e-Government in the Finnish Early Childhood Education: An Analysis of Current Status and Challenges

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Abstract. With the increasing number of citizens accessing the Internet, governments at all levels around the world have no other choice but to utilize information technology, especially the Internet, to provide improved services to their citizens. This paper studies and analyzes the status and challenges of e-government services within early childhood education context in ten of the largest municipalities in Finland. The study draws upon previous research on e-government stage models and e-government challenges. Our analysis indicates that there is significant development work in progress in the field of early childhood education and e-government in many Finnish municipalities. Many of them have reached relatively mature stage in developing early childhood education e-services. The paper also discusses the challenges municipalities face when they try to implement e-government services. Overall, the paper tries to provide examples and ideas for researchers and practitioners for developing better quality early childhood education e-government services.

1   Introduction

The role of IT is not only limited to the private sector. In the public sector, e-government has become one of the key challenges for both governments and municipalities. E-government refers to the use of information technology in the public decision making and in the delivery of public services [1]. Public sector has faced with many challenges in the recent years. Public sector pursues to improve its

productivity and effectiveness by rethinking missions, re-engineering processes and implementing information technology solutions [2]. Pressure concerns the whole public sector, but several studies show that social care sector is not yet a great user of information technology. This paper examines e-government services within early childhood education (ECE) in Finland, which are considered to be to a large degree in its infancy. Early childhood education refers to children's educational interaction before the compulsory school age of seven years. We are especially interested in the evolution and current status of e-government in this area.

In order to hasten the development of Finnish information society, the Finnish Government launched a policy program called 'Government Information Society Program' in 2003. The aim of the program is to improve competitiveness and productivity, to promote social and regional equality, and to improve citizens' well-being and quality of life through effective use of information and communications technologies [3]. These aims also concern the Finnish day care and early childhood education development. Early childhood education should be involved in the development of Finnish information society, and in the transformation of operational environment. Information technology enables for example new working practices in day care, more effective communication between different early childhood education actors and better quality education.

Early childhood education should also respond to the altered demand of its customers – i.e. families with children. The wide use of Internet and different kinds of electronic services has also increased the demand for e-services in the public sector. That is why early childhood education should change its operation models to better respond to these recent changes.

Finland is often been ranked as one of the leader countries in exploiting information and communication technology to revise its economy and to reform its public administration [4-6], but for some reason early childhood education has not been at the head of this development. However, after the launch of 'Government Information Society Program' in 2003, the development of Finnish e-government has been spread to early childhood education area as well, and many e-government development projects have taken wind under their wings. This paper examines thus this recent development by studying the early childhood education and its e-government services in ten largest municipalities in Finland.

The paper is organized as follows: in the next section, we present different e-government stage models. In section 3 we introduce different e-government challenges. The research context – early childhood education – is presented in section 4. In section 5 we introduce the methodology and cases. The analysis of the status and challenges are discussed in section 6. Finally we draw some conclusions and propose research limitations.

2   e-Government Stage Models

E-government literature demonstrates that many e-government initiatives have been failures [7, 8]. In order to help public administrators to manage often chaotic e-government initiatives, a few e-government stage models have been proposed to

understand the development from traditional administration to e-government. The most referred models are Layne and Lee's four-stage model [8], United Nation's five-stage model [9] and Hiller and Bélanger's five-stage model [10]. These models are discussed in the following subsections.

Layne and Lee's four-stage model [8]
Based on technical, organizational, and managerial feasibilities of several examples, Layne and Lee [8] found e-government to be an evolutionary phenomenon, and therefore e-government initiatives should be accordingly derived and implemented. In this regard, Layne and Lee [8] presented the four stages of a growth model for e-government as: 1) cataloguing, 2) transaction, 3) vertical integration, and 4) horizontal integration. These four stages are discussed below.

Stage I: *Cataloguing*. In this stage, governments create a 'state website' due to the pressure from the media, technology-literate employees, demanding citizens, and other stakeholders. At this stage, governments do not have much Internet expertise, and they minimize the risk by doing a small project. The main reason for 'electronic cataloguing' is the citizens' and businesses' access to Internet: as they access information on services from the private sector from the Internet, they expect the same from the government. Therefore governments put parts of the government's non-transactional information on the site. The typical government department website at this stage contains description of the department, some downloadable forms, and some links to other pages. Therefore it establishes a departmental 'presence'.

