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IT Governance for Balancing Evolveability and Standardization in Health Information System Implementation in Ethiopian Context

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ABSTRACT

Failing to balance standardization and evolveability in IS design and implementation process results sustainability failure which is common in developing country. IS research provides various IS design solution including layered modular architecture to address both evolveability and standardization simultaneously. However, this design solution requires appropriate IT governance mechanisms which lacks both theoretical and empirical explanation in IS research. The core of this research is understanding IT governance mechanism design that can balance standardization and evolveability in the course of IS design and implementation. The research uses the case of District Health Information System-2 (DHIS-2), layered modular architecture, design and implementation in public health care context of Ethiopia. The major research question guiding this study is how IT governance mechanism design and its interplay with IS architecture design shape DHIS-2 design and implementation process towards standardization and/or evolveability? The research strategy adopted in this case will be based on an interpretive case study approach.

Keywords: DHIS, HIS, standardization, evolveability, architecture, IT governance.

1. HIS design and implementation and its challenges

This study concerns balancing standardization and evolve-ability in design and implementation of health management information system (HMIS) in public health care of Ethiopia, resource constrained, context. HMIS collects data from health facility on weekly, monthly basis, aggregates and sends these routine data to the next higher administration level to wereda, zone, region and MOH on a monthly basis.

Fragmentation and lack of co-ordination in health information systems and addressing the continuously changing and emergent requirement of the health sector requires standardizing as well as evolving system. However, IS research surfaced the paradox of standardization and evolveability. Standardization enables and constrains evolveability and vice versa (Hanseth and Monteiro 1997). The health sector complexity and contextual issues are raised as challenges for the effort of standardization and evolveability.

The health sector complexity includes expanding user's interest, diversified actors, multiple applications, heterogeneous data and data types which requires special efforts, strategies than other sectors (Boonstra, Eseryel, and Offenbeek 2017; Constantinides and Barrett 2014). Addressing such heterogeneous actors' interest in IS design and implementation (Gregory et al. 2015) particularly in health sector is challenging (Boonstra, Eseryel, and Offenbeek 2017; Jorn Braa, Monteiro, and Sahay 2004). The existence of multiple stakeholders in HIS design and implementation resulted multiple institutional background which may generate different organizational beliefs, principles towards HIS design and implementation that will have its impact on standardization and/or evolveability of HIS design.

In addition to the inherent health sector complexity, addressing standardization and evolveability in HIS has been exacerbated by various contextual issues such as lack of infrastructure, resources and capacity, political, work practice, culture have been identified as a major challenge particularly in resource constrained countries (Avgerou and Walsham 2000; Mekonnen and Sahay 2009; Walsham and Sahay 2006).

These complexity and contextual issues if not addressed well in HIS design and implementation resulted sustainability failure which is common in developing countries (Heeks 2002). Survival requires a balance of standardization and evolveability

IS literatures in general informed us the importance of both standardization and evolveability for successful IS design and implementation (Gaynor and Bradner 2001; Gregory et al. 2015; Smith and Lewis 2011). Without standardization, communication and coordination amongst heterogeneous actors is impossible, without evolveability, emergent needs cannot be addressed in information infrastructure development. However, when one focuses more on evolveability addressing local needs halts coordination and communication amongst heterogeneous actors and vice versa. The problem is how can organization addresses those paradoxical features , standardization and evolveability, in IS design and implementation simultaneously (Gregory et al. 2015).

Standardization in this study is a process of creating standard HIS which is used throughout the Ethiopian public health care context to maintain communication and coordination where as evolveability is the process of addressing current and future peculiar heterogeneous actors' interest (regional health bureaus, zonal offices, wereda and health facility; health programmes, NGOs etc.).

