Building Permission Smart e-Service Status: A Literature Review

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Abstract: "Application for Building Permission" has been defined as one of the 20 primary e-Government services, which all European States were obliged to deliver online by 2005. The achievement of this e-service delivery has been aligned to critical challenges such as, service transparency; service simplification and improvement; time minimization etc.

However, evidence from European scorecards shows significant delays in this e-service delivery between the member States, with gaps between local and national levels across Europe. This phenomenon generates questions regarding this e-service, which could be summarized to the following: *which is the context of the application for building permission e-service delivery?* This question concerns an analysis of the respective information system, e-service process and even legal framework that accompany this service. An answer to this question will return useful information regarding a complexity of such a project, which could justify the existing gaps or delays even beyond the European borders.

Another question concerns *how have different countries achieved in delivering building permission e-services?* Corresponding status in several countries is analyzed, while an answer to this question is useful for the e-Government domain too, since it returns findings from exemplars that could be capitalized by countries in order to succeed in the respective e-service delivery.

This paper performs a literature review on prestigious publications and on official reports in order to answer these two questions. Moreover, this literature review aims to return a "clearer picture" regarding the different schools of thought that approach this e-service delivery.

Keywords: e-Government, building permission, European Union, e-service, urban planning.

1. Introduction

E-government (Khan et al, 2013) is a concept with demand and citizen different perspectives (Andersen et al, 2006) and represents, among others, a system with which users can access public services through the Internet (Khan et al, 2010). E-government research has made a significant progress in the last decade by researchers in diverse fields. Previous studies have focused on the e-government research domain in general (Heeks et al, 2007), provided region-specific analyses (Khan et al, 2011), and examined specific topics such as e-government models (Andersen et al, 2006), e-participation (Sæbo et al, 2008), the digital divide (Helbig et al, 2009) and E-government's relationship with aging populations (Niehaves, 2011). Such studies have typically focused on governmental programs, policy lessons, or socio-cultural issues related to the E-government research domain and have used conventional systematic literature review (SLR) methods (Kitchenham, 2004; Kitchenham et al, 2009). Such methods may be useful for attaining a general overview of a discipline and its trends, but they are limited in terms of their ability to reveal the hidden structures and properties of the research domain in question, in this case E-government.

The adoption of Internet in public libraries (Jaeger et al., 2012) and the widespread utilization of technologies have contributed to the increase of e-government acceptance and adoption (Bertot, 2011; Jaeger et al, 2011). The relationship between Information and communication technologies (ICTs), public libraries and e-government has been widely documented in the literature (Bertot et al, 2011; Jaeger et al, 2011a). However, E-government as a respected discipline and an established research field was established in the last decade, and has since developed its own research community and methodology (Scholl, 2009), alongside philosophies and theories (Heeks et al, 2007; Lee, 2010); and domains and fields of study (Khan et al, 2011; Niehaves, 2011; Sæbo et al, 2008).

"Application for Building Permission" has been defined as one of the 20 primary e-Government services, which each European Member State was obliged to deliver online by 2005 and are the main public services that should be addressed by 2010, according to the eEurope strategies. The achievement of this e-service delivery has been aligned to critical challenges, among which worth mentioning: service transparency and corruption

elimination; respective public service simplification and improvement; execution time minimization; economic growth support etc.

In this paper we will perform a literature review on prestigious publications and on official reports. Moreover, this literature review will return a "clear picture" regarding the different schools of thought that approach this e-service delivery and two main questions will be answered regarding the context of the application for building permission e-service delivery as well as the current status at different countries, specifically in Europe, in delivering building permission e-service.

Accordingly, this paper poses two research questions:

- RQ1: Which is the context of the application for building permission e-service delivery?
- RQ2: How have different countries achieved in delivering building permission e-services?

The first question is very important to be answered, since it will provide all the appropriate information that lies behind the building permission service. Moreover, it is important to address the reasons that lead European Commission to define this service as one of the primary common 20 public services. The second question sounds trivial, since European benchmarking is expected to illustrate this performance. However, this benchmarking does not justify the reasons that lie behind this performance (i.e., framework, infrastructure, process complexity etc.).

