Fad or Investment in the Future: An Analysis of the Demand of e-Services in Danish Municipalities

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Abstract: The Internet has created a new window for citizens to interact with the pubic sector through the means of electronic services (e-services). Municipalities throughout the Western world are competing to offer as many e-services as possible and several studies have explored the contents and nature of e-services for citizens. Most of these studies have dealt with the possibilities and reach of e-services. The present study applies a demand perspective focusing on which e-services citizens actually use. The use of e-services during the period May 2004 to October 2004 is analyzed based on log-files from the largest Danish provider of municipal e-services. The study fuels a discussion of whether or not the offerings of municipal offering of e-services are driven by technology fads or if they are exponents of an investment in the future that aim at improving the quality of life of citizens.

Keywords: e-government, electronic citizen services, supply and demand.

1. Introduction

One of the themes discussed under the hat of e-government is the provision of electronic services to citizens through the Internet (e-services). One reason for the emphasis on e-services might be explained by the new public management surge which has influenced the public sector for the past decade (Box, 1999; Fountain, 1999). Another reason for the interest in governmental electronic interaction with citizens is the massive diffusion of the Internet in private homes at least in the Western part of the world. This diffusion leads to the assumption that the Internet has created a demand for e-services by citizens (Grant and Chau, 2005). Yet another reason for researchers' interest for study of e-service provision might be its central role in policy documents and its visibility in society (Andersen and Henriksen, 2005). Some of the first published studies on e-services focused on the functionalities of e-services. Examples of e-services provided by government to citizens and businesses were presented laying much emphasis on the variety of services, which actually could be offered through electronic channels. Proceedings from the first international conference on electronic government (Traunmüller, 2002) and research contributions such as Atherton (2002) and Bannister and Walsh (2002) demonstrate this focus.

Another perspective regarding e-service research, which deviates from the presentation of single cases of e-service provision by governments, is the more procedural view of e-services. This perspective focuses on classifying the nature of e-services. A number of articles presenting stage models of e-service provision dominates this perspective of e-service research, (see for example Grant and Chau, 2005; Layne and Lee, 2001; Moon, 2002). A common characteristic of the stage models outlined for e-government and e-services is their technical focus and consequently also an approach where the capabilities of technology determines the reach and sophistication of each stage of e-service provision. These two approaches to e-service research are generally dominated by very descriptive accounts, which is not unlike e-government research in general (Grönlund, 2004).

To change focus and start discussing issues beyond singular phenomena and technical capabilities one approach could be to focus on uptake, deployment, and implications of the public sector providing electronic services to its citizens thus opening the discussion of citizen inclusion in – or exclusion from the e-society. The objective of the present study is to pursue this direction of e-service research. The article focuses on the demand of e-services offered at the municipal level. The article provides an analysis of which types of e-services citizens in Denmark access. Based on log-files of twenty-four e-services offered by the largest Danish provider of municipal e-services the frequencies of unique users of these twenty-four e-services were extracted. The remainder of the article is as follows. The next section presents previous research in the domain of public sector e-services. The section focuses on those contributions, which have discussed if and how the public sector can learn from the private sector when offering on-line services. The objective of this discussion is to highlight the fundamentals of public service provision and to question whether these can be met by applying lessons learned in the private sector in relation to e-commerce. Thereafter follows a presentation of the procedure for the data collection of the present study. This leads to the penultimate section where data is presented. The final section

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offers an analysis of data. Furthermore, the section presents some reflections on how to interpret the findings and also some suggestions for future research in the domain of public sector e-service provision.