Design scholars provide various technology design solutions such as IS artifact design architecture, principles and features to address both standardization and evolveability simultaneously (Hanseth and Bygstad 2015). Although design is a key for handling these tensions, if it is not supported by effective IT governance can result in a lock in situation (Wareham et al. 2014) or leads to fragmentation (Hanseth et al. 2006). The study aims at exploring the employed IT governance to support appropriate IT governance design that can balance standardization and evolvebility in IS design and implementation process (Tiwana, Konsynski, and Bush 2010; Tiwana, Konsynski, and Venkatraman 2013; Yoo, Ola, and Lyytinen 2010).

2. Statement of the problem

The ultimate aim of this research is to develop new insights in the complex matter of IT governance and to provide practical guidance for designing optimum IT governance mechanisms to address both standardization and evolveability in design and implementation of HIS in public health care organization particularly in resource constrained setting.

Thus this study employs the paradox perspective (Gregory et al. 2015) to understand the balance of standardization and evolveability dimensions of HIS design and implementation in resource constrained setting with IT governance mechanism. IT governance is the institutionalization of decision making through structure, process and communication mechanisms(Weill and Ross 2005). IT governance can be affected by cultural, structural and political and social issues (Boonstra, Eseryel, and Offenbeek 2017). Thus it requires effective IT governance which can actively designed governance mechanism such as (eg. Committee, committees, budgeting processes, approvals, IT organizational structure, alliance etc) to encourage behaviors consistent with the organization's mission, strategy, values, norms and culture. In effective IT governance when the desirable behaviors change, IT governance also changes.

However a range of IT prescriptive and unilateral governance frameworks and standards (Grant et al. 2007; Weill and Ross 2005) are inadequate to unpack the continuous change of the health sector and explain socio-cultural issues of the IT governance in HIS design and implementation (Gregory et al. 2015). Research conducted in developed country has shown how the IT governance authority decision making has been complemented or shaped by senior managers devised governance mechanisms such as alliance, sourcing arrangements, roles, teams, processes, and informal relationships (Boonstra, Eseryel, and Offenbeek 2017; Gregory et al. 2015). These IT governance mechanisms design can be affected by dominant stakeholders beliefs, values, and norms which is rarely addressed in IS research (Boonstra, Eseryel, and Offenbeek 2017) particularly in resource constrained setting. Such kinds of domination issue is heightened in resource constrained setting where there is plurality, change and scarcity, the major cause for IT governance paradoxical problem (Smith and Lewis 2011) extensively exist in this resource constrained context. Effective IT governance mechanisms require handling multiple stakeholders interest. The problem is how to design and implement effective IT governance mechanism which incorporates most stakeholders' interest and in line with the IS artifact design architecture which is the aim of this study.

The study extends the existing knowledge of IT governance mechanisms which is not well addressed in IS research both empirically and theoretically (Boonstra, Eseryel, and Offenbeek 2017; Gregory et al. 2015; Tilson, Lyytinen, and Sørensen 2010; Wareham et al. 2014) particularly in developing countries context. It will bring new insights and concepts in complex public health care organization of resource constrained setting. The output of this research will help health and IT managers how to devise IT governance mechanisms to address both standardization and evolveability while designing and implementing HIS. Researchers can use such understanding, concepts and method to study and explain IT governance in health care and in other sectors of resource constrained setting.

Thus the study will explore how IT governance mechanisms have been designed and its interplay with IS design architecture in turn shapes DHIS-2 design and implementation towards standardization and evolveability.

3. Research Setting

3.1. HIS and HIS design and implementation in Ethiopia

This research is situated in Ethiopian public health care context in which diversified stakeholders includes health, IT and management professionals situated both in governmental and non governmental organization with in uneven distribution of information infrastructure. Further the country is known with scarcity, plurality and change which are the cause for paradoxical problems. These socio-cultural diversity and resource constrained setting will make the research setting suitable to unpack the paradoxical issues of HIS design and implementation which influences the IT governance mechanisms. Furthermore the MOH represented a particularly good research context due to the transition from integrated IS-design artifact architecture to layered modular architecture which requires a new organizational logic.

