depth investigation is needed, and when a phenomenon cannot be studied outside the context in which it occurs (Benbasat et al., 1987; Bonoma, 1985; Feagin et al., 1991; Yin 1994)”*. Case studies research is important and suitable for IS research when the interest is shifted to organizations rather than technical issues (Benbasat et al., 1987). Additionally, case studies give access to real-life events, allow deep investigation for better organization understanding, open the way to new ideas and new lines in reasoning. Finally, case research is appropriate methodology for exploration and hypothesis generation, while providing explanations and testing hypotheses (Dubé & Paré, 2003).

Yin (2009) makes clear that the methodology selection is based on the type of the research question. There are four distinctive research types: a) the explanatory research (trying to explain the presumed causal links in real-life interventions that are too complex for the survey), b) the descriptive research (aiming to describe an intervention and the real-life context in which it occurred), c) the illustrative research (aiming to illustrate certain topics within an evaluation in a descriptive mode), and d) the exploratory research (used to enlighten situations in which the intervention being evaluated has no clear, single set of outcomes). Case studies can serve all the above purposes answering each time different kind of questions.

Miles and Huberman (1994) recognize the usability of this methodology in exploring real-life situations and its power to provide deep and detailed information for a research object. Three basic objectives can be fulfilled through case studies (Sterns et al., 1998): a) applied research for problems solution, b) theory building, and c) evaluation of current situation.

6.1.2 Critical Points of the Methodology

When the research objectives have an exploratory character and intend to interpret and build theory regarding a complex problem in specific and real organization conditions answering questions such as “how” and “why”, then case studies is the most suitable methodology (Yin, 2009). Case studies can help when a researcher has no control over the actual facts, or when the central research interest is around a phenomenon, which has not been previously extensively studied and there is no deep knowledge about it. Based on Meredith (1998), “how” type questions aim to interpret or predict, whereas “why” type questions intend to understand the researched phenomenon. Research via case studies can lead to theory building, as well as set control assets of existing theories. Many authors have already recognized the case studies value for theory building and control and have applied this methodology in several research fields (Eisenhardt, 1989; Kennedy, 1979; McCutcheon & Meredith, 1993; Meredith, 1998; Voss et al., 2002).

The other side of the coin, though, indicates the blur points of the case studies. According to Yin (1994), these are the following:

- a) It is hard to make scientific generalizations. Generalization could happen, referring to general propositions, but not to populations; anyway, aim of the research is not the frequency visualization (statistical generalization) of a phenomenon in a specific population, but the theoretical conclusions through analysis.
- b) The time consuming character of the procedure, which ends up with piles of documents, which are hard to edit and analyze.

Luckily, supporters of the methodology have found solutions to overcome the above issues (Baharein & Noor, 2008):

- a) Case studies enable the researcher to gain a holistic view of a certain phenomenon or series of events, and can provide a round picture since many sources of evidence are used.
- b) The case studies can be useful in capturing the emergent and immanent properties of life in organizations and the ebb and flow of organizational activity, especially where it is changing very fast (Hartley, 1994; Flyvbjerg, 2006).

- c) Case studies also allow generalizations as that result of findings using multiple cases can lead to some form of replication.

6.2 Case Study Design

The case study design is the logical succession, which combines the data to be collected and the excluded results with the initial research questions (Yin, 2003). Careful case study design is crucial for avoiding the disadvantageous points of the qualitative methods as they are analyzed above, and especially the choice of wrong sample, not enough observation cases, and the data subjectivity.

6.2.1 Key Issues in Case Studies Designing

As it is already mentioned, case studies are an efficient way for building theories. A theory is a type of connection between constructs, within a range of theoretical propositions and hypotheses (Bacharach, 1989). According to Wacker (1998), theory consists of four elements: (i) definitions of terms and variables, (ii) a specific field (where the theory can be applied), (iii) a group of relationship types, and (iv) specific predictions. The existence of a theoretical/ conceptual model is necessary for the research data to be fruitful.

The objective of case study research, when used for theory building, is to recognize the important factors, their interrelationships, and find “why” such interrelationships take place (Handfield & Melnyk, 1998). As Miles and Huberman (1994) claim, in the research design process there should be the development of a theoretical model, which includes the fundamental constructs and their relationships. Yin (2009), also, relates the case study research with the existence of preliminary theory, which could guide the data collection process.

Hence, abiding by the case study research design rules as they are described above, the research basis of this study is the proposed conceptual framework, which is developed according to the theory and has been presented analytically in the previous chapters.

6.2.2 Quality of Research Designs

During the process of diligence of the research design, four of the most popular empirical research dimensions should be considered (Kidder & Judd, 1986; Yin, 2009):

- a) Construct validity: *“identifying correct operational measures for the concepts being studied”*,
- b) Internal validity: *“seeking to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships”*. Internal validity is meaningful only for explanatory or causal studies (not in exploratory studies, which is the case of the study herein),
- c) External validity: *“defining the domain to which a study’s findings can be generalized”*, and
- d) Reliability: *“demonstrating that the operations of a study- such as the data collection procedures- can be repeated, with the same results”*

Yin (2003), states that the aforementioned research quality criteria should be carefully adopted by the case study researches. He, also, presents several tactics to be applied in order to satisfy these criteria, as well as the project phases, when they should be applied, as they are presented in Table 6.1.

Table 6-1 Case study tactics for the design dimensions (Tate & Ellram, 2009; Yin, 2003)

Dimension	Tactic	Implementation During the Research
Construct validity	<ul style="list-style-type: none"> • Use multiple sources of evidence • Establish a chain of evidence • Key informants review draft of case study report 	<ul style="list-style-type: none"> • Data Collection • Composition of Results
Internal validity	<ul style="list-style-type: none"> • Pattern matching • Explanation building • Rival explanations • Logic models 	Data Analysis
External validity	Use replication logic in multiple case studies	Research Design
Reliability	<ul style="list-style-type: none"> • Use case study protocol • Develop case study data base 	Data Collection

The suggested tactics are implemented in this case study research, apart from the actions to secure internal validity. Such actions can be taken, because the under development research has an exploratory character.

6.2.3 Types of Designs for Case Studies

Yin (2009) distinguishes case studies researches in four types (figure 6.1), based on the number of case studies (single or multiple) and the units of analysis (single or multiple). Unit of analysis is related to the fundamental problem of defining what the “case” is. For example, in the classic case study, a “case” may be an individual; that means, an individual person is the case being studied, and the individual is the primary unit of analysis. Information about the relevant individual would be collected, and several such individuals or “cases” might be included in a multiple-case study.

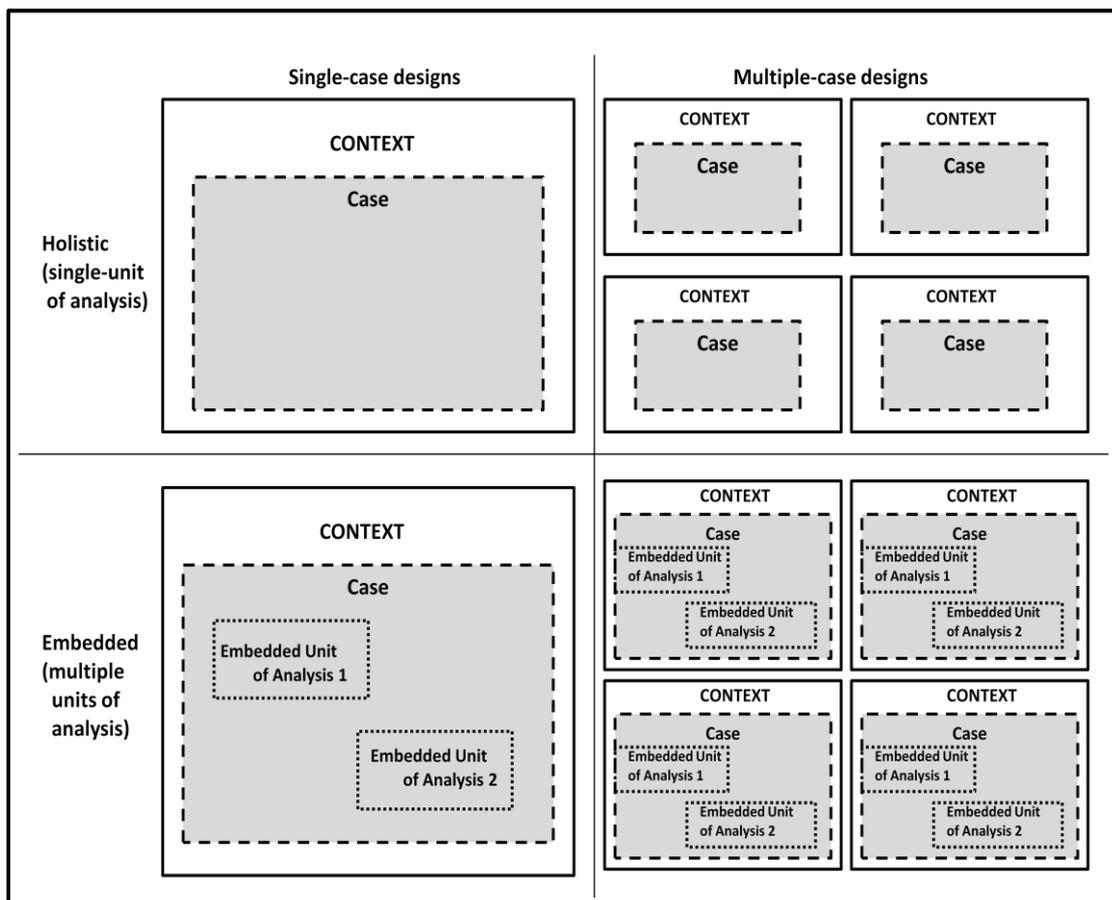


Fig. 6-1 Basic types of designs for case studies

In many researches, however, there is no single (holistic) unit of analysis, but they consist of several subunits, which are embedded in the primary unit of analysis offering wider ground for analysis.

Therefore, the resulting four types of designs for case studies are:

- a) single-case (holistic) designs,
- b) single-case (embedded) designs,
- c) multiple-case (holistic) designs, and
- d) multiple-case (embedded) designs.

Every type has its unique characteristics, advantages and disadvantages. For instance, type a) and b) (holistic case studies) are analogous to a single-experiment, and many of the same conditions that justify a single experiment also justify a single-case study. The single-case study design is an appropriate design under several circumstances, and five rationales are given below (Yin, 2009):

1. One rationale for a single case is when it represents the *critical* case in testing a well-formulated theory.
2. A second rationale for a single case is where a case represents an *extreme* case or a *unique* case.
3. A third rationale for a single case is the *representative* or *typical* case capturing the conditions and circumstances of an everyday or commonplace situation.
4. A fourth rationale for a single case is the *revelatory* case; such a case exists when an investigator has an opportunity to observe and analyze a phenomenon previously inaccessible to social science inquiry.
5. Finally, a fifth rationale for a single case is the *longitudinal* case studying the same single case at two or more different points in time.

There are other situations in which the single-case study may be used as a pilot case that is the first of a multiple-case study. However, in these latter instances, the single-case study cannot be regarded as a complete study on its own.

Types c) and d) (embedded case studies) are analogous to multiple experiments and the concept behind these types is implementing replication logic and not sampling logic (Yin, 2003). Such research types are believed by many researchers to provide generalization possibilities of the results (Meredith, 1998; Voss et al., 2002). Each case should be carefully selected so that it either predicts similar results (literal replication), or predicts contrasting results but for anticipatable reasons (theoretical replication). A few cases (two or three)

would be enough for literal replications, whereas a few other (four to six) might be designed to pursue two different patterns of theoretical replications. If the cases are in some way contradictory, the initial propositions must be revised and retested with another set of cases (Yin, 2009). The important step in all of these replications is the development of a rich, theoretical framework as it is already stated in the above paragraph.

6.3 Research Design of the Current Case Studies in the Municipalities

This research is chosen to conduct embedded, multiple case studies in order to have the right for safe generalization of the findings. Details of the case studies design are following in the next paragraphs.

6.3.1 Case Studies Selection

Given the novelty and complexity that characterize the research topic and the lack of established theory that coherently and completely explains it, the nature of this research is exploratory. A qualitative research strategy is followed based on embedded, multiple-case studies research.

The multiple-case studies research is designed deliberately, as described above, in order to pursue different patterns of theoretical replications (Yin, 2009). The cases are selected so that they predict various results but for anticipatable reasons; the examination of the advanced organizations is expected to bring out different dimensions to the immature organizations. In addition, the organization with high needs (the big in size municipalities) should raise other points in response. Of course, the similar cases are expected to give similar results (literal replications) since they are examined under the same conditions. Only with such replications would the original findings be considered robust. Each case's conclusions are considered to be the information needing replication by other individual cases.

In such a research the Greek municipalities are the cases being studied; among the 325 Greek municipalities, six are chosen as the sample of the research herein. In specific, two municipalities- the municipalities of Trikala and Heraklion- comprise the pilot case studies. These are the municipalities that are considered advanced regarding the mobile

government implementations and, hence, can provide the research with unusual amount of data (Yin, 2009). Such cases could help the researcher develop relevant lines of data collection regarding the content of the data and the procedures to be followed.

Furthermore, another two cases are the municipalities of Thessaloniki and Peristeri because of their population growth. Based on literature, large municipalities are likely to be more proactive and strategic in advancing m-government information systems (Moon, 2002). Additionally, the bigger the size of the municipalities the bigger the number of the human resources employed in the IT and hence, the higher the possibilities of effective new service production (Kalogirou et al., 2011).

Finally, examining the other side of the coin, two municipalities are selected because of the small population growth. The municipalities of Argos Orestiko and Evosmos, which have not even any electronic services evolved, are the last chosen cases; they can provide the research with useful material regarding the implementation of m-government services from a zero-level point.

Table 6-2 General characteristics of the municipalities participated in the research

	Municipality	Population Growth	New to m-Gov	No of IT Employees	Interviewees
Pilot Cases	Heraklion	175.000	No	8	1) Head of the IT Dpt.
	Trikala	76.000	No	25	1) Head of R&D- IT systems admin manager at "e-trikala" 2) Head of the IT Dpt.
Well-Populated Municipalities	Peristeri	300.000	Yes	4	1) Head of the IT Dpt.
	Thessaloniki	326.000	Yes	30	1) Head of the IT Dpt. 2) Head of the Topography Department

Medium/ Small Municipalities	Evosmos	130.000	Yes	4	1) Head of the IT Dpt. 2) Head of the IT Dpt.
	Argos Orestiko	14.500	Yes	1	1) Head of the IT Dpt.

6.3.2 Research Protocol

Research Protocol is necessary while designing the case studies research for guiding the research and avoid mistakes. It includes not only the research tool, but also the procedures and general rules to be followed in using the protocol itself and information about the sources of data (Yin, 1994). Its development is an essential procedure in order to increase reliability of the case study research, and its objective is to guide the researcher for case studies conduction according to the validity criteria. The sections of the case studies protocol are: an overview, field procedures, case study questions, and a guide for the case study report. As far as the case studies in the Greek municipalities are concerned, the research protocol is analyzed here.

An *overview* has been already presented in detail in the two paragraphs of this section above.

Field Procedure is the agreement between the researcher and the individual responsible for the communication from the municipalities' side regarding the time period of the research, the research tools to be used, the participants, and the anticipating results about the municipality and the units of analysis. For the research purposes, the main tool that has been used is the in-depth interviews. The interviews are addressed to the IT directors of the municipalities. Managers of the IT departments in the local authorities are judged to be the suitable people for answering questions regarding the mobile services development. They are supposed to be the ones to have the know-how, run after technological innovations, have ideas for technological advances, and propose and develop electronic and mobile solutions for the highest citizens' satisfaction. In most of the cases, the IT management position belongs to one person, and, hence, the number of the interviewee is one.

Case study questions: Interviews have been vital for the data collection. A guide of concrete, semi-structure questions has been used in order to analyze specific topics of interest while interviewing, to be quicker with busy interviewees, as well as to be able later on to compare the data having the same structure and answering the same questions (Simons, 2009). The questions have been around 40 in total (both open- and closed-type) following the conceptual model constructs, including information of interest about the municipality (its growth, personnel, etc.) and information about the interviewee. The interview questions are available in Appendix I at the end of the manuscript.

Guide for the case study report: A database has been created for the storage of the case studies data. Additional to the interviews' answers, field notes (Van Maanen, 1988), comments and side-remarks have been kept so as they can be further used in the analysis process or for their later verification if the case study is repeated with the same or different interviewee.

6.3.3 Variables Presentation, Data Collection and Analysis

The primary units of analysis of the case studies are the business model constructs possibilities of a single service that the municipalities have implemented, or how they plan to implement. Secondary units of analysis refer to the municipality's capacity regarding the human resources needed for the services' development and their funding, the electronic services maturity, as well as the organizations' and citizens' needs. Furthermore, information about the municipality (its growth, personnel, etc.) and about the interviewee is also provided.

The interviews are conducted after a long investigation of relevant documents and previous studies. The web-sites of all the municipalities have been visited in order to collect information about the advances in the municipalities' information systems and imprint the situation reflecting the Greek reality. Case studies from abroad are used as leading examples for chasing high standards of the organizational services.

Primary data of each case study is planned to be collected by means of an in-depth interview and the interviewee has the role of the key informant about the research questions suggesting other, more appropriate persons to interview or other sources of evidence. The questions (both open- and close-type) are semi-structured based on the

sources of evidence and the interviews are conducted with no time limits. If there are different people in charge of the operational, the management and the strategic level of the municipality's information systems, then they are all interviewed within the same municipality in order to raise the reliability of the study. However, in many cases, there are no many (or more than one) people responsible for the IS development and modernization of the municipality, and, hence, suitable for answering the questions.

The interviews have taken place during May 2012-July 2012 and their duration has been approximately 2.5-3 hours. Four of the interviews have been conducted face-to-face, whereas the rest of them took place via Skype⁶ seeing the interviewee via a webcam. Before the start of the interview the topic and the objectives of the study was analyzed.

