

# Development of a Conceptual and Methodological Framework for the Identification and Management of Barriers and Opportunities in the Adoption of e-Government services

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**Abstract.** The aim of this thesis is twofold, a conceptual and methodological framework for the management and identification of obstacles and opportunities for the adoption of electronic Government (e-Gov) services was developed. Predicting models of identifying barriers and opportunities of the adoption/use of eGov services were used. A new composition methodology of web usability evaluation of e-Gov services was developed. This method was applied on e-deliberation service of Greece. The synthesis of methodologies consists of the following assessment methods: the Nielsen's Heuristics, the Cognitive walkthrough method, the Inspection method, Expert testing, Policy analysis method, Questionnaire and Scenario as data collective methods. The questionnaire constructed following the HHS web usability guidelines as well as web usability standard ISO9241-151. The synthesis of methodologies can be applied to any e-Gov service. 125 usability points were tested and discovered that 23% of them had major usability problems 14% had small usability problems and 63% had no usability problems. The identified usability problems were categorized according to Nielsen's Heuristics, and specific usability problems were trucked down. In parallel, the adoption model of UTAUT-PBO (Predominant barriers and opportunities) following the Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed. Four models derived (Total e-Gov use, e-Gov-Obtain Info, e-Gov-Download Info, e-Gov-Filling Forms) identifying barriers or opportunities of use of e-Gov services in the EU (European Union). The data are drawn from "Eurostat" and "United Nations" statistical data bases, EU time series indicators for the years 2001-2011. Methodology of linear regression models with step was used. In the independent variables of the models potential obstacles or opportunities were evaluated. The models were evaluated per country and per year and a total of 164 models were estimated. Significant barriers and opportunities in the adoption/use of services trucked down in geographical areas of the EU. The variable "never use internet" which is negatively associated with the dependent variables of the 4 models, was identified as the predominant obstacle to the use/adoption during the period 2000 to 2011 in EU. A methodological gap in the evaluation of e-Gov in the EU exists. Europe focuses on the supply side and after the e-Gov services have been produced. It is suggested EU to follow a framework for adoption of e-Gov services in the design phase of services that takes into account the barriers and opportunities of adoption of e-Gov services.

**Subject area:** electronic Government or electronic Governance, information systems

**Keywords:** electronic Government or electronic Governance, information systems of e-Government services, barriers and opportunities of e-Government services, use/adoption of e-Government services, usability evaluation of e-Government services, UTAUT model

## 1. Introduction

The use of Information Communication Technologies (ICT) in the public administration and services is specified as *Electronic Governance* (e-Gov), which contains organisational changes and new skills for the improvement of public services and democratic processes [1]. The potential of e-Gov exceeds by far the initial achievements of electronic public services. In European Union and in many countries of the planet we notice an intense activation of both leaders and researchers on issues as broadband technology, interoperability, interactive e-Gov services accessible by all, public conventions (electronic supplies, with use of the Internet, public points of access to the internet, e-learning programs, creation of health e-card, web health services, dynamic environment for electronic entrepreneurship, safe infrastructure of information, safe communications between public services, lifting of legislative obstacles [2].

Approximately a decade earlier, the European Union (EU) was discussing European Governance and now the focus is on Internet Governance. In the year 2000, European Union's Lisbon Strategy set out the goal for the EU to become (in 2010) the most competitive knowledge based economy, enjoying full employment. The EU was determined to launch, in early 2000 an initiative to amend European Governance as a strategic objective well in advance of the Nice European Council. Decided to reform governance and how the EU uses the powers given by its citizens. One of the main aims was to open up policy-making and make governance more inclusive and

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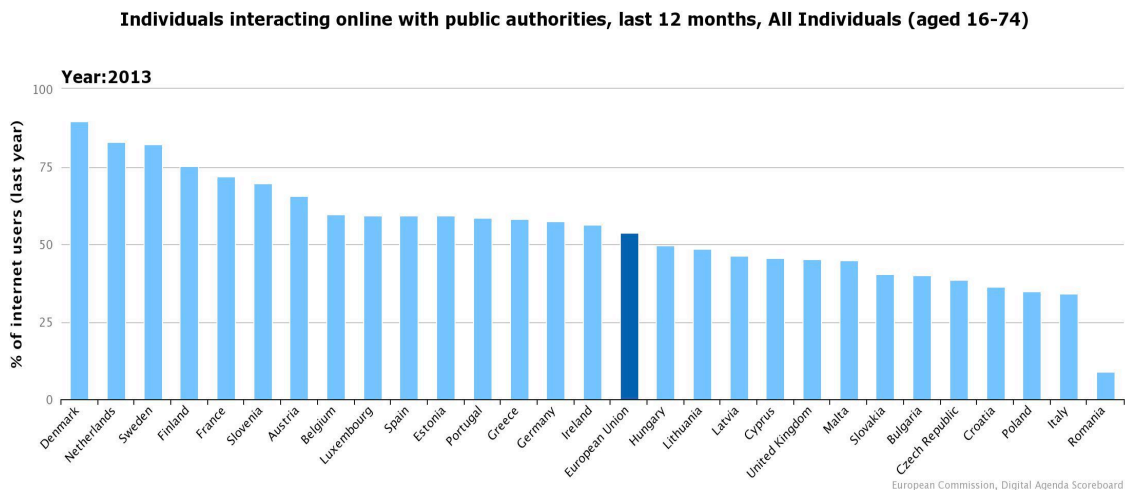
accountable. The promote of new forms of European Governance was a major scope of the European Union at 2000 [3], [4].

