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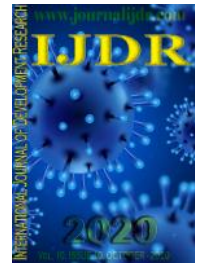
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## UNRAVELING THE SCENARIO OF ENTERPRISE ARCHITECTURE IN THE PUBLIC SECTOR THROUGH A SYSTEMATIC MAPPING STUDY

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### ABSTRACT

The research carried out in this work has identified the current enterprise architecture scenario in public organizations. How these organizations define it, what tools are used, its advantages, and difficulties of use. Which countries are using it and in which sectors of these organizations it is being used. This information contributes to a vision of the approach supporting future directions for its adoption.

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### INTRODUCTION

Public organizations find in technologies the support to deliver and enhance their actions of planning, execution, and control. There is a wide range of technologies, systems, processes, information, and business areas, given the existing complexity scenario. This emphasizes the need to develop and improve capacities, flexibility, adaptation, and internal and external communication. These elements depend on the total knowledge and mastery of the existing abilities. There are several government agencies operating in different service areas and with different design and functional structures, this scenario presents the same information systems, as well as inconsistent services and business processes, a fact that reduces the integration and communication between agencies and their members, as well as the interoperability of current and future projects. In the quest to achieve cost reduction and strategic objectives, critical success factors (CSF) such as governance, management, planning, communication, and support need to be defined, followed, and continually evolved (CHUANG; VAN LOGGERENBERG, 2010). We find, in Enterprise Architecture (EA), the ability to support organizations in obtaining the features necessary to

increase and improve the quality of their online services (SAHA, 2010). Through tools that provide business management and alignment with Information and Communication Technology (ICT), improving the integration of technologies, rationalizing data structures and applications, and providing modularity to businesses (DANG; PEKKOLA, 2016). They are exercising the role of guiding the best use of resources, by business areas, to achieve the strategic objectives defined by top management, realizing that this management often does not completely know its capabilities and the needs of the parties involved. This scenario makes them execute the projects with a hierarchical and imposing approach, characterized by a holistic governance that exerts a strong change in the culture of individuals, businesses, and behaviors (ROSS; WEILL; ROBERTSON, 2006). Therefore, it is necessary to research EA's impacts in public organizations, its advantages, challenges, definitions, tools, and the perception of those involved. A Systematic Mapping of Literature (SML) was performed, aiming to answer the research questions. The result is structured as it follows. Section 2 presents the fundamental concepts and related studies regarding Enterprise Architecture. Section 3 describes

the method used in SMS, and Section 4 presents the results obtained for the research questions. Finally, in Section 5, we highlight the final remarks, EA impacts, and possible future work.

**Theoretical Framework:** Enterprise Architecture is defined by Gartner (GARTNER, 2018) as "a discipline that aims at the proactivity and holistic leadership of corporate responses to disruptive forces, identifying and analyzing the execution of change towards the vision and the results desired by the business." In the literature, the origin of the term "Enterprise Architecture" was designed by J.A Zachman (ZACHMAN, 1987) which, in his article, defines Corporate Architecture as being a holistic approach, at the same time that it also presents EA as being a methodology for the development of large and complex systems, starting with the scope and then layers, business models, systems and technology, providing detailed representations of the system, addressing data, function, network, people, time and motivation. In the view of Röglinger (RÖGLINGER *et al.*, 2016), it is defined as a methodology aimed at adding value with central transformation governance. For Tamm *et al.* (TAMM *et al.*, 2011a), it creates value through four factors: organizational alignment, availability of information, improvement of the portfolio, and complementarity of resources. Finally, EA provides a long-term view of the processes, systems, and technologies of the organization, enabling individual projects to build capacity and not just meet immediate needs (ROSS; WEILL; ROBERTSON, 2006). Based on this complexity of knowledge, researching EA by investigating its objectives and benefits for organizations becomes important (TAMM *et al.*, 2011a).