Stage II: *Transaction*. This stage extends the capability of cataloguing and empowers citizens to deal with their governments online anytime, saving hours of paperwork, the inconvenience of traveling to a government office and time spent waiting on lines. Communication becomes now two-way communication: instead of simply having the ability to download forms, people can fill out forms online and government responds by providing confirmations, receipts, etc.

Stage III: *Vertical integration*. This stage initiates the transformation of government services rather that automating and digitizing existing processes. There should be permanent changes in the government processes themselves, because in the long run, the full benefit of e-government will be realized only if organizational changes accompany technological changes. After online transaction services become more mature, citizens' expectations will increase. This requires integration of scattered government functions at different levels.

Stage IV: *Horizontal integration*. This stage focuses on integrating different functions from separate systems so as to provide citizens a unified and seamless service. The horizontal integration across different functions of government will be driven by visions of efficiency and effectiveness in using information technology, but pulled by citizens' demands on more service oriented government functions. Such integration will provide citizens "one stop shopping".

United Nations' five-stage model [9]
Arguing that the purpose of e-government is to provide efficient web-based public service, the UN [9] suggested a five stages e-government model, which is ascending in nature and builds upon the previous level of sophistication of citizen services online. The five stages are emerging presence, enhanced presence, interactive

presence, transactional presence, and networked presence. These five stages are defined as follows:

Stage I: *Emerging presence*. A single or a few independent government website provide limited and basic information.

Stage II: *Enhanced presence*. Government provides current, specialized and dynamic information. Though more sophisticated, the interaction is still primarily one- way from government to citizen.

Stage III: *Interactive presence*. Online services enter the interactive mode with services to enhance convenience of the citizen such as downloadable forms and applications. The government officials can be contacted by e-mail, telephone and post. The site is updated with greater regularity to keep the information up to date for the public..

Stage IV: *Transactional presence*. This stage allows two-way interaction between the citizen and government. Citizens have the capability to conduct complete and secure actions through a single government website.

Stage V: *Networked presence*. Stage V represents the most sophisticated level in the online e-government initiatives. It can be characterized by an integration of G2G, G2C and C2G (and reverse) interactions. Governments utilize a single and universal website to provide a one-stop portal in which users can immediately and conveniently access all kinds of available services.

Hiller and Bélanger's five-stage model [10] and Moon's five-stage model [11]

Hiller and Bélanger [10] identified a five-stage model, which reflect the degree of technical sophistication and interaction with users – information, two-way communication, transaction, integration and participation. Despite some minor changes, Moon [11] adapted Hiller and Bélanger's five stage model. The model consists of the following stages:

Stage I: *Information*. Stage I is the most basic form of e-government, which uses IT for disseminating information, simply by posting information and data on the websites for citizens to view.

Stage II: *Two-way communication*. In this stage, government sites allow citizens to communicate with the government and make simple requests and changes. Government agencies allowing online requests provide sites with fill-in forms, but the information is not returned online, but sent by regular mail or e-mail.

Stage III: *Transaction*. In stage III, the government allows online services and financial transactions, which used to be performed by public servants.

Stage IV: *Integration*. In stage IV, all the government services are integrated vertically (intergovernmental integration) and horizontally (intragovernmental integration) to enhance efficiency, user friendliness, and effectiveness. This can be accomplished with a single portal that citizens can use to access services they need no matter which agencies or departments offer them. This stage is challenging because it requires a tremendous amount of time and resources to integrate online and back-office systems.

Stage V: *Participation*. Stage V involves the promotion of web-based political participation, which includes online voting, online registration, online public forums, and online opinion surveys. While the previous stages are related to web-based public services in the administrative arena, the fifth stage highlights web-based political activities by citizens.

It should be noted, that these e-government stage models are only conceptual tools to examine the evolution of e-government. The real adoption of e-government may follow a different linear progression. For example, a government may pursue various components of e-government simultaneously [11].

3   e-Government Challenges

E-government also faces several challenges. Chen [12] has categorized these challenges as follows:

- *Organizational and cultural inertia*. Many public entities are not exactly known for their efficiency and willingness to adopt changes. Problems such as the organizational bureaucracy and lack of clear communication and collaboration culture need to be resolved before any successful e-government initiatives can be adopted.

