

Co-creating digital government service: An activity theory perspective

Nina Helander
Tampere University
nina.helander@tuni.fi

Jari Jussila
Häme University of Applied
Sciences
jari.jussila@hamk.fi

Anik Shekhar Bal
Tampere University
anik.bal@tuni.fi

Virpi Sillanpää
Tampere University
virpi.sillanpaa@tuni.fi

Annamaija Paunu
Tampere University
annamaija.paunu@tuni.fi

Salvatore Ammirato
University of Calabria
salvatore.ammirato@unical.it

Alberto Felicetti
University of Calabria
alberto.felicetti@unical.it

Abstract

The promise of digital government is to support citizen engagement and participation in government, improve government processes, and foster external interactions with the society. The goal in the service development under the digital governance concept is to create services and delivery systems that are economic, efficient, effective, and equitable, and thus, create value for several stakeholders. Creation of such digital government services is however, a challenging task as it requires a smooth co-operation between several different actors with varying views and operation practices. In this paper, we analyze an empirical study of a co-creation project of a digital government service in Finland through activity theory lenses. The aim is to identify the co-creation activity system and further, to evaluate the outcome by applying a value co-creation (VCC) measurement framework.

1. Introduction

Digital government is a key word in the recent discussion on smart cities and digital society. The promise is to capture benefits such as citizen engagement and participation in government, smoother government processes and increased external interactions with the society [1] and to deliver services that are economic, efficient, effective, and

equitable [2]–[4]. However, development of new digital government services is a challenging task, as it usually needs not only technological capabilities, but also faces issues in terms of both culture and process [5]. In order for the government, cities and communities to be smart, they have to apply new ways of co-creation among cities, businesses, citizens and academia [6], [7]. This kind of co-creation builds new kinds of activity systems which are often characterized as joint efforts between public and private sectors.

In this study the aim is to identify what kind of co-creation activity system there is to develop a digital government service offered on a digital platform and further, to evaluate critically the outcome of the activity system by a value co-creation (VCC) measurement framework. Our research questions are thus following:

RQ1: What are the key elements and their relationships in the activity system co-creating the new digital service on a digital platform called Lupapiste.fi?

RQ2: What kind of value is co-created in the activity system?

The study first discusses value co-creation between the public and the private organizations, and then introduces a social-cultural-historical activity theory [8], [9] as analytical lenses for identifying the co-creation activity system of a digital government service. Then the VCC measurement framework is presented, as it offers a view to evaluate the outcome of the activity system. A case study of the digital

government service developed as a part of Action Programme on eServices and eDemocracy (SADe programme) set by the Ministry of Finance in Finland is then presented. Finally, case-specific, but with certain limitations transferable findings are outlined in the development of the service for construction permits and other permits related to infrastructure, which involve multiple stakeholders.

2. Value co-creation between public and private organizations

In the traditional value creation model, value is formed by the firms or manufacturers as a product or service, which is then distributed to consumers through distributors for exchange based on monetary compensation [10]. However, rapid advancement in information and communication technology have made the consumers more informed, networked and connected towards all the available value propositions in the market. Thus, management needs to rethink alternative ways rather than the traditional value creation model to achieve competitive advantages [11].

As world has become wide open and accessible, intangible aspects like specialized skills, knowledge, know-how, and process are becoming the dominant unit of exchange rather than tangible goods [12]. Vargo and Lusch [10] have argued that service- in place of goods- is the prime unit of exchange, where the value is co-created by reciprocal and mutually beneficial relationships among firms, stakeholders, employees, consumers, government agencies and other related entities.

Value co-creation (VCC) proposes collaboration between numerous stakeholders [13]. The service-dominant (S-D) logic provided by Vargo and Lusch (2004) has intensified the discussion of VCC [14]. From then numerous theoretical frameworks have been introduced by researches in search of the benchmark. Prahalad & Ramaswamy [11] have claimed VCC as a connective tool for stakeholders. The importance of VCC has incremented exponentially with the shifts of the business model from the goods offering to the service offering. Furthermore, several previous types of researches have shown that stakeholders' involvement in the value-creating process has a positive effect on the final perceived value [12]. However, the perception between the different stakeholders may vary a lot due to their different viewpoints and variations in modus operandi.

Earlier research literature [15] has identified differences in three areas related to public and private sector organizations: (1) environmental factors, (2) relationships of the organization to the actors in its

environment, and (3) internal structures and processes. Compared to public sector organizations, the private sector is argued to be more agile, less bureaucratic, and to have a more resources and stronger motivation towards proactive innovations [15]–[20].