EU has set strategic objectives of the information society in relation to the citizens in various sectors of eGov services in everyday life, such as: a) employments in the public sector, Job search, Announcements (e.g. educational possibilities, price changes in transportation means etc), b) Summaries of new laws, Official Government Newspaper, Collection of National Statistical Data, c) Electronic submission of forms, d) Demands on issuing public services documents e) Demands of assistance and guidance by public services, f) Immediate democracy: Contribution of simple people with their opinions, comments and thoughts regarding imminent statutes, bills, protests etc, g) Notifications in the services of the entire public sector: change of address, marital status, number of children etc, h) Moral and political protection of citizens, c) Application of the current national penal legislation on the internet nodes prohibiting: children pornography, drug trafficking etc [2].

For this purpose the EU undertook in Lisbon the Action Plan e-Europe 2002 [5] as a modernization guide of the European economy. Then, in the European Council of Seville, the European Committee proposed an updated action plan [1], called Action Plan e-Europe 2005. Today the EU has set in effect the new action plan eEurope i2010 [6]. The Strategic Framework eEurope i2010 is the new strategic frame of European Committee for information society and the mass media. The Action Plan eEurope i2010 focuses on three priorities: a) the completion of single European information space with the encouragement of an open and competitive internal market for the information society and the mass media, b) the reinforcement of innovation and investments in the research with object the ICT in Education, and c) the achievement of greater productivity through the efficient use of new technologies, which can be achieved with the modification of economic behavior, (making use of new technologies), the adaptation of corporate activities, the web supply of public services and the improvement of skills. It is important to point out that in order for Europe to materialize its strategic plans, not only should European governments produce e-Gov services, but also the citizens should adopt services in their everyday routine, and we must not neglect that a large proportion of the world population does not visit the internet at all [2].

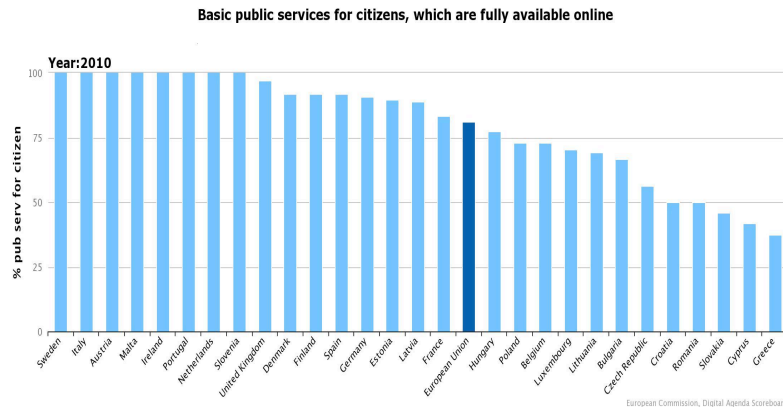
## 2. The Problem that Triggered this Doctoral Research

The problem focuses on low use of eGov services and located in the geographical area of the EU (see second chapter of this thesis) and existing indicators available from the statistical basis of Europe "Eurostat" were investigated.



**Figure1. Use of e-Gov Services in EU in 2013**

According to the last available data (2013) of the Digital Agenda Scoreboard, 53.7% of all Individuals aged between 16 to 74 years old, interact online with public authorities using Internet during last 12 months in EU. They use Internet for obtaining information from public authorities' web sites, downloading official forms and sending filled in forms. Big inequalities also exist among EU member states in this metric; for example, in Romania only 9% of Individuals interact online with public authorities using Internet during last 12 months in EU, while in Denmark the corresponding rate is 89.5%, (see figure 1).



