

The impact levels of digitalization initiatives

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Abstract: Contemporary organizations invest digitalization initiatives in order to boost their productivity, improve processes, or simply to cut costs. However, quite little is actually known about the outcomes and impacts on how, where and when digitalization initiatives create value. We aim to identify what kind of impacts digitalization initiatives in a mid-size city create. In particular, we focus on identifying potential impacts for city employees, decision-makers, citizens, organizational activities, and public sector in general. Our findings show that potential impacts are multifaceted and numerous. This has further implications to the assessment of success and benefits of the digitalization initiatives; they vary according to the stakeholders and their expectations.

Keywords: Digitalization, Public sector, Impacts, Value, Smart program.

1. Introduction

Public sector is largely about service provision (De Vries et al., 2016; Higgins, 2017). Reducing resources, citizens' expectations, and public pressure resulted in the development of operations being a constant concern. The organizations have thus launched various digitalization and smart city initiatives (Bakıcı et al., 2013; Denhardt and Denhardt, 2015; Taylor Buck and While, 2017). Those are often small-scale experiments, not radically new ways of delivering services. The experiments serve organizational learning, emphasizing the assessment of their desired impacts.

Public sector organizations are not always prepared for ubiquitous technologies, such as info-searching, banking, social networks, and communicating in their services and service provision (Lindgren and Janssen, 2013). Often the services are 'siloesd', targeted only to a single purpose rather than being broad, linking several sections or crossing organizational boundaries. This disintegration results in a number of individual and isolated services, each requiring licenses, maintenance, and user training. Their impacts on the organizational processes, costs savings, or productivity increase becomes minimal. This may result in the whole digitalization phenomena being judged unsuccessful.

Identifying and assessing the impacts and success of information systems (IS) and digitalization initiatives is not straightforward (Ylinen and Pekkola, 2018). Different stakeholders have different expectations and objectives, and they assess the benefits from their own points of view. Time is also significant since an initially unsuccessful appearing initiative may turn out to be successful when

the environment changes. The time has also other implications since dissecting the impact of an individual digitalization initiative from the broader development, e.g. the changes in the political climate, citizens' expectations, or the process improvements due to employees' better system usage, becomes very difficult. In summary, impacts and value of digitalization initiatives remain hidden.

This motivates our paper. We answer the research question: "What effects the digitalization experiments present?" by studying a mid-size city in Finland. The city has set up a digitalization program where different experiments all around the city departments and processes take place. The aim is to learn from the experiments so that their latter expansion is financially feasible and sensible. The city thus wants the impacts of their experiments analyzed. We consequently interviewed 20 key stakeholders for their perceptions about the impacts. The results of a qualitative study show a multifaceted nature of impacts, making it very difficult to assess them without explicitly articulated goals.

Section 2 presents our theoretical background. Sections 3 and 4 present the research setting and methods, and our findings. Section 5 discusses the results, and places them in a broader context.

2. Theoretical Background

A city is a complex entity with a large number of tasks. City administration needs to consider the development schemes stemming from different departments with different aspirations, maybe with political agendas (Aichholzer and Schmutzer, 2000). The city has to manage and provide services to a number of areas, such as community and environment, economical, education and culture, social and healthcare (Finnish association for municipalities ("Kuntaliitto.fi" 2018)). Each area has its own practices, process, and personnel. This presents varying requirements for information technology support and solutions. Finding unified rules and solutions becomes challenging.

Digital transformation refers to renewing the business models. This includes different ways of executing daily practices, processes, routines, and tasks. Digital transformation affects resource allocation and operational execution (Agutter et al., 2017). Altering the business logic influences not only business-related activities and functions but also the processes behind those actions. The influence escalates to organizational culture (Wirtz, 2016). Digitalization may result benefits also in non-strategic areas, such as sales and marketing (Agutter et al. 2017), being related also to the public sector whose operations converge to the privately owned format (Van der Wal et al., 2008). The extent of digitalization depends for instance on Chief Information Officers (CIO) attitude and the organization's readiness to promote and participate in experimenting, and an overall positive attitude towards renewals (Ding et al., 2014). Organizations with this kind of capabilities gain advantages in trailblazing and gathering experiences.