The remaining of this paper is structured as follows: section 2 concerns a background and a literature review with regard of this paper's context. Next, section 3 presents the main outcomes extracted from the conducted literature analysis towards the answer to the two different research questions that were mentioned earlier. Finally, section 4 includes possible implications of the conducted research and the discussion area, while section 5 presents the main conclusions of the current work.

2. Background

This section analyses the challenge of building permission e-service and the status of its application to different countries. Subsequently, we explicitly set out our research questions, which were in briefly reported earlier, our literature search strategy and discuss the status quo of building permission e-service.

A building permit is formal permission from the local authority to start a construction project. The plans review process, building permit, and inspection process protect each homeowner's interests, as well as those of the community. It also ensures that the construction is safe, legal, and sound. The building permission could be defined in general as the standard procedure to obtain building or renovation permission for a personal building (regular, initial request, i.e. not taking into consideration contesting and appeal).

On the other hand, the concept of E-service (short for electronic service) represents one prominent application of utilizing the use of Information and communication technologies in different areas. Combining the e-services with the building permits processes could lead to several benefits, both for customers and public authorities. Electronic customer related services of governments have expanded enormously. In many regulatory domains, the use of ICT services has become common property. This applies also to the field of building regulations.

2.1 Context of applying building permission e-services

There are many potential advantages of the online handling of building permits. Positive cost and time effects and a further streamlining of procedures can be expected since the system eliminates sending layers of papers. The heaps of paper in municipalities' archives can largely be replaced by one electronic archive. Progress of applications can be tracked online. Building inspectors will be able to take electronic plans and documents out on-site. Drawings can be viewed on screen and redline comments can be made. A nationwide uniform building control system is an important additional factor to facilitate the introduction of online building permit procedure. The same rules apply everywhere (e.g. technical requirements) and the building control authorities work along the same procedures. This enables the development of a central web server where local building control offices can register.

2.1.1 Security Aspects

However, since government has a duty to carefully handle all data and the identity of applicants, not every service can be handled online. Security issues are very important in all e-government processes as well as in building permission e-services. An example in the Netherlands is DigiD, the organization that manages the digital identities of citizens for the national government. Depending on the level of confidence that an identity provider is given, this will also put more trust in the provided identity, as a result of which the identity could use more functionality. This system is generally combined with the sending of an SMS code. At the time of

application the identity provider sends an SMS to the registered mobile phone with a code that can be used once.

In order, to enhance security in online transactions, a future trend in authentication and authorization that could be applied, also, in online building permission activities is biometrics, which uses body features of the applicant verified by the municipality. Biometrics can in principle replace passes, keys, passwords, codes, photos and signatures and is currently insensitive to fraud. Because this requires a national system this form of security cannot be immediately available for municipalities. Various governments are preparing for this method of security. In Belgium a start has been made with adding a chip in passports on which data is stored. A combination of this digital passport, a card reader at the user's home and a finger print reader can achieve a very high level of security.

2.1.2 Electronic Signatures in online building permission systems

Another application of ICT in online building permission systems is the utilization of electronic signatures. Signatures are no longer required for written requests to the administration, therefore obviating the need for secure electronic signatures. This especially eases the use of a portal, as document can now be created on the server (signatures would have to be created on the citizen's computer). If in doubt about the sender of the request, administration can always request a full signature (which can be on paper or electronically). For both, download of the text of the request, as a file must be offered. The citizen can then print, sign, and send it per post, or affix an electronic signature and send it per e-mail. However, there are some technically complicated issues on signatures for building plans, since these often exist in rather uncommon electronic formats and must be signed by several persons. Electronic signatures are difficult in this case, as appropriate software is rather rare.