**A. Enterprise Architecture in the public sector:** The growing presence of Corporate Architecture in the public sector stems from its characteristics in presenting itself as an appropriate approach to identify, organize and enhance the technology assets of an organization so as to support their business areas so that they can achieve strategic objectives and with that, act on the infrastructure, data, applications, and processes, creating standards, services, and integrated activities (BISCHOFF; AIER; WINTER, 2014). Its use in these public organizations is also supported by their ability to achieve social legitimacy, organizational efficiency, trust, governance, target alignment, and oversight (DANG; PEKKOLA, 2017a; WEISS; AIER; WINTER, 2013).

## MATERIALS AND METHODS

To carry out this work, we take as a basis the study by Dyba *et al.* (DYBA, TORE, TORGEIR DINGSOYR, AND GEIR K. HANSEN, 2017), where a Systematic Mapping (SM) is defined as a method conducted to acquire an overview of a particular area of research. A SM provides the theoretical foundation for a reliable, rigorous, and auditable methodology.

**A. Research Questions:** The process of research and selection of evidence started from the following question:

**RQ) What is the current scenario of usage of EA in public organizations?**

To achieve the general objective of the research, we defined six secondary questions to guide and structure data extraction, analysis, and synthesis of evidence:

**SRQ-1.** How do public organizations define EA?

**SRQ-2.** Which governments are using EA?

**SRQ-3.** Which frameworks are used in public organizations?

**SRQ-4.** What improvements are seen due to the implementation of EA in public organizations?

**SRQ-5.** What difficulties have arisen in implementing EA in public organizations?

**SRQ-6.** How is EA being applied in public organizations?

**B. Digital Libraries and Search String:** For the search in automatic databases (ACM Digital Library, IEEE Xplore, Scopus, Science Direct, Springer, Emerald), we used a string-based search on the general terms extracted from the search questions, along with the synonyms for "Enterprise Architecture" found in the literature connected by the logical operators "OR" and "AND"; thereby creating a query expression capable of returning a total of 3,221 studies from 2007 to 2018.

**Search String:** ("enterprise architecture" OR "business architecture" OR "process architecture" OR "information systems architecture" OR "IT architecture" OR "IT landscape" OR "information architecture" OR "data architecture" OR "application architecture" OR "application landscape" OR "integration architecture" OR "technology architecture" OR "infrastructure architecture") AND ("advantages" OR "benefits" OR "disadvantages" OR "challenges"). Seeking to increase the number of studies, we expanded our search by adopting manual research at conferences relevant to the EA area (AMCIS, ECIS, EDOC, HICSS). The search process used the same inclusion and exclusion criteria of the automatic searches in the digital bases, described in Section C.

**C. Selection Strategy:** According to Kitchenham *et al.* (2007) (KITCHENHAM; CHARTERS, 2007), the selection criteria stage is one of the mapping activities that is very similar to a systematic literature review. Based on experience reports or the use of a method or tool, the search for evidence provides credibility that is further enhanced when described in different organizations under different conditions. One of the crucial steps during the acquisition and selection process is to define the inclusion and exclusion criteria (OLIVEIRA; FILHO, 2007). These criteria are essential in obtaining only relevant articles to answer the research questions. Thus, the following inclusion criteria were defined: i) Studies on Enterprise Architecture; ii) Studies available on automatic or manual bases; iii) Studies published from 2007 to 2018; iv) Studies written in English. As stated by Dyba *et al.* (2017), evidence-based engineering is an excellent mechanism to support ICT adoption decisions. Therefore, to obtain studies that could provide such pieces of evidence to our research, the following exclusion criteria were defined:

- 1) Written in any language other than English;
- 2) Not available on the internet;
- 3) Guest papers, lectures, workshop reports, books, systematic mappings, systematic reviews, thesis, dissertations, incomplete documents, drafts, or not peer-reviewed works;
- 4) Studies covering areas other than computer science;
- 5) Surface studies that did not report experiences in the field;
- 6) Studies that do not present Enterprise Architecture in the public sector.