2. e-Service research and findings

The provision of electronic services to citizens is considered to be one of the core elements of e-government (Grant and Chau, 2005). Gilbert et al. (2004) define e-service as "…the government organizations' delivery of services electronically" this definition is generally shared by other researchers studying e-government and e-services see for example Aldrich et al. (2002) and Moon (2002). Though IT in the public sector is not a new phenomenon (Danziger et al., 1982) the direct window to citizens via the Internet is relatively new (Holden et al., 2003). This has led to discussions on whether the public sector can learn from the experiences gained by the private sector with respect to e-commerce. In the private sector a lot of people got accustomed to retrieve information and perform transactions via the Internet (Al-Kibsi, 2001; Buckley, 2003). Buckley discusses the inherent complexity of e-service provision in the public sector and concludes that in order to embrace the breath and depth of electronic service provision in the public sector experience from both private sector e-commerce and e-government should be included. Al-Kibsi (2001) works along the same lines and suggests that government should team up with private businesses when establishing governmental services on-line to citizens. Fountain (1999) on the other hand concludes that it is not possible based on private sector business logic to draw any conclusions about the mechanisms supporting an understanding and diffusion of e-services in the public sector.

However, regardless of Fountains' stance about the particular logic for the public sector criteria for assessing the quality of public e-services are often based on measures developed from experiences in the private sector (Barnes and Vidgen, 2003; Buckley, 2003; Teicher et al., 2002). One reason for this focus could be explained by the new public management paradigm (Hood, 1991), which influences most Western societies. The new public management discourse is rooted in a logic based on market-like practices with respect to streamlining service provision (Box, 1999) where concepts such as efficiency and slimming of public sector institutions are central building blocks. This trend is also reflected in the citizens' expectations towards the public sector. Citizens have reached a point where they based on their experiences with private on-line service solutions expect high quality in services, stability, efficiency, and integration across government agencies (Hazlett, 2003; Stamoulis et al., 2001). From this perspective the provision of e-services becomes a fiat rather than an option for government. Therefore, municipalities have to consider which e-services they can afford to offer and, more precisely, which services they can afford not to offer to their citizens (Kaylor et al., 2001) if they want to avoid being looked upon as old-fashioned. Common for the above-mentioned studies is the assumption that there is a demand for e-services from citizens and implicitly also that citizens will benefit from using the e-services.

Benefits of e-services more specifically related to the public sector domain include transparency of processes and visibility for users (Buckley, 2003), and the offering of services via the Internet as a new vehicle for citizen-initiated contact and interaction with government (Thomas and Streib, 2003). A number of researchers have studied the notion of e-service quality in the realm of e-services (Barnes and Vidgen, 2003; Buckley, 2003; Teicher et al., 2002). Buckley (2003) identified three common quality aspects of e-services required for public on-line services: user-focus, user satisfaction, and outcomes. Application of these parameters in the public sector may however not be straightforward. Contents and user-interface of public information provided via web sites has to be user-friendly and easily understandable for all to avoid that some groups are excluded from using the services offered. Contrary to private providers of services, who can choose which services to offer this is not the case in the public sector (Teicher et al. 2002). Government has an obligation to offer services universally e.g. health care or primary schools, or to specific eligible groups e.g. socially marginalized or elderly citizens. Therefore, service provision cannot be premised on a clients' ability to use the Internet as a means for communicating with the public sector.

Another feature which puts the notion of quality into perspective is the fact that public sector institutions operate in a monopoly rather than a market (Fountain, 1999). The public sector cannot pick its "customers", and the citizens on the other hand do not have other options if they are in need of social benefits or public care. The situation is therefore, that the public sector operates in a context where it has to provide e-services that are comprehensive and user-friendly for all groups, and in particular to those groups which really need services from the public sector.
In a study of the reasons for individuals' choice of electronic self-service delivery among UK citizens

(Gilbert, 2004) it was found that lack of trust with respect to financial security and information quality were among the barriers for a high level of adoption, whereas savings of time and money were perceived as drivers for adoption of e-services. In an on-line survey of barriers for e-service adoption in UK, Spain and Greece Vassilakis et al. (2005) found that barriers were mainly related to two types of explanatory factors: the citizens lack of knowledge regarding the existence of on-line services and the citizens inability to locate relevant sites. Thomas and Streib (2003) focused on reasons for users visiting government web-sites. Thomas and Streib found that most responders used government web sites for one-way communication. The rate of interaction with government agencies was lower. Interaction included direct request for services, placing of complaints or simply expressing of opinion. The findings of Thomas and Strieb (2003) indicate that citizens are not yet ready to full on-line interaction with government, and both parties are therefore not yet able to fully harvest the benefits of e-services.