Regarding the methods of development of new digital services, there are studies that claim the private sector organizations to be more active in implementing new methods, like Lean [21], [22], and Agile software development methods [23]–[25]. Public sector organizations are on the other hand claimed to utilize more traditional plan-driven software development [26], such as the waterfall process model [27]. It is claimed that public organizations are more bureaucratic, characterized by rule dominion, formal procedures, and hierarchy. This is largely due to differences in contextual factors of organizations; public sector organizations have to deal with more strict legislation related to organizational processes and requirements set for public service production [4]. It is argued that a more modern approach entailing plurality, exchange, competition, and cooperation would facilitate the public sector in accomplishing the goals of e-government [5].

However, to some extent some of these features, especially cooperation, is already increasingly adopted also in the public sector, especially when public organizations need to cooperate with private sector to create solutions. Furthermore, there are countries and cities across the globe that already successfully have applied these features. Nevertheless, differences within the aims, practices, rules, and processes potentially cause conflicts between public and private organizations and affect the activity system as a whole.

3. Activity theory

Activity theory consists of a set of five basic principles: (1) Object oriented human activity; (2) multi-voicedness; (3) historicity; (4) contradictions; and (5) transformations [28]. Firstly, activity theory distinguishes between temporary, goal-directed actions, and durable, object-oriented activity systems (Figure 1) [8], [8], [9], [29]. In this context, 'activity' has a broader meaning than 'action' or 'operation' (consider an ice hockey game as an activity and hitting a puck as an action, for example) [30]. Object oriented activity emphasizes that human activity occurs within a broadly objective reality constituted by things which are seen as object and socio-culturally constructed [31]. In this case, the activity is the creation of a new digital government service on a digital platform. Secondly, multi-voicedness acknowledges that a wider community of stakeholders exist within the activity system that bring their own perspectives, views and culture to the system. Thirdly, historicity

refers to the principle of how the activity systems are continually reconfigured over time, and that their change must be understood within the historical context [31]. For instance, the subjects, instruments and rules of the activity system may change over time. Fourth, contradictions in the activity system reflect tensions within and between elements of activity systems, which can lead to the fifth principle of expansive learning or transformation of the activity system [28], [31].

Figure 1 below illustrates the systemic structure of collective activity according to Engeström. The arrows between the key parts of the activity system illustrates the connections between all the elements. There is a reciprocal relationship between the author, the community and the subject. The model shows how the different parts of the activity system mediate with each other: the tools act as the agent and subject, the agent and the community are mediated by the rules, and as division of labor acts as the mediator between the object and the community.

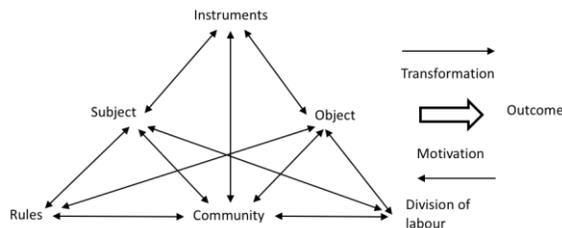


Figure 1. Systems of collective activity, adapted from Engeström [9].

In Figure 1, activity is described as a set of six interdependent elements, which are elaborated in more detail in Table 1.

Table 1. Activity theory elements [28], [32], [33].

Instruments/tools	The artifacts or concepts used by subjects to accomplish the task.
Subject	A person or a group engaged in the activities.
Object	The objective of the activity system as a whole.
Community	Social context and all the people involved.
Division of labor	The balance of activities among different people and artifacts in the system.
Rules	The guidelines and code for activities and behavior in the system

4. Value co-creation measurement

There are several frameworks proposed in the literature for VCC measurement, such as the DART-model provided by Prahalad & Ramaswamy [11], process-based VCC (supplier-customer-encounter process) framework by Payne et al. [34], a simpler tentative framework of VCC as a joint problem-solving process by Stenroos & Jaakkola [35] and an approach towards value ecosystem co-creation by Gouillart [36]. Adding to this, Saarijärvi et al. [14] have provided different approaches based on the service system, e.g. S-D logic, service science and service logic approach towards VCC.

Many articles have provided the framework for approaching VCC from different thinking perspectives. However, the answer to the prime question on how to validate the performance enhancement by VCC is still missing. In fact, identifying the value elements and measuring the actual value is a troublesome task [37].

The measurement process begins after determining **the antecedents of the process** [38] as the input and mapping the key stakeholders to identify the expected values, needs and expectations of the subjects of the activity system. This is the starting point of the whole value measurement process. Below a conceptual framework is provided in Figure 2.