The initial selection based on the inclusion criteria resulted in a total of 3,221 studies. Then, applying the exclusion criteria from 1 to 4 the quantity was reduced to precisely 210 papers. Finally, criteria 5 and 6 were used, resulting in 20 primary studies available in this work.

**D. Data Extraction:** To assist in data extraction, Mendeley<sup>1</sup> was used, which offers a shared library. We organized the selected studies into the tool, and then they were imported into the ATLAS.ti tool for the coding work. According to Merriam and Tisdell (MERRIAM; TISDELL, 2015), coding is the act of making short notes throughout the text in order to be accessed quickly later on.

**E. Data Synthesis:** After the data collection phase, the information obtained should be presented according to its relation to the research questions. The final synthesis is given in tables and graphs following the recommendations by Kitchenham *et al.* (2007).

## RESULTS AND DISCUSSION

In this session, we analyze the selected studies, seeking to answer the research questions. Each selected study was assigned a code ranging from PS01 to PS20 for unambiguous reference.

### A. SRQ-1. How do public organizations define EA?

Although the vast majority of references to the term "Corporate Architecture" are linked to the definitions by John A. Zachman (ZACHMAN, 1987) and Jeanne W. Ross (ROSS, 2007), it was possible to identify references from themselves and from some authors who present a link with the proposed use of EA in public organizations where the study takes place. Here are some definitions found:

[PS02]: "EA identifies the main components of the enterprise, its information systems, how these components work together to achieve defined objectives and how the systems support business processes" (KAISLER; ARMOUR; VALIVULLAH, 2005).

[PS03]: "Enterprise Architecture is a methodology for developing large, complex systems starting with scope, then working through layers for the Business, System, and Technology models, and finally providing detailed representations of the system. Each layer addresses Data, Function, Network, People, Time, and Motivation."

[PS04]: "Enterprise Architecture (EA) is a central notion used to align strategies, processes, information, systems, and technologies of an enterprise" (HIRVONEN, 2003)

[PS15]: "Enterprise architecture (EA) is often seen as a solution to help governments decrease operation costs, reduce corruption, and increase transparency, accountability, and better decision making" (ALHUJRAN, 2009)

[PS19]: "An agency-wide roadmap to achieve an agency's mission through optimal performance of its core business processes within an efficient information technology (IT) environment." (CHIEF INFORMATION OFFICERS COUNCIL, 2001).

<sup>1</sup>Mendeley is a desktop and web program produced by Elsevier to manage and share research documents, perform research data discovery, and promote online collaboration.

These definitions present EA as a guide, a way of identifying, defining, and standardizing its use to empower organizations to achieve objectives through IT and business areas.

### B. SRQ-2. Which governments are using EA?

The Enterprise Architecture has attracted attention from governments as a guide to meet their specific legislation (LEMMETTI; PEKKOLA, 2014). This reinforces the affirmations by Alhujran *et al.* (ALHUJRAN, 1998), which define EA as a support approach for public organizations (FRAMEWORK; FINNISH; CONGRESS, 2011).

Table I. Countries and number of studies

Country	Qty	Primary Studies
Finland	5	PS04, PS06, PS08, PS09, PS10
USA	3	PS01, PS03, PS12
Norway	2	PS16, PS17
Iran	2	PS14, PS19
Vietnam	2	PS11, PS15
Brazil	1	PS13
Denmark	1	PS02
Namibia	1	PS20
Nepal	1	PS07
Netherlands	1	PS02
Sweden	1	PS05
Thailand	1	PS18

One of the justifications for a more significant presence of studies in Finland and in the USA (Table I) is the existence of laws that oblige the definition of a corporate architecture by public companies. In the USA, the 1996 Federal law (Clinger-Cohen Act) (CONGRESS, 1996) was created to improve the way their government uses information and communication resources in ICT, with FEAF, an approach developed to be a framework for this. (CHIEF INFORMATION OFFICERS COUNCIL, 2001).