Health care system in Ethiopia is hierarchical organized from health facility, wereda, zone, region and Ministry. The hierarchical governance of the health system is a federated one, which allows health institutions (e.g. districts, zones, regions) autonomy to make administrative decisions over their designated local jurisdiction while also being overseen by higher health institutions. Interactions among health institutions are largely managed by formal structure, standardized practice and planning. Thus, the established HMIS standards (in terms of data indicator, tools, reporting procedures, district/Wereda-based planning) act as main governance and management tools in this hierarchy.

HIS design and implementation engages diversified stakeholders who have key roles to play such as IT, health and management professionals who work in governmental and non governamental organizations, Primarily like other developing countries, HIS in Ethiopia was paper based which is prone to accuracy, completeness, and consistency problems. HIS design and implementation efforts can be categorized in to three periodically. The first HIS design and implementation was initiated by multiple donor agencies and NGOs in cooperation with health programs and regions which resulted fragmented systems (Lagebo and Mekonnen 2005). Secondly, based on national level HMIS reform in 2006, FMOH in cooperation with partner organizations developed two different eHMIS which used from 2012-2017 throughout the country(FMOH 2010). However, the systems frequent technical problem and governance issue deteriorate the importance of the system (Gebre-mariam and Bygstad 2019) leads to the current, DHIS-2, design and implementation.

3.2. DHIS-2

DHIS-2 is a web based open source software developed in 2004 using modular architecture by Health Information System Program(HISP). HISP is a research and development movement initiated by two researchers of Norwegian and South African origin in 1994 in developing the previous versions of DHIS to South Africa and later extended to other low and middle income African and Asian countries. The system helps to populate, store, process and analyze data at health facility level and send to the next administrative hierarchy till MOH by aggregating the data. DHIS-2 with its modular design replaces the previous standalone versions of DHIS-1,3 and 1.4 mainly to address the continuous changing requirement of the sector and country specific requirement. DHIS-2 core platform and its supporting resources are developed based on the principles of platform. It can enable users to use it for varies activities which is different from envisaged and also it will provide resource for users to develop a new product using DHIS-2 API resources (Braa and Sahay 2012).

HISP governance strategy is networks of action (Jorn Braa, Monteiro, and Sahay 2004)(Jorn Braa, Monteiro, and Sahay 2004) which is under the principle of collective learning. A network of action governance mechanism is building for and in one place, and have that used in multiple places through HISP network. HISP network has four regional nodes under which implementation countries local universities, MOH, NGOs and individual consultants can be participated. The HISP network coordinated by the University of Oslo facilitates collective learning through circulation of people, money, implementation experience, products and resources across the network(ibid…).

3.3. DHIS in Ethiopia

The previous version of DHIS-2, DHIS-1.3 and 1.4, had been introduced and used in Ethiopia from 2004-2008 through tripartite agreement among Addis Ababa University, Oslo University and regional health bureaus. DHIS-2 has now come to Ethiopia after a decade with new architecture, layered modular, in 2017. The two major DHIS-2 implementation process in Ethiopia includes configuring DHIS-2 according Ethiopian public health care context and implementing the system in 3,800 health facilities and hierarchical administrative health offices. Accordingly, the HMIS steering committee at national level comprised from MOH IT, DHIS-2 technical persons and partner organizations staff, was responsible for system configuration and implementation of the system. DHIS -2 has now been implemented throughout the public health care setting since January 2018 using the virtual private network of health. End users at each site directly enter their monthly data on central data ware house via health virtual private network. The system enables them to store routine data, process, analyze and report data on timely manner. However, the use of DHIS-2 is varied from health facility to health facility due to uneven distribution of infrastructures such as electricity, networking, human and technical resources. Furthermore, developers and implementers have been configuring and designing DHIS-2 in order to address the continuous need of the user.