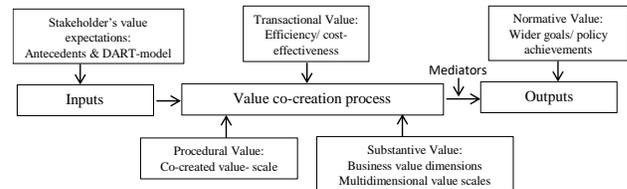


Figure 2. A conceptual framework for VCC measurement (adapted from [38]).

This framework provided in the figure above is mainly a process-focused approach to measure the context-specific performance improvement [39]. After conducting thorough research on the VCC stream, Busser & Shulga [40] have provided a co-created value (CCV)- scale based on five dimensions pillars. The dimensions are meaningfulness, collaboration, contribution, recognition, and effective response. The provided scale can be used to determine **the procedural value** at the initiation stage of VCC. The obtained procedural value can be the assistance for the stakeholders to decide on the common shared goal to avoid unexpected impacts during the process.

To measure **the substantive value** from the VCC process, Park et al. [41] have argued that a business entity can utilize four value dimensions (cost

reduction, revenue generation, resiliency, and legitimacy and image) to validate this approach. As regards to Vargo and Lusch [10], a stakeholder can find the real value from a project only after getting the expected necessities or pleasure of life from that project. Relating to this, Fernández & Bonillo [42] have provided eight types of values that a stakeholder can perceive; those are, efficiency, excellence, status, esteem, play, aesthetic, ethics, and spirituality. Different multidimensional scales can be exploited to capture substantive value.

The transaction value deals with the monetary benefits and efficiency of the process. It is the price paid in the market exchange [10]. To determine the transaction value, how efficiently the resources are managed, including financial resources, time, and skills have to be evaluated. Mediators present in the framework indicate any circumstances or intervening variables that can strongly affect the end result, or the whole value co-creation process [38]. The mediators need to be identified and tackle with conscious for risk assessment purposes.

Finally, **the normative value** represents the wider aspects of the project instead of the monetary benefits and stakeholders' perceived value. This is the final realized value where the wider goals or policy achievements (for example, sustainability, normative effectiveness, or even shared value) are generated. Lankoski [43] has provided three constitutional dimensions to measure sustainability as a normative value of VCC. The constituents are Scope (narrow vs. broad), Substitutability (weak vs. strong), and Goal orientation (absolute vs. relative). Porter & Kramer [44] argued that VCC must generate economic values for the business entity with responding to societal needs. For example, if the government impose any regulation, it must bring positive effects for the society and also for the business, and otherwise the regulation might create trade-offs.

To conclude the theoretical frameworks of this study it needs to be emphasized that these presented frameworks (figures 1 and 2) are used sequentially: first the activity theory lenses are used to identify the activity system around the developed Lupapiste.fi digital service (RQ1) and then the VCC lenses are used to in more detailed way to analyze the outcomes of the co-creation activity systems in terms of procedural, transactional, substantive and normative value (RQ2). These value categories from the VCC framework give more detailed understanding to the elements of object and outcome in the activity theory framework.

5. Methodological choices and the empirical case of Lupapiste.fi

A case study approach was chosen as the research method for this research. The chose case study is Lupapiste.fi that is a web-based open source service that enables digital application of construction permits and other permits related to infrastructure. Lupapiste.fi is compatible with software that municipalities use in managing and archiving documents related to construction activities. Pricing of the service is divided into two parts: monthly payment, which depends on the size of the municipality and payments per transactions, which is dependent upon the total number of applications in the service (i.e. more applications nationwide, lower the price per application). [45] In addition, Evolta Inc. offers complementary services, like electronic archiving, training and consultancy services.

Lupapiste.fi was developed as a part of Action Program on eServices and eDemocracy (SADe program) set by the Ministry of Finance in Finland [46]. The program aimed at providing interoperable, high-quality public sector services via digital channels to improve cost-efficiency, create savings, and generate benefits to citizens, businesses, organizations and local and government authorities. Special attention was paid to the achievement of cost benefits to municipalities. Lupapiste.fi was one of the sub-projects in the program coordinated by Ministry of Environment. In addition to Lupapiste.fi, Ministry of Environment coordinated six other projects, and total budget for those projects was 11,5 M€. After a competitive bidding, Solita Inc. was chosen as a service provider for Lupapiste.fi. [45] Lupapiste.fi service was developed in co-operation with municipalities that worked as pilots in the project, and later during the evolution of the service the ownership was transferred to Evolta Inc. a spin-off company from Solita Inc.