Based on a selective literature review of e-services a conceptualization of the phenomenon has been outlined and a discussion of some of the fundamental challenges for assessing the strengths of the services has been opened. The common factor for the cited examples is that analysis has been based on self-reported input form users and potential users. The present approach to the study of the e-service uptake differs fundamentally from this approach since it focuses on actual use measured as traffic at municipal e-service sites. The next section presents how the empirical study of e-service demand in Denmark was performed.

3. Design of the study, data collection, and method of analysis

To study the demand for e-services among citizen's log-files from the largest provider of municipal e-services were obtained. The e-service provider is a private company established in 1972. Since its beginning the company has focused on developing and supporting IT-systems in the public sector in Denmark. The company has particular focus on developing IT-systems for municipalities. Today, almost all Danish municipalities subscribe to some or all of the municipal IT-systems developed by the company. The company's core business is to provide back-office IT-systems supporting the daily IT-operations in the municipalities. In 2002 the company started to develop and market e-services. The e-services offered by the company can be integrated to the back-office IT-systems already implemented in the municipalities. The log-files included in the present analysis registered the traffic during the period May 2004 to October 2004. The data used for the analysis is based on the traffic to the entry page of each of the twenty-four e-services included in the present sample. It may be difficult to isolate citizens from other stakeholders in a public sector context (Hazlett, 2003), and the included data can not be used to identify why a given person accesses the information provided at the e-service site. It was also not possible to distinguish between the citizen's use of the e-service in her capacity as a voter, a taxpayer, a needy, or a professional. No distinction is made between the private user and the specialist user as done by (Laskowski, 2000). Instead, focus is on traffic generated on a particular e-service regardless of the purpose of the traffic.

In order to measure and qualify the level of interaction between the user and the municipality three levels of user skills were defined. The three levels of user skills reflect the degree of user commitment required and indicate the possible level of e-service interaction that can by achieved.

Table 1. Levels of user skills

Level	Skills needed by citizen for using the e-service
Low	Basic Internet surfing skills. The service provides information but there is no possibility of interaction beyond gathering information. The navigation skill required is familiar to most Internet users.
Medium	Personal information such as address or social security number (CPR) has to be provided to use the service. The citizen must have the personal information required at hand when using the service. The services in this category are typically related to for example calculation of social benefits. Interaction is content sensitive and communication is often based on specific information formats.
High	The service requires unique identification of the user, a pin-code or a digital signature. The pin-code or the digital signature must be obtained in advance in order to use the service. The citizen can complete legally binding transactions. Similar to the medium level of requirements the interaction at this level is based on specific formats.

The twenty-four e-services were classified according to level of user skill required (cf. Table 1). Two persons independently classified each service. The classification was based on use of the service via the web site. It is acknowledged

that this way of classifying the services is only an approximation to the real situation. Firstly, it must be recognized that it is a very different situation when a citizen visits the site in order to apply for a needed service or when a researcher without having anything at stake browses a site in order to examine the contents. Secondly, the two examiners belong to a user segment, which is probably well above average with respect to skills in using the Internet. Regardless of these shortcomings it was found that the classification did resemble the three types of services in a reasonable manner. To analyse the demand for the various services the ratio of the number of entries made and the total population, which had access to the service, was calculated. It should be stressed that not all services are offered to all citizens in Denmark. Some municipalities have been more eager to adopt the services than others (Henriksen, 2004). Therefore, the total population, which potentially had access to the services, varies across the 271 Danish municipalities.