Due to lack of prior logic models relevant to the topic of governmental mobile business models, the data collected will be analyzed based on cross-case synthesis techniques (Yin, 2009). The findings' analysis aims to find out whether different groups of cases appear to share some similarities. Hence, it is expected to draw cross-case typologies of the various business models dimensions that a municipality could follow in case it decides to offer new mobile services to the citizens. The groups of cases are organized abiding by the municipalities-sample selection criteria: the pilot municipalities, the big municipalities (with regard to population numbers), and small/ medium municipalities (with regard to population numbers). The case studies analysis finally concludes with a guideline that supports the decision and implementation process of mobile government information technology on behalf of the municipality.

⁶ Voice over IP service allowing people to communicate with peers using microphone, video through a webcam, and instant messaging over the Internet.

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Chapter 7.

Qualitative Research- Objectives Findings and Results Analysis

In this chapter there is a presentation and analysis of the data collected through the case study research. Such data collected through current and real-life applied conditions give food for discussion and validation of the GoMobi model. Without feedback and evaluation of the theoretical model and its constructs, the compliance with the modeled real-world phenomenon could not be verified. The use of real-life cases is one of the main evaluation methods in design-science research (Hevner et al., 2004; Pries-Heje et al., 2008).

More specifically, the provided interviewees' data is intended to be combined and analyzed in order to achieve the following milestones:

- Milestone 1- Evaluation of the 1st GoMobi stage:
 - 1) Evaluate the added value and importance of various mobile G2C service types as they result from the services' classification by function
 - 2) Evaluate the various value propositions both for the municipalities and for the citizens
 - 3) Evaluate the barriers of the local authorities impeding the implementation of the mobile services
- Milestone 2- Evaluation of the 2nd GoMobi stage:
 - 1) Comment on the model's constructs; propose additional ones or disregard existing ones
 - 2) Express preferences on various dimensions of each construct; judge the appropriateness of many of them
- Milestone 3- Evaluation of the 3rd and 4th GoMobi stage:
 - 1) Justify the necessity of the multiple alternatives' existence before conclude to the optimum business model.

These milestones are graphically presented in figure 7.1 below.

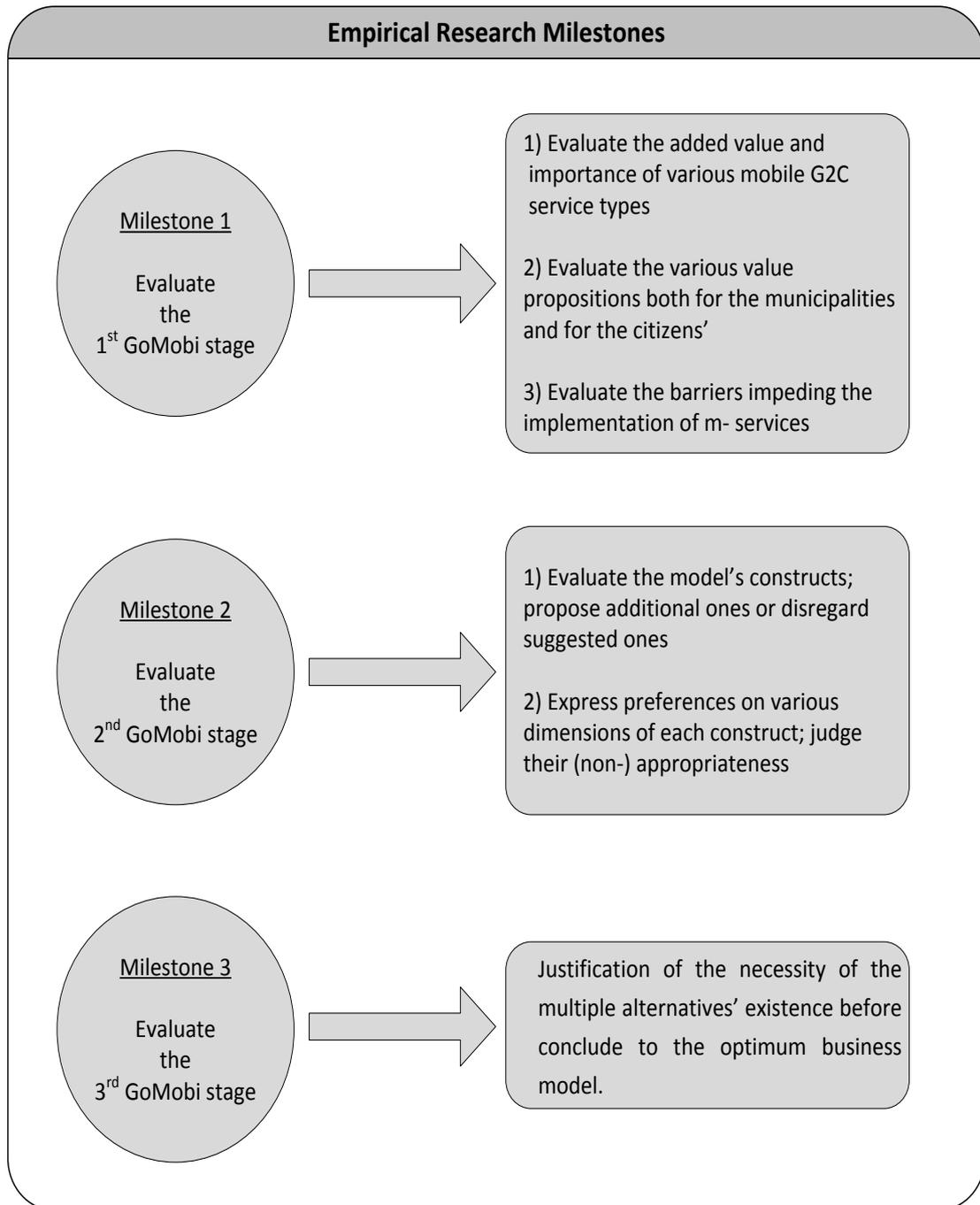


Fig. 7-1 Empirical research milestones

The multiple case studies data can lead to discussion about the variations between the municipalities' needs and optimum business model solutions in implementing m-G2C services. Comparisons are possible; similarities and contradictions can be highlighted setting various conditional situations under the services development.

In cases where no services have been implemented the models constructs and their dimensions are discussed based on simulation thoughts, testing the model as a brainstorming tool. In such cases, the framework functions as a real strategy tool, being evaluated through various comments and thoughts.

The chapter begins with the description of the cases- municipalities, which gives their fundamental characteristics. Section 7.2 presents analytical data gathered by the interviews regarding the identification of the suitable mobile G2C services (GoMobi 1st stage), whereas section 7.3 analyzes the collected data regarding the services' implementation & dissemination constructs (GoMobi 2nd, 3rd and 4th stage). Finally, there is a discussion section, which combines and interprets the findings of the empirical research achieving the settled goals and forming conclusions of the case studies.

7.1 Presentation and Analysis of the Sample Municipalities

In this section there is initially a presentation of the basic characteristics of the municipalities participated in the research. These characteristics are about the growth of population, the location, the employees, the infrastructure and the electronic services maturity.

As it is mentioned in the chapter 6 describing the methodology followed, the case studies are conducted based on the criterion of the size/ population regarding the Greek municipalities' structure. Hence, we have two categories of case studies: a) the highly populated municipalities, and b) the small- medium municipalities. This is because, based on the literature, big municipalities are more probable to be proactive in new services production and strategic in advancing m-government (Kalogirou et al., 2011; Moon, 2002). The small and medium municipalities, accordingly, seem to have common attitude towards the information systems technological advances (Ferraïos, 2013), and, hence, are considered same category of municipalities for the purposes of the research of this study.

Additionally, there is a third category of cases, which are the pilot cases. These cases are indicated for exploratory studies by the orthodox conduction of the case research methodology (Dubé, & Paré, 2003; Yin, 2009). The pilot cases may help the researcher to determine the appropriate unit of analysis, to refine the data collection instrument, and familiarize the researcher with the phenomenon itself. Therefore, the presentation of the

municipalities below follows this categorization of the municipalities' case studies, e.g. the pilot municipalities, the big municipalities, and the small/medium municipalities.

Pilot Municipalities

Municipality of Trikala: It is a municipality located in central Greece. Its population reaches the 76.000 citizens, and that ranks Trikala among the small-medium-size Greek municipalities. There are around 500 municipal employees, 25 out of which work for the IT development.

Trikala, despite of its growth, has been nominated for the Smart21 Communities for two successive years (2010-2011) by the Intelligent Community Forum (a global non-profit organization that studies the economic and social development of the 21st Century community taking into consideration the emergence of the broadband economy and its impact at the local level⁷). Additionally, one of the offered electronic G2C services- "e-Dialogos"- has been awarded by the European Commission, Information Society and Media, as the finalist service in the category of "eGovernment empowering citizens".

Since 2004, the e-trikala office, in cooperation with and in the line of the operational program "The Information Society" is acting in the fields of new broadband technologies, successfully implementing municipal projects. On the 8th of April, 2008, having the required experience, it was transformed into e-Trikala S.A., an emerging company, formed within the Municipality of Trikala. The Municipality is the basic stakeholder owning 99% while the rest 1% is owned by the local Chambers of Commerce⁸.

As far as the wired electronic information systems of the municipality are concerned, there are some advanced steps. There is updated information available on the official website regarding local news, new job positions, requests' process and evaluation of completion time, manuscripts and proceedings of council's decisions, participation in volunteer teams and local events, and analytical pricelists of local enterprises' charges. There are no online payment systems (traffic fees, local taxes) apart from buying tickets for local, sports and

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https://www.intelligentcommunity.org/index.php?src=gendocs&ref=Smart21_2010&category=Events&link=Smart21_2010

https://www.intelligentcommunity.org/index.php?src=gendocs&ref=Smart21_2011&category=Events

⁸ See <http://www.e-trikala.gr/en/aboutus>

cultural events. The citizens can apply electronically for participation in local teams (sports, educational, social), can send complains through the web, ask for certifications (birth registrations, marriage, etc.) and permissions (citizenships, applications for marriage), and apply for vital provision infrastructure (electricity, water supply, etc.). Additionally, there is vehicle tracking system using telematics. E-trikala, also, supports a dialogue web application having the form of a local forum allowing the citizens to take part in vital e-conversations and vote for municipal issues. Trikala local authorities, as an organization, have a twitter account announcing news and trends and giving citizens- followers the opportunity of direct communication. For the promotion of all the online services addressing to the citizens, there are online advertisements on various websites, accepting advertising, however, on electronic municipal service environments is forbidden.

Regarding the mobile services the Trikala municipality provides the following (Table 7.1):

Table 7-1 M-G2C services implemented by the municipality of Trikala

Service	How it works	Comments
Xenagos	Xenagos is a touristic platform that includes data such as tourist information. Additional information is provided which relates to any event or activity taking place within the city. The most important aspect of this project is that, the Municipality of Trikala has the opportunity to provide tourists with special PDA's connected to the Municipal free Wi-Fi network, downloading all the information requested. The pilot project is already running and the platform is constantly updated	The long-term future goal is to enhance the RFID technology in a way that all exhibits', monuments' and historical places' information, are automatically downloaded on visitor's devices as soon as they approach the place of interest
GIS	It refers to a digital guide that is offered to citizens through the use of the internet (specific portal) or their mobile phones. The Municipality of Trikala has digitized the street maps of the relevant areas and has recorded important urban planning data in every city block	
MobiPARK	mobiPARK tackles the organization and administration issues of an on-street parking service in a holistic manner: fees payment using SMS, municipality police administration and patrol scheduling, fine ticket issuing, fine collection, monthly parking cards administration, usage and performance statistics creation and dispatching (through web-platform). mobiPARK	mobiPARK is out of use since two years ago, because of low usage

	is fully developed by specialized Lab of the NTUA, Greece and it is offered to municipalities as a service	
Wi-Fi & WiMAX	There are 15 Wi-Fi spots since 2005, 5 out of which operate through the fiber optic network, 4 are Wi-Max and the rest 6 are Wi-Fi	Citizens and tourists show high usage. Wi-MAX, on the other hand, is out of use now, because of high license cost (15.000.000 euros)
e-Care Health Center	In collaboration with the General Hospital of Trikala, the program extends to the point of including private doctors, in cooperation with the Telehealth center's intervention for 24 hour direct communication among doctors-patients-Hospital. The Telehealth Project focuses on the major chronic diseases, like Cardiovascular Diseases (CVD); Asthma and Chronic Obstructive Pulmonary Disease (COPD). Tele monitoring services are provided to individual citizens with Chronic diseases: Individuals are equipped with light-weight handheld devices and record their vital signs at home which are then transferred (via the Telehealth center) to the municipality hospital over internet or GPRS and Bluetooth for review and feedback by the doctors. The project started in 2007 and is funded by the 3th Community Framework Support. It is conducted in cooperation with the Medical school of AUTH and Dept of BA of UOM	Up to now, over 300 medical cases have been successfully managed

Municipality of Heraklion: It is the capital of the island of Crete. Its population reaches around 175.000 citizens. The total municipality employees are about 1.100, and eight employees work for the IT department.

Although its economy is heavily dependent on tourism and agriculture and lagged behind Europe in technology, digital literacy and broadband penetration, today, it is home to the Science and Technology Park of Crete and one of Europe's top research centers, the Foundation for Research and Technology. Heraklion is nominated by the Intelligent Community Forum (a global non-profit organization that studies the economic and social development of the 21st Century community taking into consideration the emergence of

the broadband economy and its impact at the local level⁹) among the 2013 Smart21 honorees including communities from twelve nations.

The municipality is quite mature regarding the level of electronic services provision. Apart from the variety of information available through the website, electronic transactions are, also possible. The municipality platform supports online citizens' applications of complaints, birth registrations, enrolments in kinder gardens and various municipal events, as well as data registrations/updates of citizens' lists. Additionally, the municipality pushes signed certificates electronically. Citizens can also complete payment transactions through the "e-payments" service. Open forums, GIS maps and touristic information are some extra support electronic services. However, no advertisements and promotion of any of those services take place in any electronic or mobile services.

The mobile services provision, unfortunately, has not met such development in the municipality of Heraklion. The first attempt of mobile services is sending SMS notifications to the citizens informing them that their requests are complete and ready to be collected. There are also established three Wi-Fi spots providing citizens and tourists with free internet access on the move. Finally, the municipality in order to give a helpful tool to the tourists has participated in the construction of a smartphone application named "Heraklion City Guide". It is a useful application to give value added information (points of interest, shopping tips, museums, travel map for the island cruises, etc.) in multiple languages for both iOS and Android users. It is an initiative of the Heraklion Port Association supported by the local authorities.

Highly- Populated Municipalities

Municipality of Thessaloniki. Thessaloniki is the second biggest city in Greece after Athens. It is the centre of north Greece located by the sea and having a hub port pushing sea commerce and tourists transferring. The city has a population of about 326.000 people. The municipality occupies 4.500 employees, 30 out of which are hired by the IT department.

Regarding the electronic services offered by the municipality, there is a website disseminating updated information: emergency news, job positions, council's decisions, new actions, etc. The citizens are able to submit complaints/ suggestions and, they can,

⁹ <http://www.icf-foundation.org/?page=ICF>

also, apply online for birth registrations, but no other transactions (two-sided interactions) are feasible through the electronic platform. There is no electronic forum and networking possibilities, neither any electronic promotion moves. The mobile services are non-existent with the exception of a couple of Wi-Fi spots.

Despite the aforementioned, it is surprising how well-organized are the GIS services of the city. The electronic GIS system is complete providing not only citizen- and tourist-oriented information (fully mapped city with useful information like parking places, bike paths, points of interest, etc.), but also handy data for engineers and urban planning needs. Recently (in September 2012), relevant mobile application is available for free downloading in Apple Store and Google Play¹⁰. The application can be used for searches among 30.000 points of interest, for address finding, for routing in the city (from-to), and for engineering data provision.

Municipality of Peristeri. Persiteri falls between the big municipalities of Greece (according to the statistics today is the 4th biggest Greek city¹¹) located on the west borders of the country's capital municipality (Athens). The total number of residents exceeds 300.000. The municipality employees including non-permanent contracts is about 1.000. The IT department, however, occupies only four of those employees.

Hence, there is not enough emphasis given on the electronic development of the services provided to the citizens. There is an updated website disseminating information of general interest. The only extra e-services offered are the e-request and e-complaints functionalities of the platform. Electronic payments of traffic fees and local taxes are newly constructed services waiting to get citizens' feedback. No maps of the city, no networking, no electronic promotions, no GIS for the residents & tourists, no Wi-Fi, no mobile services are available. Given the web analytics measurement tools, the citizens do not seem in favor of using the electronic services with the exception of the informative posts regarding the necessary supporting documents for a specific kind of applications, and the job positions-related announcements.

¹⁰ There is analytical information on the website <http://gis.thessaloniki.gr>.

¹¹ Based on the official data the municipality announces on the website http://www.peristeri.gr/index.php?option=com_content&task=view&id=55&Itemid=83

Small-Medium Municipalities

Municipality of Evosmos- Kordelio. It is a municipality west of Thessaloniki center. Although, there are no official statistics today, its population based on the municipality lists is estimated around 130.000. The municipality employees are 636, and the IT department is supported by four people.

Regarding the electronic services provision, several actions have taken place. In 2007, an electronic platform has been developed serving not only the basic first-level needs of an informative website (uploading local news, emergency news, job positions, events, council's decisions, etc.), but also e-requests submission and participation in public consultation about current topics through electronic messages. Payments and two-sided transactions functions are not provided at all. The platform, also, supports massive SMS sending, but such functionality was never used. There is only one Wi-Fi spot available inside the city hall. There are digital maps of the area, which seem to be highly used by the citizens. There are no, however, GIS systems supporting urban data management.

Municipality of Argos Orestiko. Argos Orestiko is one of the typical small municipalities in the countryside. Located in the south-western part of Greece has 14.500 inhabitants and the local authorities consist of 71 permanent-contract employees, whereas there is only one person engaged in the information systems duties.

The official website of the municipality is well-organized, newly re-developed offering updated information. The citizens, however, do not seem very familiar with the usage of the electronic services; only a small portion of the population visits the website, whereas the majority prefers the traditional way for his transactions. It is quite impressive that there has been an attempt to establish WiMAX connection for free wireless internet access for the whole region.

