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# Systematic Literature Review: Taxonomy Of Services In E-Government

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# SYSTEMATIC LITERATURE REVIEW: TAXONOMY OF SERVICES IN E- GOVERNMENT

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## **Abstract**

*In the context of e-Government, e-Government Services domain is a popular research area since it modulates the effectiveness of facilitating services to users. Here we classify the characteristics of services in e-Government into five groups: service orientation, service attributes, service organization, levels of services adoption, and service of communication technology forms. We identify these groups by analyzing e-Government services characteristics through mapping between services characteristics, and use a systematic review of e-Government services characteristics. This study includes a discussion of the results of the taxonomy that we built and some recommendations to improve the taxonomy further. Some limitations are described. This taxonomy differs from other taxonomies by focusing on governmental services characteristics rather than governmental and nongovernmental organizations and their municipalities. In Conclusion, the taxonomy proposed here will aid decision-makers and practitioners in developing e-Government systems to facilitate communicating between supplier-side and demand-side.*

**Keywords:** e-Government, services characteristics, Taxonomy.

## **1. Introduction**

E-Government portals have developed rapidly in the Web age, their numbers of increasing in a rapid manner (Wu et al., 2012). Therefore, personal interactions between people and government employees have been reduced as people are enabled to access digital governmental services, comprehending the concept of “putting citizen online instead of in-line” (Al-Kibsi et al., 2001, P.65). Moreover, e-Government services are now accessible on a 24 x 7 basis (Charalabidis et al., 2006) and offering several phased models for public e-services. A common division of phases is: 1) information, 2) interaction, 3) transaction and 4) interaction (Goldkuh12 and Persson, 2006).

The European Commission (2010) plans to support its e-Government Action Plan 2011-2015 in order to establish a new generation of e-Government services for businesses and citizens. Their action plan aims to empower citizens and businesses by supporting the transition of e-Government into a new generation of open, flexible and co-operative e-Government services at local, regional, national and European levels.

A set of facets/characteristics of e-Government services is investigated for each service category, allowing for classification of government services based on a set of common characteristics and facets including categories, levels, structure, capabilities, clusters, navigation through website, package and service technology tools. This taxonomy has been built to make definitions using the systematic review and analysis of e-Government services characteristics in order to classify these characteristics. The main thrust of this study is to uncover the distinction between e-Government services characteristics. In order to do this, we identify and extract a taxonomy using the mapping between the characteristics. Finally, we compare the taxonomy created with other taxonomies have been created in the e-Government domain.

The authors in this study follow a number of search steps in order to identify appropriate literature and then create taxonomy for e-Government services. At the outset, we searched for articles that discuss governmental services terms such as e-government services, e-services, digital public services, and online service etc. Then we made a list of those chosen articles based on key requirements such as the number of citations, in which Journal they have been published (the researchers concentrated on scientific and technical journals in order to uncover detailed characteristics), and the papers published in the last decade. Papers were further filtered after we have read the abstracts of those papers, to identify the services categorization according to their characteristics and/or facets. Then we identified/extracted taxonomy depending on mapping between the characteristics.

This paper is organized into the following sections. The first section is the introduction. Section 2 provides a systematic literature review of e-Government services characteristics/facets and a brief overview of e-Government approaches for supplying service. After initial analysis, sub-taxonomies are identified in section 3. The discussion and analysis related to this taxonomy is described in section 4 and finally, the conclusion of this paper is provided in section 5.

## **2. Background Literature**

A small section of background is provided as context for the later systematic approaches to literature.

## **2.1. Taxonomy of e-Government services:**

A taxonomy is a description of a formal system/organization by classifying multifaceted, complex phenomena according to a set of common characteristics and dimensions; the aim of this term is to clarify, defining and comparing complex phenomena (Bradley et al., 2007), (Hill, 1999), (Rich, 1992) and to make definitions using the systematic review (analysis) of services in order to make conclusions. Each facet/characteristics uncovered later serves a specific purpose towards the realisation of municipal e-Government services (Charalabidis et al., 2006).