The case study method was considered appropriate for this research, because it allows empirical investigation of a contemporary phenomenon within its real-life context using multiple sources of evidence [47], [48]. The case study comprises a comprehensive method that covers the logic of design, data collection techniques, and specific approaches to data analysis [48]. The strengths of case study research include [49]: 1) allowing the study of the phenomenon in its natural setting and developing a relevant theory from the understanding gained through observing actual practice, 2) enabling the questions of why, what, and how to be answered with a relatively good understanding of the nature and complexity of the phenomenon, and 3) the method is suitable for early, exploratory research where the variables are not

known and the phenomenon is not yet completely understood.

The empirical data collected consisted of interviews with the subjects of the co-creation activity system of the digital government service called Lupapiste. Interviews were conducted in two phases. In the first phase, building inspectors or leading building inspectors and persons from customer service were interviewed in five municipalities (Table 2).

Table 2. Phase 1: New digital government service interviewees in municipalities.

Municipality	Roles of interviewees	Number of interviews per municipality
Vantaa	Director, supervision of building Secretary, supervision of building	2
Hyvinkää	Building inspector Secretary, customer service	2
Sipoo	Manager, supervision of building Secretary, supervision of building	2
Kuopio	Engineer, construction permit Secretary, supervision of building	2
Mikkeli	Leading building inspector Office secretary	2

In the second phase, 13 corporate representatives operating in construction, city planning, architecture and electric engineering were interviewed in order to complement the view of Lupapiste-service in the field. These company interviewees are presented anonymously due to agreed privacy issues (see Table 3).

The first interview round was carried out few months before the company interviews, as the company interviews were later in the analysis of the 1st round interviews identified as important to have in order to shed more light on the private sector perspective.

Table 3. Phase 2: New digital government service interviewees in companies.

Company	Roles of interviewees	Number of interviews per company
Architecture office	Construction design Design/Architect	2
Engineering office	Project manager	1
Energy company A	Project managers	2
Energy company B	Regional manager Field planner	2
Energy company C	Network engineer	1
Energy company D	Developers of district heating Network engineer Developer manager of electronic network Designer of electronic network	5
Infrastructure company A	Technical assistant	1
Infrastructure company B	Project designer, communications network Planner, documentation	2

The interviews were thematic interviews, and for both the 1st and 2nd round interviews it included the same general themes: background and work history of the interviewee, own and own organisation's role in Lupapiste.fi development, key cooperation actors, key benefits gained from Lupapiste, main challenges and negative sides of Lupapiste, experiences of the development process and change management, further development ideas and lastly, an open discussion on the things that came into mind in overall related to Lupapiste.fi. In overall, the interviews were very open and conversational in nature.

Researcher triangulation was used to develop a comprehensive understanding of the phenomena, with two researchers participating in the interviews [50], [51] and also in analyzing the data. Data was analyzed by utilizing the frameworks of activity theory (figure 1) and value co-creation measurement framework (figure 2) by grouping the relevant things from the interview data sets under each of the key elements of the theoretical frameworks.

6. Empirical findings

In this section, results of interviews are analyzed based on elements of the activity system (subsection 6.1) and then based on the elements of VCC framework (subsection 6.2).

6.1. Lupapiste.fi through the activity system lenses

Co-creation activity system of Lupapiste.fi is illustrated in Figure 3.

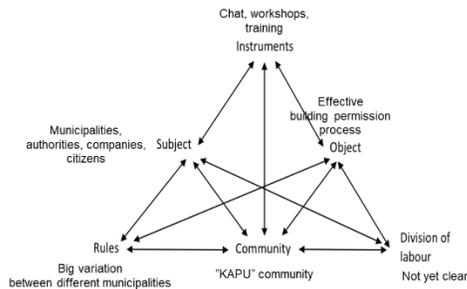


Figure 3. Co-creation activity system of Lupapiste.fi.

Object. We found in the interviews that object related to use of Lupapiste services varied in municipalities. Part of municipalities aimed at utilizing digital service in all incoming applications, whereas some municipalities had moderate targets related to the digitalization of the process. Most of the municipalities and the system vendor had arranged the first training / information presentation about the system and the applications. The majority of the company interviewees as the users of the digital service had participated in the launch event of the pilot version of the service. Although the service had been introduced for the company users as so-called “under pressure”, the user experiences of the pilot were mostly very positive.

Subject. In municipalities building inspectors, designers and customer service assistants utilize the Lupapiste service the most. Citizens and designers from different types of companies (architecture, engineering etc.) as the most important customers and actors are using the Lupapiste-service (system). In addition, different authorities participate permit processes.