4. Research Methodology

4.1. Theoretical Framework

IS scholars argue that early theories are inadequate to unpack the socio-cultural elements of IT governance and IT governance paradoxical problem caused by plurality, change and scarcity (Smith and Lewis, 2011) that changes overtime. Institutional theory has been suggested to unpack the socio-cultural elements of IT governance and understand how IT governance has actually been accomplished (Jacobson, 2009; Kizito and Kahagai, 2018). Information infrastructure and Institutional theory has been widely used to understand the complexity of the sector and contextual issues of HIS implementation yet rarely used to uncover the social-embededness of IT governance with a focus on standardization and evolveability.

The installed base and heterogeneity concept of information infrastructure will help us to understand how the existing socio-technical practice and technology exists in public health care context determine the new information infrastructure development process. Organization field concept of institutional theory is used to identify stakeholders at organizational, group and individual levels in HIS design and implementation setting of Ethiopia. Institutional logic concept enables to categorize or groups these stakeholders by their own institutional logic in various issues of DHIS design and implementation. The enterprenour concept will help us to understand how such multiple logics compete each other and devise governance mechanisms by the dominant mechanisms.

Thus Information infrastructure, IT governance conceptual framework and institutional theory will be used as a lens to explore, the complexity of HIS, the contradiction of heterogeneous actors, the social-embededness of IT governance and its change overtime (Jacobson, 2009; Avgerou, 2000). The aim of this study is therefore finding the balance how to address such paradoxes and addresses both standardization and evolveability simultaneously through understanding the IT governance mechanisms employed using institutional theory and information infrastructure concepts.

4.2. Research Approach – Qualitative Case Study

This research will be guided by qualitative case study with interpretive paradigm which is developed by Klein and Myers (1999) principles including hermeneutic circle, contextualization, abstraction and generalization, dialogical reasoning, and multiple interpretations, Interpretive research focuses on understanding the complexity of human sense making processes in situated contexts. Case study research is the most common qualitative method used in information systems(Orlikowski and Baroudi, 1991) to answer the 'how' and 'why' questions(Walsham, 1995); and useful to explain the processes, actions, and/or interactions(Easton, 2010). It focuses on understanding the dynamics present within a single settings and it is well-suited to IS research as is done in organization (Benbasat, Goldstein and Mead, 1987; Benbasat, 2002).Further, case study has been adopted for most paradox studies (Andriopoulos & Lewis, 2009) like the case at hand. The approach allows the researcher to investigate systems in particular institutional settings in order to understand the nature and complexity of the processes and actions involved (Walsham, 1995; Myers and Avison, 2002).

Therefore, interpretive qualitative case study approach is vital for the research at hand as there are different stakeholders involved in DHIS-2 design and implementation for instance donors, NGos, implementers, developers health professionals, administrative staff and practitioners. The approach enables the researcher to understand the stakeholders' perspectives, assumptions, expectations and roles towards DHIS-2 design and implementation with evolveability-standardization focus. As Yin's(2002) suggestion, this study research question deals with explaining how and why IT governance mechanisms handle contrasting needs to shape the DHIS-2 design and implementation towards standardization and/or evolveability in the course of IS design and implementation. This study does not concern over certain variables rather the study concerns the contextual and complex conditions of HIS implementation based on multiple sources of evidence to arrive at the required understanding. The research will be designed as a single case study with multiple sites involved. In this research, the case is defined as the DHIS-2 design and implementation in public health care settings and allows examining relationships at different levels of analysis within the DHIS-2 implementation context; national level, regional health bureau, zone health office, wereda health office, and health facility level and organization field level analysis. The approach will allow me to investigate the case at hand in depth to provide a rich understanding of the case.

4.3. Data Collection Method

Qualitative data is a multi-method includes observation, participant observation (fieldwork), interviews and questionnaires, documents and texts. I will employee purposive sampling (Maravasti, 2004) to identify key informants such as health workers, IT technicians, persons dealing with statistics, health and IT managers, planners) as it is not a representative of larger population. The aim is using smaller numbers of research participants for a more in-depth, detailed, understanding of a given topic(Marvasti, 2004). The data collection will continue till new data will be gained from multiple informants and saturated when similar data will recur from multiple informants. Ultimately, gathered data will be triangulated with these multiple data collection methods.