Charalabidis et al (2006) built a service classification that includes all the taxonomy-related information of a service ignoring the internal structure, organisation or functionality of each service. His taxonomy described specific external characteristics (services' main purpose, nature, orientation, means of provision, and various functional characteristics). The main objectives of his taxonomy are: the definition of usability issues of a municipal portal, the definition of the needed functionality, and the definition of the needs for data protection.

## **2.2. e-Government Approaches for supplying services**

Cities that use e-government are using two common approaches. The information-oriented approach applies the concept of one-stop shopping service. The second approach is the user-oriented approach in which it takes needs of different user groups in consideration while categorizing information and services on the web (Torres et al., 2005). Electronic services are the usage of electronic delivery of government information, programs, strategies, and services available online Sakowicz (2003); and Torres et al. (2005). According to Peraire and Coleman (2000, P.2) e- service is defined as: "some interaction offered to a user, across the Internet, that has meaning and economic value".

According to LaVigne (2001); each e-Government project needs to take in consideration five kinds of skills to achieve a successful e-Government, these skills are: technical, analytical, information management, communication, and project management skills. An example of a successful e-Government project is the Australian e-Government portal which is an early visionary of one-stop portal e-Government and established a strategic approach to e-Government that recognised the importance of an integrated approach to electronic service delivery that sometimes known as a single window. It offers a number of services and provides more

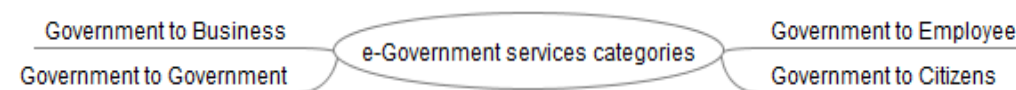
convenient transaction with government for the community including business sector. The portal offers citizens more than 80 interactive services. It allows users to access services by three ways: by services type (paying bill, applying for a grant, etc.); by life event (moving house, having a baby, etc.); or by location (government agency or department) (Holmes, 2001). On the other hand, Nevada State Governor' Office (2000) detected a number of defects in e-Government service projects at Nevada State (USA). An example would be the forms clearing house. This clearinghouse provides a website that presents a list of forms which can be downloaded and filled by the user, and organized by services. Therefore, no transactions take place electronically (reviewed by Layne and Lee (2001)).

### **3. Mini Taxonomies:**

#### **3.1. Categories of e-Government**

Generally, the governmental e-services are organized into four major areas or service interactions according to the relationship between the employee, citizen, business and government which are: government-to-citizen (G2C), this includes civil registration, health, education, and other services; G2C relationship focuses on the ability of the government and citizen to interact with each other via the Internet. Government-to-business (G2B), transactions and interactions include procurement, taxation, and licensing. G2B service interaction focuses on the ability to minimize cost and collect better information about businesses. Government-to-Employee (G2E) service relation focuses on serving the government employees like e-payroll and e-training; and it enables employees to interact efficiently with other governmental agencies and departments; and government-to-government (G2G), a variety of intra-municipal transactions such as inter-agency payments, procurement, standardized forms, and permits. G2G service interaction focuses on improving the efficiency of information delivery when transacting information between several government agencies or within one government agency Brown and Brundney, (2001); Johnson, (2003); Bakry, (2004); Evans and Yen, (2006); Yildiz, (2007); Zhao, (2010); and Hirwade, (2010). G2C and G2E involve interactions between the government and citizens while G2G and G2B focus on the interaction and cooperation between the government and internal or external organizations. Additionally, G2C and G2B represent the external service interaction and collaboration between them and the government, while G2G

and G2E represent the internal interaction and cooperation between government agencies at different levels and at different locations, as well as between governments and their employees (Siau and Long, 2005). Eight categories of public services to citizens which include birth, marriage, domicile register, education, social security, public utility, health and traffic- have been delivered through the Internet, and have been identified in the websites of 14 municipal governments with respect to G2C interactivity (Zhao, 2010) or the possibility of completing each process through internet. Figure 1 below shows a concise summary for e-Government categories.