Already maintaining the current level of services is difficult when the resources are constantly scrutinized (Arnaboldi et al., 2015). Different departments require intensive attention and development, while the resources are decreasing. At the same time, the services should be improved, redesigned and (re-)invented (ibid.). Yet it is difficult to define and measure the success and the implications of a digitalization initiative (Bourne et al., 2002; Heberle et al., 2017). Moe et al. (2006) focuses on the

personnel and their readiness to acquire and use new services. Fox (2002) argues for the better allocation of resources in providing public service. Both perspectives are about increasing productivity and impact in the public sector. Impact, however, is asks for a closer inspection.

Experimenting organizations want their employees to continue being active and productive in their mundane routines. This emphasizes management skills, an understanding of the workplace dynamics, and ability to efficiently run the experiments (Beck and Cowan, 2014; Hekkert and Negro, 2009). Planning the digitalization initiatives and introducing them into the organization requires that the employees' commitment and willingness is assured to lower potential resistance (Fernandez and Rainey, 2006). Ideally, this results in positive outcomes (Huitt, 2003) and significant benefits (Zack, 1999; Zhou and George, 2001). Digital solutions aim at improving the services, making the organizational processes more innovative and fluent, reduce costs, or making new openings (Bongiorno et al., 2018). However, the organization may not always be capable enough. People, technologies, or processes may need to be developed before the digitalization initiative. (Hagen et al., 2004)

As the public sector organizations becoming more service-oriented, their IT units are going through similar transformation. In ICT service provision, the convergence of supplier-side and user-side underlines intensive user involvement (Ahlemann, 2016) and a need for new IT governance models (Magnusson et al., 2019; Ylinen and Pekkola, 2019). Improved user involvement consists of technical usability, access, accessibility, information ergonomics, and user experience (Barki & Hartwick 1989). It also emphasizes organizational culture; how and where from new ideas are received and accepted, and possibly experimented (Verbeeten and Speklé, 2015). Organizational culture dictates the reactions when something fails. Potential reaction, ranging from rewards to punishments affects to the willingness to future experiments. The CIO plays a major role in creating and promoting a positive organizational culture towards novel ideas (De Tuya et al., 2017).

Managing digitalization initiatives is challenging. Different organizational silos and branches necessitate different management approach (Goldfinch, 2007). For example, in our case the focus was on the employment services, land-use, and customer service. The initiative was supported, not dictated, by the CIO's office. Consequently establishing, organizing, and facilitating the community for digitalization initiatives was done in collaboration between the CIO and each department.

Related literature depicts numerous points where digitalization initiatives are influenced. This makes it difficult to develop measures and metrics for assessing the impacts, effectivity, and effectiveness, and comparing the results (Baily et al., 2005). Differences in perspectives, operations, actions, and cultures make this challenging, requesting qualitative, often subjective measures.

3. Research Setting

This paper describes a case study (Yin, 2008) in a city of 230 000 inhabitants and 15000 employees in more than 2000 sites. The CIO's office provides IT services for all departments, ranging from the top management to the city tourist bureau. The stakeholders have varying needs and capabilities in using the technologies. Existing systems and services needed an update. The city thus launched a Smart city program to modernize their operations. The digitalization initiative was introduced and

localized in different departments. There project managers were supported by development managers and a steering group in both subject matters and technical issues. The program aims at developing digital services to ease the future everyday life for the inhabitants, increase wellbeing and security, promote smoother moving in and within the city, and create new business by enabling cooperation between various stakeholders.

To understand potential impacts of the Smart city program and its digitalization component, we conducted a set of semi-structured interviews to collect qualitative data from different parts of the city. The interview themes were decided with the CIO. After these talks, more concrete topics and questions based on literature were drawn. The interviews focused on the initiation and rationale of the digitalization program, its resources and stakeholders, and its effectiveness and impacts.