4.4. Modes of Analysis: Hermeneutics

There are different types of modes of analysis in qualitative of these hermeneutics, semiotics, and narrative and metaphor are considered as major (Myers, 1997). This study will adopt hermeneutics modes of analysis as it is primarily concerned with the meaning of a text or text-analogue (oral or written text). The process of analysis will pass through three stages, open coding, axial coding and selective coding (Neureman, 2014). The open coding begins with identifying themes from collected data and categorize the data accordingly. The axial coding relating the theme emerged in open coding with presumption theoretical concepts without being restrictive to concepts. Finally, selective coding enables us to find patterns by looking at themes, data and the theoretical concepts to arrive at final theoretical concepts.

5. Significance of the study

The current IT governance literature lacks both theoretical and empirical understanding to address contrasting demands (Yoo, Ola, and Lyytinen 2010) particularly in resource constrained setting where change, scarcity and plurality are extensively exist during IT design and implementation (Smith and Lewis 2011). Understanding key tensions and how to handle these contrasting issues will pinpoint the current IT governance problem and enables to design appropriate IT governance mechanism to balance standardization and evolveability.

This research aims to contribute to the theoretical domains of IS and public health field in conveying the importance of IT governance to balance standardization and evolve-ability. First, the study reveals how complex Information infrastructure in resource constrained public health care setting produces and reproduces multiple institutional logics. Second the study shows how managers managed them through IT governance mechanisms and reveal its weakness and strengths. Third, the study reveals the interplay between the IT governance mechanisms with DHIS-2 design artifact which in turn leads HIS design and implementation towards standardization and/ innovation. Ultimately the study will come up with practical contribution. First it formulates design guidelines to governance mechanism which addresses both standardization and evolveability. Furthermore it emphasizes the use of institutional logic concept to address standardization and evolveability in HIS design and

implementation. The study is different from the existing rare IT governance research in balancing standardization and evolve-ability due to its paradoxical focus in dynamic and complex health care in resource constrained context.

Accordingly, the research result of this study will surface key institutional logics, important tensions and how to deal with them in resource constrained context in the course of HIS design and implementation. Furthermore, it will bring rich insights based on interpretive qualitative case study which enables to understand the complexity of health care setting. These conceptual and empirical understanding will add on existing few IT governance mechanisms research mainly conducted in developed countries context (Sun, Gregor, and Keating 2015; Tilson, Lyytinen, and Sørensen 2010; Wareham et al. 2014). Thus the theoretical contribution of this study is bringing new concept in related to context, and rich insight regarding IT governance in resource constrained setting with a focus of balancing standardization and evolveability using institutional theory and information infrastructure perspective. Researchers can use these concepts and insights to study the design and implementation of health information infrastructure in paradox perspective particularly in resource constrained setting. These theories will enable to uncover the dynamic and complex socio-cultural issues embedded in IT governance mechanisms and the paradox of change which are recently demanded by IS scholars due to scantly addressed in the current IT governance literature (Jacobson 2009; Kizito and Kahiigi 2018).

The study is also aimed at developing practical implications for public health/ICT managers at various levels engaged in the design and implementation of ICT based IS in dynamic health care context of developing countries, specifically in the Ethiopian context. The study explicate how the dominant stakeholders' institutionalized views may affect IT decision making that enables them to consider such internal issues while designing IT governance mechanisms. It may also inform managers how contrasting tensions can be managed by explicating conflicting and complementary logics-in-use to lead HIS design and implementation towards both standardization and evolveability.

Based on the research finding, policy makers can device appropriate IT governance policy, and strategy which is capable of addressing both standardization and evolveability simultaneously. Furthermore, health managers and IT managers can use such understanding to device appropriate IT governance mechanism for the design and implementation of sustainable health information system mainly in public health care of resource constrained setting .

6. REFERENCES

Andriopoulos, and M Lewis. 2009. "Exploitation-Exploration Tensions and Organizational Ambideterity: Managing Paradoxes of Innovation." *Organization science* 20(685–834): 4.