**Figure2. Availability of e-Gov Services in EU in 2010**

According to the last available data (2010) of the Digital Agenda Scoreboard which assesses progress with respect to the targets set in the Digital Agenda for Europe (DAE), 80.9% of a basket of 12 basic services (income taxes, job search, social security benefits, personal documents, car registration, building permissions, declaration to police, public libraries, certificates, enrolment in higher education, announcement of moving, and health-related services) for which the entire procedure can be completed online, in EU. Big inequalities also exist among EU member states in this metric; for example, in Greece only 37.5% of the services are fully available on line, while in Sweden the corresponding rate is 100%, (European Commission, 2014a) (see figure 2). It is obvious that the use of services is low, and the availability is high (see figure 2), therefore a research effort was started to detect the barriers that prevent people from adopting eGov services or the opportunities that facilitate or encouraging the adoption of eGov services.

### 3. Obstacles and Opportunities of Adoption of e-Government Services

In the third chapter a literature review of the obstacles and opportunities of adoption/use of e-Gov services was accomplished. The factors that are potential obstacles or opportunities were taxinomised in 3 categories: a) barriers or opportunities from the demand side, b) barriers and opportunities concerning characteristics of e-Gov services, and c) barriers or opportunities affecting demand and related legal, strategic and technological context.

Barriers have been recorded concerning both the side of supply of e-Gov services and the side of demand. If the barriers are pinpointed, it will be possible to take them into consideration while designing e-Gov services which the citizens are likely to use, if the obstacles are raised. The barriers will thus be converted in opportunities that will facilitate the adoption. It is observed worldwide that the governments tend to convert more and more public services in web accessible services. However, no one can guarantee that the web accessible services offered by the state to the citizens will indeed be used [2].

Although governments invest continuously in producing of e-Gov services, citizens face difficulties to adopt these services. Barriers derive and prevent from using them. Barrier is anything preventing the users/citizens from the adoption of e-Gov services. Barriers impede or do not allow the adoption of e-Gov services by the citizens. We see therefore, e-Gov services being continuously produced but no one guarantees that these services are used or will be used by the citizen. Barriers concerning whether e-Gov services will be adopted or not, is interrelated among others, on various factors, among them: to the income, access to the internet, and the saving of time by the citizens, the ease of use, the experience of user, accessibility, and the civic engagement.

Social e-Gov services concerning low economic status cannot be adopted by the citizens because they do not have the required knowledge. In most countries there are many disadvantaged groups, who are much less likely to use e-Gov services. These subgroups of population include elderly individuals, people with special needs, of low socio-economic level, unemployed, low income, low formal education level, national minorities, and immigrants. These disadvantaged groups make very little use of personal computer. So we infer that while the public services become digitalized, they involve the risk that a big part of European and global population might not be able to use them. A large proportion of the world population does not visit the internet at all. Decision makers and policy engravers do not use ICT technologies to take decisions. Another barrier to the use of e-Gov services is education, lack of knowledge, low levels of technology access and concerns about privacy and security by the citizens. Among several barriers is pointed the lack of trust and confidence by the citizens. The civil servants as well as the decision makers may either facilitate or prevent the growth of e-Gov services [2].

For the application of e-Gov however, many obstacles and barriers should be overcome, while extensive investments are required. The change of procedures as far as the organization and mentalities is time-consuming and many years may be required until the combined investments in Information and Communication Technologies (ICT) funds, organization and skills yield completely their profits. The e-Gov is not only based on technological achievements, but among others, *"is a strategy aimed at offering more effective and more*

*functional services*" [7], it is, that is to say, a way in which, access by citizens to the volume of information owned by the state can be increased [8]. Also, e-Gov is an innovation of society which is often engaged as flow of information transmitted by the individuals who have the ability to influence the rest of the members of society. However, barriers interfere in this flow [9] [2]. EU must be skeptic and try to identify the barriers of adoption of e-Gov.

#### **4. European e-Government Strategy from eEurope 2002 to Digital Agenda 2020**

In the fourth chapter, a extensive Literature review, aims to track down the e-Gov European Strategy, investigating Legal documents of the Lisbon Strategy, the Action Plan eEurope 2002, the Action Plan eEurope 2005, the Strategic Framework i2010 and the Digital Agenda 2020.

The main scope of the Lisbon Strategy was not only to broaden and enrich the public debate on European matters, but also to encourage discussion on European values, issues and decisions using ICT. Europe decided to reform Governance and the concept of European Governance had to follow five political principles: openness, participation, accountability, effectiveness and coherence as well as to promote democracy in Europe. The EU's Action Plan 2002, established policies implemented in the provision of public services for citizens and businesses through Internet. Education and professional occupation where two major areas in which ICT could help citizens be part of the digital era and employees become flexible and specialized in ICT [4].

