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## **Top Management Lead Entrepreneurship in Handling Competing Institutional logics for DHIS-2 Adoption in Ethiopian Public Health Care Context**

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## **Introduction**

IT governance matters for IS adoption, development and implementation (Weil, 2004). However the range of IT governance framework is inadequate to address the complexity of IS adoption, development and implementation caused by socio-cultural, contextual, political and technological variety and changes (Smith & Lewis, 2011; Gregory et al. 2015; Boonstra, Eseryel, & Offenbeek, 2017). Diversified actors with different institutional and social background employ different IT perspectives and have impact on IT governance which in turn affect the IS adoption, development and implementation. Often dominant institutional logics influence senior managers' decision(Reay & Hinings, 2009; Xue, Gautam, & Sambamurthy, 2012). Managers are left with generic strategies to determine IS adoption, development and implementation. IS implementation with tensions in a dynamic environment requires a different IT governance approach to complement the prescriptive and unilateral IT governance frameworks and approaches(Gregory, Keil, Muntermann, & Mähring, 2015; Pache & Santos, 2010; Stettner & Lavie, 2014). Contemporary IS scholars demand paradox perspective to IT governance paradoxical problem inherent contradictory nature of information infrastructure development (Gregory et al., 2015; Smith & Lewis, 2011). Research advocate loose coupling and collaborative strategies instead of dominant institutional logic for IS Implementation in complex setting(Berente & Yoo, 2012; Boonstra et al., 2017; Jones, Boxenbaum, & The, 2015). Furthermore senior managers are advised to distance themselves from prevailing institutional logics to employ collaborative and loose coupling strategies(Berente & Yoo, 2012; Reay & Hinings, 2009). However, it is not explicitly stated how collaborative and loose coupling is devised in IT governance. This study aimed at understanding how IT governance mechanism suitable for collaborative approach is designed while adopting HIS in health care setting. In addition to the dominant actors in health care setting, the health care setting in resource constrained setting includes the partner organizations dominancy. Research findings depict how successful firms are ambidextrous which make a general shift from trade-off to paradoxical thinking (Eisenhardt, 2000; Gavetti & Levinthal, 2000; Lewis, 2000). Researchers have increasingly come to recognize the importance of balancing seemingly contradictory tensions (Adler et al., 1999; J. S. Brown & Duguid, 2001; Katila & Ahuja, 2002). More specifically, various works, ranging from technological change to organization design, have discussed the need for firms to achieve a balance between exploitation and exploration activities (Jones et al., 2015; Smith & Lewis, 2011).

This paper seeks to explore how senior managers influenced by prevailing logics while designing IT governance mechanism which accommodates all actors' logics. Understanding the prevailing institutional logics enabled to design better IT governance mechanism (Boonstra et al., 2017). The study result revealed how absence of resource and low IT capability with in Ministry of Health (MOH) generated multiple stakeholders with competitive institutional logics. The findings illuminate various IT governance mechanisms(structural and geographical separation, integration) with huge investment to the co-existence of competitive logics. This loose coupling strategy solved the contradiction of dominant actors for temporarily but unable to be a solution when changes arose in health sector.

Sought to find permanent solution MOH developed interest to shift the partner organization dominance to MOH through taking the design role. However, taking design role was seemed to be unpractical due to the absence of advanced IT capability with in MOH.

In the mean time, high level official lead entrepreneurship was initiated to consider new alternative. Senior managers were directed to devise proactive governance mechanisms such as demonstration, piloting, experience-sharing and system evaluation by including all stakeholders to learn about the new system. These mechanisms revealed the existing in-efficient system and revealed the benefits of the new system that enabled to be enacted by a range of stakeholders. Ultimately, the high level official guidance enabled senior managers to distance themselves from the prevailing institutional logic and to consider new institution. The devised governance mechanisms also used as foundation for DHIS-2 adoption by new high level official.

## **Conceptual Framework**

### ***IT Governance Mechanism***

Governance is about systematically determining who makes each type of decisions (decision right) and who has input to a decision (input right) and how these people are held accountable for their role. Governing IT while incorporating stakeholders with diverse institutional backgrounds remains a challenge for IS implementation.