Rules. Municipalities have different types of rules and guidelines for the processes; for example one of the municipalities accepted only digital applications, whereas several others were using simultaneously both traditional paper process and the new digital process. According to corporate representatives interviewed, lack of common rules and regulations

related to the process caused challenges as regulations and practices may vary even within one municipality, depending on the sector. Many companies operated nationwide, and common rules and practices would facilitate operations. As the company interviewees pointed out, the introduction of the system was almost forced (the system was just switched on, there were no other options) to them, and they had to follow the municipalities rules, which in turn varied between different municipalities.

The complexity of the system revealed different guidelines for municipalities and cities. Clearly, all the possibilities for using the Lupapiste.fi service were still missing in a part of the municipal field. Some municipalities were still able to do double work, first through the digital Lupapiste.fi service and then in paper form. Some municipalities and towns were also communicated through the Lupapiste.fi and the system also became aware of when the permit was processed or additional clarifications were desired, some of which were carried out in some other way.

Apparently, each municipality can decide and guide the use. No common guidelines have been created for this, e.g. on building control authorities. Lack of clarity, consistency and guidance for municipalities on the use of the Lupapiste.fi and its opportunities came up from the interviews. Some of the operators worked in the whole of Finland and the practices vary from municipality to municipality a lot.

Money (or mainly its tightness) seemed to dictate strict rules and timetable pressures. Scheduling pressures, both in project implementation and, for example, in obtaining permits (may have lasted for a week / months) were challenging.

Instruments. Municipalities utilized different types of tools to facilitate the digitalization of the process. Technical equipment, like effective computers and large screens were considered as a focal requirements for the implementation of Lupapiste. For instance, it was described that only when the computer screens are large enough when inspecting building plans, they do not need to be printed out and laid on the office wall or table for inspection. One municipality that had advanced well in the digitalization efforts payed personnel by results related to degree of digitalization, which was a noticed as an effective tool to reach the targets quickly. They also arranged monthly a free lunch event called ‘soup and spiritual guidance’ in the local restaurant where all participants of the digitalization process had opportunity to meet and discuss about the project in casual environment. Corporate representatives underlined the importance of education and webinars organized by the municipalities. They also considered

Lupapiste.fi as a potential communication channel for the network of different projects.

Division of labor. Building inspectors, designers and customer service assistants utilize the Lupapiste service the most. One large municipality had hired system developers from Evolta, which was the company responsible for Lupapiste.fi development, to support the implementation of the system. We noticed that dedicated technical person who supports the use of the system was found very beneficial for the implementation and further use. Lupapiste.fi enabled two municipalities to share tasks and personnel resources; some persons could specialize e.g. in block houses and allow all permits related to those in two municipalities, which would increase productivity. In corporate side it became evident that the main contractor defines how the project proceeds and what actions are to be taken.

Community. Communication actions by Evolta have built a community based on the Lupapiste-service, including events, e.g. 'Lupisfest', regular meetings and communication channel for dedicated contact persons in each municipality (called KAPU). All these activities strengthen the Lupapiste.fi community, which in the first phase consists of municipality representatives. Informative web site along with the chat was appreciated by corporate representatives. They also underlined the importance to extend the user group to national authorities, e.g. Regional State Administrative Agencies and Centre for Economic Development, Transport and the Environment. Corporate representatives had fairly positive attitude, but also reservations about the idea of co-operative network. Interviewees proposed Lupapiste.fi events for corporate users in the future.

6.2. Lupapiste.fi through the VCC lenses

From the perspective of value co-creation measurement, the inconsistencies and contradictions in the activity system are challenging, and thus the **value antecedents** should be identified. The developer and provider of Lupapiste.fi service (business-to-government, B2G) receives monetary compensation partly based on payments per transactions, i.e. how many permits the municipality gives to citizens, corporations and government officials digitally. Based on the interviews, in some municipalities the object was to have all incoming permit applications digitalized (thus generating revenue for service provider), whereas some municipalities had moderate targets related to the digitalization of the process. On the other hand, for corporations (G2B) applying for permits using the system there is no monetary incentive rather a necessity to use the system.

Furthermore, **the transactional value** (cost effectiveness) that the system can bring for the corporation depends on the digitization level and rules set by the municipality. From the viewpoint of **the processual value**, cooperation between the authorities, i.e. within the various institutions of the city, was seen as a challenge, and the operating methods were not the same in the different municipalities as regards Lupapiste.fi.