Furthermore, the EU's Action Plan 2005 promoted its belief that "Europe's public sector is today at crossroads, facing challenging economic and social conditions, institutional change and the profound impact of new technologies. However, there were barriers that had to overcome such as: change mindsets, push through organisational change and sustain investment. Citizens expect authorities to safeguard liberty, justice and security in the Internet as in real life. The main idea was accessibility for all, broadband connections, and interactive public services. For this reason an "Interoperable Framework for Pan European Services, electronic public procurements and public Internet points" should be created, with priority given to e-learning and e-Health. According to i2010 ICT could help make public health and welfare systems more efficient and effective. ICT could have an impact on cultural creativity in a large number of citizens. ICT could be used as a tool for environmental sustainability by using disaster management and by creating low energy efficient production processes. A new Lisbon Governance Cycle was outlined in the Strategic framework i2010, and thus new objectives of European Information Society had to be followed. The main scope was: a) to create a Single European Information Space with the aim of creating an open and competitive internal market, b) to produce better public services that increase quality of life as well as jobs and sustainable development, and c) to increase innovation and invest in ICT in order to increase growth and jobs EU [4].

Last but not least, according to the Digital Agenda 2020, in 2010, taking of course into perspective the economic crisis, the EU realized that ICT via Internet Governance could propose actions for smart, sustainable and economic growth. Priority was given to the Internet but there are seven obstacles that prevent the exploitation of ICT, such as: 1) Fragmented digital markets, 2) Lack of interoperability, 3) Rising of cybercrime and the risk of low trust in networks, 4) Lack of investment in networks, 5) Insufficient research and innovation efforts, 6) Lack of digital literacy and skills, 7) Missed opportunities in addressing societal challenges [4].

It is very important for the EU to create a "*Framework of Adoption of e-Gov Services*" that ensures that e-Gov services will be adopted by the citizens. In this view, the EU should try to ensure that e-Gov services will be used by as many European citizens as possible. This could happen, if services are produced by taking into consideration at the phase of design all the above mentioned barriers of adoption of e-Gov services, it would be more likely to increase e-Gov usage [4].

#### **5. Identification of Barriers of e-Government Implementation**

In the fifth chapter, Eurostat Database was searched and a data analysis was accomplished in order to identify barriers of e-Gov Implementation. Strategic objectives are pointed out as well as the barriers of e-Gov implementation such as, low computer use, low internet use, low computer skills, low internet skills, low level of Internet access of households. European citizens that do not have internet access at home estimate that: access costs are too high (telephone, etc.), or there is lack of skills, or they don't need it because content is not useful, or content is not interesting, or the equipment costs are too high, or content is harmful, or there are privacy or security concerns. Concerning barriers there are great differences among countries in EU. Also, it is very important for the EU to create a "*Framework of Adoption of e-Gov services*" that will enable e-Gov services to be adopted by citizens. In order for the EU to materialize its strategic plans, European governments have to ensure that citizens are using those services in their everyday routine. If e-Gov services are not used by the citizens, then the European relevant strategies will not benefit for the society [4].

Eurostat Database was searched in order to demonstrate some of the e-Gov evaluation metrics that probably affect the use and availability of e-Gov in EU concerning individuals and enterprises. Row data were processed and estimated the annual average and the annual average change of 19 e-Gov indicators for the years 2005-2010. Furthermore, some of the targets of Digital Agenda 2020 were evaluated whether will be accomplished ore

not, at 2015. Therefore, according to existing trends these indicators were estimated how will be, if nothing changes, in 2015. Major differences pointed out for the same indicator among countries member states of EU.

Major conclusions were that some targets of Digital Agenda were very ambitious and might not become reality by 2015, for all European countries member states of EU. Also, major differences appeared in some indicators and Europe should find out the reasons that cause these differences. If nothing changes the same indicators' trends for the years 2005-2010 will probably appear the next 5 years (2011-2015). If this happens, according to our data analysis, some countries will be under the key performance targets of Digital Agenda 2020. Also, for the years 2005-2010 trends of the same indicator are negative for some countries of EU and for others are positive. Future research is needed to investigate the reasons why this is happening [10].

Among these indicators, there are some that might affect the use of e-Gov. Availability of e-Gov in EU for the years 2005-2010 was high. Nevertheless, e-Gov usage by individuals for obtaining information from public authorities, for downloading official forms from public authorities, or for sending filled forms was very low at the same period, 32% at the period 2005-2010. This indicates that is not enough to evaluate mainly the supply side, but Europe should investigate the reasons why e-Gov use is low [10]. In EU a large amount of European citizens do not use a pc or internet, they do not know how to use a pc or internet. The results of the empirical research revealed that e-Gov services are not for "all citizens". The empirical study is a pilot study and a precursor of the investigation carried out in chapter 9. Furthermore this pilot research helped our research should focus on the assessment and management of e-Gov. E-Gov usage by enterprises is high for the years 2005-2010 concerning usage of Internet: for obtaining information from public authorities, or for obtaining forms from public authorities, or for returning filled in forms to public authorities but it is low concerning interaction with public authorities for full electronic case handling. On the contrary, e-Gov usage by enterprises for interaction with public authorities for e-procurement is low. Internet purchases of goods or services, over the Internet, by individuals for private use is very low as well as, online purchases in the last 3 months for the period 2005-2010. Online sales of small medium enterprises (SMEs), without financial sector, 10-249 persons employed, with at least 1% of turnover, are very low for the years 2005-2010 [10].