2.1.3 Interoperability issues on online building permission services

UK is a great exemplar for interoperability issues based on the UK e-Government Interoperability Framework (e-GIF). E-GIF is an initiative that aims to define the essential requirements for a Web-enabled government. It defines the technical policies and specifications governing information flows across government and public sectors and is mandatory to comply with e-GIF standards and policies. The UK government policy defines:

- XML and XML schemas for data integration;
- UML, RDF, and XML for data modelling and description language; and
- XSL, DOM, and XML for data presentation.

2.1.4 Legal implications of online building permissions applications

Finally, there should be noted that one-stop government possesses as well as online building permissions applications contain many legal implications (Sonntag et al, 2003) as well as several other issues such as assignment of responsibilities for checking the applications as well as serving multiple official documents. Previously communication between companies/citizens and administration was established through the department responsible for the decision. Only in rare cases (e.g. in appeals) another instance receives it and is responsible for passing it on. However, the receiving unit usually is or was also involved in the proceeding. One-stop government does not touch material jurisdiction and therefore no problem in this area arises. Still difficult situations can be imagined (e.g. the company timely sent the response to the one-stop unit, but this delays it unduly so it reaches the final recipient too late).

2.2 Reviewing the theme of building permission e-service

The EU e-Government Benchmark (EUeGovBe) builds on the Lisbon and i2010 agenda. 20 public services clustered into four areas remain at the core of the measurement: income-generating cluster, registration cluster, returns cluster and permits and license cluster. To understand the progress of the above policy and countries' efforts, the EUeGovBe measures these 20 public services and the national portal, using five main indicators: online sophistication (the extent to which government services allow for interaction and/or transaction between the administration and citizens or businesses), full online availability (the extent to which there is fully automated and proactive delivery of the 20 key public services. A comparison over time illustrates the speed and extent of convergence in performance in Europe), user experience of services (the extent to which the 20 basic e-Government services are easy to use, which covers aspects of usability, transparency, privacy and multi- channel policy as well as the possibility for users to give feedback on the quality of services to administrations), portal sophistication (identifying the most mature, user-centric and personalized portals that provide direct access to a wide range e-Government services), sub-national analysis (nomenclature of

Territorial Units for Statistics levels, providing an unprecedented granularity of e-Government performance across regional and local administrations).

Table 1 summarizes the main stages of the e-service during the benchmarking process. Each stage represents a different level of maturity of the online building permission system.

Table 1: Stages of Benchmarking Process

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Stage 0	There is no public accessible website for building permission application.
Stage 1: Information	A website is available with published information necessary to start the procedure to obtain a building or renovation permission.
Stage 2: One-way Interaction	The public website offers, besides basic information, the possibility to obtain the paper form to start the building application procedure in a non-electronic way.
Stage 3: Two-way Interaction	There are increased electronic capabilities at the public website such as to start the procedure to obtain a building or renovation permission through an electronic form.
Stage 4: Full electronic case handling	The building permission can be applied, managed and validated completely electronically.
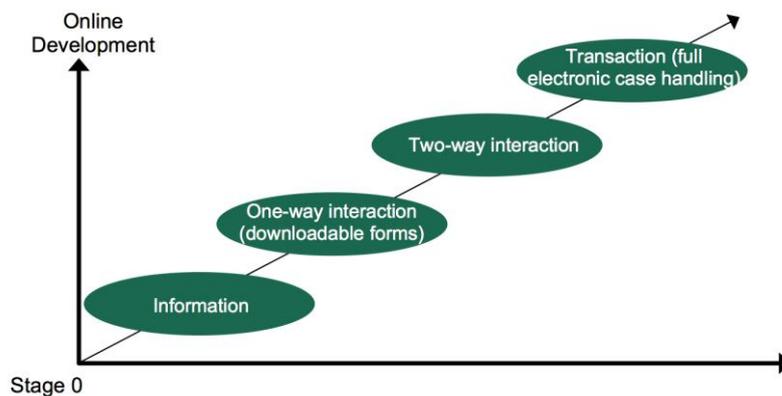
Figure 1: Visual representation of the maturity of the online development of the building permission e-service.