### C. SRQ-3. Which frameworks are used in public organizations?

In a scenario of numerous characteristics, combined with the enormous effort to build and maintain the architecture, it is common to see examples of approaches that seek high benefit, simplicity, and adequacy to the specific needs of each project (ROSS, 2007; TAMM *et al.*, 2011b). The discipline of EA provides a framework to integrate models into one enterprise-wide representation as a valuable asset (TARABANIS; PERISTERAS; FRAGIDIS, 2001). Architectural frameworks are required due to the complexity of the information that is handled in an organization in projects of Enterprise Architecture (SESSIONS, 2007). It was possible to identify commercial and proprietary frameworks, as shown in Table II.

Table II. Frameworks cited in the studies

Frameworks	Qty	Studies
TOGAF	4	PS08, PS14, PS16, PS17
GEA	3	PS04, PS06, PS07
ZACHMAN	2	PS02, PS03
FEAF	2	PS11, PS14
EAMMF	1	PS01
GIF	1	PS07
INEAF	1	PS14
MODAF	1	PS05
SEAF	1	PS12
PROPRIETARY	1	PS18

In this sense, Dang and Pekkola (DANG; PEKKOLA, 2017b) have highlighted some of EA main challenges, which are the framework solutions centered on specific problems of each organization. We have noticed the use of hybrid methodologies as one of the biggest answers, observing the fact that they are developed to meet specific needs of each organization.. This is why we see TOGAF present as the basis for custom solutions, either because of its deployment process or its recommendations and assessments (known as ADM), which facilitate its deployment (FIRMANSYAH; BANDUNG, 2016).

#### D. SRQ-4.What improvements are seen due to the implementation of EA in public organizations?

Besides the benefits identified in the work of Tamm *et al.* (TAMM *et al.*, 2011b), new evidence has been placed in this research, presenting new directions for the successful implementation of EA in public organizations (Table III).

**Table III. Improvements due to the implementation of EA**

Benefits	Qty	Studies
Improved integration	11	PS02, PS03, PS04, PS07, PS08, PS11, PS12, PS13, PS14, PS16, PS20
Improved communication & collaboration	10	PS02, PS04, PS05, PS06, PS07, PS08, PS11, PS12, PS13, PS20
Improved business processes	8	PS02, PS03, PS04, PS06, PS07, PS08, PS11, PS12
Improved IT systems	7	PS02, PS07, PS08, PS09, PS13, PS14, PS20
Providing stability	7	PS02, PS03, PS04, PS07, PS08, PS12, PS14
Improved decision making	7	PS02, PS03, PS04, PS05, PS07, PS12, PS14
Increase in value	7	PS04, PS06, PS08, PS09, PS13, PS16, PS20
Competitive Advantage	7	PS01, PS04, PS05, PS06, PS08, PS09, PS16
Regulatory compliance	6	PS02, PS03, PS08, PS13, PS14, PS20
Increased responsiveness and guidance to change	5	PS02, PS07, PS11, PS14, PS17
Business-IT alignment	4	PS05, PS07, PS11, PS14
Agility of processes	4	PS01, PS04, PS06, PS09
Reduced (IT) costs	4	PS02, PS04, PS07, PS13
Reduction of risks	3	PS04, PS07, PS12
Reuse of resources	2	PS06, PS14