**Figure 1. The governmental e-services Categorise**

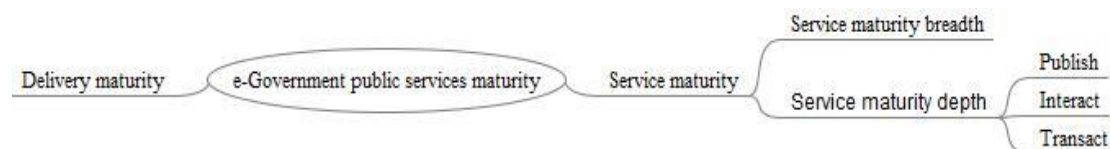
### **3.2. e-Government public services maturity**

Maturity is a term to define and concern with to what extent local governments have developed their presence online (Torres et al, 2005). The government services are classified within public e-service maturity into two phases: service maturity and delivery maturity which are summarized in Figure 2. Torres et al. (2005) gathered information in a number of European Union cities with high administrative relevance to their countries (Austria, Belgium, France, Germany, Ireland, Italy, Luxembourg, Portugal, Spain, and the UK); and then studied the depth and breadth of the services they offer online. The survey conducted focuses on e-services, describing the accessibility to digital governmental services, programs, strategies, and services which are available online, by navigating through municipal Web sites looking to identify which online public services are currently offered by local governments in the countries studied. The level of interactivity of the online public services was determined and information was collected about the extent of basic public services development.

Service maturity is concerned about the extent to which local governments have developed their existence online and it is obtained as the result of two dimensions (Torres et al., 2005); (Zhao, 2010) which are Service maturity breadth and Service maturity depth. Service maturity breadth demonstrates the number of online services offered which included 67 services across 33 local governments studied by Torres et al (2005). Service maturity depth classifies services into three categories in relation to the form of G2C interactivity, comprising: 1) Publish:

Users can only access what is shown on the screen, thus interaction is limited. In this category, the Internet is underused with little advantage compared with the older traditional proceedings. 2) Interact: Users can contact for example public departments to arrange a service, but there is no guarantee that the department will respond. Internet is not developed well, but compared to the old traditional approaches it represents an advance. 3) Transact, including case handling: Interaction between administration and citizens through Internet and then service will be performed. According to Irani et al. (2006) most of e-Government development models identify a transaction phase as a necessary phase to full systems integration. They argue that a considerable number of e-government projects be unsuccessful at this phase and consequently create a challenge to achieve the endeavour of consistent and means of access to e-government services.

Delivery maturity (Torres et al, 2005) includes Web site aspects that provide benefits for citizens and gives an indicator of Web site sophistication:



**Figure 2. e-Government Public services maturity**

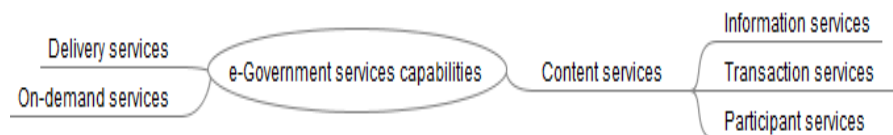
- Degree of accessibility: “ability to access” which is the availability of a product and/or service to people. For example, provide Alternative Text for Images for disabled.
- Degree of navigability: “ability to navigate” which is a website roadmap that help users while using the website system. For examples, Navigation Bar, Sitemap, and Tab Bar.
- Web flexibility/suitable interactive in using web service component such as functions are provided by online application.
- Web facility to make the use of the Internet more fascinating, such as e-mail account.