These metrics showed us that EU, in the evaluation frameworks of e-Gov, did not give a deep focus on some indicators that might affect directly the use of e-Gov or might play the role of "prerequisites" for e-Gov adoption. Therefore a new model was introduced for the adoption/use of e-Gov services in chapter 9, the UTAUT-PBO (predominant barriers or opportunities) of e-Gov Adoption. This model includes variables that are included to the category of "prerequisites of e-Gov adoption". We must not neglect that a major proportion of individuals in EU had never used Internet for the period 2005-2010. Is very important that, before EU implements a new e-Gov strategy, it sees the trends of those indicators that affect directly the adoption/use of e-Gov services by individuals and enterprises. This will help EU to track down a strategy with more realistic targets. Europe should establish a framework that should track down the reasons why e-Gov usage is low in some countries and why is high in other countries. EU may group countries according to its e-Gov readiness or maturity of adoption of e-Gov services. Also in this framework must be defined which indicators affect directly e-Gov use. Is internet use? Is computer use? etc. If these indicators are defined a more realistic European strategy could be outlined for all countries member states of EU [10].

In our days, Europe first sets targets of e-Gov and then evaluates them. In order for the targets of Digital Agenda to be successfully accomplished, EU should produce e-Gov services that will be evaluated at the phase of design. In the design stages, the services will be personalized accordingly to a) citizens' needs of each country, and b) the prerequisites of adoption of e-Gov services. This could be materialized if a "Common Framework of Pre-evaluation" is taking in consideration the prerequisites of adoption of e-Gov services and is followed by all countries at the stage of design of e-Gov services, [10]. Therefore chapter 9 and chapter 10 focus to a "Common Framework of Pre-evaluation" of the "Adoption/Use of e-Gov services".

## **6. Different Models in the Evaluation and Management of e-Government**

In the sixth chapter we explored and recorded the different models in the evaluation and management of e-Gov. In order to explain the adoption, intention to adopt, use or intention to use of e-Gov services several models are used. Some researchers refer to adopt or intention to adopt of e-Gov services, or both. Others deal with intension to use, use of e-Gov services, or both. Some researchers employ the term "use" to imply intention to use e-Gov services. Since "adoption" is more a subjective attitude and does not necessarily imply use, we opted to deal with use and intention to use of e-Gov services directly. These models take into account many of the factors influencing the adoption or intention to adopt, use or intention to use of e-Gov services. Some of the theories predicting the use of information system (IS) can be found in the following works: Theory of Reasoned Action (TRA) [11], Extension of TRA theory is Theory of Attitude toward Behavior ([12], Technology Acceptance Model (TAM) [13], Extension of the Technology Acceptance Model (TAM2) [14], Diffusion of Innovation Model (DOI) [9], [15], Unified Theory of Acceptance and Use of Technology (UTAUT) ([16], Theory of Planned Behavior –TPB model, [17], Technology Acceptance Model- Motivational Model-MM model, Model of PC Utilization, (MPCU model ) [18], Social Cognitive Theory (SCT), [19], Unified Theory of Acceptance and Use of Technology-UTAUT, Venkatesh [16].

To explain e-Gov adoption or use, some researchers: (a) suggest models which follow these theories, or (b) propose new models which attempt to predict and explain the behavior using a variety of independent variables, (c) explore new models giving weight to trust, security and usability, or (d) apply data driven methods, i.e. do data analytics without proposing models.

Among others these theoretical frameworks give focus to the following mentioned explanatory variables: Perceived Usefulness, Perceived Ease of Use-PEOU, Previous Positive Experience, Perceived Credibility, Computer self-efficacy, TOG, PU, PEOU, Perceived Risk, Cultural Characteristics which affect Uncertainty avoidance, effective interaction over the net, Risk & Uncertainty Avoidance, PU, PEOU, effective interaction over the net, Trust of the actor providing the service, General Predisposition to trust, Social Demographics (gender, education etc.), Party Affiliation, Cultural factors, Risk perceptions, Time, Environment of Innovation, User Characteristics, Satisfaction, Web-site Design, Perceived Control over the process, Perceived Usefulness, User Expectations, Economic Development, Innovation, Internet Connectivity, National Performance Indicators.