- *Government and legal regulations*. There are often numerous laws and regulations at all government levels which are intended to specify rights or duties or to carry out a supervisory or balancing functions. Despite their well-intended nature, they can inhibit innovations.

- *Security and privacy*. E-government applications must protect the privacy within an open and often not-so-secure Internet environment. This applies to e-business too, but governments have an extra burden of guaranteeing security and privacy for citizens.

- *Disparate and out-dated information infrastructures and systems*. Many government departments experience budget restrictions which lead up to out-of-date information infrastructure and systems.

- *Lack of IT funding and personnel*. IT spending is often not a priority in government units, which can be seen in small investments in ICT and staff training.

Similarly, OECD [13] has identified external obstacles to e-government, namely: 1) legislative and regulatory barriers; 2) budgetary barriers: 3) technical barriers; and 4) the digital divide. Legislative and regulatory barriers, budgetary barriers and technical barriers are all analogous to Chen's categorization, whereas the latter obstacle refers to the access to ICT and the Internet. According to OECD, generally the most disadvantaged citizens have the lowest levels of access, and at the same time they are the ones who have the highest levels of interaction with government. If these individuals can not access e-government services, they will miss out on the benefits of e-government.

4   Research Context

In Finland, every child has a subjective right to receive public day care and the municipalities have the obligation to organize day care according to the demand. The

concept early childhood education (ECE) refers to the care of children under compulsory school age (ages 0–6). Public day care is mostly organized in day care centers (approx. 70 % of the children) and family childcare, which offer full day, full year service, including evening, night and weekend childcare for children whose parents are either working or studying. The main goal in day care is to promote child's healthy growth, development and learning skills. Day care should also support parents raising their children [14].

Early childhood education in Finland is a well-developed system and much appreciated by the parents. Early childhood education is assured by public investments, and quality regulations are clear and strictly enforced. Charges for day care are based on a percentage of the family's gross income. The charge for a municipal day care place cannot be more than 200 € a month (in 2008) [15]. Early childhood education emphasizes the importance of co-operation between different administrations in relation to the organization of early childhood education and care services for children and parents as well as the educational partnership of parents and personnel [16].

According to a recent study, there were approximately 186 000 children in day care, which represents over 50 per cent of the children under compulsory school age in Finland. In 2005, municipal day care employed 57 000 employees. In all, Finnish social care employed 101 000 employees in 2005, thus day care workers represent a considerable proportion of municipal workforce [17].

5   Research Design

Data collection
This study examines and analyzes the status of e-government service development in early childhood education in ten largest municipalities in Finland. The rationalization for selecting 10 largest municipalities into this study lies behind the innovation adoption literature, which suggests a positive relationship between size – in this case population – and innovation adoption, i.e. e-government adoption. Therefore, the study selected the following ten Finnish municipalities based on their population in the end of 2006: Helsinki, Espoo, Tampere, Vantaa, Turku, Oulu, Lahti, Kuopio, Jyväskylä, and Pori.

Because there is not much knowledge on e-government services within early childhood education, a qualitative case study was deemed applicable for this study. Yin [18] defines case study as follows: A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. A multisite case study approach was followed in order to understand the processes in different municipalities.

The data was collected using theme interviews and observation. Altogether eight early childhood education experts whose titles varied from Project Managers to Directors of day care center were interviewed. This strategy had the advantage of exploiting different perspectives on the key issues. All the interviews were recorded for more detailed analysis. After the interviews, the audio material were listened and

transliterated to enable comparison between cases. The data was completed with observation. We got acquainted with the ECE portals in the above-mentioned cities and analyzed their content. The data collection took place from November 2006 to June 2007.

Case descriptions

Helsinki
Albeit the fact that Helsinki is the largest city in Finland and its capital, the city has not exactly been a forerunner in developing e-government services in ECE. The city has fairly informative ECE-website, but the emphasis is particularly on the distribution of information. The information is regularly updated and the site provides access to many printable forms. However, no electronic forms are available. All the forms are in PDF-format, so there is no possibility to return them electronically. The only more advanced feature is the option for the parents to receive a day care invoice electronically.