The CIO suggested the key interviewees. Also snowball sampling (Morgan, 2008) was used. Twenty interviews were conducted, including the CIO, program manager, three development managers, ten project managers, IT manager, service designer, productivity controller, enterprise architect, and a digimarketing manager. All interviews, lasting 60 minutes in average, were recorded and transcribed. Three different cases were chosen: the city land-use office, customer service, and employment services. Land-use office wanted to renew their processes. They took on a demanding, but rewarding and promising experiment of 3D-modelling their construction sites as an example. The requirements were novel in terms of technologies and users' mindsets. Customer services focused on the customer scheduling. They felt the experiment being relative easy as the work practices did not differ much. Employment services experimented with robotic process automation to be used for fetching their customers' background information. This created significant time-savings.

The data analysis followed interpretive research approach (Walsham, 2006). The first researcher went through the material several times to gain an overview of the topic. He labeled the issues related to potential impacts. Process diagrams and stakeholder maps were drawn and iterated with the city representatives and the second author. Finally the findings were collectively discussed.

4. Findings

Successful implementation of an experimenting culture and gaining benefits from various innovations required close co-operation between all parties. The experiments comprised both functional and technological innovations. This means the idea of the 'digitalization' concept varied significantly between the departments. In some, the use of Skype was seen as 'digitalization' while in others the process itself was considered. The benefits of Smart city program were mostly the experiences from the experiments: how these issues should be addressed in the city operations and on what organizational level.

The goal of digitalization is to provide better services for the citizens and the city employees (Flak and Solli-Saether, 2013; Paivarinta et al., 2007). In our case, the experiments merely touched this. In the words of a senior employee at the ICT unit: "There are very few direct impacts on the citizens. Perhaps there will be later [...] Currently everyday life will not get any better as the scalability is still lacking."

We identified five targets for the impacts: citizens and their everyday life, individual city employees and their routines, departments where the employees are working, city processes and operations, and regional or even nation-wide angle.

Some interviewees acknowledged that the citizens might experience direct benefits from the Smart city initiative. For example, when contacting the customer service with reduced waiting time. However, also opposite opinions were articulated. It was said that these benefits will be realized only after the service is scaled up and being standardized into regular service offering.

Digitalization enforces city officials to unlearn their old ways of working as all innovations are not technical. The processes need to be rethought and renewed, requiring changes in the attitudes and mental models. The understanding about the tasks need to become clearer and broadened with digitalization: "The way of conducting business is changing [...] It is clearer what needs to be done, besides those single points." [Project manager]

This was seen as an instant benefit. Individual tasks were reflected through the understanding of the operations and the city strategy. The departments rethought their processes. Broader understanding from different perspectives supports this. Development of the thinking patterns includes the managerial function and the subordinate issues: "In general, better working, on and for all sides [...] new culture of doing things" [Project manager]

The bigger picture becomes clearer. This, in turn, helped to comprehend the role of each department among others. Communication within the city improved as there were more resources for the initiative. This in turn increased the need for communicating the progress, increasing the awareness of the results from the experiments. The city officials felt that the initiative took the city into the 21st century. Also the image of public sector and civil servants improved: "The operation [of the city] is simply more up-to-date, forward-looking and more risk-taking." [Project manager]

Some experiments were also reflected to even broader scale. For example, the employment services renewed their operations so that their time-savings gained attention from the ministry. Similar actions were then planned to be implemented to other cities.

It is also necessary to consider whether the service quality, the employees' and citizens' experiences, or the departments' performances improved since there may be innovative ways to execute the tasks, which however, may result 'side effects' on different organizational levels. This may even be scaled up on the citywide level to see whether the actions correspond to the city's strategic objectives. The national level was mentioned in only a few of cases. All cases emphasized that immediate benefits may not necessarily be gained.

All project managers supported the initiative by stating that it was for a worthy cause. The digitalization, in whatever form it may be applicable for their own department, was welcomed development. The interviewees were one-minded that the transparency of the city administration in general, and in the program in particular, was much improved.

5. Discussion and conclusion

The largest impact of digitalization was that the city benefited from learning a new culture. The progress and the attitude towards the innovations at large were perceived positive. The city operation are now more transparent for internal parties, and the city's culture has taken a step towards a more innovation friendly atmosphere.

The experiments require knowledge and technical skills, and a vision and understanding of an overall situation. The organizational culture and the processes facilitating the actions are essential. Thus a need to replace old ways of working emerges. Still, before this can happen, old practices need to be unlearned and new ways of working need to be learned. This chain of learning was seen as a significant impact by the project managers. All impact levels are summarized in Table 1.