7.2 Identification of the suitable m-G2C services by the municipalities

7.2.1 Services' Evaluation

Based on the m-G2C services typology presented in Chapter 3, the interviewees are asked about their opinion on the importance of implementing them. A five-point Likert scale is

followed in order to get the subjective evaluation of managers in the local authorities attaching the significance level within the range of 1 (Not important at all) to 5 (Very important).

After the interviewees deposit their ratings for each service separately, the average degree per group of services is deducted for each municipality participating in the research. The services are grouped according to the classification suggested by the author in Chapter 3. To recall, the proposed types of mobile G2C services (after the classification) are: Information Dissemination, Payments, Citizens' Applications, Issuing Signed Papers by the municipality to the citizens, Wireless Access, Traffic Solutions, Forum and Networking, Touristic services, GIS systems, and Promotional services. The results are available on table 7.2

Table 7-2 Evaluation of m-G2C services' importance

	Pilot Municipalities		Avg.	Big Municipalities		Avg.	Small/ Medium Municipalities		Avg.
	Trikala	Heraklion		Thessa- loniki	Peristeri		Evosmos	Argos Orestiko	
Information Dissemination	4,1	3,7	3,9	3,7	4,4	4,05	3,3	4,2	3,75
Payments	5	5	5	2	2	2	4	5	4,5
Citizens' Applications	4	3,8	3,9	4	5	4,5	3,14	3,71	3,4
Issuing Papers	5	5	5	4	5	4	4	5	4,5
Wireless Access	5	5	5	5	4	4,5	5	5	5
Traffic	5	5	5	5	4,8	4,9	4,4	3,6	4
Forum	5	5	5	3	2	2,5	3	2	2,5
Tourism	5	5	5	4,5	3	3,75	5	4	4,5
GIS	5	5	5	5	4	4,5	5	4	4,5
Promotion	2,5	2,5	2,5	3	1,5	2,25	3,5	3	3,25

Analyzing the data collected and giving emphasis on the reliability of the research, it is noteworthy that there are no interesting differences between the two cases of each group of municipalities (pilot, big, and small municipalities). This fact gives literal replications of

the cases (Yin, 2009) without having contrasting results, as it was expected by the theory of the research topic. Hence, grouping the municipalities according to the growth of population and, consequently, their potential mobile readiness (Kalogirou et al., 2011; Moon, 2002) seems to reflect a harmonized result regarding the municipalities' evaluation of various types of m-services' important role.

Having a closer look, the difference between the data of the replication cases is from zero up to one degree; this is accepted and can be easily explained due to the subjectivity of the area and the questions. Statisticians, usually, consider one degree of a five-point scale in qualitative researches as unimportant difference. The Likert scale is used as a bipolar scaling method, measuring either a positive or a negative response to the statements. The data are considered symmetric or "balanced" evaluating the general importance of specific m-services existence.

The exception lies in a wider degree-difference of the evaluations of the big cities regarding the "Promotion" and the "Tourism" services. The touristic services for the city of Thessaloniki seem to be quite important; with an average degree of 4.5, it looks like being among the priority services for this municipality. Peristeri, on the other hand, has given an average of 3 for such services showing a less concerned mood towards tourists. The promotional services, relatively, are of a medium importance for Thessaoniki (3 degrees), whereas Peristeri has a negative tendency towards them (1.5 degrees). This different tendency might be excusable due to the different attitude of the two municipalities. Thessaloniki tries to cultivate a touristic profile due to the city's geographical and historical interest. Peristeri, on the other hand, having no touristic interest, and focuses on a more urban style promoting city life facilities. Accordingly goes the explanation about the different opinion about the promotional services. The municipalities' habitants could be informed about new services and local actions by word of mouth; there is no need for the local authorities spending and consuming time and human resources on promotional tactics.

Figure 7.2 accumulates visually the results of the means per type of service per municipality from table 7.2. It is easy to exclude from the figure that the pilot municipalities show a more intense interest for all the types of services compared to the other municipalities. This could be combined with their deeper maturity regarding the electronic (and mobile) development within the local authorities. They might be aware of the benefits of the

mobile implementations, they might have overcome obstacles due to previous achievements and they might be more ready to decide and face a new mobile project. It is quite encouraging for the mobile future, the fact that the municipalities, which have already dealt with the mobile concept, show a strong support for mobile services.

The service of the highest preference for all the municipalities is the provision of free wireless access. Especially the small- medium size municipalities have given strong evaluation for the existence of Wi-Fi spots. It is a service, which upgrades the quality of life of both the citizens and the travelers. It is a separate technology, which does not require integration and change of the legacy systems, and it is possibly affordable for the cases of financial crisis of the municipalities.

There is also consensus about the high importance of the GIS services and the traffic services. The small municipalities, however, are not that fond of the traffic services as it is expected; obviously, the traffic conditions in the low-dense populations do not require emergent tools to avoid traffic problems.

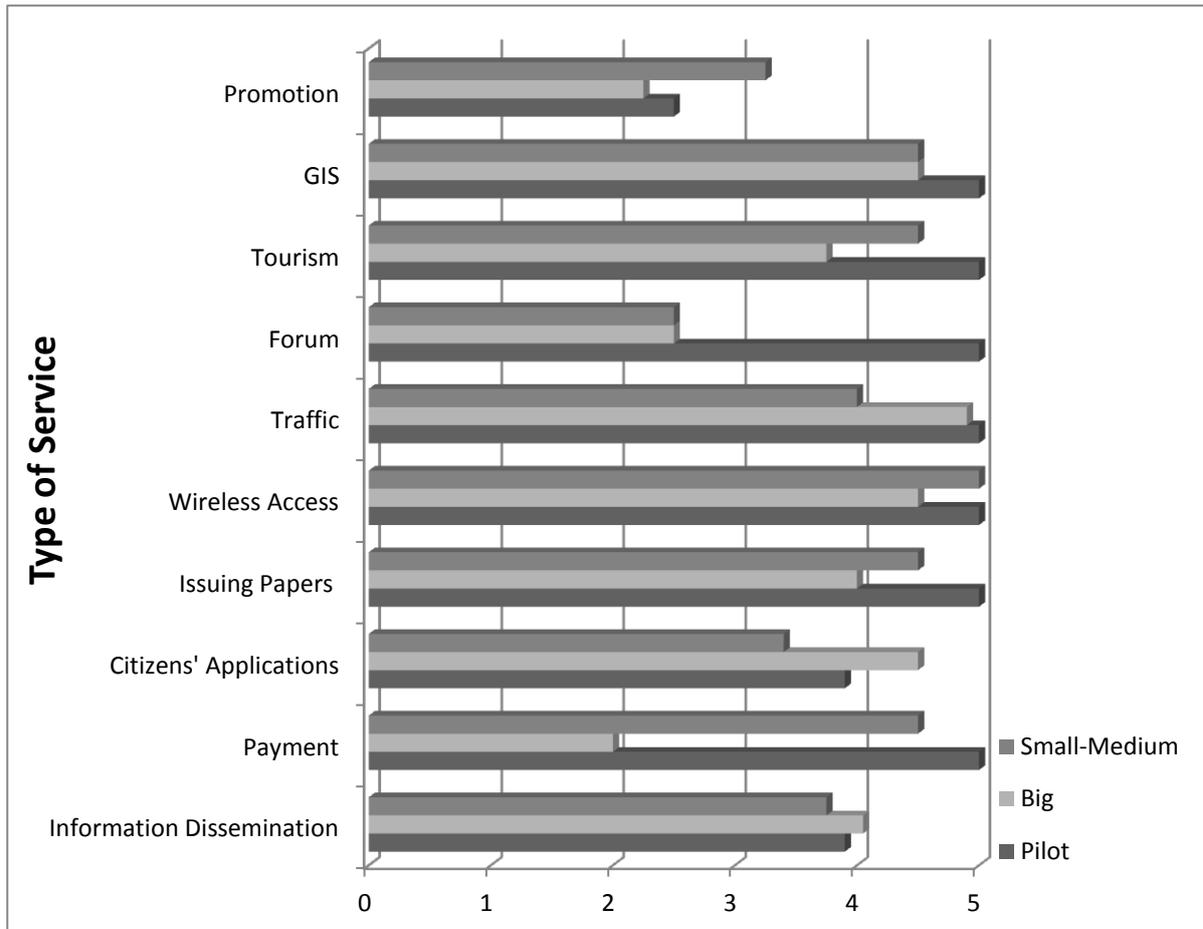


Fig. 7-2 Means of the types of services per municipality group

It is noteworthy that the big municipalities show a negative tendency regarding the importance of the payment services. Maybe, paying the local taxes, fees or buying tickets for local activities do not impose such big problems on the municipalities' functions, so as to launch mobile payment services. Furthermore, mobile networking and the establishment of citizens' mobile forums within the municipality seems to impress only the innovative municipalities. Pilot cases have rated highly top such services, whereas the other municipalities do not seem that interested.

Regarding the least important service, there is a consensus; all the municipalities' representatives have rated the promotional services as the least significant mobile service to be implemented. Marketing and dissemination services are not a priority for mobile government provisions.

After the evaluation of the mobile services' importance and regardless of the aforementioned services categories, the interviewees' are invited to choose the top priority mobile service, if they had to implement. The responses are based on usefulness/significance as well as feasibility of the service. They are shown on table 7.3.

Table 7-3 Top priority services according to interviewees

Municipalities	Top Priority Services according to interviewees
Trikala	<ol style="list-style-type: none"> 1) mobile parking 2) GIS services with emphasis on the tourists
Heraklion	<ol style="list-style-type: none"> 1) A mobile application that integrates various services from multiple stakeholders (hospitals, urban planning organizations, etc.) 2) Traffic information dissemination (informing people about next buses, free parking spaces, etc.)
Thessaloniki	<ol style="list-style-type: none"> 1) Information dissemination about emergency situations 2) Traffic information dissemination (closed streets, parking seats, etc.) 3) Touristic application
Peristeri	<ol style="list-style-type: none"> 1) A mobile application for information dissemination 2) Citizens' mobile applications
Evosmos	<ol style="list-style-type: none"> 1) Information dissemination for local activities, voluntary teams, etc. 2) Traffic information dissemination (closed streets, parking seats, etc.)
Argos Orestiko	<ol style="list-style-type: none"> 1) Information Dissemination about news, emergency situations and local activities

The respondent of the municipality of Trikala would first choose to implement a mobile parking service as they have already done. Although the service is out of function recently, the IT director insists that an enhanced version would help the citizens with the payment methods while being on the road earning time and money. Additionally, a better promotion of the service and training of the citizens would raise the statistics of usage. Secondly, they would give emphasis on tourist applications, in order to promote the local nature and attract travelers in the area.

The head of the IT department of Heraklion municipality, also agrees with the implementation of an application that solves many of the high traffic problems. His main concern, however, is the construction of an application with integrated services. He claims:

“There should be a common place with a unified interface, where citizens could serve most of their requirements. Health services, informative services, urban planning needs, traffic info, etc. could be embedded in one application. The back-end systems could separate the different data and process with them from the different departments from the municipality. The citizens, though, should have this provision. That is the digital vision for the mobile government future”.

The IT director of the municipality of Thessaloniki focuses on the mobile character of the services and what are the cases that people might use the mobile services. Hence, he concludes that emergency news broadcasting is one useful case, because citizens would not have the time and the medium to access such information under emergent circumstances. Traffic information dissemination (closed streets, parking seats, etc.) services are also likely to be both useful and appreciated by citizens while moving. One last group of people that are in high need of information with no access via the web at home/ office are the travelers; so, tourist services through the mobile devices would be considerably helpful.

The response from Evosmos is almost the same as above. Emergency news dissemination, local activities and openings in local team participations, as well as mobile traffic solutions would be of high usability for citizens going around the area of the municipality, or for visitors who are not well acquainted with the streets around.

Peristeri suggests the creation of a free mobile application, which is the new trend and would attract the citizens to use it. Such application should be helpful offering updated news to the public, as well as giving the opportunity for applying via mobile various requirements (e.g. asking for papers or deposit complaints). As a second suggestion, the IT department head proposes the installation of Wi-Fi spots upgrading citizens’ digital life and saving them money from private subscriptions to telecommunication companies. Wi-Fi spots would encourage the higher usage of a governmental application, as long as they could provide free access to the application from anywhere within the municipality.

As it is already mentioned, Argos Orestiko is quite immature electronically. Hence, the mobile development would start from SMS notifications about local news that are critical for all the citizens to be aware of; even those people, who do not use computers and do not visit the governmental websites could be informed by important, temporary issues via SMS.

A more advanced application would not be appreciated due to public's unfamiliarity with new mobile ways of conducting transactions.

7.2.2 Value Proposition for the Citizens

Why did exactly the IT department directors of the above municipalities would suggest the aforementioned services? What are the services' value propositions for the citizens and which one matters the most? What are the separate benefits from the public's size that are evaluated as important when a mobile project is in plan?

Such benefits that, in essence, are the motives pushing for the implementation of a mobile service come from the theory and are analyzed in Chapter 2. Such benefits have been classified into four categories: time saving, cost saving, availability & convenience, and relationship management.

The interviewees are required to evaluate each item of the four types of benefits following the five-point Likert scale as described above (5 for very important benefit- 1 for not important at all). The means of the benefits per group per municipality are available on table 7.4 below.

Table 7-4 Means of the types of benefits for the citizens per municipality

	Pilot Municipalities			Big Municipalities			Small/ Medium Municipalities		Avg.
	Trikala	Heraklion	Avg.	Thessa-loniki	Peristeri	Avg.	Evosmos	Argos Orestiko	
Saving Time	4	5	4,5	3,43	4	3,71	4,86	4,71	4,78
Saving Costs	3,67	5	4,33	3	4	3,5	4,33	3,33	3,83
Availability & Convenience	4	4,88	4,44	4	3,88	3,94	4,75	4,38	4,56
Relationship Management	3,67	4,8	4,25	3	4	3,5	4,5	3,5	4

As it is explained in paragraph 7.2.1, the means of the citizens' benefits evaluation do not have significant differences for the municipalities of each of pilot, big, and small-medium

municipalities. Hence, the data could be analyzed per municipality group without abusing statistical rules.

A graphical presentation of the results of the evaluation of the benefits for the citizens given by the municipalities groups is presented in figure 7.3 below.

There are no significant differences between the various benefits. All of them are considered quite important. All the municipalities have rated most of the motivational factors between 3.5-4.5 degrees. The most highly evaluated are the benefits of time saving and availability & convenience. Finally, it is noteworthy that the pilot municipalities have given a higher score to all the benefits in comparison to the other ones.

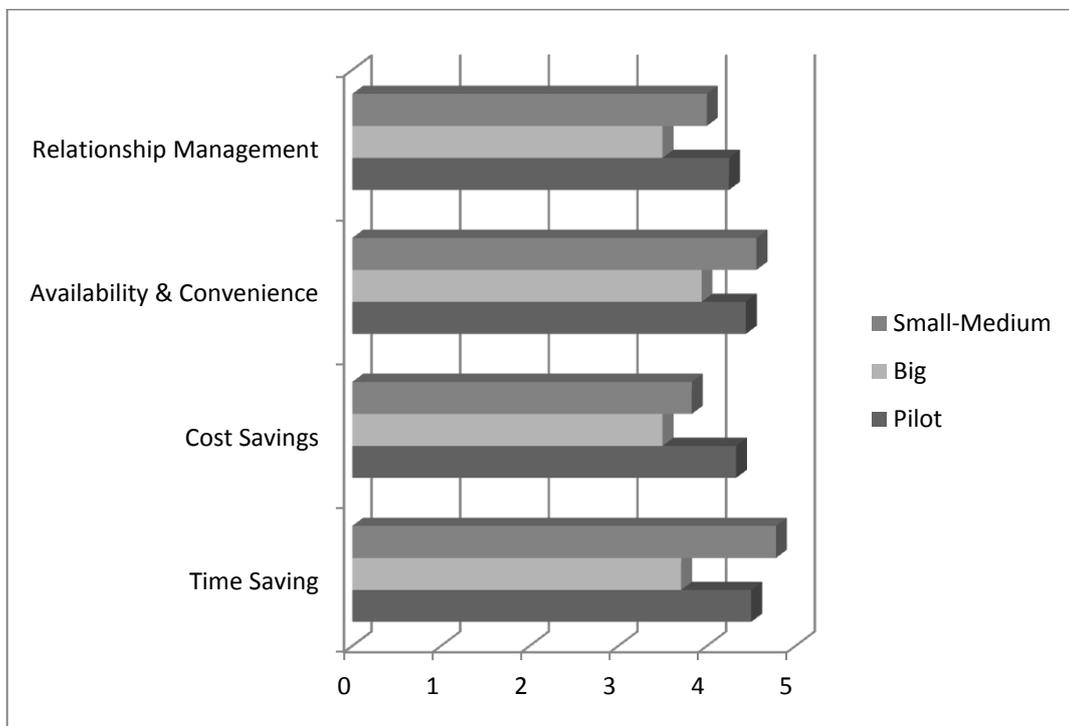


Fig. 7-3 Means of the types of benefits for the citizens per municipality group

7.2.3 Value Proposition for the Municipality

The m-G2C services are advantageous not only for the citizens, but also for the municipality's functionalities. The choice of the appropriate service to be implemented should be also examined based on its value proposition to the municipality.

The benefits for the municipalities derive from theory and from practices of conducted projects. They are analyzed in paragraph 2.4.2 and can be grouped in: changing working conditions (the role of the employees, different demands, etc.), cost saving (reduced employees, reduced administrative costs), general efficiency (more efficient and faster processes, etc.), improving the image of the municipality (to earn citizens' trust & loyalty, to impress the foreigners and attract tourists, attract entrepreneurial activities and investments, to attract European projects).

The means from the evaluation process of the importance of the above benefits are available on table 7.5.