In conclusion, the whole maturity (Torres et al, 2005) assigned to service maturity and delivery maturity seek out to offer more significance to the delivery of services online (service maturity) than to the level of sophistication of Web sites (delivery maturity) based on navigation throughout government Web sites with the aim of measuring service maturity and delivery maturity.

### **3.3. e-Government Services Capabilities**

Hu et al. (Hu et al., 2012) illustrated a hierarchical model depicted in (Figure 3) based on a survey carried out through face-to-face interviews, telephone interviews, e-mail messages, and paper questionnaires, 7 government departments and 35 Master of Public Administration (MPA) centres were investigated. The analysis of this survey

revealed the mechanisms of how one type of capability is imposed on the others and how they shape government capabilities in providing e-services. The e-government services capabilities consist of content services which in turn is divided by the E-government services into three types: First, information services which include (e.g. government news, forums, public policies, research information, employment and business opportunities, etc) (Larsen and Rainie, 2012). Second, transaction services, West (2007) states that e-Government services are those services in which entire transactions can occur and displayed online. Third, participation services which are no longer the exclusive privilege of politicians, and the citizenry is given the opportunity to vote and make decisions regarding civic and public issues via Internet (Evans and Yen, 2006). The other e-government services capabilities are the delivery services and on-demand services. The delivery services are shown by the service design transport mechanisms and viewed as highly efficient and effective. On-demand services are characterized by these attributes (service design transport, and highly efficient and effective mechanism) in influencing delivery services and content services. On-demand services provide the mechanisms for technology adoption, innovation, learning and emergency reactions that build a continuously inventive model for improving service performance.



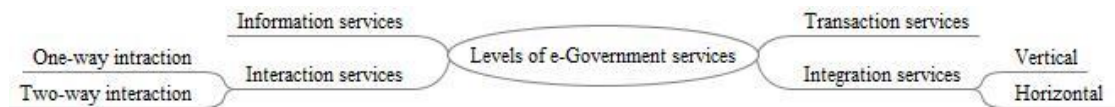
**Figure 3. Hierarchical model for services capabilities**

### **3.4. Sophistication Levels of e-Government Services**

In 2010, the availability of 20 common government services in 32 European countries was issued (European commission, 2010), (Arduini et al., 2010). The European Commission (2010) adopted a scoring structure based on a four-level sophistication model of e-government services (Figure 4). Information services in which the public agency website provides information only about the services themselves and how it is provided. Interaction services can be further divided into One-way interaction and two-way interaction. In one-way interaction citizens are allowed to download a form to request the service, then the filled form can then be sent to the agency using old approaches. In two-way interaction the public agency website allows citizens to start



the service supply. Transaction services are services supplied completely online, typically also including payment. Lastly, integration services allow government services, when pro-actively providing service to its citizens, may need horizontal (within governmental unite) or vertical (using governmental levels) integration of various government agencies. The significant common aspect of this model that it underlines the prominence of the interaction stage as well as the evolution of any e-government system and the integration stage (Venkatesh et al, 2012), (Norris and Moon, 2005).



**Figure 4. Sophistication levels of e-government services**

### 3.5. Clusters and Package of e-Government Services

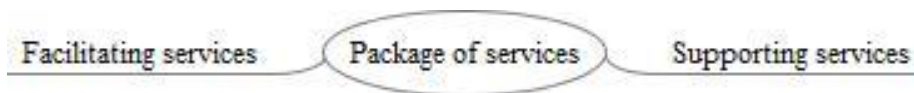
The perception of clustering services was proposed in the six stage e-government transformation model (Turban et al., 2006), which was anticipated by Deloitte Research in 2000 and has been cited by many academic research papers. Government identifies shared service and clusters its delivery to citizen so that citizens could sight once-disparate services in the portal.