## **7. E-Government Evaluation Frameworks Used by the EU Action Plan e-Europe-2002 to the Digital Agenda 2020**

In the seventh chapter we record the “e-Gov Evaluation Frameworks” used by the EU, from Action Plan e-Europe 2002 [20] [21] to the Digital Agenda 2020. A methodological gap was found in the evaluation of e-Gov services in Europe, while EU evaluates mainly the supply side. European e-Gov evaluation strategy is outlined in Action Plan eEurope 2002, Action Plan e-Europe 2005, the Strategic Framework i2010 and the Digital Agenda 2020. The availability & sophistication of 20 basic public services was evaluated in the evaluation frameworks of Action Plan e-Europe 2002, Action plan e-Europ was adopted. In the last decade, Europe evaluated mainly the supply side of e-Gov by evaluating the availability of 20 basic public services by estimating the indicator “Online availability and interactivity of public services”, [10].

An evaluation of Europe’s evaluation frameworks of Action Plans from e-Europe 2002 to Digital Agenda 2020 was accomplished and a data analysis in Eurostat Database [22] was conducted. Europe at these evaluation frameworks, until strategic framework12010, focuses mainly on availability and sophistication of e-Gov services.

The assessment of the availability of the 20 basic e-Gov services is included in Action Plans e-Europe 2002, e-Europe 2005, Strategic Framework i2010 [23]. In the last decade Europe gives priority to the supply side of e-Gov services According to Digital Europe measurements e-Gov services treated as advanced services and citizens that are digital divide cannot use them. [24]

Europe follows specific measurement frameworks, by beginning with the “Evaluation Framework of e-Europe 2002” until today following the “Evaluation framework of Digital Agenda 2020”. In Action Plan e-Europe 2002 [20, 25-27], in Action Plan e-Europe 2005 [27-30] and in the Strategic Evaluation framework of i2010 [31-32] followed the “4 stage evaluation model” for the assessment of e-Gov indicators. A lot of researchers follow similar model for e-Gov evaluation, [33], [34]. Others focus to the idea of fully or not fully integrated on line e-Gov services [35]. It must be pointed out that the above mentioned methodologies evaluate e-Gov services after they are produced.

## **8. Usability Evaluation of e-Government Services**

In the eighth chapter a new synthesis of methodologies for usability evaluation of e-Gov in the EU was proposed, which can be customized with appropriate adjustments to any service e-Gov. Also this new usability evaluation method could take the place of a “Common Framework of Pre-evaluation” of e-Gov services at the phase of design. The lack of usability is one of the most important obstacles that affect the use of e-Gov services. We apply the proposed methodologies in the e-deliberation service in Greece.

The objective of this chapter is to evaluate the usability of any e-Gov service. The e-deliberation service of Greece was chosen to serve as an object of evaluation. In Greece (a member state of EU), there is one central e-deliberation service called “Opengov”, [36] available for all Ministries. In the course of the study the input of the e-deliberation service of Greece and how easily the citizens publicize their comments are examined. The focus is on the e-deliberation service of Greece, and usability problems are detected following a scenario/script: “*The submission of comments by the citizen by using the e-deliberation service of Greek Government*”, in order to find out the barriers of usability problems that citizen face when using an e-Gov service. [37]

The combination of methods proposed for the usability evaluation of e-Gov services are as follows: Nielsen’s Heuristic, Cognitive Walkthrough, Inspection, a script/scenario, a questionnaire, usability guidelines, usability standards, expert testing and, policy analysis. The questionnaire used was [38] to identify usability problems of e-deliberation service of Greece according to Nielsen’s principles, categorized into major and minor problems. The questionnaire followed HHS usability guidelines [39] and ISO 9241-151 usability standard [40] [41]. This could help comparisons between usability evaluations, facilitate exchange of best practices and measure usability in a more structured way [37].

The questionnaire was filled by 4 experts. Usability problems are barriers of adoption/use of e-Gov services. Major and minor usability problems of an e-Gov service were detected according to Nielsen’s principles concerning the e-deliberation service of Greece [37] see table 1.