Avgerou, Chrisanthi. 2000. "IT and Organizational Change : An Institutionalist Perspective." *Information technology and people* 13(4): 18.

———. 2008. "Information Systems in Developing Countries: A Critical Research Review." *Journal of Information Technology* 23: 23.

Avgerou, Chrisanthi, and Geoffrey Walsham. 2000. *Information Technology in Context: Studies from the Perspective of Developing Countries*.

Benbasat. 2002. "Case Research Strategy in Studies of Information Systems." *Qualitative research in information systems*: 79–99.

Boonstra, Albert, U. Eseryel, and Marjolein Offenbeek. 2017. "Stakeholders ' Enactment of Competing Logics in IT Governance : Polarization , Compromise or Synthesis ?" *European Journal of Information Systems*.

Braa, Jorn, Eric Monteiro, and Sundeep Sahay. 2004. "Networks of Action: Sustainable Health Information Systems Across Developing Countries." *MIS Quarterly* 28(3): 337–62.

Braa, and Sundeep Sahay. 2012. *Integerated Health Information Architecture: Power to the Users*. New Delhi: MATRIX.

Chandler, A. D., and J Cortada. 2000. "The Information Age: Continuities and Differences." In *A Nation Transformed by Information: How Information Has Shaped the United States from Colonial Times to the Present*,.

Cho, Lars et al. 2008. "Contextual Dynamics during Health Information Systems Implementation: An Event-Based Actornetwork Approach." *European Journal of Information System* 17(6): 16.

Constantinides, Panos, and Michael Barrett. 2014. "Information Infrastructure Development and Governance as Collective Action." *Informatiion System Research*.

Easton, Geoff. 2010. "Critical Realism in Case Study Research." *Industrial Marketing Management* 39(1): 118–28.

FMOH. 2010. IV Federal Democratic Republic of Ethiopia Ministry of Health *Health Sector Development Program: 2010/11 -2014/15*. Addis Ababa. http://phe-ethiopia.org/admin/uploads/attachment-721-HSDP IV Final Draft 11Octoberr 2010.pdf.

Gaynor, Mark, and Scott Bradner. 2001. "The Real Options Approach to Standardization." *Proceedings of the Hawaii International Conference on System Sciences* 00(c): 125.

Gebre-mariam, Mikael, and Bendik Bygstad. 2019. "Digitalization Mechanisms of Health Management Information Systems in Developing Countries." *Information and Organization* 29(1): 1–22.

Grant, Gerald, Allen Brown, Aareni Uruthirapathy, and Shawn Mcknight. 2007. "An Extended Model of IT Governance : A Conceptual Proposal." In *AMCIS 2007 Proceedings, ,* 12.

Gregory, Robert, Mark Keil, Jan Muntermann, and Magnus Mähring. 2015. "Paradoxes and the Nature of Ambidexterity in IT Transformation Programs." *Informatiion System Research* 26(1): 57–80.

Hanseth, Ole, and Bendik Bygstad. 2015. "Flexible Generification: ICT Standardization Strategies and Service Innovation in Health Care." *European Journal of Information System* 24: 18.

Hanseth, Ole, Eduardo Jacucci, Miria Grisot, and Margunn Aanestad. 2006. "Reflexive Standardization : Side Effects and Complexity in Standard Making." *MIS Quarterly* 30: 563–81.

Hanseth, Ole, and Eric Monteiro. 1997. "Inscribing Behaviour in Information Infrastructure Standards." *Accounting, Management and information System* 7(4): 183–212.

Hanseth, Ole, Eric Monteiro, and Morten Hatling. 1996. "Developing Information Infrastructure: The Tension between Standardization and Flexibility." *Science Technology and Human Values* 21(4): 407–26.

Heeks, Richard. 2002. "Information Systems and Developing Countries : Failure , Success , and Local Improvisations." *The Information Society: An International Journal* 18(2): 101–12.