Table 7-5 Means of the types of benefits for the municipalities per municipality

	Pilot Municipalities		Avg	Big Municipalities		Avg.	Small/ Medium Municipalities		Avg.
	Trikala	Heraklion		Thessa-loniki	Peristeri		Evosmos	Argos Orestiko	
Changing Working Conditions	3,67	3	3,33	2	2	2	2,67	3,33	3
Saving Costs	3,5	2,5	3	2	3	2,5	2	2	2
General Efficiency	4,33	4,33	4,33	4	5	4,5	5	4	4,5
Improving the Image of the Municipality	3,25	3,25	3,25	3,75	4,5	4,13	4	4	4
Entrepreneurial Activities	3	2	2,5	2	4	3	2,5	3,5	3

As happened above, the analysis can be conducted in municipality groups, as long as the municipalities of the same group seem to have inclined tendencies. The results with the means from the evaluation process per municipality group are shown graphically in figure 7.4 below.

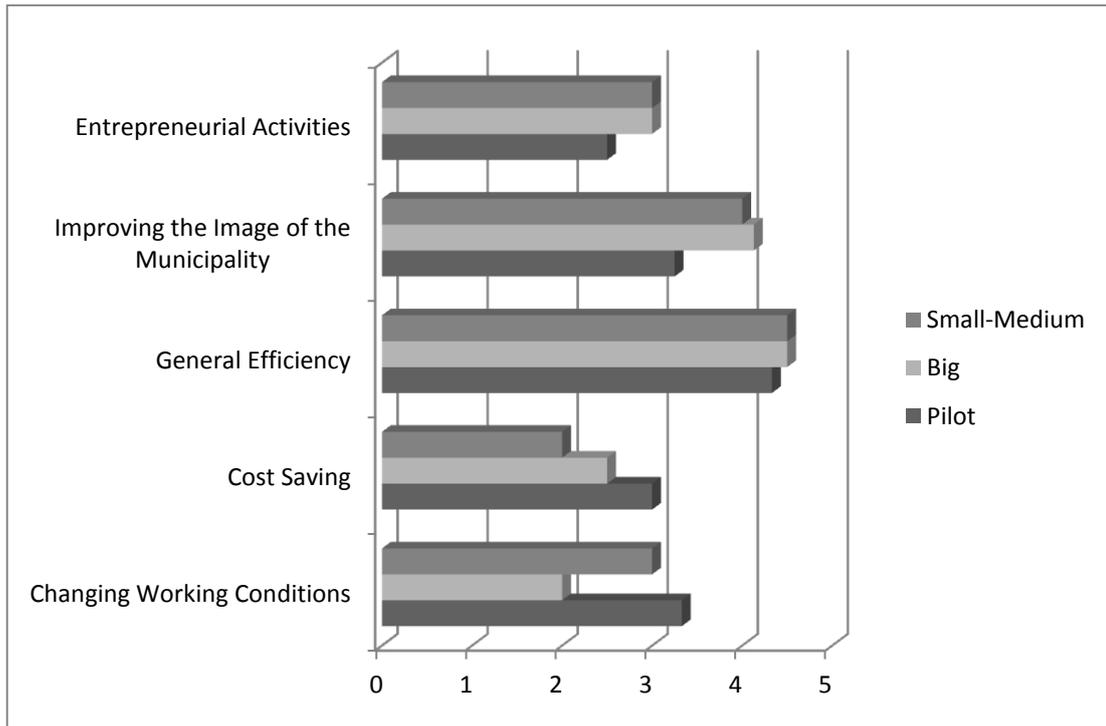


Fig. 7-4 Means of the types of benefits for the municipality per municipality group

It is obvious from the figure that the most highly evaluated motive for all the municipalities is improving the general efficiency of the transactions and the functionalities. The municipalities are also interested in improving their image in order to attract European projects, tourists, entrepreneurial activities, and co-operations with other municipalities (maybe pilot municipalities). The pilot municipalities have not emphasized on this factor in comparison to the other municipalities, probably because they have already initiated the innovative character of the services provided.

Changing working conditions is not a concern of the big municipalities. Finally, it is noteworthy that the small-medium municipalities do not emphasize on cost savings. Maybe, the smaller the municipality the less the employees and the administrative costs anyway.

7.2.4 Barriers impeding the m-services implementation

As long as the evaluation of the sample municipalities regarding the benefits of the m-G2C services implementation is quite encouraging, what are the barriers impeding it? What are the factors that counteract the value proposition of the governmental mobile services?

Table 7-6 Means of the types of barriers for the m-G2C services implementation per municipality

	Pilot Municipalities		Avg	Big Municipalities		Avg.	Small/ Medium Municipalities		Avg.
	Trikala	Heraklion		Thessa- loniki	Peristeri		Evosmos	Argos Orestiko	
Behavioral	2,75	3,4	3	2,8	2	2,4	3,4	3,4	3,4
Technological	2,5	2	2,25	2,83	2,17	2,5	2,17	1,67	1,97
Organizational	2,57	2,71	2,64	4,57	4,14	4,36	4,71	4,14	4,43
Financial	2,5	1,5	2	4,5	3,5	4	3,5	4,5	4
Regulation	3,67	3,33	3,5	5	5	5	5	4,67	4,83

Such factors are mentioned in detail in paragraph 2.4.3. Classifying each disincentive into impeding factors categories, the following categories are suggested in this research: behavioral (lack of trust and security, fear of spamming, lack in familiarity, difficulty in learning how to use them), technological (small screen, battery life, integration methods, network problems, etc.), organizational (lack of sustainable business models, innovation of the authorities, no infrastructural investments, no IT personnel, no citizens-oriented goals, etc.), financial (telecommunication and development costs), and legal/ regulation factors (no legal electronic signature, law cover in doubt cases, etc.).

The interviewees are required to evaluate each of the above factors based on a five-point Likert scale (1- not important at all- to 5- very important). The means are presented in table 7.6 above. The responses from the municipalities of the same municipality group do not present noteworthy differences, and so, they are visually described in figure 7.5.

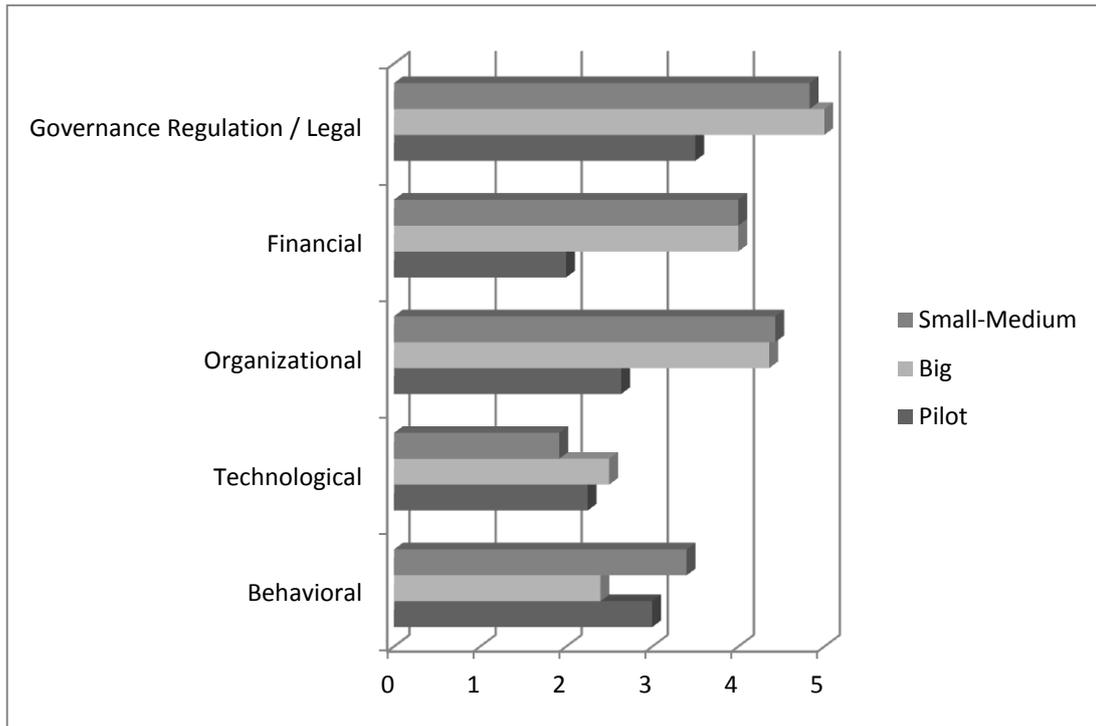


Fig. 7-5 Means of the categories of barriers for the m-G2C services implementation per municipality group

As could somebody realize from the above figure the most important impeding factor is the unbalanced legal environment of the country regarding the verification of the electronic and mobile transactions context. If the electronic signature does not obtain the legal power, no mobile requirements or signed papers can be officially processed. Additionally, the laws regarding mobile transactions and exchange of data and official documents are not advanced enough to legally protect the “victim” in problematic situations, or settle litigations.

Equally important are the organizational issues. The IT headers of the municipalities attribute big responsibility part to the authorities’ and mayor’s innovativeness. The lack of sustainable business model plus the lack of appropriate knowledge of the technical employees in case of building mobile projects also hinders such processes. Changing demands and responsibilities on the existing employees in the case of mobile processes existence (process re-engineering) seems an intimidating procedure.

Financial issues are also highly ranked, although they are not as important as could somebody expect. The header of the IT department of Heraklion clearly states: *“It is clearly a matter of administration decisions. Technological and financial issues are an easy excuse.”*

Money can be found through national and international funds". Technological issues, on the other hand, are the least concerned barriers.

Finally, it is remarkable that the pilot municipalities have given the lowest importance in all the impeding factors in comparison to the other municipalities with the exception of the behavioral subjects.

7.3 Services' Implementation & Dissemination Constructs

Continuing the presentation of the data collected through the case studies research this section introduces the interviewee's responses regarding the implementation and dissemination constructs building the suitable business model for the governmental mobile services development. Such data excluded from the field and coming from real-life experiences and opinions could effectively test the constructs of the proposed theoretical GoMobi framework.

7.3.1 Technology & Delivery Channels

Municipality of Trikala has used the following technologies for the existing services:

- For "Xenagos" service: A web platform has been developed to store and manage all the relative information. The users should be equipped with PDAs to have access to the service. The PDAs can connect to the Municipal free Wi-Fi network, downloading all the information requested.
- GIS: A mobile browser is used for having access to the digitized maps.
- "MobiPARK" service: A web-platform is used by municipality police administration and patrol scheduling, fine ticket issuing, monthly parking cards administration usage and performance statistics creation and dispatching. The mobile part of the service refers to the citizen's side regarding the payment method, which is conducted via SMS charging their bill of the telecommunication company.
- Wi-Fi & WiMAX: Regarding the Wi-Fi connection the network's provision is the simple ADSL line. The municipality pays the telecommunication provider and provides free access to the citizens free of charge. WiMAX is hard to be implemented and sustained. Not only are the equipment and implementation costs high, but also hard

to get license is required. Such licenses provisions to the municipalities oppose to the telecommunication companies' interests.

- "e-Health Care" service: Individuals' vital signs at home are recorded through light-weight handheld and then transferred (via the Telehealth center) to the municipality hospital over internet or GPRS and Bluetooth for review and feedback by the doctors. To sum up there is need for specialized handheld devices and then GPRS or Bluetooth (or internet) communication for the tele-transfer of data.

The above mobile channels have been chosen, due to availability at the time of the services' development. The technology of mobile applications was not mature enough since four or five years ago, when the above services have been designed. The mobile applications compatible with smartphone operation systems, however, are considered user-friendly and easy-to-use, and there is intense interest for future implementation.

The content of the services is the municipality's responsibility. The developers have no involvement in the publishing content.

The needed infrastructure and equipment for the developed services so far are: 35 servers, routers and network connections. As far as the cases of the mobile applications are concerned, the municipality's needs in infrastructure would be re-evaluated and new ones would pop up. For example, there would definitely be need of many Wi-Fi spots around the city for citizens' free access to the application. Additionally, many private companies would be involved offering hosting to the services, because the municipality's capacity would not be enough.

Municipality of Heraklion has used so far only SMS services. The University of Crete was in charge of the platform development, whereas the local authorities are the ones to decide about the actual content of the service. The simplicity of the service also lies in the needed infrastructure; the municipality's server and simple cell phones are enough for such function. The Wi-Fi spots are easy and useful to be provided. WiMAX antennas, on the contrary, are expensive and present bandwidth problems, unless somebody puts plenty of them (increasing the cost). The municipality is fond of the new trend of mobile applications; that is the reason of accepting vital contribution to a private initiative project.

Municipality of Thessaloniki is one of the very few Greek municipalities who have experience of mobile application provision. The municipality provides a mobile application for both Android and iOS, offering GIS services enriched with points of interest and city suggestions. They intentionally chose such technology because it is modern and can be exploited by tourists.

The design of the service, as well as the content provision has been executed by one municipality's employee. The development though was delegated to three different private companies. No extra infrastructure is needed, because everything can be supported by the existing GIS web infrastructure.

The delivery channels of the application are "Google Play Store" and "Apple Store". The delegated for the development private companies have their own agreement with the delivery markets. The municipality has no involvement in such agreements.

The Wi-Fi spots are also a technological choice based on usefulness to tourists and simplicity in infrastructure. Additionally, Wi-Fi spots require no extra maintenance care by the municipality's employees.

Municipality of Peristeri, Municipality of Evosmos and Municipality of Argos Orestiko have never been involved so far in a mobile service development. If they had to choose among the mobile channels from a technology point of view, they would prefer the mobile applications; they are pure mobile, trendy, and easy to use even by people not very familiar with new technologies. However, the IT directors are skeptic using them because of several issues such as integration and sustainment know-how. Regarding the existing infrastructure the municipalities own servers and networks' equipment.

7.3.2 Personnel

The **Municipality of Trikala** has 25 employees working for the Information Systems development. Most of them (22) are hired by "e-Trikala", an emerging company formed within the municipality, dedicated to the electronic and mobile services' needs. They are specialized in Computer Engineering and Informatics (10), Business Administration (1), Finance (3), Psychology (2 psychologists for the health services), and many technicians. They have at least 3 years of experience and they are quite young (25-35) having fresh ideas

and appetite for creative job. They are a cross-functional team covering the needs in software development (2 people are programmers), hardware and network needs, as well as customer care/ support. In case of new mobile services development, they have no need to hire new personnel; if they need something temporarily, they could have a contract with experts for specific time period. The three employees who work for the official IT department of the municipality (not for e-Trikala) are engaged with the support of the municipality's systems; the development of new services is not within their duties.

Municipality of Heraklion occupies 8 employees in the IT department. They have all studied Informatics and Mathematics apart from two persons who have not studied and they are dedicated to take care of technicalities (cable and electrical connections, etc.). The employees are responsible for the offices equipment, the services maintenance and the established networks within the municipality. They have an average of fifteen years of working experience. In cases that new mobile services construction are required, the municipality would not need to hire new developers. They would outsource the project to a private company having the whole responsibility for the project; this way the hired employees would not be allocated to new projects distracting them from their existing tasks. Nevertheless, the existing employees do not have the technological know-how of developing new services.

Municipality of Thessaloniki occupies around 30 employees, who are all specialized in computer science having both academic and industrial working experience. They focus on the existing system management, helping the users of the existing information systems, designing and implementing new dimensions of the existing services, and the management of the communication (requests) between the multiple departments of the municipalities and various external information systems contractors. The header of the IT department highlights that: *"99% of the above responsibilities focus on information and data needs of the municipality's departments and not the citizens' better satisfaction"*. The current personnel could definitely not support the mobile development of the municipality. In such scenario, there would be need for at least 5 new people, highly experienced in mobile software development, young with innovative spirit.

Municipality of Peristeri has four employees, three academically experts in computers and one technician for technical support. Their role within the department refers to maintenance and management of computer systems and support of the information

systems of the various municipality departments. Two of the employees are specialized in hardware systems and only the other two could be allocated for mobile software development. Although they have quite high long working experience, they have no experience in new technologies. Hence, the easy solution for the implementation of mobile services is outsourcing the project to an assigned company under the conditions of a contract. The experts company can be fully responsible of the project and deliver a fully-functional service under specific payment.

Municipality of Evosmos regarding the IT personnel has exactly the same conditions with the municipality of Peristeri described above. The four employees are allocated for covering current needs of the municipality. The mobile services provision would be perfectly delivered by external contractors. This also happened previously with the development of the platform providing the electronic services.

Municipality of Argos Orestiko has the smallest possible IT department. Only one person facilitates the department and serves the municipality needs of the computer and network systems. The only employee is also responsible for updating the web portal. It is obvious that the mobile services provision is a project that needs extra people working on it. Possibly the assignment to an external company would be the easiest and more direct solution.

7.3.3 Partnerships

The **Municipality of Trikala** has entered into the following collaborations:

Table 7-7 Established partnerships of the municipality of Trikala

Who?		Y/N	Why?
Public Agents	Other municipalities from the country	✓	They sell consultancy to another 25 Greek municipalities
	Other municipalities from abroad	✓	In cases of European projects
	Universities/ Research centers	✓	Co-operation with Greek universities for research programs and pilot projects (e.g for the tele-health service)

Network	Wi-Fi Operators	x	No, because they implement the Wi-Fi services themselves
	Network Operators	✓	“Cosmote” and “hol” are the operators providing the optical fiber and the ADSL lines
Hardware Equipment	Device Manufacturers	x	No need so far
	Equipment Vendors	x	No need so far
Mobile Application	Private Development Companies	✓	In cases of high data volume hard to manage in specific time or in cases when a fund program imposes the private sector involvement, there is need for extra contractors (bidding winners)
	Application Distributors	x	No, because no application implemented so far
Payment Agents	Banks (for credit cards)	✓	Co-operation for tickets booking (Piraeus Bank)
	VISA/ PayPal/ etc.	✓	Co-operation for tickets booking (Piraeus Bank)
	Telecommunication Providers (for SMS)	x	No need

In any kind of the above co-operations responsible for the development, costing, content provision, functioning and maintenance of the services are the municipality itself. There are contracts with each of the partners (most usually defining their payments after bidding process). After the predefined payment, the partners have no involvement in the project or the service. Respectively, all the cost and revenue sharing is a responsibility of the municipality. In cases of a private company participation in the development process of a platform, the company has no right to use it for its own profit (e.g. advertisements).