**Table 1. Nielsen's Heuristics**

1. Visibility system status
2. Match between system and real world
3. Recognition rather than recall
4. Flexibility and efficiency using
5. User control and freedom
6. Consistency and standards
7. Error prevention
8. Aesthetic and minimalist design
9. Help users recognize, diagnose and recover from errors.
10. Help and documentation

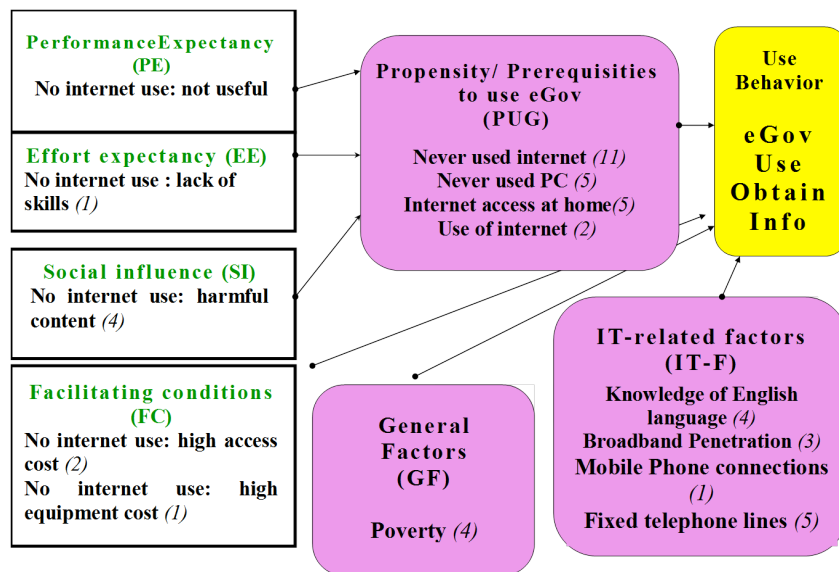
The results showed that 23% usability points had major usability problems, 14% had minor usability problems and 63% had no usability problems. Usability problems were grouped in accordance with Nielsen's Heuristics. If designers follow this combination of methods approach at the stage of design of any e-Gov service, the usability will increase [37].

Overall, e-deliberation service of Greece is simply designed and tells the user what the next step is. This is a significant advantage in order to be comprehensible and usable by the average user. Because of its simplicity, it might be possible for citizens to participate in the e-deliberation procedure. From the other hand, the service does not help the unskilled users because they are not guided at all, there are no tools for search. These kinds of functions are essential for deliberation and for real dialogue to be accomplished in practice. Certain usability problems were addressed according to Nielsen's Principles.

### 9. Adoption Model of e-Government Services "UTAUT-PBO"

In the ninth chapter through empirical research some of the prevailing obstacles or opportunities were identified that affect the use of e-Gov in the EU by applying the "Adoption Model of e-Gov Services UTAUT-PBO" (PBO stands for predominant barriers and opportunities). Four models were evaluated to track do the key barriers and opportunities in Adoption/Use of e-Gov services"

The objective of this chapter is to ascertain the relation of e-Gov use to a variety of explanatory variables in an effort to measure the impact of barriers and opportunities to the ability of the general population in the EU countries to take advantage of the e-Gov services. In this research there is an effort to identify the predominant factors affecting the use of e-Gov services. An empirical study was conducted in 30 countries of the EU. Time series data were conducted for 11 years from 2001 to 2011 and for the 30 countries on 25 variables. Data were extracted from EUROSTAT and the statistical database of the United Nations. This research contributes to existing literature in the scientific area of e-Gov by proposing a model of use of e-Gov services by extending the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Statistical analysis reveals specific barriers and opportunities that affect the use of e-Gov services in EU. The predominant barrier among them is the "never used internet" attribute.



**Figure 3. Adoption Model e-Gov Services UTAUT-PBO**



Barriers and opportunities were identified influencing e-Gov services use in EU. The most important barrier was the fact that individuals had never used the Internet. Even though this number is decreasing in time, policy makers should explore other channels to offer e-Gov services, if the target is to increase their use in the immediate future.

Further examination of barriers and opportunities such as the ones identified herein (PC use, costs factors etc.) should be carried out before the implementation of e-Gov use enhancement measures, so that the measures themselves could be more effective and realistic.

The empirically validated model could provide a useful framework for e-Gov authorities to develop, implement and promote e-Gov services more likely to be adopted. The findings of this research also provide several important implications concerning each country in separate. The results must be seen in details by each country. Since the variable "never used internet" was identified as the most important variable to use e-Gov services, future research should focus on explaining the reasons behind the lack of internet use (a) is it objective (difficulty in access/absence of access)? (b) is it subjective (citizens do not want to or cannot use the internet)? Depending on the explanation different e-Gov implementation strategies should be adopted. In the former case improvements in access should increase the use of e-Gov services; In the latter other means of e-Gov services access should be exploited, such as mobile/smart phones and information kiosks. Since there exist considerable differences among EU countries in e-Gov, the Union should study the reasons for these differences and develop tailor made solutions which will take under consideration the country environment. To achieve a better explanation of opportunities and barriers of e-Gov use, more factors should be explored. To implement such a project, the European strategy should focus on data collection on an expanded basis.