**Table IV. Difficulties in implementing EA**

Challenges	Qty	Studies
Communications	15	PS01, PS02, PS04, PS06, PS08, PS09, PS10, PS12, PS14, PS15, PS16, PS17, PS18, PS19, PS20
Governance Risks	13	PS01, PS02, PS05, PS06, PS08, PS09, PS10, PS12, PS14, PS15, PS16, PS19, PS20
Processes	10	PS02, PS03, PS09, PS10, PS12, PS14, PS15, PS17, PS19, PS20
Willingness to use EA	9	PS02, PS03, PS05, PS07, PS08, PS09, PS15, PS17, PS19
Strategic Alignment	9	PS01, PS04, PS06, PS09, PS14, PS16, PS17, PS19, PS20
Shared understanding about EA	7	PS02, PS03, PS06, PS07, PS08, PS14, PS17
Organization structure	6	PS04, PS05, PS06, PS07, PS10, PS11
EA objectives	6	PS02, PS03, PS04, PS05, PS06, PS19
EA products	4	PS04, PS12, PS17, PS19
Conflicting benefits	4	PS05, PS08, PS12, PS17
Cooperation among agencies	3	PS07, PS14, PS17
Legal rule and/or regulation	3	PS02, PS07, PS14
EA basic	3	PS09, PS10, PS11
Frameworks	2	PS01, PS02
Over-emphasized IT-perspective	2	PS10, PS11
Formation of the EA team	2	PS07, PS17
Data integration (TIC)	1	PS12
Inactive implementing EA	1	PS12
Politics and/or sponsors	1	PS16
EA Planning	1	PS06
Ability and capability of the EA team	1	PS07
Capabilities of the users	1	PS10

Based on the findings, we see improvement in the integration of technologies, processes, people and in the support for decision-making and direction towards strategic objectives. In other words, EA has been providing solutions that strategically help the organization in the planning and implementation of a productive standards-based information infrastructure with integrated services and activities (BISCHOFF; AIER; WINTER, 2014). EA adds new benefits such as gaining

competitive advantage and increasing the value of the organization. These gains emerge in conjunction with the agility of processes, which is also evident in organizations that have started to use EA (SHANKS *et al.*, 2018). In the selected studies, we have identified data that presented an EA containing some specific benefits (Table III) for organizations. This favors its use and expansion by the governments that, as already seen, need a lot of the capacities that come with the implementation of an EA program.

#### E. SRQ-5.What difficulties have arisen in implementing EA in public organizations?

Enterprise Architecture has achieved significant growth over the years in public organizations. However, the initiatives do not always have their success guaranteed, and there may be several problems in the projects of the organizations. Dang and Pekkola (DANG; PEKKOLA, 2017b) formulated a set of challenges that were identified in the studies of this research (Table IV).

They present some of the difficulties in the implementation of EA in public organizations that they find in new technologies (JULIA; KURT; ULF, 2017), together with differences in the culture and various hierarchical levels that need to be endured to achieve positive results (BANAEIANJAHROMI; SMOLANDER, 2016) making a specific implementation of EA necessary for each organization since no current proposal can fill this gap (JANSSEN; HJORT-

MADSEN, 2007). They reinforce that more mature and usual approaches are not enough to implement EA (NIEMI; PEKKOLA, 2013). Items such as communication, risk governance, process control, and EA difficulty, cause an evident problem in strategic alignment. Together with the other evidence, these elements must be addressed to increase the collaboration between the technology and business areas and cooperation between sectors (BANAEIANJAHROMI; SMOLANDER, 2016).

#### F. SRQ-6. How is EA being applied in public organizations?

EA has been used in organizations to align business and IT to build a foundation architecture for systematic planning and management of changes with governance practices to improve or provide new services (RUSU; VISCUSI, 2017). A large number of frameworks, modeling techniques, and tools are available. These are useful for defining and developing a detailed description of the architecture, the principles governing its development, and the standards applied during this process (AHLEMANN, FREDERIK, et AL., 2012). The EA tools seek to support the architecture implementation process, offering functionalities and benefits to the professionals involved (SCHEKKERMAN, 2011). The graph presented in Figure 1 lists the EA tools used in the studies and the sectors of public organizations in which they were applied. Public companies use EA in no small extent to align strategies, processes, information, systems, and technologies (HIRVONEN, 2003). They are using EA tools to provide solutions to their sectors. As pictured in Figure I, in general, EA tools are most used for supporting management tasks, followed by activities related to general services (education, health and safety) in addition to e-gov applications.