Espoo
The second largest city in Finland, Espoo, has clearly put more emphasis on developing e-government services for parents. The ECE website is comprised of several features, such as FAQ of child care services, a comprehensive list of contact information of different district social centers, and a long list of printable forms. The most remarkable function is an electronic daycare application. The application can be filled in and returned on Espoo's webpages. The application also contains a feature which calculates the exact monthly fee of child's day care. In order to use such an e-service, electronic identification is needed. The service generates user name and password, which can be used in all the e-services the city provides (e.g. application for adult learning centers, applying for open job vacancies within the city, etc.).

Tampere
The city of Tampere started a five-year knowledge society program called eTampere in the turn of the millennium. The aim of the program was to transform Tampere into the world's leading city in the research, development and application of knowledge society by strengthening the knowledge base, creating new business activity and introducing new public online services. The program therefore also included the parental services. The purpose of Parental e-services -project was to improve service cost efficiency, quality, fastness and interaction. In other words, the aim was to create valuable electronic services to little children's parents. Among the services generated within the project are electronic application for day care centers and elementary school, electronic notification of open day care places, electronic invoicing, possibility to change one's contact information electronically, electronic application of transfer to another day care center, and electronic cancellation of day care places. The goal is to reduce manual processing in day care management and provide better quality services for parents. Identification is needed to use these e-government services, and the security and privacy is guaranteed by the use of VETUMA, an online identification and payment solution for citizens.

Vantaa, Turku and Pori

The electronic ECE-services are quite similar in the cities of Vantaa, Turku and Pori. As in Helsinki, the emphasis is more on providing information for the citizens, rather than offering them a chance to deal with their ECE-affairs online. There is basic information about different day care centers, and some of them even have their own websites. There is no electronic day care application in Turku and Pori, but the parents in Vantaa have an opportunity to fill in, sign and send the application in electronic format using an online banking network ID or electronic identification card. Similarly to Espoo, also Turku has an electronic application which calculates the amount of family's day care fee.

Oulu
The city of Oulu is known for its technological expertise, and it has attracted many global actors of IT. Therefore Oulu and its surrounding nine municipalities has striven to establish a regional day care operations model which will provide the most advanced day care services in the whole country. The region is famous for its rapid growth in population, and the need for day care services across municipalities is strongly present. The aim is to manage the whole day care application process on the Internet. Families can also receive bills and browse their customer files electronically using their electronic identification cards. In addition, the customers can send and receive information, such as notices of absence, via e-mail or SMS.

Lahti
Lahti's development program, FENIX, focuses on development of software technologies and applications. The main goal is the development of user-friendly application technologies and services for public bodies. As a result, together with the city of Oulu, Lahti is creating a so called citizen's account with which citizens can interact with appropriate authorities online. The citizen's account can be used in a same way as for example an online bank account. One result of this program is an application called 'Mobile-kid'. Mobile-kid is an electronic communication service which connects homes and day care centers. It aims to ease the daily communication between home and day care centers and provide real time information about day care centers' activities. Mobile-kid exploits Internet, e-mail and SMS.

Kuopio
Also the city of Kuopio has started its own development project which deals with electronic day care services. It includes customer-oriented information and communications services, and internal information services for the day care personnel. The idea is to gather up fragmented information services of different actors in day care, and to clarify the electronic communication between them. These actions pursue to more efficient and smooth processes within day care, and to help families to find suitable services for their individual needs. The application form for day care is not available in electronic form yet, but the citizens can give feedback on day care services online.

Jyväskylä
A regional day care development project including Jyväskylä and eight surrounding municipalities was executed in 2005–2007. The idea was to respond to the growing need for day care services in the area. The objective was to produce day care services across municipalities, to clarify different regional day care management models, to

develop parent guidance of different day care options, to strengthen service network, to introduce common use of day care information systems, and to detect different costs.

One part of the project was a pilot which tested the consolidation of day care information system, municipal time card system and day care planning system. The idea behind the pilot was that basic personal information about children and personnel and the time they have spent in day care centers would be automatically transferred to day care information system and to the payroll. This data would then act as a basis for different statistics and invoicing the parents. Different planning processes and compilation of statistics are really time-consuming tasks in day care, and along with the system these manual tasks would become much easier and efficient to handle. The director of the pilot day care centre had calculated that the use of the pilot system would save them over 400 working hours per year.