IT governance is institutionalized decision making structure, process and communication mechanisms to specify the decision rights and accountability (Peterson, 2004; Weill & Ross, 2005). Effective IT governance is determined by the way the IT function, process and communication is organized and where the IT decision-making authority is located within the organization that is specified in structure. Structure represents the tangible planning and organizational elements outlined by the high-level governance strategy that includes IT organizational structure, committees and boards (S. De Haes, Grembergen, & Ph, 2005; Weill & Ross, 2005). Process refers to strategic decision making, strategic information systems planning (SISP) and monitoring, control, and process frameworks to provide ongoing control and evaluation of the IT design, implementation and use (Damianides, 2005; B. S. De Haes & Grembergen, 2004; Korhonen & Pirttila, 2003). Communication amongst stakeholders overcomes the problem of domain awareness in both IT and the business field. Well-designed, well-understood and transparent mechanisms promote desirable IT behaviors and individual accountability.

A range of IT governance frameworks and standards (Brown & Grant, 2005; Weill & Ross, 2005) are inadequate to address the complexity and dynamic nature of IS (Smith & Lewis, 2011). Continuous change of technology and the world, the interventions of multiple socio-cultural and political issues create various contradictory issues in IT transformation Programs (Gregory et al., 2015). IS research have shown how senior managers devised governance mechanisms through alliance, sourcing arrangements, roles, teams, processes, and informal relationships that in turn shaped the IT governance decision making process (Boonstra et al., 2017; Gregory et al., 2015). These senior managers act of IT governance mechanism design can be affected by dominant stakeholders beliefs, values, and norms which is rarely addressed in IS research (Boonstra, Eseryel, and Offenbeek, 2017). These contradictory tensions in a dynamic environment require a paradox perspective to complement the prescriptive and unilateral IT governance frameworks and approaches. Decision makers are faced with IT governance dilemmas (Weil, 2004; Weill & Ross, 2005, p. 27; Xue et al, 2008) of which it is nowadays accepted that black or white choices will not work (Debreceeny, 2013). To unpack such socio-cultural issues, institutional theory has been advocated and used to handle contradictory issues (Jacobson, 2009; Kizito & Kahiigi, 2018 ; Boonstra et al., 2017). Thus this study used the institutional theory contemporary concepts, institutional logic and entrepreneur (Avgerou, 2000; Jacobson, 2009) to understand how IT governance handles the contradictory institutional logics in DHIS-2 implementation in Ethiopia.

### ***Institutional Logic***

Institution logic integrates the structural, normative, and symbolic as three necessary and complementary dimensions of institutions (Thornton & Ocasio, 2008). Institutional logic holds principles, assumptions, identities and domain dimensions (Berente & Yoo, 2012). Institution logic principle guides actors how to behave in a specific situation and provide reasons for action and thus embody the goals and values of the institutions (Friedland and Alford 1991; Thornton and Ocasio 2012). It is also established on assumptions associated with specific causal means and end relationship. Furthermore, it has its own identities (Friedland & Alford, 1991; Jepperson, 1991; Thornton & Ocasio, 2008). Finally, institutions are more and less salient to specific domains and their practices (Friedland & Alford, 1991; Jepperson, 1991). Institutional logics are 'the organizing principles that govern the selection of technologies, define what kinds of actors are authorized to make claims, shape and constrain the behavioral possibilities of actors and specify criteria for effectiveness and efficiency' (Lounsbury, 2002, p. 253).

Institutional logics are never homogeneous; within an organization, multiple logics may be simultaneously in play, contributing to institutional contradictions (Friedland & Alford, 1991). Institutional logics conflict results change or new account of activities, and their consistency brings stability to an organization field (Thornton & Ocasio, 2012). Heterogeneous actors may draw on different

logics and exercise their power to influence the decision making (Xue et al., 2012). Thus the institutional logic concept enables to understand aspects of complexity such as multiplicity, heterogeneity, coexistence of different logics (Thornton and Ocasio 2012; Royston Greenwood et al. 2011; Grisot and Vassilakopoulou 2013). Though, institutional logic has been used for different purpose in IS research, recently the concept has now been widely used to unpack the paradoxical problem of IS implementation (Berente & Yoo, 2012; Boonstra et al., 2017; Buchana & Seymour, 2017). This study used the institutional logic concept to unpack the contradictory issues in the process of HIS adoption and how these logics influenced the IT governance in consequence influence the adoption process. This study seeks to answer the following research questions How competing institutional logics created, co-existed and how the competing institutional logics management affected the IT governance mechanism and in consequence impacted the HIS adoption.

