

## **The concept of active learning and the measurement of learning outcomes: A review of research in engineering higher education**

Active learning has gained growing political, instructional, and research interest. However, the definitions of active learning are wide. The learning outcomes related to it have been mostly positive but the measurement methods are not without problems. This review provides an overview of active learning, especially in the context of engineering higher education, by answering two research questions: (1) How is the concept of active learning defined and justified in engineering higher education research? (2) What are the learning outcomes connected to active learning and how is learning measured in engineering higher education research? Sixty-six empirical articles were analyzed inductively with qualitative content analysis. The analysis showed that active learning was defined in various ways, and in some articles, it was not defined at all. In addition, justification (theoretical or empirical) for the use of active learning was seldomly reported. Finally, the indicators used to measure the impact of active learning on students' learning outcomes were mostly based on students' self-report data and focused on course specific development in subject-related knowledge. More thorough descriptions and theoretical justifications, as well as the consideration of learning outcomes with appropriate research methods, could reinforce the transparency of empirical interventions and the application of active learning.

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Organisations: Education, Research group: Knowledge and Learning Research Center, Helsinki University

Contributors: Hartikainen, S., Rintala, H., Pylväs, L., Nokelainen, P.

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Research output: Contribution to journal › Article › Scientific › peer-review

## **Water Supply and Sanitation in a Green Economy Society: The Case of Finland**

A green economy specifically considers the welfare of the environment and is closely aligned with sustainable development—in both, the use of natural resources should be less than their natural production. In this article, the concept of a green economy is discussed from the viewpoint of water services, a crucial part of a sustainable society, with the objective of enhancing knowledge about sustainable and resilient water services that will meet society's future demands. Drawing from a literature review and a stakeholder workshop attended by 68 experts, it seeks to answer three research questions: (a) What are appropriate and sustainable urban water supply and sanitation policies for a society that is adopting the basic principles of a green economy? (b) What should be the role of water supply and sanitation in a green and circular economy and what are the current challenges to meeting this objective? and (c) What actions are needed in the Finnish water and sanitation services (WSS) sector to effectively meet the requirements of a green and circular economy? The results are applied to the specific case of Finland, and recommendations and conclusions for the Finnish society and its water services are presented.

### **General information**

Publication status: E-pub ahead of print

MoE publication type: A1 Journal article-refereed

Organisations: Civil Engineering, Finnish Environment Institute

Contributors: Laitinen, J., Antikainen, R., Hukka, J. J., Katko, T. S.  
Publication date: 2019  
Peer-reviewed: Yes

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Ratings:

Scopus rating (2019): CiteScore 1.9 SJR 0.448 SNIP 1.183

Original language: English

ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration

Keywords: green economy, sanitation, sustainable development, water services, water supply

DOIs:

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#### Bibliographical note

EXT="Laitinen, Jyrki"

Source: Scopus

Source ID: 85066303562

Research output: Contribution to journal › Article › Scientific › peer-review

#### Importance of Knowledge Management at Water Utilities

Water utilities face continuous challenges with the changes of operational environment, aging personnel, and related tacit knowledge of employees. This article explores knowledge management at one Finnish utility and points out knowledge sharing in daily tasks. It highlights how employees interpret knowledge and tacit knowledge and their sharing. Qualitative inquiry was used. Semistructured interviews were conducted with 61 employees (65% of personnel) in 2004 and 33 in 2013 (47%). Knowledge management was regarded as a personal, individually controlled property. Value was one obstacle to the unwillingness to share knowledge and tacit knowledge. Positive change between 2004 and 2013 was seen in the interpretation of tacit knowledge: being something that is recorded in your own head only. Tacit knowledge was daily shared with the closest coworkers. As a strategic asset, knowledge should be managed at water and wastewater utilities as further development needs crucial understanding of previous procedures and practices.

#### General information

Publication status: E-pub ahead of print

MoE publication type: A1 Journal article-refereed

Organisations: Civil Engineering, Satakunta University of Applied Sciences

Contributors: Sandelin, S. K., Hukka, J. J., Katko, T. S.