Jacobson, Dax. 2009. "Revisiting IT Governance in the Light of Institutional Theory." In *Proceedings of 42nd Hawaii Internaional Conference on System Sciences*, , 1–9.

Kizito, Michael, and Evelyn Kahiigi. 2018. "Conflicting Logics in IT Governance : Achieving Ambidexterity in Healthcare Organisations." In *Twenty-Fourth Americas Conference on Information Systems*, New Orleans, 1–10.

Klein, Heinz, and Michael Myers. 1999. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems." *MIS Quarterly: Management Information Systems* 23(1): 67–94.

Kyng, and Mathiassen, eds. 1997. *Computers and Design in Context.* Cambridge, MA: MIT press.

Lagebo, Birkinesh Woldeyohannes. 2019. "Development of Resilient Health Information Infrastructure in Complex, Dynamic and Resource Constrained Health Care Context." *IFIP Advances in Information and Communication Technology* 558: 497–512.

Lagebo, Birkinesh Woldeyohannes, and Selamawit Molla Mekonnen. 2005. "Challenges and Approaches to Scaling and Standardizing Health Information Infrastructure in Developing Countries: Case Studies from Ethiopia." University of Oslo, Norway.

Marvasti, Amir. 2018. "Research Methods." In *The Cambridge Handbook of Social Problems*, Cambridge University Press, 23–37.

Mekonnen, Selamawit, and Sundeep Sahay Sahay. 2009. "An Institutional Analysis on the Dynamics of the Interaction between Standardizing and Scaling Processes: A Case Study from Ethiopia." *European Journal of Information System* 18: 10.

Myers, and David Avison. 2002. *Qualitative Research in Information Systems*. eds. Micheal. D Myers, David Avison, and . London: SAGE Publications Ltd.

Myers, Michael. 1997. "Qualitative Research in Information Systems." *MIS Quarterly Discovery* (June).

Orlikowski, Wanda, and Jack Baroudi. 1991. "Studying Information Technology in Organizations: Research Approaches and Assumptions." *Information system research* 2(1): 1–28.

Smith, Wendy, and Marianne Lewis. 2011. "Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organizing." *Academy of Management Review* 36(2): 381–403.

Sun, Ruonan, Shirley Gregor, and Byron Keating. 2015. "Information Technology Platforms : Conceptualisation and a Review of Emerging Research in the IS Discipline." In *Australian Conference on Information Systems*, Adelaide, 1–17.

Tilson, David, Kalle Lyytinen, and Carsten Sørensen. 2010. "Digital Infrastructures: The Missing IS Research Agenda." *Information Systems Research* 21(4): 748–59.

Tiwana, Amrit, Benn Konsynski, and Ashly Bush. 2010. "Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics." *Information Systems Research* 21(4): 675–87.

Tiwana, Amrit, Benn Konsynski, and N Venkatraman. 2013. "Special Issue : Information Technology and Organizational Governance : The IT Governance Cube." *Journal of Management Information Systems* 30(3): 7–12.

Walsham, Geoff. 1995. "Interpretive Case Studies in IS Research: Nature and Method,." *EJISDC* 4: 7.

Walsham, Geoff, and Sundeep Sahay. 2006. "Research on Information Systems in Developing Countries: Current Landscape and Future Prospects." *Information Technology for Development* 12(1): 7–24.

Wareham, Jonathan, Paul Fox, Joseph Lluis, and Cano Giner. 2014. "Technology Ecosystem Governance." *Organization science* 25(4): 1195–1215.

Weill, Peter, and Jeanne Ross. 2005. "A Matrixed Approach to Designing IT Governance." *MIT Solan Management Review* 46(2): 26–34.

Yin, R. K. 2002. "Applications of Case Study Research." *SAGE publication*.

Yoo, Youngj, Henfridsson Ola, and Kalle Lyytinen. 2010. "Research Commentary — The New Organizing Logic of Digital Innovation : An Agenda for Information Systems Research." *Information Systems Research* 21(4): 724–35.