The study was conducted by Capgemini (2007) for the European Commission to measure the progress of on-line public service delivery across 31 European Countries. This study investigates the web-based activities of more than 5000 public administrations and 14000 web pages providing 20 public services in the 31 participating countries. Data are provided on two core indicators of sophistication and accessibility of on-line services, measured across 20 services. Services are grouped into four clusters (Figure 5): Income and fiscal services (e.g. taxes and social contributions), registration (e.g. car, company and marriage), Social services (e.g. health, libraries and job search) and Permits and Licenses (e.g. building, passports and other ID certification) (Capgemini, 2007); (Arduini et al., 2010).



**Figure 5. Services grouped into four clusters**

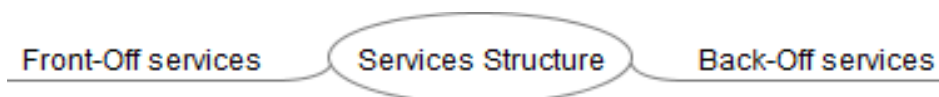
According to Venkatesh et al. (2012) a package of services depicted in figure 6 is considered as a collection of core services. Such as, facilitating and supporting services. Core services are the primary reason for the existence of services. Facilitating services are fundamental services that help customers to consume a core service. For examples: graphical information, help and guidelines. Supporting services are elective services that help the core service to be more attractive to users and therefore improving the service experience. For example, airline service consists of a core service—i.e., transportation—facilitating services/goods—e.g., check-in procedures and air tickets—and supporting services/goods—e.g., cabin crew services and in-flight meals.



**Figure 6. Hierarchal shows package of services**

### **3.6. e-Government Structure for Services Process**

e-Government concentrates on the reorganization of service processes and citizen services depicted in figure 7. The separation between front and back offices has become the most favoured E-Government service organization (Lenk, 2004). The front office handles specific office processes or service components, with a focus on certain target groups (Lenk and Traummuller, 2001). The back office is the place where decisions are taken, and where IT functions such as databases, applications, signature infrastructure are located (Schuppan, 2009). In this structure; e-Government efforts to move from the front-office (service users) layer of governments to the back-office (Administration level) layer; this is referred to as transformational government (Weerakkody and Dhillon, 2008).



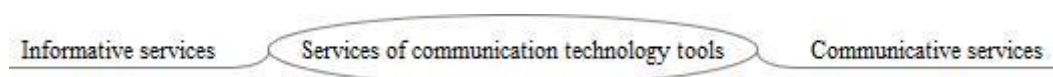
**Figure 7. Services structure (process) through delivery services**

### **3.7. Services of Communication Technology Tools**

Governments are expected to offer both e-services digital government and communication technologies (Holzer and Mandoharan, 2008). Moreover, e-services

are cost effective way of delivering services, and this cost savings can be quantified easily (Li and Feeney, 2012). According to Ahn (2011) the aim of e-services adoption is for cost savings while the adoption of communication technologies aims to respond to citizens needs (e.g. tracking system for any applied application, chatting service).

The web portal setting contains tools with flexibility and adaptableness depending on their use. The design of these tools is based on web services, such as (e.g. - chat, message box and e-libraries), which are widespread in the public web community. These tools are distinguished into two groups: *informative* and *communicative* demonstrated in Figure 8. The *informative* tools include services related to informational government functions and their utilities. On the other hand, the *communicative* tools include services that allow matching of users related to the same or different cluster (Drigas and Koukianakis, 2009). Ross and Perry (1999) concluded that the characteristics of public services make them special. In other hand, each public service organisation has distinctive characteristics are: public service organisation not provide just one chain of command but multiple chains of commands, the nature of public service organisations is that they provide services, and The purpose of public service organisations is that they serve the common good (Pratt et al, 2007).