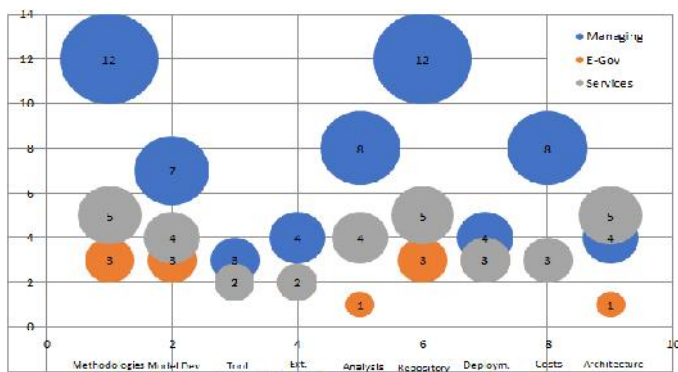


Figure I. Ea tools and their presence by area/sector in public organization

#### Conclusion

Based on this paper's conclusions, we can see Enterprise Architecture as an integral approach to create the necessary links to business areas with the Information Technology sectors. This definition comes from relevant references found and public organizations' efforts in using EA frameworks and tools. EA initiatives must be developed to enhance services and other public organizations' service public organization public organizations' benefits and improve projects about communication, organizational learning, and continuous development. It is evident for organizations, as they need to consider cooperation between their internal and external environments. (JONKERS et al., 2006). It is possible to create a collaboration cycle providing constant learning for all parties

involved (MARTIN, 2012). Unfortunately, we see an isolation scenario does not give the parties, causing losses with the lack of feedback. (VAN DER RAADT et al., 2010).

#### Appendix

Table V. List of papers included in the mapping

[PS01] Getter, J. R. (2007). Enterprise architecture and IT governance a risk-based approach. In Proceedings of the Annual Hawaii International Conference on System Sciences.
[PS02] Janssen, M., & Hjort-Madsen, K. (2007). Analyzing enterprise architecture in national governments: The cases of Denmark and the Netherlands.
[PS03] Irwin, C. S., & Taylor, D. C. (2009). Identity, credential, and access management at NASA, from Zachman to attributes. In Proceedings of the 8th Symposium on Identity and Trust on the Internet.
[PS04] Valtonen, K., Seppänen, V., & Leppänen, M. (2009). Government enterprise architecture grid adaptation in Finland. Proceedings of the 42nd Annual Hawaii International Conference on System Sciences.
[PS05] Franke, U., & Johnson, P. (2009). An enterprise architecture framework for application consolidation in the Swedish Armed Forces. In Proceedings – IEEE International Enterprise Distributed Object Computing Workshop, EDOC (pp. 264–273). IEEE.
[PS06] Valtonen, K., Korhonen, I., Rekonen, R., & Leppänen, M. (2010). EA as a tool in change and coherency management - A case of a local government. In Proceedings of the Annual Hawaii International Conference on System Sciences.
[PS07] Adhikari, G. P. (2011). National ID project of Nepal. In Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance. www.doi.org/10.1109/ICMLC.2007.4370514
[PS08] Valtonen, K., Mäntynen, S., Leppänen, M., & Pulkkinen, M. (2011). Enterprise architecture descriptions for enhancing local government transformation and coherency management case study.
[PS09] Niemi, E., & Pekkola, S. (2013). Enterprise Architecture quality attributes: A case study.
[PS10] Banaeianjahromi, N., & Smolander, K. (2016). Association for Information Systems AIS Electronic Library (AISeL) Understanding Obstacles In Enterprise Architecture Development
[PS11] Dang, D., & Duong Dang, D. (2017). Enterprise architecture institutionalization: a tale of two cases. European Conference on Information Systems (ECIS), 2017.
[PS12] Bui, Q. N., & Levy, M. (2017). Institutionalization of Contested Practices: A Case of Enterprise Architecture Implementation in a US State Government.
[PS13] Detoni, A. A., Miranda, G. M., Renault, L. D. C., Falbo, R. A., Almeida, J. P. A., Guizzardi, G., & Barcellos, M. P. (2017). Exploring the role of enterprise architecture models in the modularization of an ontology network: A case in the public security domain.
[PS14] Shams Aliee, F., Bagheriasl, R., Mahjoorian, A., Mobasheri, M., Hoseini, F., & Golpayegani, D. (2017). Towards a National Enterprise Architecture Framework in Iran.
[PS15] Dang, D. D., & Pekkola, S. (2017). Problems of Enterprise Architecture Adoption in the Public Sector: Root Causes and Some Solutions. www.doi.org/10.1007/978-3-319-58978-7_8
[PS16] Ajer, A. K. S., & Olsen, D. H. (2018). EA Challenges: A Case Study of Three Norwegian Public Sector. 26 <sup>th</sup> (ECIS2018).
[PS17] Hylving, L., & Bygstad, B. (2018). Responding to Enterprise Architecture Initiatives: Loyalty, Voice and Exit.
[PS18] Prinyapol, N., & Nantika. (2018). The guidelines to support the development of enterprise architecture of state enterprise.
[PS19] Banaeianjahromi, N. (2018). Where enterprise architecture development fails a multiple case study of governmental organizations.
[PS20] Shaanika, I., & Iyamu, T. (2018). Developing the enterprise architecture for the Namibian government. Electronic Journal of Information Systems in Developing Countries, 84(3).