2.3 The building permission e-service status quo

The in-depth analysis of the literature resulted to several papers regarding e-government and e-services as well Information and Communications Technology (ICT) utilization in e-government processes. The development and utilization of public libraries seems to be also an important factor that is extensively analysed in the literature and several ICT tools are proposed towards the development of more efficient public libraries.

However, there are not adequate references for the study of online building permission systems and the current status of those systems in different countries. Thus, the current literature analysis included, besides scientific articles in journals and conferences, national and European regulations of building permissions as well European benchmarking reports and surveys on Electronic Public Services that are summarized in Table 2.

Table 2: Main Journals, Conferences and Surveys on Building Permission e-services.

Journals
ISPRS Journal of Photogrammetry and Remote Sensing
ISPRS Journal of Photogrammetry and Remote Sensing
Annals of GIS
Geo-spatial Information Science
Engineering Applications of Artificial Intelligence (Elsevier)
Design Studies (Elsevier)

Journal of Urban Technology
International Journal of Digital Society (IJDS)
International Journal of Geographical Information Systems
Library & Information Science Research
Government Information Quarterly
Studies in Computational Intelligence
Habitat International
Conferences
International Conference on Digital Government Research
International Conference on Intelligent Environments
International Conference on Utility and Cloud Computing
Reports – Surveys
Benchmark Measurement
i2010 – A European Information Society for growth and employment
Web Based Survey on Electronic Public Services

An in-depth analysis of the articles provided evidence of the following arguments and key areas of study:

- Advantages of the online building permission system in comparison with traditional building permission processes.
- Utilization of ICT tools in existing building permission e-services and review of future potentials of the facilitation of the technology towards more efficient and secure systems.
- Investigating several interoperability issues that arise from the utilization of online services and report several common practices that face interoperability and interconnectivity issues.
- Reporting legal aspects that arise from the utilization of an online building permission system.
- Analyse current practice in several countries and report the level of intrusion of the building permission e-service to European countries.

3. Results of the review analysis

In this Section the results from the literature analysis are being presented and organized in two subsections according to the different research questions that were mentioned earlier.

The analysis of the literature that was performed included a deep analysis into scientific conferences, journals and surveys and reports, as presented in Table 2. There were utilized several keywords during the extended literature analysis, such as electronic public services, online building permission, building permission application, urban planning information systems, GIS framework for urban planning, ICT services for building permission, etc. The main results of the analysis include 4 reports and surveys regarding the digitization of public services, EU regulations from 15 European countries regarding the building permission application, three reports regarding well-recognized European benchmarking processes of online building permission services in several EU countries, over 10 scientific papers to journals and conferences regarding the status of public libraries and their utilization to online building permission process and numerous (over 20) scientific papers of the utilization of ICT tools and specifically GIS systems to e-Services, e-Government and electronic building permission application. However, as reported earlier, the main literature covers the e-Government generic domain, but do not focus at the online building permission application and services.

3.1 Comparison of strategies among different countries in delivering building permission e-services

The results of the benchmarking process that was analyzed in previous sections, depicting the 5 stages of building permission e-services intrusion to official governmental processes and everyday transactions of citizens, are presented in Figure 3.
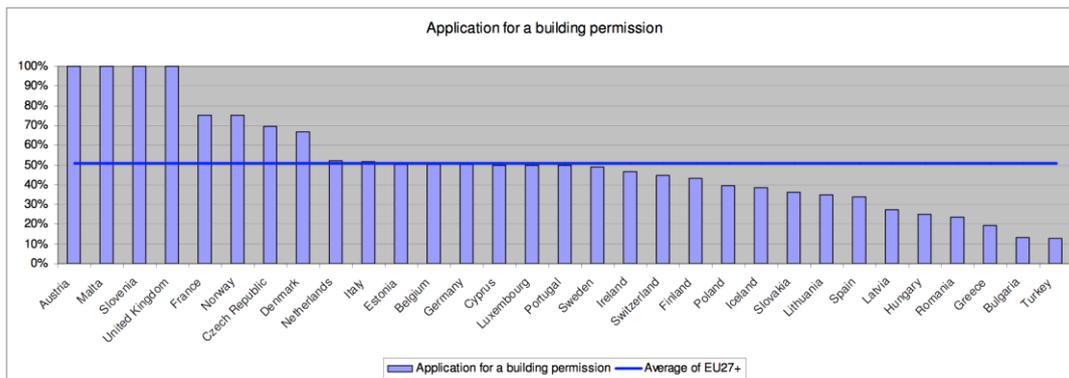
Figure 3: Percentage of utilization of online application for a building permission and relative e-services among different EU countries