Table 1: The impacts of digitalization on various levels

	Service experience	Novel attitude	Work input	Manage the task	Relation to strategy
Citizen	x	x	x	x	
City employee	x	x	x	x	x
City dept.		x	x	x	x
City		x		x	x
Nation			x		x

The service experiences may become quicker, better, and more concentrated on the important issues. This applies to both the citizens and the employees. The actions and their fit with the city strategy were also seen important. Through the experiments, the employees felt that the transparency improved and understanding about the city operations was clearer.

Some issues need to be further developed. These include measuring uncertainties in individual tasks and their connections. Expectations and objectives were not clear for all project managers. Even if the improvement actions were commonly agreed, concrete steps were not always clear. For example, what digitalization means varied; is it about the processes or the tools? It was also not always clear when something is 'good enough' and 'what is enough'. Smart city initiative was thus a combination of technological innovations with a change to prevailing attitudes. The resistance for change can be relieved by actively involving the personnel into the initiative.

The experiments aimed to communicate and implement the city's strategy, and further to formulate a mission for individual departments. The mission is then refined to an action plan where the objectives are set. The action plan entails an answer to what are the employment services after all; are

they about finding jobs for unemployed, or to improve the self-seeking processes. Therefore the setting of goals for the digitalization experiments becomes crucial. This need to be done concurrently with planning and assigning decision-making power. The objectives need to be defined individually for various parts of the initiative. However, there the experiments may not be comparable as the same metrics cannot be used. The operations are simply too different. This, again, makes it difficult to assess the impacts.

We thus provide two-fold contributions. We first illustrate possible dimensions of impacts of Smart City initiatives. They are summarized in Table 1. Second, we argue that planning and executing the initiatives is difficult since they all require different goals, actions, and measures. This makes the learning of experiments very difficult.

There are several limitations. This is just one case. However, we argue that it is plausible to assume that similar settings would provide comparable results. Further research is although needed. Second, we derived the impact levels and dimensions from the data. This needs more validation. Third, measuring the impact itself was left out. This need to be considered as our impacts might be marginal or significant.

References

- Agutter, C., England, R., van Hove, S., Steinberg, R., 2017. VeriSM - A Service Management Approach for the Digital Age. van Haren Publishing.
- Ahlemann, F., 2016. How digital transformation shapes corporate IT: Ten theses about the IT organization of the future, Federated Conference On Computer Science and Information Systems, 2016. IEEE, pp. 3–4.
- Aichholzer, G., Schmutzer, R., 2000. Organizational challenges to the development of electronic government, in: Proceedings 11th International Workshop on Database and Expert Systems Applications, pp. 379–383.
- Arnaboldi, M., Lapsley, I., Steccolini, I., 2015. Performance management in the public sector: The ultimate challenge. *Financ. Account. Manag.* 31, 1–22.
- Baily, P., Farmer, D., Jessop, D., 2005. Purchasing principles and management. Pearson Education.
- Bakıcı, T., Almirall, E., Wareham, J., 2013. A smart city initiative: Case of Barcelona. *J. Knowl. Econ.* 4, 135–148.
- Barki, H., & Hartwick, J. (1989). Rethinking the concept of user involvement. *MIS quarterly*, 53-63.
- Beck, D.E., Cowan, C., 2014. *Spiral dynamics: Mastering values, leadership and change*. John Wiley & Sons.
- Bongiorno, G., Rizzo, D., Vaia, G., 2018. Cios and the Digital Transformation: A New Leadership Role, in: *CIOs and the Digital Transformation*. Springer, pp. 1–9.
- Bourne, M., Neely, A., Platts, K., Mills, J., 2002. The success and failure of performance measurement initiatives: Perceptions of participating managers. *Int. J. Oper. Prod. Manag.* 22, 1288–1310.
- De Tuya, M., Cook, M., Sutherland, M., Luna-reyes, L., 2017. The leading role of the government CIO at the local level: Strategic opportunities and challenges - *ScienceDirect. Gov. Inf. Q.*