## REFERENCES

- AHLEMANN, FREDERIK, ET AL., EDS. Strategic enterprise architecture management: challenges, best practices, and future developments. [s.l: s.n.].
- ALHUJRAN, O. Determinants of e-government services adoption in developing countries: a field survey and a case study. *Information Systems*, 2009.
- BANAEIJAHROMI, N.; SMOLANDER, K. Understanding obstacles in enterprise architecture development. 24th European Conference on Information Systems, ECIS 2016, v. 1, p. 1–4, 2016.
- BISCHOFF, S.; AIER, S.; WINTER, R. Use it or lose it? the role of pressure for use and utility of enterprise architecture artifacts. *Proceedings - 16th IEEE Conference on Business Informatics, CBI 2014*.
- CHIEF INFORMATION OFFICERS COUNCIL. A Practical Guide to Enterprise Architecture. Version 1.0. n. February, 2001.
- CHUANG, C. H.; VAN LOGGERENBERG, J. Challenges facing enterprise architects: A South African perspective. *Proceedings of the Annual Hawaii International Conference on System Sciences*, p. 1–10, 2010.
- CONGRESS, U. Clinger-Cohen Act. Public Law, v. 1996, n. 5, p. 1–55, 1996.
- DANG, D. D.; PEKKOLA, S. Root causes of Enterprise architecture problems in the public sector. *Pacific Asia Conference on Information Systems, PACIS 2016 - Proceedings. Anais...2016*
- DANG, D. D.; PEKKOLA, S. Systematic Literature Review on Enterprise Architecture in the Public Sector. *Electronic Journal of e-Government*, v. 15, n. 2, p. 130–154, 2017a.
- DANG, D. D.; PEKKOLA, S. Problems of enterprise architecture adoption in the public sector: root causes and some solutions. In: *Information Technology Governance in Public Organizations*. [s.l.] Springer, 2017b. p. 177–198.
- FIRMANSYAH, C. M.; BANDUNG, Y. Designing an Enterprise Architecture Government Organization Based on TOGAF ADM and SONA. 2016.
- FRAMEWORK, E. A.; FINNISH, B.; CONGRESS, E. I. Enterprise Architecture Framework adoption By Finnish applied universities' network. 2011.
- GARTNER. Gartner IT glossary. Technology Research, 2018.
- HIRVONEN, A. ET AL. The Gap between Strategies and Implementation-Methodic Support for EA Projects as a Bridge. *International Business Information Management Conference. Anais...2003*
- JANSSEN, M.; HJORT-MADSEN, K. Analyzing enterprise architecture in national governments: The cases of Denmark and the Netherlands. *Proceedings of the Annual Hawaii International Conference on System Sciences*, p. 1–10, 2007.
- JONKERS, H. et al. Enterprise architecture: Management tool and blueprint for the organisation. *Information Systems Frontiers*, v. 8, n. 2, p. 63–66, 2006.