Publication date: 2019

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Journal: Public Works Management and Policy

ISSN (Print): 1087-724X

Ratings:

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Original language: English

ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration

Keywords: constraints, Finland, knowledge sharing, tacit knowledge, water utility

DOIs:

10.1177/1087724X19870813

#### Bibliographical note

EXT="Sandelin, Sirpa K."

Source: Scopus

Source ID: 85071646574

Research output: Contribution to journal › Article › Scientific › peer-review

#### Features of Water Cooperatives: A Comparative Study of Finland and Kenya

There are several ways of arranging rural water supply. One of these is through water cooperatives that have been established to provide water supply, irrigation, and/or sewerage services. Water cooperatives are found in developed countries such as Finland, Denmark, Austria, Canada, and United States, and in developing countries in South America, such as Bolivia and Chile. Water cooperatives or their equivalent organizations that exist in Kenya are called self-help water projects. Yet, surprisingly little attention has been paid to this option even in countries with rich tradition of

cooperatives in other sectors. In this study, Finland and Kenya were selected for a comparative analysis of the identified features of water cooperatives. Best practices observed in the features with differences could be shared between the two countries.

#### **General information**

Publication status: Published  
MoE publication type: A1 Journal article-refereed  
Organisations: Civil Engineering, University of Nairobi  
Contributors: Arvonen, V., Kibocha, S. N., Katko, T. S., Pietilä, P.  
Number of pages: 22  
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ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration  
Keywords: community, rural water supply, self-help water projects, water user associations  
Electronic versions:  
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<http://urn.fi/URN:NBN:fi:tuni-202003102627>

#### **Bibliographical note**

INT=RAK, "Arvonen, Vesa"  
Source: Scopus  
Source ID: 85029710889  
Research output: Contribution to journal > Article > Scientific > peer-review

#### **Assessing Regional Cooperation in Water Services: Finnish Lessons Compared With International Findings**

Water services, that is, water supply and wastewater disposal, are traditionally the responsibility of local governments. Many municipalities have joined forces to meet the challenges of increasing water quality requirements, aging infrastructures, and decreasing fiscal resources. Regional cooperation is claimed to generate benefits in various ways, but there are challenges to this assumption. This article assesses the benefits and challenges of regional cooperation through the following categories: economies of scale, socioeconomic and spatial disparities, autonomy and legitimacy, by comparing Finnish experiences with previous research findings. Our assessment concludes that the benefits and challenges of regional cooperation are not straightforward, not only dependent on the local context but also on the level and tradition of cooperation, especially on the degree of organizational autonomy.

#### **General information**

Publication status: Published  
MoE publication type: A1 Journal article-refereed  
Organisations: Department of Civil Engineering  
Contributors: Kurki, V., Pietilä, P., Katko, T.  
Number of pages: 22  
Pages: 368-389  
Publication date: 1 Oct 2016  
Peer-reviewed: Yes

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Scopus rating (2016): CiteScore 0.8 SJR 0.198 SNIP 0.475

Original language: English

ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration

Keywords: bilateral agreement, Finland, inter-municipal cooperation, municipal federation, water wholesale

DOIs:

10.1177/1087724X16629962

Source: Scopus

Source ID: 84984971151

Research output: Contribution to journal > Article > Scientific > peer-review

### **Evolution of Community-Managed Water Supply Projects From 1994 to the 2010s in Ethiopia**

This article discusses the evolution of community-managed projects (CMPs) along with the global community-based management of water supply and sanitation services since the 1960s, particularly the evolution of Ethiopian water resources development in the last century. The study was conducted with intensive reviews of journals, reports, project documents, and discussions with the people involved in CMP implementation, including many Ethiopian government officials. The article presents the various development phases of the water and sanitation sector in Ethiopia together with national and global influences. Currently, in the 2010s, the CMP financing mechanisms and the national development of water supply and sanitation are more organized and integrated, and are in the stage of scaling up. The recently agreed national water, sanitation, and hygiene strategic framework is expected to have significant impacts on the rural water supply and sanitation development in Ethiopia.