4. E-services included in the sample

In Table 2 a list of the twenty-four e-services included in the sample is presented. The twenty-four e-services were the total number of e-services that the private provider offered to municipalities at the time of data collection. The order of the e-services listed in the table is based on the order of the original data where the e-services are listed alphabetically (it resembles the lists at each of the 271 municipal web-sites hosted by the provider of the e-services). There is hence no priority in complexity of use or subject matter based on trust departments such as housing or child benefits. Table 2 shows that most of the e-services offered are at the high level of user skills (cf. Table 1). It is in other words not enough that the users are capable of navigating the Internet. The users also need to obtain a pin-code or a digital signature in order to make full use of the services. The twenty-four e-services represent a mix of municipal core services such as services which help citizens to apply for social benefits, announcement of change of address, or the utility check where citizens can monitor consumption of utilities and make payments. Other services offer information. That is for example the case with the service “municipality facts”, which provides key figures of the municipality, or the “budget-module” which can help people to get a better overview of their financial situation. This type of service resembles the notices at billboards, folders found in public offices, and announcements published in local newspapers.

Table 2. List of e-services, their content and their level of interaction

e-service	Contents of e-service	Level
Check of real estate data	Information on real estate with respect to changes and improvements can be checked and altered by the owner.	High
Calculation of child benefit	Calculation of possible claim for receiving special child benefit for parents under education.	Mediu m
Pay your municipality	Here the user can pay her municipally on-line, for example pay for childcare.	Mediu m
Budget-module	This service helps the user to draw up a budget to see how much money is available after having paid all fixed expenses. The service provides an overview of the user’s financial situation.	Mediu m
Building-guide	Through this service the user can report building on the user’s real estate. The guide helps the user to meet the legal requirements of a building project.	High
Maternity/ paternity leave	The user can get information about the rules for getting paid leave. To check the status of the users’ paid leave the user need a pin-code or digital signature.	High *
Housing benefit	The user can calculate her eligibility for housing benefit. The user can apply for housing benefit online.	High *
Your real estate	Here the user can get an overview of all the information the user’s municipality stores on the users’ real estate.	High
Taxation matters	Provides insights to ongoing and finalized tax matters. Letters and memos are available.	High
Real estate facts	All public information about real estate in Denmark is available through this service.	Low
Change of address	The user can change her address electronically through this service. She can print a receipt after having finalized the registration.	High
Institutional facts	Information about choices of local child care.	Low
Municipality facts	Key figures about municipalities are	Low

	exhibited on this site. Comparisons of municipalities can be made. A top-ten list is provided on each key figure.	
Utility check	Reporting of consumption of utilities such as water, electricity etc. of the user's household.	High
Signing up for waiting-list	The user can put her child on a waiting list of the institutions the user wants her child to attend.	High
Childcare guide	Direct access to put the user's child on a waiting list for childcare.	High
Central payment service	Through this service the user can notify that she wants her payments to be handled electronically and automatically.	Mediu m
Guide to social pensions	The user can calculate if she is eligibility for social pension through this service.	High
Placing on waiting-list	Check the user's position on a waiting list.	High
Sickness benefit	Employers can apply for sickness benefit through this service.	High
Apply for child benefit	Application for ordinary and extraordinary child benefit for one-parent families.	High
Withdrawal of child	The user can withdraw her child from an institution through this service.	High
Valuation index	The user can examine the official valuation of any real estate in Denmark through this service.	Low
Scholarship	Application for scholarship for the user's children to nursery school.	High

* It is possible to access information on the low level but to achieve full benefit of this e-service requires a pin-code or a digital signature.

In Figure 1 an estimate of the demand during the period May 2004 to October 2004 for each of the twenty-four e-services is presented.