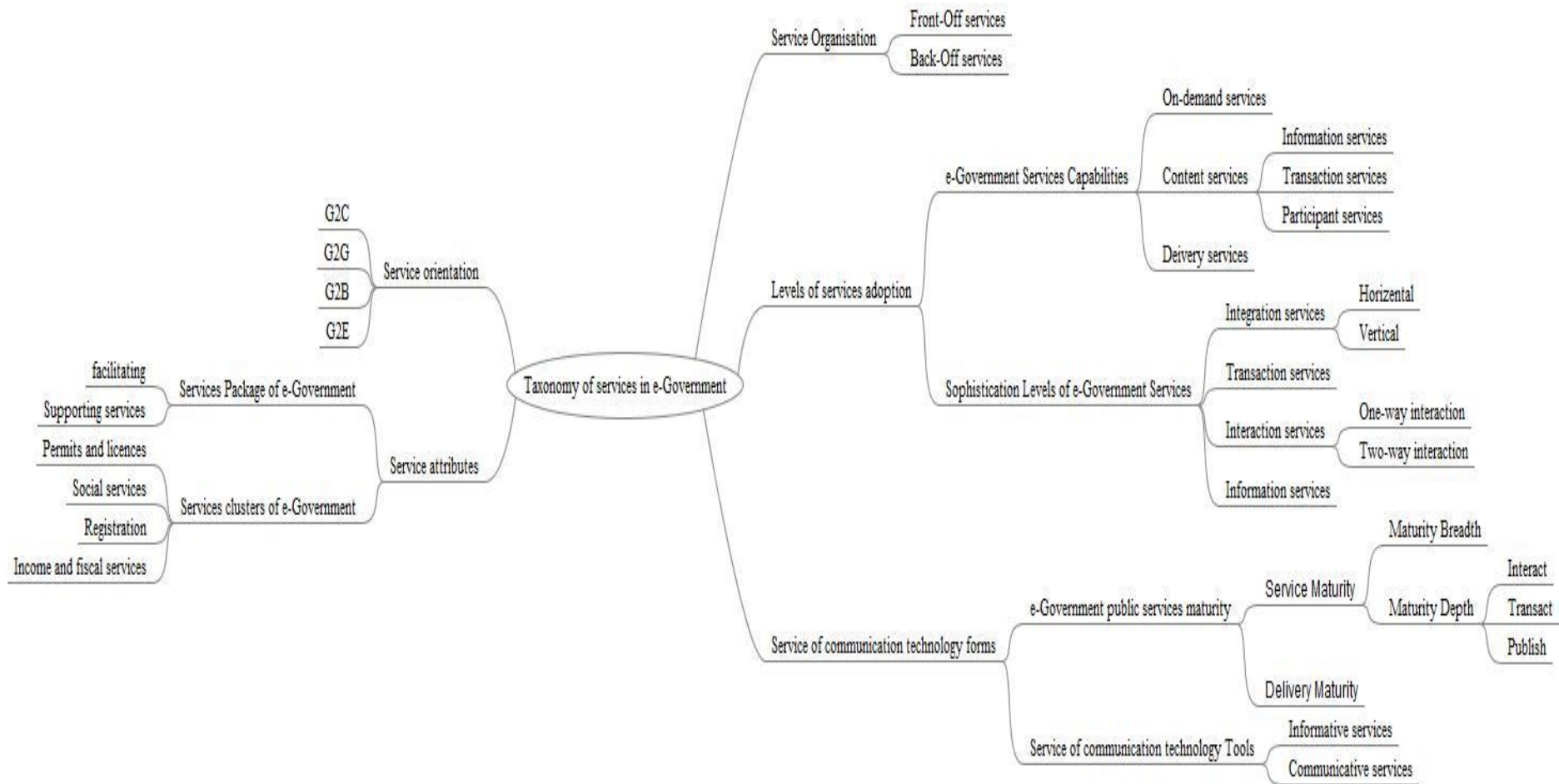
**Figure 8. Services of communication technology tools**

#### **4. Discussion and Analysis**

In this study, we classified the e-Government services into five groups: service orientation, service organization, levels of services adoption, services attributes, and Service of communication technology forms. The resulting classification may support and/or encourage decision-makers and practitioners to make use this study and information providing `during the development process of e-Government systems. This is illustrated by usage of e-Government agencies functionality in the taxonomy of e-Government services to analyse a set of services characteristics (depicted in figure 9 and demonstrated in sections 4.1 and 4.2). Each group classified in this study has distinctive characteristics/facets that need to be considered when contemplating,

building or delivering an e-Government service. Furthermore, government project administration is able to infer management indicators from these characteristics/facets and provide a possible basis for diverse government agencies to work together.