#### **General information**

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Life Cycle Effectiveness of the Built Environment (LCE@BE), Department of Chemistry and Bioengineering, Community-Led Accelerated WASH (COWASH) Project

Contributors: Behailu, B. M., Suominen, A., Katko, T. S.

Number of pages: 22

Pages: 379-400

Publication date: 22 Oct 2015

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Journal: Public Works Management and Policy

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Original language: English

ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration

Keywords: community-managed projects (CMP), Ethiopia, evolution, sustainability, water sector reforms

DOIs:

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Source: Scopus

Source ID: 84942086997

Research output: Contribution to journal > Article > Scientific > peer-review

### **Middle-Aged and Elderly Finnish Households Considering Moving, Their Preferences, and Potential Downsizing Amidst Changing Life Course and Housing Career**

We examine the moving and housing preferences of middle-aged and older in Finland, a country where population composition and movement through the life course are changing. A logistic regression reveals that middle-aged, moderate income residents, renters, those who have lived in their houses only a short time, and residents who are generally dissatisfied are most likely to consider moving. Downsizing appeals to residents with lower incomes who live alone, and who have been in their current houses longer. All potential movers agree on the importance of transportation access and a neighborhood grocery store; however, those preferring to downsize are also interested in house and neighborhood design as well as services that will allow aging in place. Income limitations may create affordability problems for some potential movers.

#### **General information**

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Department of Civil Engineering, Research group: Digitalization in the real estate and construction sector, Georgia State University  
Contributors: Gibler, K. M., Tyvimaa, T.  
Number of pages: 23  
Pages: 373-395  
Publication date: 2 Oct 2015  
Peer-reviewed: Yes

#### Publication information

Journal: Journal of Housing for the Elderly

Volume: 29

Issue number: 4

ISSN (Print): 0276-3893

Ratings:

Scopus rating (2015): CiteScore 1 SJR 0.432 SNIP 0.491

Original language: English

ASJC Scopus subject areas: Life-span and Life-course Studies, Public Administration, Gerontology

Keywords: downsizing, housing career, housing preferences, residential mobility

DOIs:

10.1080/02763893.2015.1055029

URLs:

<http://www.scopus.com/inward/record.url?scp=84947275816&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 84947275816

Research output: Contribution to journal › Article › Scientific › peer-review

#### Designing a performance measurement system to support outsourcing decisions in a Finnish university

In recent years, the role and importance of performance measurement in public organisations has been much emphasised. However, the discussion on the issue so far has been on a rather general level. This paper aims to understand the challenges faced by public organisations in developing performance measurement systems (PMSs) for a specific managerial purpose, to support outsourcing decisions. The objective of the paper is approached with a literature review and a single qualitative case study carried out as an action research. The case study introduces a detailed description of a PMS development project carried out in the support services of a Finnish university. A framework developed in prior research is utilised to analyse the impacts of two typical characteristics (conflicting stakeholder needs and undefined objectives) of public organisations in a PMS design project. The contribution of the paper is to extend the existing understanding about public sector PMS especially regarding two key points: 1) to understand the impact of different purposes for measurement (in this case the outsourcing context) on the PMS development process; 2) to understand the need to align the PMS system with the organisational culture and other managerial control systems in order to achieve desired performance outcomes.

#### General information

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Department of Industrial Management, Research group: Center for Research on Operations Projects and Services, Department of Information Management and Logistics, Managing digital industrial transformation (mDIT), Lappeenranta University of Technology

Contributors: Jääskeläinen, A., Lönnqvist, A., Kulmala, H. I.