From **the normative value** viewpoint, there were suggestions from several interviewees to extend the use of the Lupapiste.fi, for example, to various authorities like National Board of Environmental issues and landowner information. To achieve normative value as the wider goals set by the government can be best achieved when all the players are involved early on in the value co-creation process. Producing outcomes desired by the government can be best served if the also the value expectations of different actors in the activity system are recognized and put to use in the design of the activity system.

7. Discussion and conclusions

We investigated the co-creation of digital government service for building and other infrastructure permits in Finland through activity theory lenses and value co-creation measurement framework. Building inspectors and customer service personnel from five municipalities and 13 corporate representatives (in government-to-business relationship, G2B) were interviewed to uncover contradictions that emerge in the activity system involving the creation of new digital government service, as well as, to gain insight on value co-creation in public and private sector interface.

Contradictions in the activity system were identified to emerge both from the internal inconsistency of the activity system elements and in the relationships between the elements. For instance, cooperation between the authorities within the various institutions of the municipalities was perceived as a challenge, and the operating methods were not the same in the different municipalities. Thus, in government-to-business relationships the corporate representatives had to deal with a different set of rules depending on the municipality although the information system remained the same in each case.

The recommendation that stakeholders should decide on the common shared goal to avoid unexpected impacts during the process [40] ignored the corporations (G2B) entirely in this case. As Porter & Kramer [44] have argued value co-creation must generate economic values for the business entities that are responding to societal needs.

One key takeaway from the study is that eGovernment and smart city initiatives should take a broader perspective to value co-creation and not involve only the most evident relationships, such as B2G and Government-to-Citizens (GC2) relationships in this case, in the common shared goal setting, even if the funding for the initiatives comes from the government. This finding is well in line with the recent service design research, see e.g. [52], where the importance of involving actors at different levels of macro, meso and micro to be able to realize the aimed changes in the value co-creation system. Furthermore, delivering services that are economic, efficient, effective, and equitable can emerge from surprising relationships, such as Government-to-Government (G2G) that was in this case represented by two municipalities sharing personnel resources in inspection of digital permits.

However, special emphasis should be put on the potential power asymmetry challenges in this kind of value co-creation system. Value co-creation is a key driver for building these kinds of multiple actor and activity systems, but however, presence of power is undeniable even in the most co-operative systems [53]. As was seen in this Lupapiste.fi activity system case, the municipalities still had the power position in the system compared e.g. to the private companies participating in the development of the digital service. An interesting question for further studies is how the presence of power and potential power asymmetry affect the value co-creation capability of the activity system. In present study, the analysis was limited only to activity theory and value co-creation measurement.

To conclude, we propose that government and the municipalities could use service design approach in developing these kinds of digital services to involve the key stakeholders already in the early phases of the process. Value mapping could be one method to apply in the beginning of the process, and later in the process different participatory and dialogue based methods could be used. It is important that open interaction and information and knowledge sharing is fostered between the subjects in the value co-creation activity system.

Acknowledgements

This research was supported by the Strategic Research Council's Project CORE (313013 +313016).

References

[1] J. Esteves and R. C. Joseph, "A comprehensive framework for the assessment of eGovernment projects," *Gov. Inf. Q.*, vol.

25, no. 1, pp. 118–132, Jan. 2008.

- [2] J. C. Bertot and P. T. Jaeger, "The E-Government paradox: Better customer service doesn't necessarily cost less," *Gov. Inf. Q.*, vol. 25, no. 2, pp. 149–154, Apr. 2008.
- [3] L. S. Flak, W. Dertz, A. Jansen, J. Krogstie, I. Spjelkavik, and S. Ølnes, "What is the value of eGovernment – and how can we actually realize it?," *Transform. Gov. People, Process Policy*, vol. 9, no. 2, p. TG-03-2015-0014, May 2015.
- [4] K. Norman-Major, "Balancing the Four Es; or Can We Achieve Equity for Social Equity in Public Administration?," *Journal of Public Affairs Education*, vol. 17. National Association of Schools of Public Affairs and Administration (NASPAA), pp. 233–252, 2011.
- [5] S. Singh and B. Travica, "E-Government systems in South Africa: An infoculture perspective," *Electron. J. Inf. Syst. Dev. Ctries.*, p. 16, 2018.
- [6] M. Markkula and H. Kune, "Making Smart Regions Smarter: Smart Specialization and the Role of Universities in Regional Innovation Ecosystems," *Technol. Innov. Manag. Rev.*, vol. 5, no. 10, pp. 7–15, 2018.
- [7] I. Kunttu, "Developing smart city services by mobile application," in *ISPIM Conference Proceedings*, 2019.
- [8] Vygotski L. S., *Thought and language*. Ontario: MIT Press, 1962.
- [9] Y. Engestrom, "Activity theory as a framework for analyzing and redesigning work," *Ergonomics*, vol. 43, no. 7, pp. 960–974, Jul. 2000.
- [10] S. L. Vargo and R. F. Lusch, "Service-dominant logic: Continuing the evolution," *J. Acad. Mark. Sci.*, vol. 36, no. 1, pp. 1–10, 2008.
- [11] C. Prahalad and V. Ramaswamy, "Co-creation experiences: The next practice in value creation," *J. Interact. Mark.*, vol. 18, no. 3, pp. 5–14, 2004.