The **Municipality of Heraklion** has entered into the following collaborations:

Table 7-8 Established partnerships of the municipality of Heraklion

Who?		Y/N	Why?
Public	Other municipalities from the country	x	No need

Agents	Other municipalities from abroad	x	It did not happen
	Universities/ Research centers	✓	Only for e-services so far
Network	Wi-Fi Operators	x	No need
	Network Operators	x	No need
Hardware Equipment	Device Manufacturers	x	No need
	Equipment Vendors	x	No need
Mobile Application	Private Development Companies	✓	For the platform supporting SMS sending. It is also embedded with the back-end systems.
	Application Distributors	x	No need
Payment Agents	Banks (for credit cards)	x	No need
	VISA/ PayPal/ etc.	x	No need
	Telecommunication Providers (for SMS)	x	No need. The private company developing the platform for the SMS sending is responsible buying monetary units from a telecom operator. He charges this cost within his final payment

The **Municipality of Thessaloniki** has entered into the following collaborations:

Table 7-9 Established partnerships of the municipality of Thessaloniki

Who?		Y/N	Why?
Public Agents	Other municipalities from the country	x	No need
	Other municipalities from abroad	x	It did not happen
	Universities/ Research centers	x	No need
Network	Wi-Fi Operators	x	No need

	Network Operators	x	No need
Hardware Equipment	Device Manufacturers	x	No need
	Equipment Vendors	x	No need
Mobile Application	Private Development Companies	✓	For the development of the service. Its design has been accomplished by the municipality's employee (The head of topography dpt.)
	Application Distributors	x	No need. The development companies are responsible to arrange with the distributors (Apple Store & Play Store)
Payment Agents	Banks (for credit cards)	x	No need. Downloading is free for the citizens
	VISA/ PayPal/ etc.	x	No need. Downloading is free for the citizens
	Telecommunication Providers (for SMS)	x	No need

Municipalities of Peristeri, Evosmos and Argos Orestiko have never developed any mobile services, and, therefore, they have not involved in such partnerships. They have co-operated with private companies before for the electronic services implementation. Such co-operations are not taken into considerations (although they have similar context and could conclude to similar results), because are considered out of the scope of the existing thesis.

To sum up, the local authorities so far, have only committed partnerships under competition (bidding). The most profitable tender signs a contract with the municipality under specific payment and responsibilities. Other than that, the local authorities are fully responsible for the completion and future of every project. Within the context of this partnership model, the interviewees are asked to evaluate the importance of possible problems between the stakeholders that might hinder the collaboration booming.

The author has accumulated possible reasons hindering the partnership commitments of the municipalities and provides a full list of issues excluded from theory and case studies abroad. The list of possible problems, as well as the interviewees' evaluation is shown on table 7.10 below.

As could somebody notice from the average degrees coming from the evaluation process there are no significant problems raising through the existing partnership model. As long as there are specific contract, there is no high concern about high private sector's degree of engagement, or abandoning the project midway. Additionally, there are neither legal and regulation issues (e.g. lack in standard contracts negotiating the penalties when content provision fails or is not available in time, ownership of documentation) nor security concerns (e.g. misuse of individual data of the citizens by external parties intermediate the channel to the citizens, losing control over the information flow between citizen and government, passing the data to external parties).

According to the municipalities' representatives' opinions, however, this co-operation model, has one big negative aspect: it does not promote innovative initiatives and does not bring market needs and trends inside the public sector. Fresh ideas of experts from the field do not have a motive to reach the municipalities. Hence, the municipalities lose the touch with contemporary comforts and there is negative acceleration towards the change forwards.

There is high need for trying a new partnership model. The IT director of Peristeri municipality suggests that: *"private companies should have bigger involvement in the projects by investing money in them"*. The IT director of Heraklion municipality adds accordingly: *"Public-Private-Partnerships (PPPs) are necessary for new projects explosion. Both public and private initiatives could invest in new services, share possible revenues and have rights on exploiting the service further. The same happens with agreements for national roads constructions. They both invest in the construction, and the construction companies have the rights to receive the tolls revenues. Accordingly, the private company could run the whole service and the municipality could pay per citizens' transaction or use. This agreement could engage the involved company with the proper and optimum function of the service, while the service continues to be used regularly"*.

Table 7-10 Evaluation of partnership problems

	Pilot Municipalities		Avg.	Big Municipalities		Avg.	Small/ Medium Municipalities		Avg.
	Trikala	Heraklion		Thessaloniki	Peristeri		Evosmos	Argos Orestiko	
They have no objectives and investment in common	3	2	2.5	2	1	1.5	3	3	3
They have different degree of engagement	3	2	2.5	2	1	1.5	3	2	2.5
The private companies change their business interests and abandon the governmental services	3	2	2.5	1	1	1	2	2	2
The competition of the government with the private market is forbidden by law (The government should not monopolize the supply position with regard to distribution, pricing, licensing and competition)	3	2	2.5	1	1	1	2	2	2
Commercial companies want to have control over the information flow between citizen and government and, thus, influence and filter content and reach.	1	2	1.5	1	1	1	1	2	1.5
Law concerning of passing the data to external parties	3	2	2.5	1	1	1	2	1	1.5
Lack in standard contracts negotiating the penalties when content provision fails or is not available in time	2	2	2	1	2	1.5	3	2	2.5
Ownership of documentation (in cases when the authorities wouldn't back critical and dangerous for the masses info published by information services e.g. about air pollution, etc.)	3	2	2.5	1	1	1	2	2	2
Misuse of individual data of the citizens by external parties intermediate the channel to the citizens	1	2	1.5	1	2	1.5	2	2	2

The PPP model is hard to implement unless there is strong political will. It is a matter of the authorities to decide on new co-operation directions and give motives to the private sector in order to get involved in innovation and business prospects within the municipalities. Both the head of Heraklion and the head of Peristeri agree that the above partnership problems would have a much higher rating in cases of PPPs. Especially, if it was for a PPP, someone could be highly skeptic about the following:

- Lack of standard contracts negotiating the penalties when content provision fails or is not available in time.
- Ownership of documentation (in cases when the authorities wouldn't back critical and dangerous for the masses info published by information services e.g. about air pollution, etc.).
- Misuse of individual data of the citizens by external parties intermediate the channel to the citizens.
- Commercial companies want to have control over the information flow between citizen and government and, thus, influence and filter content and reach.

It is noteworthy that the municipality of Trikala seems to have different tendency regarding the evaluation of the partnership problems. The municipality representative has given quite higher rating to almost all the factors. This makes sense, because e-Trikala, which is responsible for the IT development of the municipality, has anyway the form of private company (although the municipality is the main stakeholder/ owner). Although could not somebody claim that this is a PPP case, there is a different approach in the partnerships. The e-Trikala employees can face many IT development challenges themselves, and are slightly more skeptic about problems that might rise after a partnership with a private company.

7.3.4 Cost & Revenue streams

Municipality of Heraklion has spent in 2008 around 100.000 Euros for buying a web platform, which supports e-services, e.g. e-payments, etc. The SMS platform is a separate project, which cost around 10.000 Euros in 2008. The biggest part of the cost (80%) was for the payment of the developer. Only 10% of the cost was intended for the hardware, and the rest was distributed to other monetary needs for the project completion. The

telecommunication providers have agreement with the development company for the cost of the SMS and charge nothing to the municipality. The whole project was a once in a time expense and, thereafter, the cost for the maintenance is negligible.

The fund of this project comes exclusively from national and international resources. The only motivation for implementing such service is the better needs' satisfaction of the citizens. There are no revenue streams at all. Earning profits exploiting citizens' transactions is forbidden by law.

Municipality of Trikala does not reveal the amount of money spent for the mobile services due to confidentiality reasons. Most of the provisions have been developed during the period 2008-2010. Because of the highly skilled personnel of "e-Trikala" the biggest part of the money has been spent for network infrastructure and hardware and less for external developers' payments. All the mobile services are fully funded by national and European resources. Citizens are not charged at all for using the services. Everything is provided for free and, hence, there are no revenues in return. There are no profits made out of the mobile services.

Municipality of Thessaloniki invests recently in electronic G2C services quite large amounts of money. In 2009 the municipality spent 230.000 Euros for a web platform providing e-services. Since then, every year the maintenance cost rises up to 7.000 Euros.

The "Municipality of Thessaloniki" mobile application has been implemented in 2012. The development cost around 15.000 Euros. The whole amount of money has been spent for the developers' payment. The development company has an annual contract for the future maintenance of the project and, from now on, will get paid per year. The application distributors are getting paid by the external contractors; there is no such charge for the municipality.

The project has been funded by the municipality's own resources. The mayor's council accepted to spend for the service under the condition of its free distribution. They expect to have no revenues. It is an investment for further exploitation of the digital information of the existing GIS web provisions and for covering citizens' and travelers' needs.

Municipality of Peristeri has not accomplished any mobile service. The municipality has only spent a quite large amount of money (~700.000 Euros) in 2009 for the website and the

platform supporting the electronic services. National and international sources are exploited for this project and there has been no profit so far (and it is not expected to be).

Municipality of Evosmos has also spent a considerable amount for e-G2C services in 2007 (120.000 Euros for a web-platform providing e-services, 80.000 Euros for payments of third-party companies extending and customizing the platform, 25.000 Euros for hardware and equipment, 5.000 for training the municipality employees/ users of the platform, and 5.000 Euros for promoting the new services to the citizens). National and international sources are exploited for this project and there has been no profit so far (and it is not expected to be).

Municipality of Argos Orestiko has mainly invested money on 2009 for buying software that serves mainly G2G needs. As far as the G2C services are concerned, there has been a website constructed in 2011 which cost around 2.000 Euros. National and international sources are exploited for this project and there has been no profit so far (and it is not expected to be).

To sum up, there is consensus that money has not been the problem so far, because there have been enough national and mainly European resources. Furthermore, the opinion of the interviewees is that making profits out of mobile services is not a high motive; charging the citizens per transaction, or forcing them to pay for downloading mobile application comes in contradiction with public ethics. On the other hand, the citizens are expected to be unwilling to spend money for conducting transactions; they would mostly prefer the traditional or online channel instead. Additionally, regarding the profits, uploading advertisements by getting paid is officially prohibited. Hence, it is expected no revenues from the mobile services creation.

7.3.5 Social Context

The interviewees agree that social factors affect the citizens' adoption of the mobile services, and, hence, the municipalities' initiatives for implementing them. Accordingly, various social dimensions affect the choices of the business model constructs, e.g. the maturity and familiarity degree of the citizens with the mobile technologies. More possible social factors and the way they can affect the business model choices are analyzed in Chapter 5.

The municipalities' representatives in this research have given their estimations and expectations about the influence of social factors. Their answers are formed based on feedbacks they have received from the implemented mobile services, as well as the everyday citizens' requirements. Specifically, they have expressed themselves referring to three factors: Citizen's familiarity with mobile technologies, the influence of going through a hi-tech era, and the current cost of living. During the interview, they were challenged to assess other dimensions. A synopsis of their positions is presented on table 7.11. On the table the following symbols are used: (+) indicating a positive influence on mobile services' development, (-) indicating a discouraging factor of mobile services' usage for municipal issues, and (N) indicating that the factor plays no role.

Table 7-11 Social factors' impact on m-G2C services

Representatives of:	Citizen's familiarity with mobile technologies	Hi-Tech era	Cost of Living	Other...
Municipality of Trikala	-	+	-	
Municipality of Heraklion	-	+	N	
Municipality of Thessaloniki	+	+	N	
Municipality of Peristeri	+	+	-	
Municipality of Evosmos	+	+	-	
Municipality of Argos Orestiko	-	+	-	

The positions on the influence of citizens' familiarity with the mobile technologies on the mobile services' adoption vary from municipality to municipality. Although statistics indicators show that the mobile devices penetration in the European countries is extremely high, researches, as they are analyzed in chapter 2, find that the familiarity with conducting mobile transactions is not accordingly high. The head of e-Trikala highlights that the mobile parking service is no longer in function, due to low usage degree by the citizens. Although the citizens had no loss (e.g. extra charge) in using the mobile way to pay for the parking

fee, they still used to prefer the traditional payment method. This might reveal that the public is not mature enough to use the mobile channel for their everyday transactions. The other side of the coin, however, shows that at least younger groups of citizens are very fond of mobile technologies and are expected to be fond of mobile services in the near future.

The exponential rate of technological evolution nowadays forms a high tech era. This atmosphere demands cutting-edge technological solutions in all sectors. Mobile devices' boom, mobile commerce blossom, mobile banking adoption and wireless applications all over cultivate high expectations for mobile government applications. All the municipality representatives agree that we are in season when society spends time and energy for modern technologies enforcing public organizations to follow such tendencies.

Regardless of the high interest in technology and gadgets, how does cost of living currently affect the mobile evolution? It seems to have a negative effect, because financial crisis in modern Europe doesn't always allow citizens to invest in mobile equipments and subscriptions. The most optimistic, however, heads of IT departments of Thessaloniki and Heraklion municipalities claim that financial issues of society is not expected to have any impact on mobile G2C services acceptance under the conditions that such services' usage is free of charge.

7.3.6 Legal Context

As it is analyzed above, regulation issues are among the most important barriers in mobile services implementation. As long as the mobile transactions do not have officially legal context they cannot be widely applied.

There is no doubt that the cross-case analysis gives unanimously that the electronic signature is a technologically solved issue. There are technological solutions that can uniquely authenticate and sign certifications electronically substituting the traditional process of signing papers. It is only a matter of the government principals to recognize such technological signatures as equally powerful and personal as the traditional signatures. Unless such legislation takes place, the mobile services cannot reach high communicative levels. The IT director of Argos Orestiko says that: *"It is not only that the lack of official electronic signature hinders the mobile exchange of papers. It is also that makes people*

doubtful and reserved using the mobile medium generally, because it has informal character”.

Apart from that, there is also regulation gap regarding the mobile services that the European municipalities should provide. There is no obligatory framework forcing the local principals to implement specific platforms supporting mobile functionalities (e.g. accepting SMS from citizens, or sending massive SMS). Going even deeper, there is no regulatory model defining the technical interface standardization among authorities & different national initiatives. As soon as the authorities provide no standards and the legislative frameworks are unable to coordinate a secure and trustworthy mobile development, the mobile services' future is vulnerable. All the municipality representatives agree upon the negative influence of the existing regulation problems on the business model decision; they make the business development of the mobile services blurry and encumber the business framework building.

7.3.7 Communication Channels

The way the municipalities communicate the new mobile services to the citizens is one of the constructs in the proposed framework of this dissertation. The meaning of “communication” includes the concepts of the services' promotion strategies, propositions of various ways to make the citizens use (and/ or keep using) the (chosen/ implemented) mobile services (in other words to increase citizens' loyalty), as well as reasons the municipalities should maintain the (chosen/ implemented) mobile services and further implement new/ more ones (increase the provider's degree of commitment).

The interviewees, who have been involved in existing mobile projects, respond to these questions based on their experiences from the implemented projects (municipalities of Trikala, Heraklion, and Thessaloniki). The municipalities that do not have previous experiences respond based on estimations judging from what has happened accordingly with the electronic services, and based on feedbacks they have received from the authorities and the citizens so far.

Regarding the promotion strategies, the interviewees have given the following data (Table 7.12):

Table 7-12 Preferred promotion strategies for the mobile services

Representatives of:	Promotion Techniques	Comment
Municipality of Trikala	<ul style="list-style-type: none"> - Traditional methods: press releases and web-site announcement - Mainly based on wom 	No need to spend for advertising agencies. If the product is really useful, it challenges the citizens and they can circulate the news with each other. An initial push of costless, traditional techniques is enough
Municipality of Heraklion	<ul style="list-style-type: none"> - Traditional methods: press releases and web-site announcement - Mainly based on wom 	Same as above
Municipality of Thessaloniki	<ul style="list-style-type: none"> - Traditional methods: press releases and web-site announcement - Mainly based on wom 	Same as above
Municipality of Peristeri	<ul style="list-style-type: none"> -Word of Mouth (wom) 	No organized moves by the municipality. But if there is a useful service, then it can be self-promoted
Municipality of Evosmos	<ul style="list-style-type: none"> - Traditional methods: press releases and web-site announcement 	-
Municipality of Argos Orestiko	<ul style="list-style-type: none"> - Traditional methods: press releases and web-site announcement 	If the product is really useful, it challenges the citizens and they can circulate the news with each other. An initial push by costless, traditional techniques is enough

Regarding the strategies to attract new users for the mobile service and increase the loyalty of the existing ones, the interviewees have given the following data (Table 7.13):

Table 7-13 Proposed ways to make the citizens use the (chosen/ implemented) m-services

Representatives of:	Ways to make the citizens use the m-G2C service	Comment
Municipality of Trikala	<ul style="list-style-type: none"> - Short trainings free of charge - Enforcement to use the new 	Offering trainings is a civilized way to motivate the citizens to get

	service, by offering no alternatives	acquainted with the new services. The history, however, shows that forcing the citizens to use the new services (e.g. by abandoning the traditional ways) is more effective. Rewards are usually inevitable to happen, because the service is provided by organizations and not by profit-companies (most of the times there is no money transfer)
Municipality of Heraklion	- Enforcement to use the new service, by offering no alternatives	Seminars are good, but only as additional offering. It is not a standalone way. The history shows that imposition is effective (e.g. the imposition of TAXISnet)
Municipality of Thessaloniki	- Enforcement to use the new service, by offering no alternatives	Same as above
Municipality of Peristeri	- Enforcement to use the new service, by offering no alternatives	Nobody would attend the seminars due to lack of time and interest
Municipality of Evosmos	- Enforcement to use the new service, by offering no alternatives - Reward in cases of mobile payments (i.e. fee reduce if payment via the mobile)	-
Municipality of Argos Orestiko	- Enforcement to use the new service, by offering no alternatives	Nobody would attend the seminars due to lack of time and interest

It is not hard to draw conclusions upon strategies of attracting new users. A newly implemented service has high chances to succeed, if the citizens are forced to use it. Seminars and trainings free of charge would be a solution to make citizens familiar with new services, but if the participation in such seminars is low, they would not have sufficient impact. The history shows that imposition is the most effective way to commit the citizens with the service.