In Figure 9, we have classified the e-Government services based on common features that have been founded among e-Government services themselves through studying their characteristics/facets then we combined all previous figures to identify Figure 9. These features helped in deriving a new taxonomy, presented in full in Figure 9.



**Figure 9. Taxonomy of e-Government services (Key characteristics in each group)**

## **4.1. Characteristics of each classified group**

### **4.1.1. Group 1: Service orientation**

Service orientation categories of government services are based on four distinct categories (G2C, G2B, G2G, and G2E) that each have been mentioned in section 3.1 that is, each category comprises a set of features (types of services provided by government) related to each category, these features help in identifying the group of potential users for services. Obviously, each type of digital services can have a number of types of service users. Thus, the aim of this group is to recognize the group of service users targeted based on functionality of the services provided.

### **4.1.2. Group 2: Service Organisation**

This facet group comprises two dimensions that have been identified in section 3.6 (front-off office and back-off office). Each dimension shows the attitude of government and service user, through the level of organization that provides the services. Currently, the new science research in government services is studying how to design services beginning from front to back rather than back to front. The separation between front and back offices has become the most favoured E-Government service organization (Lenk, 2004). The front office handles specific office processes or service components, with a focus on certain target groups (Lenk and Traunmuller, 2001). The back office is the place where decisions are taken, and where IT functions such as databases, applications, signature infrastructure are located (Schuppan, 2009). Regarding to services clusters (Figure 5), a relationship has been conducted between the first services cluster (income fiscal service) and services organization (front-off office, and back-off office) as the first focus of government is to monopolize in the income fiscal services. The result is that EU average for online accessibility of incoming fiscal services is all above 80%. These services consume high costs due to considerable 'front-office' paperwork, while back-offices were implementing advanced IT systems. Therefore, a business case for the investment was quick and easy to produce, followed by reasonably easy application. On the other hand, the other clusters are still at very low performance levels. These services are more various in natures, and they are typically presented by local providers. This setting is an obvious reason for the considerable slower progress in comparison to many of the more homogeneous high volume central services (like tax)(Cho and Park, 2003).

#### **4.1.3. Group 3: Levels of services adoption**

Services of this group are continually developing because this group of services is considered the base of government development phases according to four main stages (information, interaction, transaction, integration) that have been identified by European commission. Services in this group require high level of mechanism/protocol to make the service user communicate and customise with e-services. Thus, in this group of services “flexibility and provision of diverse options are required” (Cho and Park 2010, P.347). Moreover, these services are extremely customised through different types of internet-media like (email, chatting, conversation). For more details refer to section 3.3 and 3.4.

#### **4.1.4. Group 4: service attributes**

Services attributes comprises two dimensions (services clusters, and services package). In this study we merged those dimensions together based on common characteristics e.g. (social services such as health and job search, and facilitating services such as graphical information and guidelines) shared between them. Each dimension includes a number of facets that has been illustrated in details in section 3.5. Recently, the interactions and transactions have been increased in the process of supplying government services to citizens. e-Government services applications require a highly advanced technologies tools to grant ability for service user communicating with services provided by government. Therefore, services of this group need a continuous improvement to keep up with advanced needs of services users.