- [12] S. L. Vargo and R. F. Lusch, "Evolving to a New Dominant Logic for Marketing," *J. Mark.*, vol. 68, no. 1, pp. 1–17, 2004.
- [13] K. Ranjan and S. Read, "Value co-creation: concept and measurement," *J. Acad. Mark. Sci.*, vol. 44, no. 3, pp. 290–315, 2016.
- [14] H. Saarijärvi, P. K. Kannan, and H. Kuusela, "Value co-creation: theoretical approaches and practical implications," *Eur. Bus. Rev.*, vol. 25, no. 1, pp. 6–19, Jan. 2013.
- [15] H. G. Rainey, R. W. Backoff, and C. H. Levine, "Comparing Public and Private Organizations," *Public Adm. Rev.*, vol. 36, no. 2, p. 233, Mar. 1976.
- [16] G. A. Boyne, "Public and Private Management: What's the Difference?," *J. Manag. Stud.*, vol. 39, no. 1, pp. 97–122, Jan. 2002.
- [17] B. Bozeman and S. Bretschneider, "Public Management Information Systems: Theory and Prescription," *Public Adm. Rev.*, vol. 46, p. 475, Nov. 1986.
- [18] S. Bretschneider, "Management Information Systems in Public and Private Organizations: An Empirical Test," *Public Adm. Rev.*, vol. 50, no. 5, p. 536, Sep. 1990.
- [19] L. Mohan, W. K. Holstein, and R. B. Adams, "EIS: It Can Work in the Public Sector," *MIS Q.*, vol. 14, no. 4, p. 435, Dec. 1990.
- [20] H. J. Scholl, K. Barzilai-Nahon, J. H. Ann, O. H. Popova, and B. Re, "E-Commerce and E-Government: How Do They Compare? What Can They Learn from Each Other?," in *2009 42nd Hawaii International Conference on System Sciences*, 2009, pp. 1–10.
- [21] M. Poppendieck, "Lean Software Development," in *29th International Conference on Software Engineering (ICSE '07 Companion)*, 2007, pp. 165–166.
- [22] C. Ebert, P. Abrahamsson, and N. Oza, "Lean Software Development," *IEEE Softw.*, vol. 29, no. 5, pp. 22–25, Sep. 2012.
- [23] P. Abrahamsson, O. Salo, J. Ronkainen, and J. Warsta, "Agile Software Development Methods: Review and Analysis," Espoo, 2002.
- [24] P. Abrahamsson, J. Warsta, M. T. Siponen, and J. Ronkainen, "New directions on agile methods: a comparative analysis," in *25th International Conference on Software Engineering, 2003. Proceedings.*, 2003, pp. 244–254.
- [25] T. Dingsøy, S. Nerur, V. Balijepally, and N. B. Moe, "A decade of agile methodologies: Towards explaining agile software development," *J. Syst. Softw.*, vol. 85, no. 6, pp. 1213–1221, Jun. 2012.
- [26] B. Balter, "Toward a more agile government: the case for rebooting federal IT procurement - ProQuest," *Public Contract Law J.*, vol. 41, no. 1, pp. 149–171, 2011.
- [27] W. Royce, "Managing the development of large software systems: concepts and techniques," in *Proceedings of the 9th international conference on Software Engineering*, 1987, pp. 328–338.
- [28] Y. Engeström, *Activity theory and individual and social transformation*. 1999.
- [29] K. Kuutti, "Activity theory as a potential framework for human-computer interaction research," in *Context and consciousness*, MIT Press, 1996, p. 400.
- [30] J. Jussila, V. Sillanpää, T. Lehtonen, N. Helander, and L. Frank, "An activity theory perspective on creating a new digital government service in Finland," in *Proceedings of the 52nd Hawaii International Conference on System Sciences*, 2019.
- [31] K. Mervyn, A. Simon, and D. K. Allen, "Digital inclusion and social inclusion: a tale of two cities," *Information, Commun. Soc.*, vol. 17, no. 9, pp. 1086–1104, Oct. 2014.
- [32] Y. Engeström, *Learning by expanding : an activity-theoretical approach to developmental research*. 1987.
- [33] S. Bryant, A. Forte, and A. Bruckman, "Becoming Wikipedian: transformation of participation in a collaborative online encyclopedia," in *Proceedings of the 2005*