6   Discussion

Although often being criticized for dragging behind the development of other e-government services in Finland, our study shows that early childhood education in many municipalities has recently tried to reach out the gap. All the examined municipalities in our study have at least created some kind of extended presence (UN's stage II) on the Internet, where a citizen can find dynamic, specialized and regularly updated information on ECE services. In fact, our study shows that only one of the studied municipalities – Pori – was still in this early stage of e-government evolution, while the other municipalities appeared to be further on their development.

Several municipalities had taken the step on to the next level, which is interactive presence (UN's stage III; Hiller and Bélanger's stage II). Many of the studied municipalities allow citizens to download different forms online, but the information can not be returned online, but sent by regular mail or visiting the local office. Some of the studied municipalities also try to enhance the convenience of citizens by providing applications which calculated the day care fee, and by offering the possibility to give feedback on day care services online.

Some of the studied municipalities had developed the ECE e-government services even further into transactional stage (Layne and Lee's stage II; UN's stage IV; Hiller and Bélanger's stage III), and developed systems which enable citizens to conduct complete and secure actions through an ECE website. Examples of these services are electronic day care application, electronic invoicing, sending and receiving e-mails and SMS, and receive real time information about day care center's activities. These e-services are available in all the studied municipalities excluding Turku, Pori and Kuopio.

A pleasant example of a genuine attempt to develop mature e-government services was found in Jyväskylä, where they have tried to integrate different functions from separate systems in order to provide citizens and employees a unified and seamless system, which would ease the day care process. The example is a good illustration of horizontal integration (Layne and Lee's stage IV).

The presumption that all the e-government services within ECE are less mature than other e-government services in Finland was therefore to some degree proved wrong. The findings are however affected by the fact that the studied municipalities represented the ten largest municipalities in Finland, and therefore the findings can not be generalized. If the study would have included also smaller municipalities, the findings could have been different and various challenges or obstacles for developing electronic ECE-services would have probably emerged. The findings of our study are summarized in the following table:

Table 1. Summary of the findings

City	e-Government services	e-Government stage
Helsinki	basic information, printable forms, electronic invoice	transactional stage
Espoo	basic information, printable forms, day care fee calculator	interactive presence
Tampere	electronic application, electronic invoice, electronic notification, transfer and cancellation of day care places	transactional stage
Vantaa	basic information, electronic application	transactional stage
Turku	basic information, day care fee calculator	interactive presence
Oulu	electronic application, electronic invoice, e-mails, SMS's	transactional stage
Lahti	basic information, real time information about day care activities, e-mails, SMS's	transactional stage
Kuopio	basic information, electronic feedback	interactive presence
Jyväskylä	basic information, pilot which integrates different day care information systems	horizontal integration
Pori	basic information	extended presence

Although having been quite successful in implementing e-services into ECE, the studied municipalities had faced several challenges of e-government. According to our interviews, the most considerable challenges the municipalities had faced were legal regulations, security and privacy challenges, and the lack of investments in IT. Most of the information in ECE consists of information about the children. There are

strict laws about what kind of information about children can be processed electronically, and therefore the question of security and privacy becomes extremely relevant. Many municipalities for example forbid parents to send their children's personal identification numbers via e-mail. Therefore secure transactions and encrypted connections are extremely important; without those the municipalities simply can not provide e-services such as electronic day care application form, which requires child's personal identification number.

Many of the studied municipalities also complained about the small funding in IT. It is virtually impossible to develop modern e-government services in ECE, if the IT infrastructure is out-of-date. The budget in ECE usually goes to other functions than IT, because decision-makers do not often see the potential of ICT in early childhood education. And even though the ECE manages to acquire modern IT, the staff can not often use it efficiently. The Finnish day care personnel's average age is quite high, and their IT skills are quite restricted. In fact, a few recent studies [19, 20] have showed that almost half of the Finnish day care professionals estimate their IT skills to be minor or non-existent. With the lack of funding in staff's IT training, the outcome is not very advantageous.