Regarding the strategies to engage the municipality with maintaining the existing services and have interest in developing new ones, the interviewees have given the following data (Table 7.14):

Table 7-14 Proposed reasons the municipalities should maintain the (chosen/ implemented) mobile services

Representatives of:	Reasons the municipalities should maintain the service	Comment
Municipality of Trikala	<ul style="list-style-type: none"> - Improve the image of the municipality - Reduced costs through rearrangements (administrative, employees, etc.) 	The reasons are identical to the municipality motives analyzed in previous section
Municipality of Heraklion	<ul style="list-style-type: none"> - Improve the image of elected mayor and council 	Political motives
Municipality of Thessaloniki	<ul style="list-style-type: none"> - Citizens' pressure towards such implementations. - If there is force by law or national authorities - If there is 100% funding - If there is permission to publish advertisement in order to cover the costs - If the partnership model changes and private companies would like to invest in governmental services 	
Municipality of Peristeri	<ul style="list-style-type: none"> - Improve the image of elected mayor and council 	Political motives
Municipality of Evosmos	<ul style="list-style-type: none"> - If there is force by law - If there is 100% funding 	No high motive for taking initiatives towards implementing mobile services. Only if it is a good "opportunity" with no cost, or there are obligations by law
Municipality of Argos Orestiko	<ul style="list-style-type: none"> - Improve the image of the municipality - Improve the image of elected mayor and council 	The reasons are identical to the municipality motives analyzed in previous section

Mainly, the most commonly met reasons for commitment with the mobile services provisions refer to political context. Improving the image of the local authorities is a high motive. Improving the image of the municipality is also usual, as well as the total fund of the service letting the authorities with no concern about the costs of the service implementation.

7.4 Discussion of the Results

To start with, based on the case studies above, somebody could claim that the mobile evolution of the municipality is not necessarily correlated with the development of the electronic services, and the other way round. E-government has started to be applied many years ahead of m-government; there are regulations published by the European Union regarding the e-services that all European municipalities should provide, as well as standardized frameworks imposed regarding the services' development. Enough amounts of money have been offered by European resources to fund the development of the electronic services. Within this context, many municipalities in Greece have followed the regulations and absorbed the funding to create electronic services. Mobile services, however, are not the successor of the electronic services blossom.

Big municipalities, which have constructed even transactional services through the web (4th stage of the web measure index (Stiakakis & Georgiadis, 2011)) and have high needs in electronic services due to the large population, have not planned any mobile services development. Municipalities, on the other hand, which concern about mobile G2C services provision (e.g. the pilot municipalities), have developed the mobile mentality not because of their growth or their electronic maturity and readiness degree; they have cultivated mobility due to administrative innovativeness taking individual, sporadic initiatives and exploiting possible fund opportunities.

Hence, disconnecting e-government from m-government and digging deeper into framework building for the mobile G2C services provision by the municipalities, cross case analysis of the case studies could provide the study with feedback on the proposed theoretical framework and help with drawing conclusions and achieve the milestones as they are mentioned at the beginning of the chapter.

The differences of the evaluations given by the replication cases of the research are not statistically significant. The data per municipality group (pilot municipalities, big municipalities, small-medium municipalities) are considered symmetric or "balanced". This result verifies the theory of case studies' external validity and analytic generalization (Yin, 2009) allowing the researcher to safely draw conclusions per municipality type (pilot, big, small-medium). The following results adhere to the municipality's grouping and are discussed accordingly.

The findings can lead to the following:

- **Results of Milestone 1**- Regarding the 1st GoMobi stage/ Identification of the suitable m-G2C service:

It is noteworthy that the municipalities evaluate the different functional categories of the mobile services giving similar ratings despite of their growth or readiness degree. Trying to identify the mobile services with high added value the cross-case analysis shows that the services of first need are:

- Free Wi-Fi access to the citizens, mainly through Wi-Fi spots established in various geographical positions around the cities. All the municipalities find highly important to provide free access to mobile internet, because without it the rest of the mobile provisions would be useless, or at least pricey
- Traffic services. A service providing information about traffic conditions and parking facilitations are of high priority even in smaller municipalities, where the traffic problems should not be high. Mobile traffic services, in addition, cannot be substituted by traditional services, because drivers would need them while being on the move with no access to online information
- GIS & Tourism services. Digital mapping of the city and points of interests are very significant for the travelers, who might need information while traveling. Such services are, also, an advantage for the municipality itself improving the tourism conditions and attracting more of them
- A service disseminating massively emergency news and information. These are the information that citizens would need while being on the road without having access to web-sites
- Issuing signed papers directly to the citizens' smartphones seems to get high ratings of importance. Of course, it is not among the first priorities because such service does not highly exploit the mobility advantages. It seems, however, to cover citizens' and municipalities' needs. Later on the text, there is explanation about these citizens' and municipalities' needs.

Regarding the least important service, there is a general consensus; all the municipalities have rated the promotional services as the least significant mobile service to be implemented. Marketing and dissemination services are not a priority for mobile

government provisions. Furthermore, mobile networking and the establishment of citizens' mobile forums within the municipality seems to impress only the innovative municipalities. Pilot cases have rated highly top such services, whereas the other municipalities do not seem that interested.

As far as the value propositions of the above services are concerned, there is discrimination between the service's added value covering municipality's needs and service's added value covering citizens' needs.

Regarding the m-services' value proposition from the citizens' side, there are no significant differences between the various benefits categories. All of them are considered quite important. That gives a general positive tendency in the sense that the citizens have strong motives to support the mobile services implementation. The most highly evaluated are the benefits of time saving and availability & convenience. Finally, it should be highlighted the fact that the pilot municipalities have given a higher score to all the benefits in comparison to the other cases. This might explain the reason why they are pioneers; they recognize and give extra emphasis on the m-services' beneficial character for the citizens.

From the municipalities' side, the most highly evaluated benefit is unanimously the improvement of the "general efficiency" of the transactions and the functionalities (more efficient and faster processes, etc.). This priority excuses the choice of "issuing signed papers" to citizens via mobile as a suitable service for implementation. Such a service would improve the general efficiency of the municipality completing bureaucracy procedures faster and handy at the personal device of the citizen.

Secondly, improving the image of the municipality in order to attract European projects, tourists, entrepreneurial activities, and co-operations with other municipalities is a highly evaluated motive to launch mobile services. The pilot municipalities, however, have not evaluated this factor as highly as the other municipalities have done. This is excusable, because the pilot municipalities have already accomplished such benefits, so they do not focus on such value.

Changing working conditions is not a concern of the big municipalities. Probably, they do not need to handle the roles of the employees and their demands, or at least not through the mobile transactions. Finally, it is noteworthy that the small-medium municipalities do not emphasize on cost savings. Maybe, the smaller the municipality the less the employees

and the administrative costs anyway; hence, reducing expenses is not on the front line of benefits to be achieved.

But, given the positive attitude towards the mobile services and the appreciation of their value propositions, why do not the municipalities implement them? The answer is clear. All the municipalities claim that the biggest impediment is the lack of mobile regulations and legal cover. As long as the electronic signature is not regulated, no paper can be electronically signed and delivered through the mobile channel. Additionally, the laws regarding mobile transactions and exchange of data and official documents are not advanced enough to legally protect the “victim” in problematic situations, or settle litigations.

Equally important are the organizational issues. The IT headers of the municipalities attribute big responsibility part to the authorities’ and mayor’s innovativeness. The lack of sustainable business model plus the lack of appropriate knowledge of the technical employees in case of building mobile projects also hinders such processes. Changing demands and responsibilities on the existing employees in the case of mobile processes existence (process re-engineering) seems an intimidating procedure.

Although financial issues, talking for today’s Greek reality, are reasonably expected to be highly ranked, the interviewees have not responded accordingly. Technological issues, on the other hand, are the least concerned barriers. Obviously, technological problems can be overcome if there is infrastructure in equipment, officially legal contracts, and sustainable plan.

Finally, it is remarkable that the pilot municipalities do not seem as skeptic about the impeding factors as the other municipalities do, with the exception of the behavioral subjects. This comes in accordance with essential logic; they have already faced many of the preventative factors- organizational, technological or even some regulation ones. They cannot, though, control citizens’ attitudes or predict behavioral problems such as lack of trust in the security of the transactions or the fear of spamming.

- **Results of Milestone 2-** Regarding the 2nd GoMobi stage/ Services’ implementation and dissemination constructs:

Each construct of the proposed model has been studied separately. The data collected from the interviews are analyzed per construct and then the conclusions are synthesized to give a thorough feedback on the dependencies between the constructs. Concluding remarks per construct are presented below:

Technology & Delivery Channels:

Regarding the construct of technology, as it is defined in the GoMobi model, somebody could conclude to the following:

- Mobile applications are the most preferable *type* of technology. They are trendy, user-friendly, and can support integrated solutions for services with flexibility regarding their content and functionality. For instance, it is a very suitable technological solution for GIS and tourism services, which are among the priority services to be provided
- The infrastructure in hardware and network needed for the mobile applications development is not a prohibitive factor for the municipalities to deploy them. Nothing extreme, that the municipality could not obtain, is required. The infrastructure is a dimension dependable on the partnership model that the municipality might follow. For example, if the development of the service's software is assigned to a third-party company, then the infrastructure is also the private company's concern
- The content provision in any case is the municipality's responsibility. The local authorities depending on what could/needs be published should decide the uploaded and exchanged data. The developers have no right to filter or further use any information
- The delivery channels depend on the chosen type of the mobile technology for the service. In cases of mobile application the delivery platform could be the popular Apple Store or Google Play Store. This way the application could be easily accessed. On the other hand, if the mobile service uses SMSs, then a telecommunication operator should be chosen for the sending messages. The delivery channels are, also, dependable on the partnership model and who the developer is. When the development of the service/ platform is responsibility of an external human resource, usually the municipality has no involvement in the delivery channels choice. The

developers are the ones who make the agreements for the services’ “delivery operators”

- Wi-Fi spots, as it is indicated above, is a highly preferable technology to be used in order to provide the citizens with free access to wireless Internet. It is easily achievable in co-operation with telecommunication providers, do not have high maintenance requirements and have high added value in low cost
- SMS, Bluetooth and RFID services are important, but satisfy a limited number of services. They both mostly serve needs on communication and information exchange level
- The requirements on end-users equipment for the above popular types of technology (mobile applications and SMS) are simple cell phones or smartphones. They are anyway popular in Europe nowadays.

Partnerships:

The local authorities so far, have committed partnerships only under competition (bidding). The most profitable tender signs a contract with the municipality under specific payment and responsibilities. The local authorities, though, are fully responsible for the completion and future of every project. This is a safe partnership model, because under specific contract, there is no high concern about low private sector’s degree of engagement, or abandoning the project midway. Additionally, there are neither legal and regulation issues nor security concerns.

This co-operation model, however, has one big negative aspect: it does not promote innovative initiatives and does not motivate fresh ideas of experts from the field to reach the municipalities. Hence, the municipalities lose the touch with contemporary comforts and there is negative acceleration towards the change forwards.

There is high need for trying a new partnership model, which involves market experts in investments of municipalities’ services implementation. The PPP (Public- Private Partnerships) model would promote business prospects within the municipalities and increase actions around mobile services. PPPs, however, are intimidating to be accomplished because of high risk regarding:

- Lack of standard contracts negotiating the penalties when content provision fails or is not available in time

- Ownership of documentation (in cases when the authorities wouldn't back critical and dangerous for the masses info published by information services e.g. about air pollution, etc.)
- Misuse of individual data of the citizens by external parties intermediate the channel to the citizens
- Commercial companies want to have control over the information flow between citizen and government and, thus, influence and filter content and reach.

In addition, co-operations between universities or research centers and municipalities are suggested. When happened, the results have been positive; students/ researchers might be beneficiary of working on governmental projects as well as municipalities could exploit their expertise. Last but not least, the chances of municipalities' co-operation with each other would be fruitful; disseminating (or selling) consultancy about accrued practices benefits both the municipality-consultant and the municipality-learner.

Cost & Revenue:

The costs of the services are usually covered by national or international funds. Such funding is reasonable to cover the development and maintenance needs of the service. That is the reason that financial issues are not the very first barriers impeding the mobile services implementation. Only in the cases that municipalities have tried to establish WiMax network the costs are non-affordable; high license fees and infrastructure expenses make it hard for the municipality to own its own network.

Revenues through the mobile services in Greece are hard to achieve. Law prohibits advertisements, whereas imposing transactions or subscription fees on the services' user are concerned unethical.

Personnel:

The municipalities' personnel could not face the challenges of developing a new mobile service. They are already fully allocated to their current tasks and, mainly, the support of the existing information systems (mostly support G2G services and organizations and employees needs).

It is said that the current personnel could not manage the volume of the requirements for the mobile service development, and mainly, they do not have the technological know-how

of building such services. More in number and specialized resources are required, with specific expertise in mobile software development. Two suggested solutions under examination are to hire skilled people and/ or assign the project to an expert company-developer (outsourcing). The decision is dependable on dimensions of the partnership construct.

Social Context:

The construct's presence in the model is essential in order to set adoption standards and possibly define the services' target group. To be more specific, there is consensus that European communities go through a hi-tech era and people give emphasis on technological evolutions (including mobile evolutions), expect them and seem to adopt them. This spirit could give an encouraging boost to the mobile evolution of the governmental organizations.

There are doubts, however, about citizens' familiarity with mobile transactions. Mobile devices have highly penetrated the market, but this does not necessarily go in accordance with the familiarity degree of citizens conducting official transactions via mobile. The familiarity degree is often related to the age of the citizens. A service that targets mainly the younger groups would have higher chances of being used. Targeting the elder ageing groups, the services would have chances of adoption, if extra educational trainings and seminars would be available.

Cost of living does not seem to have a high impact on adoption degree as long as the services are provided for free and do not require costly equipment.

Legal Context:

Regulation limitations have an impact on the type of the chosen service to be provided. For instance, unless legislation of the electronic signature takes place, the mobile services cannot surpass the informational level; signed papers cannot be issued to citizens in an electronic format through the mobile, because they would not have an officially accepted signature.

Furthermore, possible existence of specific regulations about the technological standards (e.g. interface or content of a service) would affect the technological dimensions.

Finally, advertising bans by law in Greece affect the revenue constructs. Obviously, the municipalities have no means of making profit because broadcasting advertisements on the mobile service as an entrepreneurial activity is prohibited.

Communication Channel:

The data collected from the case studies unanimously give that the governmental services, after their development, are not promoted in special and modern marketing ways, such as online and offline communication and promotion campaigns. The municipalities would not allocate human resources or money for the new services' promotion strategies. There is the belief, that if the service is really worth it and satisfies the citizens' perceptions, it can become popular by word of mouth. Other than that, usual press releases and web-site announcements are enough to give an initial incentive for trying the new service.

Furthermore, it is not hard to draw conclusions upon strategies of attracting new users. A newly implemented service has high chances to succeed, if the citizens are forced to use it. As long as there are alternatives, or the option to conduct the service using the traditional medium, many citizens would not bother to try the new one. Either due to lack of enthusiasm and innovativeness, or due to lack of time to experiment with new technology trends, a big part of the municipality population would remain stuck with what they already know. Maybe many citizens would not trust channels that are not tested. Seminars and trainings free of charge would be a solution to make citizens familiar with new services, but what would happen if the participation in such seminars would be low? The history shows that imposition is the most effective way to commit the citizens with the service.

On the other hand, the local authorities find motives for continuing the further development of the mobile services and commitment for maintenance of the existing ones into:

- Improving the image of elected mayor and council.
- Citizens' pressure towards such implementations.
- Force by law or national authorities
- 100% funding
- Permission to publish advertisement in order to cover the costs
- If the partnership model changes and private companies would like to invest in governmental services.

The case studies showed that the above constructs fully cover the options for building a thorough framework for a successful business model of mobile G2C service provision. The case studies under examination neither added any new, extra construct nor neglected any of the examined ones. They are interrelated and when combined can give various alternatives of business models solutions.

- **Results of Milestone 3**- Regarding the 3rd and 4th GoMobi stage:

All the above conclusions show that there is no unique solution when a governmental mobile service is proposed for development. After having decided the type of the service to be developed based on its value proposition, the various dimensions of alternative business model constructs should be taken into consideration. The relational dependencies between the constructs, as they are analyzed above, should be also considered.

For instance, let's take the case that the municipality is about to develop a tourism service in order to attract tourists and provide extra comfort to travelers targeting no revenues. There are at least two options of technology type for its implementation: (i) broadcasting information through Bluetooth when passing in front of touristic spots, or (ii) providing a mobile application with touristic content. Any of the two choices leads to different business models; it has different requirements regarding at least the rest of the technology dimensions (data provided, software, networks, end-user equipment), the personnel needs (who does know how to build it), the partnership needs, and the costs. Synthesizing the various possible dimensions gives a number of alternative business models.

Choosing different dimension of each construct gives various suggestions for the models. It is a matter of the local authorities to decide on the optimum one to be followed based on more detailed analysis of the predominant mobile models.

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Chapter 8.

Conclusions

This chapter summarizes the main research findings along with the drawn conclusions, their implications and future research dimensions. It starts by summarizing the research presenting the main findings that satisfy the needs of each of the research objectives. Thereafter, the research contributions are discussed; they are organized in two paragraphs separating them in contributions reflected to theory and contributions reflected to practice. Additionally, the limitations, under which the study is conducted, are outlined and, finally, the chapter ends with future research suggestions.

8.1 Research Overview and Findings

The research presented in this thesis is aimed at providing a framework which upgrades the information systems of the municipalities by integrating the appropriate modules for the selection, design, implementation and sustainment of mobile services provided to the citizens. The accomplishment of this aim is regarded to be helpful with the transactions between the citizens and the local authorities. The author has structured the study in eight chapters. As we are now in chapter 8, a summary of the previous seven chapters along with their findings is provided below.

Chapter 1 is the starting point of this thesis describing, initially, the main motivations of the research. It is explained that mobile government attempts have been unstructured implemented. Although the m-government services value has been recognized, there are no standardized guidelines and frameworks building the fundamental principles indicating the way the municipalities could adopt the mobile services. Business model grounded theories, on the other hand, are not advanced regarding the mobile development in the public sector, and, in specific, the municipal sector.