- international ACM SIGGROUP conference on Supporting group work*, 2005, pp. 1–10.
- [34] A. F. Payne, K. Storbacka, and P. Frow, “Managing the co-creation of value,” *J. Acad. Mark. Sci.*, vol. 36, no. 1, pp. 83–96, Mar. 2008.
- [35] L. Aarikka-Stenroos and E. Jaakkola, “Value co-creation in knowledge intensive business services: A dyadic perspective on the joint problem solving process,” *Ind. Mark. Manag.*, vol. 41, no. 1, pp. 15–26, 2012.
- [36] F. J. Guillard, “The race to implement co-creation of value with stakeholders: five approaches to competitive advantage,” *Strateg. Leadersh.*, vol. 42, no. 1, pp. 2–8, Jan. 2014.
- [37] N. Helander, J. Jussila, and H. Kärkkäinen, “Value creation in business-to-business crowdsourcing,” *Int. J. Knowl. Soc. Res.*, vol. 5, no. 1, pp. 28–39, 2014.
- [38] M. Restuccia and J. Ouellet, “Value co-creation orientation: Conceptualization, measurement and impact on firm performance,” in *In Doctoral Workshop-Naples Forum on Services*, 2009.
- [39] A. Neely, M. Gregory, and K. Platts, “Performance measurement system design: A literature review and research agenda,” *Int. J. Oper. Prod. Manag.*, vol. 25, no. 12, pp. 1228–1263, 2005.
- [40] J. Busser, L. S.-T. Management, and undefined 2018, “Co-created value: Multidimensional scale and nomological network,” *Elsevier*.
- [41] J. Park, J. Sarkis, and Z. Wu, “Creating integrated business and environmental value within the context of China’s circular economy and ecological modernization,” *J. Clean. Prod.*, vol. 18, no. 15, pp. 1494–1501, 2010.
- [42] R. Sánchez-Fernández and M. Á. Iniesta-Bonillo, “The concept of perceived value: a systematic review of the research,” *Mark. Theory*, vol. 7, no. 4, pp. 427–451, Dec. 2007.
- [43] L. Lankoski, “Alternative conceptions of sustainability in a business context,” *J. Clean. Prod.*, vol. 139, no. 2016, pp. 847–857, 2016.
- [44] M. Kramer and M. Porter, “Creating shared value,” *Harv. Bus. Rev.*, vol. 89, no. 1/2, pp. 62–77, 2011.
- [45] J. Jussila, T. Lehtonen, V. Sillanpää, N. Helander, and J. Kallio, “Can e-government solutions enhance the work in municipalities?: empirical evidence from case lupapiste,” in *Proceedings of the 20th International Academic Mindtrek Conferenc*, 2016, pp. 20–25.
- [46] M. Saarijärvi, I. Alanko, and P. Nurminen, “SADe-ohjelma, loppuraportti,” 2016.
- [47] M. N. K. Saunders, P. Lewis, and A. Thornhill, *Research methods for business students*. Prentice Hall, 2009.
- [48] R. K. Yin, *Case study research : design and methods*. Sage Publications, 2003.
- [49] C. Voss, N. Tsikriktsis, and M. Frohlich, “Case research in operations management,” *Int. J. Oper. Prod. Manag.*, vol. 22, no. 2, pp. 195–219, Feb. 2002.
- [50] M. Q. Patton, “Enhancing the quality and credibility of qualitative analysis.,” *Health Serv. Res.*, vol. 34, no. 5 Pt 2, pp. 1189–208, Dec. 1999.
- [51] N. Carter, D. Bryant-lukosius, A. Dicenso, J. Blythe, and A. J. Neville, “The Use of Triangulation in Qualitative Research,” *Oncol. Nurs. Forum*, vol. 41, no. 5, pp. 545–547, Aug. 2014.
- [52] Vink, Josina, et al. "Understanding the influence of the co-design process on well-being." *Service Design Geographies*. Proceedings of the ServDes. 2016 Conference. No. 125. Linköping University Electronic Press, 2016.
- [53] Astley, W. G., & Sachdeva, P. S. “Structural sources of interorganizational power: A theoretical synthesis.” *Academy of Management Review*, 9, 104-113, 1984.