Based on the EUeGovBe, Austria seems to have a respectful e-government system, which means that each citizen or business has the possibility to access the service via a fully transactional electronic channel. Towards the online building permission application (Sonntag et al 2003), an automatic check of completeness of online forms and documents is performed first, and then the application is handed through to the servant responsible for verifying and processing it. The fee is also paid online. If nobody appeals within the next three weeks after the information on the positive decision, the servant performs the final archiving of the record.

Applications for building permission are organized at a local level in Spain (Figure 4). All cities have reached stage 1 of maturity (description of the service and contact details), and most of them are at stage 2 (downloadable forms). Some have reached full transactional status, such as the city of Lleida. Citizens there can apply for a building permit and the provision of the service is fully electronic, including delivery.
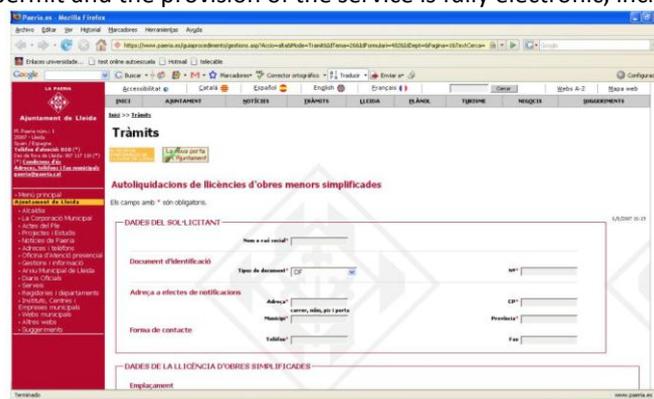

Figure 4: Online building permissions system in Spain

Moreover, in Netherlands, under the auspices of official policy, various state-funded projects have been started in certain domains (e.g. Building & Housing and Care & Welfare). These projects are expected to spread, through a sort of 'ripple' effect, across the entire public sector. Nowhere in the Netherlands is it possible to actually submit a building permit application electronically, but some municipalities offer a function for checking out the status and progress of an application: information on the processing of building permit applications is available in the back office and is made publicly accessible via the Internet. To date, this is as far as Dutch municipalities have progressed in the digitization of building permit applications.

The Planning Portal in UK (http://www.planningportal.gov.uk/, Figure 5) is accessible for general public, professionals and government users. It allows users to apply for a building permission. The implementation of this Portal increased the score for this service in the United Kingdom. Provides information, forms and indicates the e-level of the local authorities: List of the local authorities who are fully online, allowing the user to submit an application electronically, to add attachments and pay online.
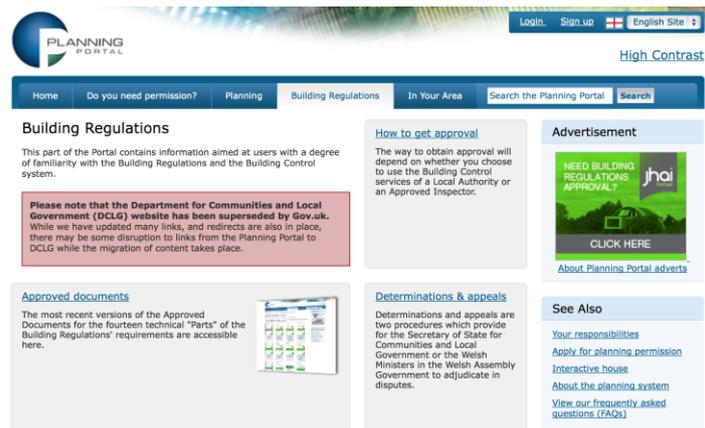
Figure 5: The Planning Portal in UK with building permission e-services capabilities

In May 2005 a new building regulatory system has come into force in Scotland (Meijer et al 2007). In the new system the local authorities are responsible to carry out building control. In the future it could be possible that private parties could also play a role as verifier. Full electronic handling of permits is possible in Scotland.