7   Conclusions

Governments and municipalities have started increasingly to use information and communication technologies in their daily operations. This study examined the use of ICT within the Finnish early childhood education. The study identified areas in which ten largest Finnish municipalities have developed their ECE e-government services. The study therefore provides benchmarks for developing ECE e-government services, and helps municipalities to improve their electronic ECE-services based on the practices in Finland.

As discussed in the previous sections, despite the relatively slow start, the progress towards mature e-government services in ECE in Finland is underway, and it is supported by many regional development projects. Many of the studied municipalities are situated in the higher stages of e-government evolution models: interaction has become two-way between government and citizens, and several municipalities have developed applications which enable online services and financial transactions.

However, the study also has its limitations. The results are limitedly generalized, because the study was conducted just in one country with a minor sample. Nonetheless, the cases described in this paper illustrate the possibilities and challenges many e-government projects especially in the social sector encounter. E-government services should not be seen as obstacles or unavoidable coercion, but as a new way of interacting with citizens and as an opportunity to participate citizens in the governmental processes they are a fundamental part of.

References

1. J.R. Gil-Garcia and I.J. Martinez-Moyano, Understanding the evolution of e-government: The influence of systems of rules on public sector dynamics, *Government Information Quarterly*, Vol.24 (2007), pp. 266-290.

2. M.M. Kamal, IT innovation adoption in the government sector: identifying the critical success factors, *Journal of Enterprise Information Management*, Vol.19 (2006), No.2, pp. 192-222.

3. K. Harjuhahto-Madetoja, V.-V. Ahonen, and S. Hyvärinen, Suomalaista tietoyhteiskuntaa rakentamassa - Hallituksen tietoyhteiskuntaohjelma 2003-2007. 2007, Finnish Government: *Helsinki*.

4. OECD, E-Government in Finland: An Assessment. 2003, Geneve: OECD.

5. Accenture, eGovernment Leadership: High Performance, Maximum Value. The Government Executive Series. 2004: Accenture.

6. Accenture, Leadership in Customer Service: Delivering on the Promise. Government Executive Series. 2007: Accenture.

7. M.P. Gupta and D. Jana, E-government evaluation: A framework and case study, *Government Information Quarterly*, Vol.20 (2003), pp. 365-387.

8. K. Layne and J. Lee, Developing fully functional E-government: A four stage model, *Government Information Quarterly*, Vol.18 (2001), No.2, pp. 122-136.

9. Benchmarking E-Government: A Global Perspective. 2002: United Nations and American Society for Public Administration.

10. J. Hiller and F. Bélanger, eds. *Privacy Strategies for Electronic Government*. E-government 2001, ed. M.A. Abramson and G.E. Means. 2001, Rowman & Littlefield Publishers: Lanham, MD.

11. M.J. Moon, The Evolution of E-Government among Municipalities: Rhetoric or Reality?, *Public Administration Review*, Vol.62 (2002), No.4, pp. 424-433.

12. H. Chen, Digital Government: technologies and practices, *Decision Support Systems*, Vol.34 (2002), No.3, pp. 223-227.

13. OECD, The e-government imperative: main findings. 2003, Geneve: OECD.

14. Day care Act, in 36/1973. Day care Act 36/1973.

15. OECD, Starting Strong II. Early Childhood Education and Care. 2006, OECD Publishing.

16. Ministry of Social Affairs and Health, Decision in Principle of the Council of State Concerning the National Policy Definition on Early Childhood Education and Care. 2002: *Helsinki*.

17. N. Färkkilä, T. Kahiluoto, and M. Kivistö, Report on the situation of children's daycare. September 2005. Reports of the Ministry of Social Affairs and Health. 2006, Helsinki: Ministry of Social Affairs and Health.

18. R.K. Yin, Case Study Research: Design and Methods. Second ed. Applied Social Research Methods Series, ed. D.S. Foster. 1994, Thousand Oaks: Sage Publications, Inc.

19. S. Mäntylä, Lapsiperheet, IT ja tasa-arvo. Esiselvitys. 2003, City of Tampere: *Tampere*.

20. M. Veikkolainen and P. Hämäläinen, Sosiaali- ja terveydenhuollon henkilöstön tieto- ja viestintätekniikan koulutus- ja oppimateriaalitarve ja koulutuksen kehittämisen haasteet. 2006, Stakes: *Helsinki*.