Tracking the gap of the missing business strategies within the mobile municipal sector, the author forms the research question searching for the appropriate elements for the selection, design, implementation and sustainment of mobile services provided by the

municipalities to the citizens, all integrated into a theoretical framework. Aiming to accomplish this research purpose, there are secondary objectives set constituting the whole study. Figure 8.1 shows how the various objectives established in chapter 1 are satisfied throughout the dissertation.

Table 8-1 Accomplishments of the research objectives

Research Objectives	Accomplishments
Objective 1: Explain the research motivations, research paradigm, methods and techniques that fit the current research objectives and lead to valid research results	Objective 1 has been accomplished in chapter 1, where important details about the research background and context have been explained. In this chapter it is explained the need for research regarding the development of a framework as a strategy tool for identifying the suitable m-G2C services, planning their implementation and take care about their future maintenance. The methodologies for accomplishing the objective are also explained
Objective 2: Analyze the value proposition of the m-services for the municipalities	Objective 2 has been achieved in chapter 2. Chapter 2 presents a detailed analysis of the beneficial character of the mobile G2C services for the municipalities, such as reducing administrative costs, impressing foreigners and attracting tourists, etc. The analysis of the value propositions is a result of extended literature review
Objective 3: Analyze the value proposition of the m-services for the citizens	Objective 3 has been achieved in chapter 2. Chapter 2 presents a detailed analysis of the beneficial character of the mobile G2C services for the citizens, such as faster access to documents, fast emergency news dissemination, etc. The analysis of the value propositions is a result of extended literature review
Objective 4: Identify the barriers in implementing mobile services	Objective 4 has been achieved in chapter 2. Chapter 2 presents a detailed analysis of the barriers impeding the mobile G2C services implementation, such as lack of security in transactions, lack of sustainable business models, etc. The analysis of the barriers is a result of extended literature review
Objective 5: Record the most crucial and popular public services examples provided worldwide, and classify them based on their type of function	Objective 5 has been achieved in chapter 2. There is a table summarizing examples of implemented m-G2C services globally. The examples are firstly chosen based on their popularity (the frequency they are met in literature, studies reports and white papers or the frequency they are cited in such documents). Secondly, they are chosen as representative examples in order to cover as many fields the services can be applied and add value as possible
Objective 6: Provide a typology of possible	Objective 6 has been accomplished in chapter 3. There is a table summarizing the m-G2C services proposed, classified

municipal mobile services	based on their type of function. The main services categories are information dissemination, issuing papers, wireless access, traffic, forums, payments, promotion, GIS, tourism, applying submissions
Objective 7: Imprint the current situation in Greece regarding the municipal mobile services provisions, using the proposed m-services' typology	Objective 7 has been accomplished in chapter 3. The Greek municipalities have been examined regarding the mobile G2C services they provide. The municipalities are 325 in total and all their websites have been visited searching for interesting information regarding the mobile services. 51 municipalities have been found to provide Wi-Fi networks, whereas only 19 municipalities adopt the mobile channel (mainly SMS and m-applications) for the transactions with the citizens. There are more details about the type of the services and the way they function
Objective 8: Identify the main business model components along with their implementation in line with the concept of mobile government	Objective 8 has been accomplished in chapter 4. Business model components from literature about traditional business models, mobile business models and, more specialized, mobile government business models. Concluding, nine factors- technology, personnel, partnerships, cost, revenue, delivery channel, social context, legal context, communication channel- are chosen as the most suitable to be adjusted in the theoretical framework of the study
Objective 9: Develop the theoretical framework for the strategic planning of the mobile services on a municipal level, synthesizing the business model components and the services' value propositions	Objective 9 has been accomplished in chapter 5. The theoretical model- the GoMobi framework- consists of four stages: 1) Identification of the suitable m-G2C services, 2) Examining service implementation & dissemination constructs and defining their parameters, 3) Synthesis of alternative BMs, and 4) Final municipal mobile model proposition
Objective 10: Explain the research methodology that fits the testing of the theoretical model and leads to the final artifact of this research	Objective 10 has been accomplished in chapter 6. Case studies in municipalities are selected as the suitable methodology for the testing phase of the proposed theoretical model. Chapter 6 explains the suitability of the methodology for the research objective as well as the rules and conditions for conducting reliable case studies excluding valid research results
Objective 11: Case studies research in order to test the theoretical framework	The theoretical framework is tested through case studies, the descriptions of which along with their results are presented in chapter 11. Valuable remarks about the framework's stages and its dimensions are extracted, while the validity of the whole framework as an entity is verified
Objective 12: Evaluate the research conclusions in terms of their significance to theory and practice and	The objective is achieved in this chapter and more specifically in the following three subsections in addition to this table

identify future research directions that are important to continue refining this important area of research	
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Thereafter, chapter 1 refers to the methodology mix used for the research design. Speculation, frameworks & conceptual models, library research, literature analysis, secondary data, content analysis, and case studies using interviews are necessary for the study conduction.

In **Chapter 2** there is an analytic introduction to the concepts of mobile government and its implementations. Mobile government background and definitions are well established. The mobile character and the special features of ubiquitousness, convenience, localization, and personalization are explained. There are also references to literature propositions for classifications of the mobile services based on the stakeholders (G2G, G2B, G2C, and G2E), on the type of functions (informational services, transactional, operational), on the purpose (m-communication, m-democracy, m-services, m-administration), on the used technologies (SMS, mobile browsers, mobile applications), and on the mobility exploitation degree (essential and adaptive services). It is clear, at this point that, the research is restricted to G2C services of any type of function and technology.

Chapter 2, also, accumulates the enablers and benefits of the mobile G2C services for the citizens, e.g. faster access to documents, fast emergency news dissemination, etc., and for the municipalities, e.g. reducing administrative costs, impressing foreigners and attracting tourists, etc. Accordingly, the chapter presents the barriers impeding the wide implementation of m-G2C services e.g. lack of security in transactions, lack of sustainable business models, etc.

Finally, the chapter summarizes examples of implemented m-G2C services globally. The examples are firstly chosen based on their popularity (the frequency they are met in literature, studies reports and white papers or the frequency they are cited in such documents). Secondly, they are chosen as representative examples in order to cover as many fields the services can be applied and add value as possible. There are examples of services of multiple types of functions worldwide; health and payment transactions (tickets,

taxes, etc.) seem to be very popular. The most commonly used technology worldwide seems to be the SMS.

Chapter 3, in turn, depicts the conduction of part of empirical research based on secondary data of municipalities and content analysis of their websites combined with literature review and library research.

The first goal is to provide a full list of mobile G2C alternative suggested services that could be provided by the municipalities to the citizens. The suggested services are finally classified into a typology based on their type of function. The classification includes the following types of services: information dissemination, issuing papers, traffic, wireless access, forums, payments, tourism, GIS, citizens applying statements, and promotion. The existence of the typology of services is important for the rest of the study; it is taken into consideration at the theoretical framework construction.

In order to test the suggested typology- enrich it with more services or remove the useless ones- as well as to depict the current situation regarding the provisions of the mobile services by the municipalities, chapter 3 presents the results of a research to all Greek municipalities (mainly via examining their websites and their secondary data). In brief, there are the following findings:

- Apart from the Wi-Fi spots (16,3 % of the municipalities provide free wireless access spots), only 19 municipalities out of 325 (5,8 %) have implemented mobile G2C services. The implemented services are 24.
- The implemented services mainly refer to “information dissemination” and secondly to “complaints submissions” and “tourism services”. The used mobile technology is mainly SMS; smartphone applications, however, have also a growing interest among the newer services.
- The implemented services have followed no guidelines or stable plan and some of them are considered non-sustainable. Either the services cannot be maintained, or the citizens do not use them widely; hence, the services are about to be abandoned soon.

Generally, there are implemented m-services with no consistency on a national level. They are based on spasmodic initiatives of the local authorities in each municipality separately.

No standardized patterns or plans seem to have been followed so far. This situation verifies the necessity of further research towards a unified business model and common strategic dimensions that could be followed as a tool for a safe future development of mobile government in municipalities.

Chapter 4 begins with introduction to the business model theories searching for the appropriate business dimensions that could be used into the missing framework, which would ensure the sustainable mobile booming of the municipalities.

Starting from the fundamental principles of traditional business models, the chapter continues with detailed analysis of the mobile business models. Finally, emphasis has been given on the governmental mobile business ontologies in order to find out what has been established so far. It is concluded, however, that there are only limited sources in literature about the governmental mobile business models lacking in providing strategy tools about how to organize and implement the mobile services development in the municipalities.

Taking into consideration the primary lines regarding the successful composition of a business model combined with the extracted needs for a sustainable governmental model, the chapter concludes with the selection of nine business constructs suitable to be integrated into the suggested theoretical framework. These nine governmental mobile business constructs are: technology, cost, revenue, personnel, partnerships, delivery channel, communication channel, legal context, and social context.

Chapter 5 exploiting the gained knowledge of the theoretical analysis from the previous chapters, synthesizes and presents the suggested theoretical model (the GoMobi Framework) constructed as an innovative proposition of a strategy tool for the mobile G2C services development integrated into the information systems of the municipalities.

GoMobi has a linear, streaming flow organized in four successive stages:

1st: Identification of the Suitable Service

2nd: Examining service implementation & dissemination constructs and defining their parameters

3rd: Synthesis of alternative BMs

4th: Final model proposition

In chapter 5 there is deep analysis of each stage depicting all the including concepts, constructs and their dimensions.

Chapter 6 explains the methodology undertaken to test and evaluate the theoretical framework suggested in chapter 5 (the GoMobi Framework). It is explained that case studies is the chosen methodology because case studies research is important and suitable for IS research when the interest is shifted to organizations rather than technical issues. Additionally, case studies give access to real-life events, allow deep investigation for better organization understanding, open the way to new ideas and new lines in reasoning. Finally, case studies research is the appropriate methodology for explorative researches, while providing explanations and testing.

After the critical points and quality of research designs are described, it is concluded that the research of this dissertation is conducted through embedded, multiple case studies in order to have the right for safe generalization of the findings. The multiple-case studies research is designed deliberately in order to pursue different patterns of theoretical replications. Six municipalities have been chosen as the sample of the empirical research and primary data of each case study have been collected by means of in-depth interviews. The data collected are mainly used for cross-case analysis until conclusions are drawn suitable material.

Such data collected through current and real-life applied conditions give food for discussion and validation of the GoMobi model presented in **Chapter 7**.

The case studies showed that the GoMobi stages fully cover the way to a successful business model for mobile G2C services provision. The case studies under examination verified the mobile services' typology, discussed the value propositions and the impeding factors. Additionally, the business constructs of the second stage are fully verified; neither any new, extra constructs have been added, nor any of the examined ones have been neglected. They are interrelated and when combined can give various alternatives of business models solutions.

8.2 Research Contributions

The current study provides a framework as a strategy tool for the design and implementation of mobile services by the municipalities extending current research and taking governmental mobile ontologies an important step forward systemizing and leveraging municipal mobile service strategic planning.

The contributions throughout the research can be attributed to theoretical and managerial facets. This study adds value to research and practice communities related to mobile services, mobile technologies, and municipal and governmental types of services in addition to those interested in business model development and business ontology factors. The innovative combination of these research domains also enhanced the value of contributions made in this research. This section analyzes the contribution to both theory and practice.

8.2.1 Contributions to Theory

The contributions to theory can be summarized into the following points:

- Comprehensiveness of the mobile G2C services value propositions and barriers grounded theories: There are sporadic researches regarding the governmental mobile services commenting on the strong and weak points of the mobile character of the governmental information systems. The study herein however, has additional value to the existing literature, due to its integral, comprehensive and complete dimensions. The study accumulates both the possible beneficial and impeding factors that lie among various literature sources. The benefits of the m-G2C services are originally organized and synthesized into categories, while they are separated into benefits for the municipalities and benefits for the citizens. Hence, the entities interested in the municipal mobile services can have a holistic viewpoint even for their value propositions. Accordingly, the barriers are originally and comprehensively organized into clusters based on their type (organizational, financial, etc); hence, whoever interested can have an integral perspective about the risks that might hinder the success of the mobile services integration into the municipalities' information systems.

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- Inclusiveness of the mobile G2C services typology: There might be sporadic sources about examples of mobile services that could be adopted and provided by the municipalities to the citizens. Many researchers share their experiences with some of them or try to create new ideas of services that could improve the citizens' transactions. However, there is a literature gap with regard to an inclusive typology of mobile G2C services. The proposed typology in chapter 3 contributes towards filling in this gap. The proposition of a full list of possible mobile G2C services based on their types of function completes the concept of the mobile government; the mobile government theory focusing on a municipal level is incomplete without specifying the mobile services possibilities.
 - Completeness of mapping of the provided mobile G2C services in Greece. The results of such empirical research provide a realistic picture of the existing situation. The findings verify theoretical statements, which claim that mobile government is still in its infancy. Additionally, the mapping of the provided services shapes the tendencies of the municipalities in relevance with the existing types of services and their used technologies, their revenue models as well as resulting issues of their implementation so far. Such data feed the literature with new relevant evidence around these topics. In any case, mapping the current situation in Greece could have a valuable contribution to the international literature of mobile government providing data regarding researches about m-services adoption and helping with comparative cross-country and cross-cultural studies.
 - Integrity of the conceptual review of the business models and ontologies dimensions: Literature accumulation of traditional business model values, mobile business ontologies dimensions and governmental mobile business structures leads to a useful "value-table" of components of business models. The decomposition of the existing models into its fundamental dimensions could be valuable material for designing and synthesis of new models built on strong basis. Having an analysis of the key elements and mechanisms of the business planning in a specific domain would impact on a deeper understanding of the real needs and/ or tricky points while implementing new services. Clear understanding could be effectively communicated and shared with the involved entities producing an efficient and successful model.
 - The Development of the GoMobi Framework: The implications and contributions of the constructed BM conceptual framework can be summarized as follows:
-

- Research innovativeness. The unified framework synthesized the BM compositional dimensions of ontological structure in a novel manner. It provides a complete foundation for researchers (and practitioners as mentioned in the next paragraph), who are looking forward to utilizing the business model concept in further researches. It delineates a versatile instrument that can be of assistance to the BM scientific research community.
 - Research fruitfulness and flexibility. This framework establishes a common language and terminology in order to overcome the propagation of sporadic ideas and terms regarding the business model concepts and constituents, and, finally, help with the communication between the business development involved entities. The framework can be internationally used, regardless of the cultural and linguistic differences between various nations. The content of the proposed mobile services might vary depending on the different needs and cultural ethics, but the GoMobi framework as strategy tool could be customized and adjusted to information systems of multinational municipalities. The proposed framework, additionally, implies flexibility in its related functions such as design, management, evaluation and change and also facilitates the reusability of the components for new business models. This makes the concept an efficient and effective framework being fruitful for mobile government development involved entities.
 - Design tools theories. It helps with transforming useful practices and theoretical indications into theoretical models; it links the model designing logic with pure theoretical suggestions.
- Information provision verifying theories: The case studies conducted are built based on theoretical points accumulated from various scientific fields such as mobile government, business model dimensions, strategy tools structure, steps of designing processes, etc. The collection of data through interviewing experts can provide useful evidence from the field; unique experiences are collected carefully and organized methodologically so as to verify literature principles and bridge the gap between theory and practice.

8.2.2 Contributions to Practice

The study contributes to practice through the provision of the mobile services' typology, the depiction of the current situation via mapping the provided mobile G2c services in Greece, and the development of the GoMobi framework.

There are many mobile application developers, mobile devices companies, telecommunication companies, and mobile marketing companies looking forward to expanding their possibilities into the public sector. It is not easy, however, to understand the needs of the local authorities, neither to extort information about their existing potentials in the municipal sector. The typology of the mobile services provides the practitioners with ideas of mobiles services construction that are in demand by both the municipalities and the citizens.

The description of the existing situation, on the other hand, reflects the room left for the mobile services growing opportunities. The numbers of the mapping and the final results are valuable data at the hands of those in the mobile community interested in emerging sectors.

The development of the GoMobi Framework, in turn, has a multifold contribution to the practitioners. First, its unified character enhances municipalities' ability to design, create, communicate, compare, analyze, evaluate, and modify their existing and future business dimensions of their provided mobile information technology services.

The framework can be used concurrently for alignment functions, technology leverage, and decision making practices. The idea of utilizing the business model concepts improves cohesively organizations' internal alignment. Looking at the business model as a mediating construct between technological artifacts and the attainment of strategic outcomes is also useful. Particularly in information systems, there seems to be an agreement that a technology does not succeed by itself; rather the perception is that a consistent and effective organizational setting and structure are needed in addition to technological architecture if the technology is to be successful and useful to its intended users. The business model however fulfils these requirements due to its comprehensive configurations discussed previously.

8.3 Limitations & Future Research

In addition to the aforementioned contributions of this study, the author should highlight possible future directions for extension of the presented research. Such future implications are shaped after examining the limitations of the research. Overcoming each of the limitations, new dimensions of the research appear. Such limitations and conditions pop up while organizing the research and, mainly, the empirical parts of the researches.

Analytically, such limitations refer to:

➤ Exclusive focus on mobile G2C services of municipalities.

It is clearly stated since the first chapters of this thesis, that the research is planned to be exclusively conducted focusing on the mobile G2C services. Extra study could be conducted regarding additional types of mobile services satisfying needs of employees (G2E services), of other governmental organizations or other municipal internal transactions (G2G services), and of entrepreneurial needs (G2B services). In such cases, the framework would be further extended including additional value propositions and accordingly enriched with more and/or different business constructs and constructs' dimensions.

Additionally, the framework could be extended and examined out of the local governmental level. Needs and services of regional, national, or even international governmental transactions and provisions could modify the framework accordingly.

➤ Geographical restriction of the empirical research parts within the Greek borders.

It should be noticed that the empirical parts of the research conducted- the mapping of the services provided by all the municipalities and the case studies conducted to test the theoretical model- have as research sample only municipalities from Greece. This is justified because the research does not take into consideration cultural needs or special ethical variations. The theoretical model and the research assumptions are based on statutory regulations regarding the municipal obligations and operational processes, which are supposed to be compliant with EU standards.

It would be reasonable, however, to have different results if the mapping of the services and the testing of the cases studies would be executed in different countries. The mobile government development would be expected to follow the general development of the

public and governmental sector of the various countries; hence, quite different empirical results would be expected.