#### **4.1.5. Group 5: Service of communication technology forms**

This is the last group in this study, called means of services provision. This group is concerned about ICT infrastructures that are required to provide access and updates with government services (e.g. Internet services, Mobile-phone, Browsers, and anther social media). In-fact, this group includes two major facets (public e-services maturity, and services of communication technology tools). Each facet comprises common features and characteristics, these characteristics support us to build this mini taxonomy. The employee-staff who concern about this group of services have to work in cooperation with government administration in order to sustain stakeholders help and support.

### **4.2. Distinguishing characteristics of this taxonomy**

The mini taxonomies of e-service (categorisations) in this study were conducted on governments as part of a systematic review of literature. Importantly though, the literature available in this area is quite limited. Most previous studies focus on governmental and nongovernmental organization and their municipalities rather than focus on government services characteristics. Thus, in our study we were more concentrating on services with common characteristics/features, and we compared this taxonomy with those of previous taxonomies (Silvestro et al., 1992); (Charalabidis et al, 2006); (Hill, 1999); (Barquero, 2011); (Vakil, 1997). Our research study has two key features that differ from those of traditional features. First, the categorization in this study was conducted on the level of grouped services with common characteristics. Moreover, we did a comparison with previous classifications concentrating on the level of government and non-government organisations. The characteristics of each specific group of services in e-Government need to be considered, since many government organisations and their agencies attempt to specialise their services in specific field and provide them to service-users. Depicted in table 1 is an example of service classification for two frequently requested services from Citizens and Business. Furthermore, each group of services characteristics indicates the functionality of government services. It should also be noted that literature is reporting on information systems being deployed on an ever advancing Web and Internet architecture.

This research study indicates that classified groups includes government services characteristics need to be highly classified to fully understand their structure in order to support/encourage decision-makers and practitioners in e-Government project development to make use this study and information during developing e-Government information and services systems.

Service provided	ID card	Professions Licenses
Taxonomy		
Service orientation	Citizen	Business
Service organization	Front-office: fill online application Back-office: application processing by G2C	Front-office: fill online certificate Back-office: certificate processing by G2B
Level of service adoption	Integration-ID issuing	Integration-certificate
Service attributes	Service cluster-social services	Service cluster-permits and licences
Service of communication technology forms	Service maturity breadth	Service maturity depth-Transact

**Table 1. Classification for ID card and Professions Licenses**



## 5. Conclusion

In this paper we have proposed a taxonomy including five major groupings, each group represents a sub-taxonomy of service characteristics (classification groupings); using mini-taxonomies to support the integration of common characteristics in e-Government services. The contribution of this paper is to build integration of each e-Government service characteristics into a single conceptual framework (Taxonomy), the myriad variety of ways that e-government services have been classified. This framework will direct IT managers, practitioners, and policy makers to identify the technological and organisational requirements for e-Government services development by learning how to use and manage e-Government services to renovate service processes, improve decision-making administration, and gain competitive advantage from the adoption of e-Government services. An example is illustrated in table 1. The proposed taxonomy, depicted in figure 9, is facilitated in a relational Data-Base Management system (DBMS) through view and query of e-Government services in order to provide a mechanism for creating, updating, deleting, and modifying Data-Base records for service category nodes. The proposed framework (taxonomy) will assist in re-designing e-Government systems and their municipalities by supporting the decision-makers to identify what services to deploy based on querying and viewing of these services.

The study can add value or contribute to a fuller consideration of government services with a focus on specific characteristics or features. With the results of this study, we recommend that the characteristics of government services should be taken in consideration during the specification, development and deployment of e-Government information and services systems. The purpose of the proposed framework is to reduce any confusion surrounding the e-Government services characteristics, by understanding each group service characteristics. However, our research study faced a number of limitations and challenges during the extraction and preparation of these characteristics. One of these challenges is that e-Government infrastructure and technology play a crucial role in the classification of these characteristics when moving from group to group. Another challenge is the lack of e-Government service user's perceptions in the literature. e-Government services will be impacted by and impact a diverse group of people (stakeholders). Further consideration of the service user offers an interesting area of further.

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