Number of pages: 16

Pages: 237-252

Publication date: 3 Jan 2015

Peer-reviewed: Yes

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ISSN (Print): 1741-1041

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Scopus rating (2015): CiteScore 0.3 SJR 0.125 SNIP 1.03

Original language: English

ASJC Scopus subject areas: Strategy and Management, Organizational Behavior and Human Resource Management, Public Administration

Keywords: Decision-making, Finland, Outsourcing, Performance management, Performance measurement system, PMS, Productivity, Public sector, Support services, University

DOIs:

10.1504/IJPSPM.2015.067814

URLs:

<http://www.scopus.com/inward/record.url?scp=84924369881&partnerID=8YFLogxK> (Link to publication in Scopus)

#### **Bibliographical note**

ORG=tt,0.6

ORG=tlo,0.4

EXT="Kulmala, Harri I."

Source: Scopus

Source ID: 84924369881

Research output: Contribution to journal › Article › Scientific › peer-review

#### **Institutional entrepreneurship, power, and knowledge in innovation systems: Institutionalization of regenerative medicine in Tampere, Finland**

In this paper we ask what is the place of institutional entrepreneurship in a (regional) innovation system. The main research questions addressed are (a) how does a new science-based concentration of innovation become institutionalized in an innovation system; (b) who are the institutional entrepreneurs and what do they actually do in their efforts to institutionalize new beliefs, practices, and activities within a system; and (c) what knowledge do institutional entrepreneurs need and what kind of power do they exercise in the institutionalization process. We add new knowledge to studies focusing on innovation systems by revealing how new elements are attached into it. We also add power and knowledge to the study of institutional entrepreneurship and institutional change. The empirical analysis identifies the main phases of institutionalization, key actors in different phases, and their strategies of influence. This paper is based on the analysis of secondary data and twenty-eight interviews with key actors.

#### **General information**

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Institute of Society and Space (SOCIS)

Contributors: Sotarauta, M., Mustikkamäki, N.

Number of pages: 16

Pages: 342-357

Publication date: 2015

Peer-reviewed: Yes

#### **Publication information**

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Ratings:

Scopus rating (2015): CiteScore 4.1 SJR 1.479 SNIP 1.591

Original language: English

ASJC Scopus subject areas: Environmental Science (miscellaneous), Public Administration, Management, Monitoring, Policy and Law, Geography, Planning and Development

Keywords: Innovation system, Institution, Institutional entrepreneurship, Knowledge, Power, Regenerative medicine

DOIs:

10.1068/c12297r

URLs:

<http://www.scopus.com/inward/record.url?scp=84926362021&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 84926362021

Research output: Contribution to journal › Article › Scientific › peer-review

#### **Situated knowledge-situated legitimacy: Consequences of citizen participation in local environmental governance**

This article examines how situated knowledge produced by citizens affects the construction and understanding of legitimacy in local environmental governance. By scrutinising a case from Finland where local citizens decided to take lake restoration in their own hands, we demonstrate how legitimacy is constructed in a specific local context. The main concepts used to interpret this dynamic are situated knowledge (Haraway, 1988; Lang, 2011) and situated legitimacy (Connelly, Richardson, & Miles, 2006). The paper shows how the local traditions together with the historical and social context have distinct effects on the construction of situated knowledge. Further, situated knowledge not only frames the boundaries and possibilities of local action, but also shapes the interpretations of legitimacy. Approaching the construction of knowledge and legitimacy from this perspective challenges the customary understanding of context in participatory practices and, as we suggest, has also the ability to improve these processes.

### General information

Publication status: Published  
MoE publication type: A1 Journal article-refereed  
Organisations: Institute of Society and Space (SOCIS)  
Contributors: Leino, H., Peltomaa, J.  
Number of pages: 10  
Pages: 159-168  
Publication date: Jun 2012  
Peer-reviewed: Yes

### Publication information

Journal: POLICY AND SOCIETY  
Volume: 31  
Issue number: 2  
ISSN (Print): 1449-4035  
Ratings:

Scopus rating (2012): CiteScore 1.8 SJR 0.314 SNIP 0.483

Original language: English

ASJC Scopus subject areas: Sociology and Political Science, Political Science and International Relations, Public Administration

Keywords: Citizen participation, Environmental governance, Situated knowledge, Situated legitimacy