It would be of great interest to compare empirical results from various countries and examine whether there are similar conclusions or draw conclusions anew. A future cross-country repetition of the same research would verify the external validity of the data concluded and allow the safe generalization of the results on a universal level. That would upgrade the value of the GoMobi framework offering a useful tool worldwide.

➤ The selection of the participating municipalities in the case studies.

The municipalities participating in the case studies research have been selected based on their population under the assumption- verified by theory- that the bigger the municipality the higher the information systems development. The growth of the municipality, however, is a metric determined after comparison; what is big, medium or small population is not a fixed dimension defined after standardized measurements. Hence, the selected municipalities are chosen based on the comparative population standards among the Greek municipalities at the discretion of the author.

The conduction of the research using sample of municipalities with completely different sizes from the Greek ones, e.g. London (population of 8.174.100 citizens¹²), might give different results. It would be of great interest to test the theoretical model taking into consideration municipalities of extreme sizes of populations- very big or very small- and take results of how the model adjusts in such cases.

➤ The number of the interviews conducted within the same municipality.

While collecting the data in order to form the case studies results, multiple interviews have been attempted to be conducted aiming to get a holistic picture of the municipality case. The interviews have been mainly addressed to people of the IT department of the municipality under the assumption that they are the ones in touch with the technological and information systems advances and could know how cutting-edge technologies could be used to cover modern needs in the municipalities.

¹² Based on <https://www.google.gr/search?q=population+of+London&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a>, accessed in March, 2013

The researcher has tried to interview people from all the levels of the information systems- operational, strategic, and management- and take into consideration the variations of data inputs viewing the mobile information systems development and integration from multiple and specialized perspectives. Unfortunately, that was not always feasible due to the way the Greek municipalities are equipped with personnel. Usually, there are not different people working on the different levels of the information systems. The same people, and often even the same unique employee, are responsible for all the information technology layers. The managers of the municipal IT department make the decisions of all information systems levels.

Experiences of specialized people in each information system layer could reduce the interviewees' objectiveness controlling the biased answers, which influence the results. It would be of high significance to test the proposed model in municipalities that employ experts for each structural layer of the municipal information systems.

Appendix I

Structure of Interview to Municipalities

A. Identifying suitable mobile G2C services/ applications

1. Which of the following governmental services does your municipality provide already through the internet and/or through the mobile? Please fill in the two last columns with numbers from 1 to 5 reflecting the citizens' response to each service (1= no response at all, 5= very high response).

Service Clusters/ Type of Function	Service Type	Use through the internet	Citizens' Response	Use through mobile	Citizens' Response
Information Dissemination	Time critical public information (traffic & road info, police info, earthquakes & floods)				
	News (changes in buildings, employees, new services, new infrastructure)				
	Process stages about the citizens' requests & evaluation of time of completion				
	Where, how and what are the necessary papers for submitting an application, registration, request, etc.				
	New Job positions (esp. in the public/ municipality sector)				
	Minutes & decisions of local authorities' councils				
	News & events regarding schools, libraries and training programs (for children or adults)				

	Broadcasting about the formulation of voluntary teams (for lifeguards, firefighters, planting)				
	Participation in local events/ competitions/ projects (under request)				
	Businesses' and citizens' informing about price lists, invoices breakdown (under request)				
Payments	Traffic fines				
	Council Tax				
	Tickets for sports & cultural activities/ manifestations of the municipality				
Applying Submissions/ Statements	Participating in local social, educational, cultural and sports teams				
	Complaints/ Suggestions				
	Certificates (birth certificate, marital status, etc.) & Licenses & Permits (getting married, permanent residence)				
	Updating data/ deleting/ registering in the citizens' records				
	Registrations (in the kinder garden, parking permission, etc.)				
	Lawsuit of a robbery, incident, etc. to the police				
	Vital constructing provisions of the municipalities' organizations (electricity, water and drainage supply)				

Issuing papers	Sending signed personalized verifications (personal or family credentials & certifications, construct licences, permanent residency permit etc.)				
Wireless Access	Wi-Fi Spots				
	WiMAX -free internet access all over the city				
Traffic	Parking payment (payment method based on the time someone has been parked)				
	Parking places information (nearest parking, availability, cost, etc.)				
	Mobile transport ticketing (buy bus, train, metro)				
	Updates about bus/ metro/ train routes/ delays/ cost, etc.				
	Tracking of the public vehicles (fleet management)				
Forum	Local Social Network (for information, m-participation in dialogues, commenting on news/ events/actions/ opinions,)				
	Participation in established, well-known social networks and forums				
Tourism	Guiding the travelers around monuments, museums, visiting places of the area/city				
	Providing maps & information about the POI of the city (how to go to restaurants, cinemas, banks, pharmacies, petrol station, etc.)				

GIS	Data Management System regarding the digital mapping of the geographical area helping out the constructions, measurements of plots, engineering and geology projects, etc.				
Promotion	Accepting advertisements/banners in the m-applications, m-browsers, etc.				
	Advertising the municipalities events/ actions, etc. through the mobile channel				
Other				

2. Could you evaluate the importance of each of the following mobile service?

Service Clusters/ Type of Function	Service Type	Not at All 1	2	3	4	Very Much 5
Information Dissemination	Time critical public information (traffic & road info, police info, earthquakes & floods)					
	News (changes in buildings, employees, new services, new infrastructure)					
	Process stages about the citizens' requests & evaluation of time of completion					
	Where, how and what are the necessary papers for submitting an application, registration, request, etc.					

	New Job positions (esp. in the public/ municipality sector)					
	Minutes & decisions of local authorities' councils					
	News & events regarding schools, libraries and training programs (for children or adults)					
	Broadcasting about the formulation of voluntary teams (for lifeguards, firefighters, planting)					
	Participation in local events/ competitions/ projects (under request)					
	Businesses' and citizens' informing about price lists, invoices breakdown (under request)					
Payments	Traffic fines					
	Council Tax					
	Tickets for sports & cultural activities/ manifestations of the municipality					
Applying Submissions/ Statements	Participating in local social, educational, cultural and sports teams					
	Complaints/ Suggestions					
	Certificates (birth certificate, marital status, etc.) & Licenses & Permits (getting married, permanent residence)					
	Updating data/ deleting/ registering in the citizens' records					
	Registrations (in the kinder garden, parking permission, etc.)					
	Lawsuit of a robbery, incident, etc. to the police					
	Vital constructing provisions of the municipalities' organizations (electricity, water and drainage supply)					

Issuing papers	Sending signed personalized verifications (personal or family credentials & certifications, construct licences, permanent residency permit etc.)					
Wireless Access	Wi-Fi Spots					
	WiMAX -free internet access all over the city					
Traffic	Parking payment (payment method based on the time someone has been parked)					
	Parking places information (nearest parking, availability, cost, etc.)					
	Mobile transport ticketing (buy bus, train, metro)					
	Updates about bus/ metro/ train routes/ delays/ cost, etc.					
	Tracking of the public vehicles (fleet management)					
Forum	Local Social Network (for information, m-participation in dialogues, commenting on news/ events/actions/ opinions)					
	Participation in established, well-known social networks and forums					
Tourism	Guiding the travelers around monuments, museums, visiting places of the area/city					
	Providing maps & information about the POI of the city (how to go to restaurants, cinemas, banks, pharmacies, petrol station, etc.)					
GIS	Data Management System regarding the digital mapping of the geographical area helping out the constructions, measurements of plots, engineering and geology projects, etc.					

Promotion	Accepting advertisements/banners in the m-applications, m-browsers, etc.					
	Advertising the municipalities events/ actions, etc. through the mobile channel					
Other					

3. Which m-G2C services would be/ has been the first to implement (regarding their importance)?

a).....

Why?

.....

b).....

Why?

.....

c).....

Why?

.....

4. Could you evaluate the importance of each of the following motives/ benefits from the municipality's side by providing an m-G2C service? (expected benefits for the municipality)

Motives	Definition	Not at All 1	2	3	4	Very Much 5
Changing work environment	Changing role of staff					
	Reducing time demands on staff					
	Increasing demands on staff					
Cost saving	Reduce the municipality's employees					
	Reduce the administrative costs					
General Efficiency	Making processes more efficient					
	Improving the existing processes (faster services for the citizens					
	Disseminating information to a large number of people at a very short time, (enlarged accessibility & transparency)					
Improving the image of the municipality	Formulating high standards of the municipality's profile to earn citizens' trust & loyalty					
	Impress the foreigners and attract tourists					
	Attract entrepreneurial activities and investments in the area					
	Aiming to co-operations with other municipalities for European development projects/ Giving the infrastructure to attract European projects					

Entrepreneurial activities	Increase non-tax-based revenues					
	Paid advertising on the mobile					
Other					

5. Could you evaluate the importance of each of the following citizens' benefits/ motives using m-G2C service?

Motives	Definitions	Not at All 1	2	3	4	Very Much 5
Time Saving	Providing faster access to documents and forms					
	Processing transactions speedily					
	High speed accessibility					
	Reducing citizens' time spent travelling to government offices					
	Decrease citizens' queuing time					
	Reaching more information in less time					
	Having a quicker response time to queries					
Cost Savings	Saving transaction costs					
	Saving parking & petrol cost					

	Saving postage costs					
Availability & Convenience	Reducing the number of customer visits to government offices					
	Being user friendly and easy to use					
	Easy to find information					
	Convenience and Availability (24/7 from everywhere)					
	Making interaction with government less bureaucratic					
	Providing up-to-date information					
	Keeping citizens informed about the news					
	Location awareness					
	Relationship Management	Decreased face-to-face interaction				
Encouraging active participation from citizens						
Communicating in a modern way attracting more and young citizens						
Providing personalized services						
Keeping citizens' data private						
Increasing citizen loyalty and encouraging repeat visits						
	Other.....					

6. Could you evaluate the importance of each of the following barriers impeding the implementation of these m-G2C services?

Barriers	Definition	Not at All 1	2	3	4	Very Much 5
Behavioral	Lack of transactions security					
	Lack of trust in using m-services concerning low privacy					
	Fear of receiving spam messages					
	Lack of familiarity with mobile technologies/ Lack of awareness					
	Difficulty of citizens in learning how to use m-services					
Technological	Lack of interoperability and backend process integration					
	Lack of mobile technology standards					
	Inconvenient user interface					
	Lack of network connection					
	Low data transfer speed					
	Tech-limitations of mobile devices					

Organizational	Lack of sustainable business models related to m-services					
	Reluctant of authorities to alter traditional ways of dealing with citizens <i>(Top Management Commitment)</i>					
	Lack of managerial innovative decisions for m-services					
	Lack of infrastructural investments and low budget for m-services					
	Lack of technical knowledge among IT personnel					
	The services are structured based on the goals of the administration, not the citizens					
	Weakness in reorganizing the work context with the workers. <i>(BPR)</i>					
Financial	High telecommunication costs					
	High development costs					
Governance- Regulation/ Legal	Lack of laws related specifically to the unique aspects of mobile government services					
	Lack of combined m-governance/m-business models					
	No authorized electronic signature					
	Other.....					

B. Mobile G2C services/ applications Development (Readiness)

7. Regarding the Technology specifications of the m-G2C services:

- What is the technological channel used for the delivery of the m-G2C services you have already implemented (SMS, mobile browser, mobile application)? Why did you choose that?

.....
.....

- Who did develop the technological platform (the mobile browser, the platform that sends the SMSs, the mobile application, etc.)? Why did you choose that?

.....
.....

- Who does decide about the content of the service?

.....
.....

- What are the needs in mobile equipment/ mobile devices to run those services? (PDAs, smartphones, typical mobile phones, etc.)

.....
.....

- What is the distribution channel of the implemented m-services (Branded app store, device retailers, operators' stores, etc.)? Why did you choose that? Which companies in specific (their names)?

.....

8. Regarding the Infrastructure needed for the services:

-What is the current municipality’s infrastructure that could host such services? (Wireless Nets, Servers, Handset devices, MVNOs, etc.) ?

.....

.....

- Please comment on the “City-owned Networks” and the “Municipal Wi-Fi” as different infrastructure business models.

	Definition	Comment
City-Owned Network	<i>The municipality owns and manages the network for internal operations and may share a limited amount of excess bandwidth with citizens for internet connectivity, typically, free of charge.</i>	
Municipal Wi-Fi	<i>Usually referred to as public-private partnerships- local government partners with a private entity, such as service provider. The provider owns and manages the network, charges fees for connectivity and value-added services.</i>	

- What other needs in infrastructure would be necessary in order to implement m-G2C services?

.....

.....

9. Regarding the municipality's demands in personnel:

- What is the current situation with regard to the Municipality's IT personnel?

1. No of Employees:

No of employees:	2009-2010	2010-11	2011-2012	2012-2013 (Expected)
In the IT Department				

2. What is their background? :

3. What is their role? :

4. What is their expertise? :

5. What is their working experience? :

- What are the municipality's demands in personnel in order to implement the m-G2C services, with regard to:

Demands regarding:	Comment
No of employees/ IT staff	
Background of the employees (level of degree, specialization etc.)	
Years of experience of the staff	
Age of the employees/ IT staff	
Degree of employees' adequacy/ performance in digital skills	
Soft skills of the staff (innovativeness, adaptability to changes, learning easily, etc.)	
Soft skills of the managers/ people in charge (innovativeness, adaptability to changes, learning easily, etc.)	
Background of the decision maker (mayor?)	

10.Regarding the Partnerships:

- Who would you need to co-operate/ have you co-operated with in order to implement the m-services?

Who?		Y/N	Why?	Name them
Public Agents	Other municipalities from the country			
	Other municipalities from abroad			
	Universities/ Research centers			
Network	Wi-Fi Operators			
	Network Operators			
Hardware Equipment	Device Manufacturers			
	Equipment Vendors			
Mobile Application	Private Development Companies			
	Application Distributors			
Payment Agents	Banks (for credit cards)			
	VISA/ PayPal/ etc.			
	Telecommunication providers			
Other			

- Regarding the Public-Private-Partnerships you have already implemented:

1. Regarding the service offered, who was responsible for the:

- development:
- financing:
- operating:
- maintaining:
- content provided:

2. How are the costs divided?

3. How are the earnings divided?

4. Is the private company allowed to make use of the infrastructure for ads & other commercial services for additional income?

Model	Comment
<i>The private sector operator is responsible for developing, financing, operating and maintaining the system, and the government starts to pay the transaction fees after the transaction level has reached a pre-agreed volume. The commercial company is allowed to make use of the information infrastructure for ads and e-commerce services for additional income. The municipality is the content provider.</i>	
<i>The commercial company builds and operates the mobile service, and charges the citizen for using the service. Revenues can be shared between authority and private partner, or retained completely by the private company as reimbursement of efforts. The municipality is the content provider.</i>	
<i>The Municipality's IT department is responsible for the development of the services and just co-operate with the telecom operators for connection achievement and infrastructure paying them a commission fee according to the services usage. The municipality is, also, the content provider.</i>	

- What are the problems arising through the Public-Private-Partnerships (PPP)? How important are the following reasons?

Reasons	Not at All 1	2	3	4	Very Much 5
They have no objectives and investment in common					
They have different degree of engagement					
The private companies change their business interests and abandon the governmental services					
The competition of the government with the private market is forbidden by law (The government should not monopolize the supply position with regard to distribution, pricing, licensing and competition)					
Commercial Companies want to have control over the information flow between citizen and government and, thus, influence and filter content and reach.					
Law concerning of passing the data to external parties					
Lack in standard contracts negotiating the penalties when content provision fails or is not available in time					
Ownership of Documentation (in cases when the authorities wouldn't back critical and dangerous for the masses info published by information services e.g. about air pollution, etc.)					
Misuse of individual data of the citizens by external parties intermediate the channel to the citizens					

11.Regarding the Financial Issues (Cost & Revenues)

- What is the investment in electronic and mobile G2C services per year so far (in euros)?

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13 (expected)
Cost of e-services
Cost of m-services

- How are the above expenses for the mobile services divided per year?

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Hardware- New PCs							
Servers							
Buying Software Platform							
m-devices							
Network Connection							
Network Infrastructure							
Paying the 3 rd -party mobile application developers							

Paying the application distributors							
Paying for SMSs the telecommunication Companies							
Other.....							
Total	100%						

- How are the expenses divided per service? (Which one was the most/ least cost-effective? Did all cost the same?)

.....

- How was it funded?

Funds from:	Comment
National and international Funding	
Advertising	
Sponsoring	
Payment by the citizens per transaction	
Payment by the citizens per subscription	
Payment for access/ downloading the application	
Mixed model	
Freemium Use	
Other.....	

- How have you created profit (in monetary values) out of these services? (covered & exceeded the expenses)

.....

- How have you created/ do you intend to create profit by implementing each of the above mobile G2C services?

.....

12. According to your opinion, what are the social factors that form the appropriate Social Context for the m-G2C services implementation, and how do they affect those services' success? (E.g. citizens' mobile maturity, hi-tech era, cost of living, etc.). Is there the appropriate social context in Greece for implementing m-G2C services?

Factors	Comment
Citizens' mobile maturity	
Hi-tech era	
Cost of living	
Other.....	

13. Are there any Regulation Restrictions related to the implementation of the m-G2C services? Please Comment

Problem	Comment
No technical interface standardization among authorities & different national initiatives	

The electronic signature is not officially accepted	
Lack in giving official registration numbers in the mobile applications	
Other.....	

C. Sustaining mobile G2C services/ applications

14. How would you consider the dissemination of the m-G2C services (promotion tactics, etc.)? Do you have some successful strategies in mind?

.....

15. How would you encourage the citizens to use the m-G2C services (give a reward, force them to execute the transaction only via the mobile devices, education/training, etc.)?

.....

16. What would motivate the municipality to further implement m-G2C services and improve the existing ones?

.....

D. General Information

- Municipality of.....

- Growth of the Municipality (in number of citizens).....

- No of Employees:

No of employees:	2009-2010	2010-11	2011-2012
In the Municipality			
In the IT Department			

- Municipality's Revenues:

	2009-2010	2010-11	2011-2012
€			

- Interviewee's Name/ Position in the Municipality/ Background/ E-mail:

.....