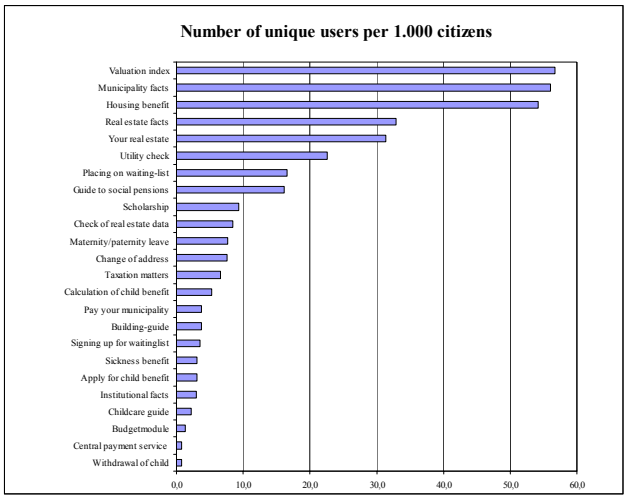

Figure 1: Ratio between number of users and potential users

Figure 1 presents in a graphical form the demands for e-services offered by the municipal portals. Generally, there is very little demand for the e-services included in the sample. Two thirds of the e-services are used by less than 1% of the potential users. And only three of the e-services are demanded by more than 5% of the potential users. Two of these three services are classified as "low", whereas the third e-service is categorized as "high" with respect to user skills. This seems to indicate that there is more demand for e-services, which are categorized as "low". To test a possible statistical dependence between demand and level of requirements the data was tested using a non-parametric test, the Wilcoxon test. Since the number of services classified as "low" and "medium" turned out to be very low, and since it was important to find out whether e-services requiring pin-codes or digital signature were a barrier for the users the categories "low" and "medium" were collapsed in this statistical test.

Table 3. Wilcoxon two-sample test

Wilcoxons' Exact Test	
One-Sided Pr >= S	0.2838
Two-Sided Pr >= |S - Mean|	0.5667

Table 3 shows that the test is not statistically significant. Therefore, the demand of an e-service is statistically independent of the level of user skills. There is in other words no support for the claim that users prefer one-way interaction (levels low and medium in the classification scheme). This contradicts the findings of Grant and Chau (2005) where one-way interaction dominated the e-service usage.

5. Reflections, discussion, and directions for future research

The analysis of citizens' demand for e-services has provided fuel for thoughts with respect to the expediency of priorities in the municipalities. Much effort and many resources are spent on giving access to citizen services on-line, and Denmark is as a result of this also ranked in the top-five in a number of the international e-government indexes (Economist 2005; Cap Gemini 2005; Eurostat 2005) which among other issues focus on e-service provision. Some shortcomings of these rankings are that they focus on supply rather than on demand and on external exposure rather than on improvement of internal efficiency and return on investments. From the supplier perspective (the municipalities) the deployment of the services gives rise to speculations about whether the offering of e-services is driven by a managerial fad (Abrahamson, 1996) or is it an investment in the future?

The launch of the e-services included in the present analysis started in 2002 and it is therefore a relatively new phenomenon. An interpretation driven by the theory of diffusion of innovations suggests that the diffusion process is in a take-off stage and that it is only a matter of time before a massive diffusion will happen (Rogers, 2003). Rogers claims that innovators initiate the kick off of the S-shaped diffusion curve. He states that innovators represent 2.5% of the population of potential adopters. Innovators are characterized by being venturesome with an interest in new ideas. An example of innovative behaviour is the acquisition of a digital signature or a pin-code needed for accessing most of the services included in the sample. The analysis indicated that use of e-services was independent of whether or not a digital signature or a pin-code were needed. The good news is therefore that Danish users in the capacity of innovators as role models do not perceive a high degree of skills of using the e-services as an obstacle. This could indicate an important shift in users' attitude to the Internet as a means for communication with the public sector even when sensitive information has to be submitted. Security, which Gilbert et al. (2004) found to be one of the major barriers for the diffusion of e-service usage in UK, does not seem to be a strong barrier in Denmark, at least not for those that have come into the habit of servicing themselves through the Internet. By applying Rogers' widely used model for diffusion of innovations (2003) the study suggests that the supply of e-services could be an investment in the future. The findings from Vassilakis et al. (2005) support this type of interpretation. Vassilakis et al. found that the two most prevalent barriers for e-service uptake among citizens were related to lack of knowledge about the existence of on-line services and inability to locate relevant sites. Communication and learning are the corner-stones in the theory of diffusion of innovations (Attewell, 1992; Rogers, 2003) and it should therefore only be a matter of time before the level of demand increases given that change agencies and change agents invest an effort in communicating the e-services. It is also worth mentioning here that 80% and 84% of all Danish families had access to the Internet from their homes in year 2004 and year 2005 respectively (Statistics Denmark). One challenge is as stated by (Dugdale et al., 2005) that

> *"… citizens who are the biggest users of government services are the least likely to be connected to the internet."*

That is typically low-income families including elderly. Denmark is still in a good position for successful diffusion even when taking this barrier into consideration. As shown in Table 4 there has been a substantial growth in the share of households with access to the Internet in the lowest income group (70% to 84%).