- JULIA, K.; KURT, S.; ULF, S. Challenges in Integrating Product-IT into Enterprise Architecture - A case study. (P. J. M. R. M. J. R. R. S. C. J. R. Cruz-Cunha M.M. Varajao J.E., Ed.) *Procedia Computer Science. Anais...Elsevier B.V.*, 2017.
- KAISLER, S. H. S. H.; ARMOUR, F.; VALIVULLAH, M. Enterprise architecting: Critical problems. *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*, 2005.
- LEMMETTI, J.; PEKKOLA, S. Enterprise architecture in public ICT procurement in Finland. *Innovation and the Public Sector*, v. 21, p. 227–236, 2014.
- MARTIN, A. Enterprise IT Architecture in Large Federated Organizations: The Art of the Possible. *Information Systems Management*, v. 29, n. 2, p. 137–147, 2012.
- NIEMI, E.; PEKKOLA, S. Enterprise Architecture Quality Attributes: A Case Study. 2013 46th Hawaii International Conference on System Sciences, v. 9, n. 1, p. 3878–3887, 2013.
- RÖGLINGER, M. et al. How to structure business transformation projects: The case of Infineon's finance IT roadmap. *Journal of Information Technology Theory and Application*, v. 17, n. 2, p. 5–21, 2016.
- ROSS, J. W.; WEILL, P.; ROBERTSON, D. Enterprise architecture as strategy: Creating a foundation for business execution. [s.l.] Harvard Business Press, 2006.
- RUSU, L.; VISCUSI, G. Information Technology Governance in Public Organizations: Theory and Practice. [s.l: s.n.]. v. 38
- SAHA, P. Enterprise Architecture as platform for connected government. Report of Government Enterprise Architecture Research Project, 2010.
- SCHEKKERMAN, J. Enterprise Architecture Tool Selection Guide version 6.3. Institute for Enterprise Architecture Developments, v. 6, p. 25, 2011.
- SESSIONS, R. A Comparison of the Top Four Enterprise Architecture Methodologies. *Msdn Microsoft*, v. 466232, p. 1–31, 2007.
- SHANKS, G. et al. Achieving benefits with enterprise architecture. *Journal of Strategic Information Systems*, v. 27, n. 2, p. 139–156, 2018.
- TAMM, T. et al. How does enterprise architecture add value to organisations? *Communications of the Association for Information Systems*, v. 28, n. 1, p. 141–168, 2011a.
- TARABANIS, K.; PERISTERAS, V.; FRAGIDIS, G. Building an Enterprise Architecture for Public Administration: A High Level Data Model for Strategic Planning. *Ecis*, p. 987–998, 2001.
- VAN DER RAADT, B. et al. The relation between EA effectiveness and stakeholder satisfaction. *Journal of Systems and Software*, v. 83, n. 10, p. 1954–1969, 2010.
- WEISS, S.; AIER, S.; WINTER, R. Institutionalization and the effectiveness of enterprise architecture management. 2013
- ZACHMAN, J. A. A framework for information systems architecture. *IBM systems journal*, v. 26, n. 3, p. 276–292, 1987.

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