## 10. Conclusions

The results of this research are manifold. Obstacles and opportunities of adopting e-Gov services were categorized by the side the demand of e-Gov services as well as to citizen's and service's characteristics. Also some of Europe's strategic objectives of e-Gov will not be achieved in 2015. There is a methodological gap in the evaluation of e-government services and systems as the EU evaluates mainly the supply side.

This thesis contributes to the existing literature in the research field of e-Gov by producing a new synthesis of methodologies for usability evaluation. The produced method can be applied to any e-government service at the phase of the design of e-Gov services and aims to rise the use of e-Gov services through increasing the usability. We must not neglect that, the lack of usability is one of the primary obstacles in the adoption of any IT system, and one of the main factors of not adopting e-Gov services. Usability is a key criterion in the diffusion of ICTs and plays an important role in e-Gov services and electronic participation environments. E-Gov services are used by heterogeneous population groups, so interfaces should have these features that guarantee all citizens may use them. Even though, EU claims that "e-Gov services for all", when e-Gov services are produced EU does not aim to usability. To produce e-Gov services for all citizens must follow the usability principles of design for all (design for all).

Developers, as well designers, could make the appropriate corrections, in order to increase the usability of the particular e-Gov service. The ultimate purpose is to increase usability of any e-Gov service and the overall added value of an e-Gov service. The proposed methodology could help avoid usability problems and increase usability, which is one of the barriers of the adoption/use of e-Gov services. The proposed evaluation methodology can be applied to any e-Gov service in order to identify the barriers of the usability. The advantage of the proposed methodology is that it combines the adoption of standards, the formulation of relevant guidelines and Nielsen's Heuristics, in an integrated whole, leading to the identification of the great majority of usability problems. It also facilitates the classification of problems in a way that the path to their solution is easily understood. ISO 9241-151 web usability standard as well as HHS usability web guidelines could be used as a common base of web usability evaluation in all member states countries of EU and evaluators could follow the general guidelines of ISO 9241-151 and produce checklists and questionnaires. This could help comparisons between usability evaluations, facilitate exchange of best practices and measure usability in a more structured way [37].

Expert usability evaluation evaluates e-Gov service at the phase of prototype's design. A user testing could be conducted at the second phase. Many usability professionals first do a usability evaluation and then follow it up with a usability test [42]. Also, an accessibility testing should be designed in the future, because "Usability and Accessibility are looking at User Experience through two Lenses. Usability and accessibility are slightly different lenses to assess user experience. It is possible to be strong in one area and weak in the other. Using either approach alone could result in an inaccurate view of your site's user experience. Evaluating your website with both usability and accessibility in mind gives all users the best possible user experience"[42].

We tried by employing a multi-method approach, to trace the range of usability problems. This multi-method approach and the findings of this study can provide the basis of future explorations of usability problems of e-Gov services in Europe.



This research provides significant findings about factors that influence the adoption/use of eGovernment services by introducing a new adoption model "UTAUT-PBO". The proposed model "UTAUT-PBO" is an extension of "UTAUT" model. In UTAUT model three new categories of variables were added: the factors which are the prerequisites of use of eGovernment services, general factors and factors related to technology. The main factor influencing the adoption/use of e-Gov services in all EU countries was that "people have not ever use the internet". Other factors affecting the use of e-Gov use in EU are as following "never used internet", "Internet access at home", "no basic computer skills", "never used PC", "poverty", "no internet: high access cost", "no internet: high equipment cost", "no internet: not useful", "no internet: lack of skills", "no internet: harmful content", "GERD", "GDP", "Knowledge of English Language: First Certificate", "Knowledge of English Language: Proficiency", "service availability", "employment rate", "broadband penetration", "Use of internet", "mobile phone connections", "fixed telephone lines", "internet use over never used internet residual", "never used pc over never used internet residual", "broadband penetration over never used internet residual", "mobile telephone over never used internet residual", "internet access home over never used internet residual"

The mediator variables of the UTAUT model were grouped into two structural components: "General Factors" and "IT-related Factors", involving more dimensions. "General factors" contain factors determining the quality of life within a society as Gross Expenditure on Research and Development (GERD), Gross Domestic Product (GDP), employment rate, poverty. IT-related factors contain the IT framework, infrastructure, the supply channels of e-Gov services such as mobile connections, fixed telephones lines, broadband penetration, mobile phone connections. This is direct result of the fact that in order to use E-Gov services available technologies of ICT must be used. Additionally, PC or internet related technology requires a fair knowledge of the English Language. The empirically validated model could provide a "Useful Framework for e-Gov Authorities" to develop, implement and promote e-Gov services more likely to be adopted. The findings of this research also provide several important implications concerning each country in separate. The results must be seen in details by each country.

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