DOIs:

10.1016/j.polsoc.2012.04.005

URLs:

<http://www.scopus.com/inward/record.url?scp=84862014074&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 84862014074

Research output: Contribution to journal › Article › Scientific › peer-review

### Policy learning and the 'cluster-flavoured innovation policy' in Finland

With this paper I aim to shed light on the attempts that have been made to adjust Finnish policy making to the changes in the global technoeconomic environment, as well as to the meta-rationales behind the evolving cluster-flavoured innovation (CFI) policies. Policy learning is discussed with reference to the main cluster and innovation policy changes in Finland and related conceptual development. My main aim is to paint an overall picture of Finnish CFI policies and learning related to them as well as to analyse how efforts to redesign the policies have been unfolding over the past twenty years. This paper is based on (a) secondary data (ie, earlier studies and reports on the Finnish cluster and innovation policies) and (b) data from two empirical studies.

### General information

Publication status: Published  
MoE publication type: A1 Journal article-refereed  
Organisations: Institute of Society and Space (SOCIS)  
Contributors: Sotarauta, M.  
Number of pages: 16  
Pages: 780-795  
Publication date: 2012  
Peer-reviewed: Yes

### Publication information

Journal: ENVIRONMENT AND PLANNING C: GOVERNMENT AND POLICY  
Volume: 30  
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ISSN (Print): 0263-774X  
Ratings:

Scopus rating (2012): CiteScore 2.6 SJR 0.869 SNIP 1.007

Original language: English

ASJC Scopus subject areas: Environmental Science (miscellaneous), Public Administration, Management, Monitoring, Policy and Law, Geography, Planning and Development

Keywords: Cluster policy, Finland, Governance, Innovation policy, Policy learning

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10.1068/c1191

URLs:

<http://www.scopus.com/inward/record.url?scp=84868023229&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 84868023229

Research output: Contribution to journal › Article › Scientific › peer-review

### **A systemic perspective on school reform: Principals' and chief education officers' perspectives on school development**

**Purpose:** This study aims to gain better understanding of the perceptions comprehensive school principals and chief education officers have about the implementation of school reform and the means they use to facilitate the development of such. **Design/methodology/approach:** This research project was carried out using a systemic design research approach. Open-ended questionnaires provided the data for the study and these were completed by educational leaders operating in local school districts. **Findings:** The results demonstrated that pedagogy was emphasized most often as the core of school reform by principals but chief education officers considered technical and financial factors more often as the critical core of educational reform. Nevertheless, both groups had quite similar ideas on how to promote school development. **Research limitations/implications:** The findings reflect the Finnish educational system and capture only two levels of leadership within the system. Future research ought to focus on studying school reforms within different school systems as a complex of correlated events, processes, strategies, interactions and qualities. **Practical implications:** To be able to achieve a successful and sustainable school reform more attention must be devoted to creating and activating collaborative learning environments, not only for pupils and teachers, but also for educational leaders at all levels of school administration. **Originality/value:** The study adds to an understanding of the often-mentioned gap or conflict in perceptions and beliefs between different actors in an educational system.

#### **General information**

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Regulation of learning and active learning methods (REALMEE), University of Helsinki, Ita-Suomen yliopisto

Contributors: Pyhältö, K., Soini, T., Pietarinen, J.

Number of pages: 16

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Publication date: Jan 2011

Peer-reviewed: Yes

#### **Publication information**

Journal: JOURNAL OF EDUCATIONAL ADMINISTRATION

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Issue number: 1

ISSN (Print): 0957-8234

Ratings:

Scopus rating (2011): CiteScore 1.9 SJR 0.788 SNIP 0.947

Original language: English

ASJC Scopus subject areas: Education, Public Administration

Keywords: Education, Educational innovation, Finland, Leadership, Schools

DOIs:

10.1108/09578231111102054

URLs:

<http://www.scopus.com/inward/record.url?scp=78651078713&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 78651078713

Research output: Contribution to journal › Article › Scientific › peer-review

### **Institutional entrepreneurship for knowledge regions: In search of a fresh set of questions for regional innovation studies**

We investigate conceptually the institutional change process and innovation underpinning knowledge-based regional development from the point of view of institutional entrepreneurship. The main aim is to raise institutional entrepreneurship among debated concepts in regional development studies. We set out to discuss the following question: what kind of conceptual base provides empirical studies with a fresh set of research questions and hence point of departure in a study of the ways in which actors influence the course of events and aim to change the very institutional setting in which they are embedded.