According to Meijer (2005) and based on the data submitted by CGE&Y, it seems that in Ireland there is no such thing as a 'building permit'. Ireland applies a system of planning permission, commencement notices and fire safety certificates. Within the framework of the Government Action Plan for the Information Society in Ireland, goals have been defined for online access to planning application and development control processes, including commencement notices. In some municipalities it is also possible to track the (planning) procedure.

In France, the acquisition of a building permit for new projects actually starts with planning permission from the local authority. The websites of most of the municipalities and regions feature detailed information on the building permit procedures. Forms may also be downloaded from many of these sites, but there are no facilities for submitting applications electronically.

4. Implications and discussion

European countries have set ambitious goals to improve the online availability of their public services the coming years. Without ICT applications these goals cannot be reached. Substantial progress has been realized in the Netherlands. More or less all layers of government (central government, provinces and municipalities) and the bulk of businesses and private citizens have Internet access. Many public services are available on line and a growing number of services can be managed via the electronic super highway.

Apart from England & Wales, nowhere else in Europe is it possible to actually submit a building permission application electronically on a large scale. Tough, significant progress and interesting work has been going on in other EU countries (e.g. in The Netherlands) to realize a system for the online submission of applications. There seems to be many advantages of an online submission and approval of a building permit. An online system has positive cost and time effects and enables a further streamlining of procedures. The system eliminates sending multiple paper plans, and it is available around the clock. Local authorities can remove a lot of their paper storage and one electronic archive can be established. Progress of applications can be tracked. Building inspectors will be able to take electronic plans and documents out on-site. Drawings can be viewed on screen and redline comments can be made. Work completed outside of the office can be synchronised with the main system once back in the off ice.

Through the review of the literature and the respective analysis that was performed, our two main research questions have been answered. In order to set the context of the application for building permission e-service delivery, we should mention that there are many potential advantages of the online handling of building permits. To this context several ICT tools can be utilized, such as GIS services and 3D Databases of buildings and territories. However, security and interoperability aspects need to be initially defined in order to establish an effective building permission e-Service.

In order to answer the second research question that we have pointed out in this report, we should mention that although all European countries work on the introduction of online permit handling, progress is slow. Drawback of the current monitoring system is that information is missing if the intended goals are being reached. Important subjects for future research will be the fine-tuning of the assessment method by which progress can be compared and a nearer analysis of the actual contents and practical effects of the online

building permit services. This could be attributed to the security issues that arise, which are crucial for online applications. The implementation and utilization of Electronic Signatures services are a step towards the security enhancement but do not eliminate the problem. In addition, as reported earlier, there are still numerous interoperability issues, not only technical, but also administrative and procedural, since there are many public departments and services that need to be connected towards an efficient online building permission application.

5. Conclusions

The world is not changed by the utilization of technology or by the application of e-services, but by those that use or do not use them. The issue of low take-up of e-Services is currently an important question. Governments realize that huge budgets are invested in e-Government programmes and e-public services that are used by too few people.

To this end, online handling of building permits can potential provide significant benefits both to users and to public authorities mainly reducing the cost and eliminating the time for an application.

As reported at the section of the results, there was performed an extended analysis of the literature with several keywords regarding the current status of the building application e-Services as well as the utilization of ICT tools to an online building permission application. However, the main literature mainly contains scientific publications regarding e-Government services and an extensive analysis of the respective domain, but do not focus at the online building permission application and services. This obstructs the current work, since there are not enough scientific publications and the literature analysis extends to European reports and surveys. For future work, a more extensive analysis of national reports can be conducted to enhance the knowledge in the specific field of current practice.

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