- De Vries, H., Bekkers, V., Tummers, L., 2016. Innovation in the public sector: A systematic review and future research agenda. *Public Adm.* 94, 146–166.
- Denhardt, J.V., Denhardt, R.B., 2015. *The new public service: Serving, not steering*. Routledge.
- Ding, F., Li, D., George, J.F., 2014. Investigating the effects of IS strategic leadership on organizational benefits from the perspective of CIO strategic roles. *Inf. Manage.* 51, 865–879.
- Fernandez, S., Rainey, H.G., 2006. Managing successful organizational change in the public sector. *Public Adm. Rev.* 66, 168–176.
- Flak, L.S., Solli-Saether, H., 2013. Benefits Realization in eGovernment: Institutional Entrepreneurship or Just Hype?, in: 2013 46th Hawaii International Conference on System Sciences. IEEE, pp. 2062–2071.
- Fox, K.J., 2002. *Efficiency in the Public Sector - Google-kirjat*. Springer Science+Business Medi, LLC, New York.
- Goldfinch, S., 2007. Pessimism, computer failure, and information systems development in the public sector. *Public Adm. Rev.* 67, 917–929.
- Heberle, A., Löwe, W., Gustafsson, A., Vorrei, Ö., 2017. Digitalization Canvas-Towards Identifying Digitalization Use Cases and Projects. *J UCS* 23, 1070–1097.
- Hekkert, M.P., Negro, S.O., 2009. Functions of innovation systems as a framework to understand sustainable technological change: Empirical evidence for earlier claims. *Technol. Forecast. Soc. Change* 76, 584–594.
- Higgins, B., 2017. *Reinventing human services: Community-and family-centered practice*. Routledge.
- Huitt, W., 2003. A systems model of human behavior. *Educ. Psychol. Interact.*
- Kuntaliitto.fi [WWW Document], 2018. URL <https://www.localfinland.fi/> (accessed 6.6.18).
- Lindgren, I., Janssen, G., 2013. Electronic services in the public sector: A conceptual framework. *Gov. Inf. Q.* 30, 163–172.
- Magnusson, J., Högberg, E., Sjöman, H., 2019. How the West was Lost: Chief Information Officers and the Battle of Jurisdictional Control, in: *Proceedings of the 52nd Hawaii Int'l Conference on System Sciences*.
- Moe, C.E., Risvand, A.C., Sein, M.K., 2006. Limits of public procurement: information systems acquisition, in: *Electronic Government*. Springer, pp. 281–292.
- Morgan, D., 2008. Snowball sampling. *SAGE Encycl. Qual. Res. Methods* 2455, 816–817.
- Paivarinta, T., Dertz, W., Flak, L.S., 2007. Issues of adopting benefits management practices of IT investments in municipalities: a Delphi Study in Norway, in: 2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07). IEEE, pp. 103–103.
- Taylor Buck, N., While, A., 2017. Competitive urbanism and the limits to smart city innovation: The UK Future Cities initiative. *Urban Stud.* 54, 501–519.
- Van der Wal, Z., De Graaf, G., Lasthuizen, K., 2008. What's valued most? Similarities and differences between the organizational values of the public and private sector. *Public Adm.* 86, 465–482.

- Verbeeten, F., Speklé, R., 2015. Management Control, Results-Oriented Culture and Public Sector Performance: Empirical Evidence on New Public Management 36, 953–978.
- Walsham, G., 2006. Doing interpretive research. *Eur. J. Inf. Syst.* 15, 320–330.
- Wirtz, B.W., 2016. Business model management, 2nd ed. German University of Administrative Sciences Speyer.
- Yin, R.K., 2008. Case study research: Design and methods, Applied social research methods series. Sage Publications, Incorporated.
- Ylinen, M., Pekkola, S., 2018. Searching Success in a Successful IS Acquisition, in: Proceedings of the 51st Hawaii International Conference on System Sciences.
- Ylinen, M., Pekkola, S., 2019. A process model for public sector IT management to answer the needs of digital transformation, in: Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Zack, M.H., 1999. Managing codified knowledge. *MIT Sloan Manag. Rev.* 40, 45.
- Zhou, J., George, J.M., 2001. When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Acad. Manage. J.* 44, 682–696.