Table 4: Access to the Internet based on household income (2004-2005)

Income DKK	Internet access in %	
	2004	2005
0-99.999	70	84
100.000-399.999	71	74
+ 400.000	92	95

Source: Statistics Denmark (www.dst.dk)

Fountain (1999) argues that there is an in-build danger of increased inequality in the diffusion of e-government and the servicing of people on-line. Fountains' argument for this inequality is that citizens who function well and who have more resources than the average are better at raising their voices, and that they therefore are getting more attention from the civil servants. However, the most well represented issue in the e-service sample is related to parenthood and children. Nine of the twenty-four services are related to one or another aspect of parenthood or children. Applications for extra social benefits and maternity/ paternity leave are among the services directly related to parenthood. Aspects of childcare are also well represented such as signing up for kindergarten and checking the number on a waiting list for a particular institution. Ceteris paribus, all groups in society get children, but especially citizens with fewer resources are those that can apply for extra social benefits to make their financial situation better. This overall evaluation of the e-services in the present sample only appears partly to support the speculations

about increased inequality as argued by Fountain (1999).

The analysis shows that there is a very modest level of demand for the twenty-four e-services included in this analysis. This might however be a truth with modifications. The e-services, which are most popular, are at the 5% level. However, there are serious problems with this simplistic calculation of the demand for services. The ratios are calculated based on the total number of citizens who have access to the service. Calculation is hence based on the number of people living in the municipalities subscribing to the service. As stated above some municipalities have been more eager to adopt the services than others (Henriksen, 2004). The analysis does not take into account that some services are only relevant for certain groups of people. But, fortunately not all people in the population are potential users of a given service. An illustrative example of this dilemma of measurement is the e-service "Maternity/paternity leave". Maternity/ paternity leave is estimated to be used by less than 1% of the potential users. About 48% of the population has according to the data access to this service. This equals approximately 2.5 million Danes – but, not all these 2.5 million Danes are eligible of maternity or paternity leave. In year 2003 the total number of childbirths was 64,682 (Statistics-Denmark). The data shows that 19,614 unique users accessed this service during the six-month period included in the analysis. From this perspective the "real" level of use is very high. This example clearly demonstrates the challenges of measuring demand of e-services. It is definitely a challenge for future research to focus on developing more meaningful and proper measurements for demand of e-services.

From the perspective of the municipalities the figures can be viewed as good news as well as bad news. From a positive perspective the offering of digital services can seen as a means for optimizing work-routines (Andersen, 2004) and generate savings hence supporting the ideas of new public management. However, by looking at the rather low adoption rates it can be argued that the provision of an alternative channel for communication with the public sector is not at present a success with respect to cost reductions given that the traditional channels of communication, phone or personal appearance at the town-hall, are still used by the great majority. Then again the measures of success are challenged: when has a citizen gathered enough information? In the present study focus was on the number of unique entries to a given service. We did not analyze how many entries led to a completed and submitted application. To some people the interaction ends by getting information about the likelihood of getting a specific benefit. Information is in many cases enough to decide whether further interaction will lead to a desired result. Viewed from this perspective the provision of e-services resembles the function of a search engine, which can filter out more simple cases thus leaving resources for the more complex cases. The study of the demand for e-services has revealed serious challenges concerning methods on how to study and analyze this area. Fortunately, not all citizens need to apply for services or social benefits. Therefore, it is difficult to determine the size of the group of potential adopters. Some effort should be made to determine the size of the population under investigation in relation to each e-service. Future research should also include estimates of the actual number of completed and submitted applications for a given service in order to determine whether or not e-service diffusion in Denmark is a success or a failure.

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