#### **General information**

Publication status: Published

MoE publication type: A1 Journal article-refereed

Organisations: Institute of Society and Space (SOCIS)

Contributors: Sotarauta, M., Pulkkinen, R.

Number of pages: 17

Pages: 96-112

Publication date: 2011



Peer-reviewed: Yes

### Publication information

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Volume: 29

Issue number: 1

ISSN (Print): 0263-774X

Ratings:

Scopus rating (2011): CiteScore 2.5 SJR 0.991 SNIP 1.168

Original language: English

ASJC Scopus subject areas: Environmental Science (miscellaneous), Public Administration, Management, Monitoring, Policy and Law, Geography, Planning and Development

DOIs:

10.1068/c1066r

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<http://www.scopus.com/inward/record.url?scp=79952143814&partnerID=8YFLogxK> (Link to publication in Scopus)

Source: Scopus

Source ID: 79952143814

Research output: Contribution to journal › Article › Scientific › peer-review

### Organizational effects of digitalization: A literature review

The effect of digitalization on organizations has been studied separately but there has been very little research done on the overall “big” picture of the effects. However, the digitalization of society and business is marching forward at an ever increasing speed, calling for more converged research on the phenomenon. The main areas of effects elicited from the literature are organizational learning, digital innovations, organizational agility, business ecosystems, and organizational structures. More minor influences have been gathered in the framework of digitalization presented in this article. It can be seen as a tool for managers to explore their organizations capabilities on the digitalization front.

### General information

Publication status: Published

MoE publication type: A2 Review article in a scientific journal

Organisations: Research group: Software Engineering and Intelligent Systems, Industrial and Information Management

Contributors: Kuusisto, M.

Number of pages: 22

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Publication date: 2017

Peer-reviewed: Yes

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Volume: 20

Issue number: 3

ISSN (Print): 1093-4537

Ratings:

Scopus rating (2017): CiteScore 0.3 SJR 0.174 SNIP 0.178

Original language: English

ASJC Scopus subject areas: Applied Psychology, Public Administration, Organizational Behavior and Human Resource Management

Source: Scopus

Source ID: 85028054203

Research output: Contribution to journal › Review Article › Scientific › peer-review

### Can e-government solutions enhance the work in municipalities?: empirical evidence from case lupapiste

Digitalization and increasing demand of e-government services are not changing only the way the citizens can use public services, but also the nature of work of many municipality employees. At best this kind of digitalization can offer added value in the form of enhancing the work of the municipality personnel. In this paper, we study the effects of adopting an e-government service on work in municipalities. Based on an empirical investigation of five municipalities we propose flow efficiency as a key metric to grasp the added value of digitalization of a public service, as it reveals the most valuable activities as well as the potential bottlenecks. Flow efficiency measurement gives therefore a better indicator to be used in e-government process development than e.g. simple throughput time especially when evaluating the effects of digitalization on knowledge work productivity.

### General information

Publication status: Published

MoE publication type: A4 Article in a conference publication

Organisations: Department of Information Management and Logistics, Research group: Novi, Managing digital industrial transformation (mDIT), Solita Oy

Contributors: Jussila, J., Helander, N., Lehtonen, T., Kallio, J., Sillanpää, V.

Number of pages: 6

Pages: 20-25

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ASJC Scopus subject areas: Public Administration, Information Systems, Human-Computer Interaction

Keywords: E-Government, Efficiency, value assessment

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Research output: Chapter in Book/Report/Conference proceeding › Conference contribution › Scientific › peer-review