Institutionally pluralistic organizations are not passive agents navigate and maintain contradictory logics. Generic strategies (defiance, compromise, avoidance and manipulative) have been provided to handle multiple institutional logics (Oliver, 1991). Given to the dynamic nature of actors' institutional logic over time, this study employed the loose coupling and entrepreneur concept as an organizational response to analyze the competing institutional logics which inclined to balance the tensions.

### ***Loose coupling***

Regardless of competition which emphasize to dominant logic, few research employed loose coupling and collaboration as a strategy to co-existence of competing logics (Berente & Yoo, 2012; Reay & Hinings, 2009). Loose coupling often used the compromise and avoidance strategy to handle competitive institutional logics. Loose coupling refers to patterns of action that are distinct, or separate from each other, yet are still responsive to each other in some fashion (Berentee & Yoo, 2012). Institutional theory conceptualizes loose coupling as distinguishing between the performance of a given practice (which is consistent with one institutional logic) and the presentation of that practice (in a way that is consistent with a contradictory institutional logic). Loose coupling, then, provides a "working space" for individuals navigating multiple conflicting institutional forces (Seo & Creed, 2002). Loose coupling can be achieved through informal coordination, the avoidance of detailed inspection, and the performance of activities (Meyer & Rowan, 1977). Furthermore, the manager who handles multiple institutional logics simultaneously will become entrepreneur that is another source for change.

### ***Entrepreneur***

The entrepreneur concept emphasizes on the role of institutional actors in changing the institutional context thus requires IS researchers to have a broad view of entrepreneurship. Institutional entrepreneurship is one of the drivers to institutional change (Jepperson, 1991; Thornton & Ocasio, 2012). Institutional entrepreneurship is a process of creating new institutions or transforming the existing institutions through leveraging resource (Maguire, Hardy, & Lawrence, 2004) where as entrepreneurs are responsible actors, individuals, groups or organizations, who have resources, abilities and skills for new or changed institutions (Hardy & Maguire, 2008).

The study of institutional entrepreneurs emphasizes on how entrepreneurs regulate and coordinate the process of institutional entrepreneurship (Garud, Jain, & Kumaraswamy, 2002). To engender change in stable institutional settings, institutional entrepreneurs need to: (1) develop an understanding of the prevailing institutional context; (2) undermine its utility by showing that the existing institutions are ineffective in some way; and (3) develop a picture of an alternative future that 'solves' the identified problems (R. Greenwood, Suddaby, & Hinings, 2002) so that consensus can be developed around a new set of institutional arrangements.

The entrepreneur and loose coupling concepts are employed to uncover the role of key actors and their process or activities shaped the IT governance mechanisms which also bring impact on HIS adoption.

## **Research Methodology**

The purpose of this study is to understand how multiple institutional logics created, influenced each other to shape the IT governance in the process of DHIS-2 adoption. The study employed interpretative case

study Klein and Myers (1999) with a focuses on multiple interpretations principle. 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). Further, case study has been adopted for most paradox studies (Andriopoulos & Lewis, 2009) like the case at hand.

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 new system adoption, design and implementation with. 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 adoption.

Data was collected from a variety of sources including interviews, observation and document analysis from May 2019- August 2020 (Walsham, 2006; Walsham & Walsham, 1995). Purposive sampling (Maravasti, 2004) was employed to identify key informants such as IT professionals, health and IT managers, and planners at various health hierarchy. The aim was using smaller numbers of research participants for a more in-depth, detailed, understanding of a given topic (Marvasti, 2004). The data collection continued till new data will be gained from multiple informants and saturated when similar data recurred from multiple informants. Ultimately, gathered data was triangulated with multiple data collection methods. The author handled discussion with selected informants based on the 1st round data analysis to create shared meanings.

| Levels                    | Departments  | No of informants | No of Interviews |
|---------------------------|--|------------------|------------------|
| MOH                       | Information Technology Department(ITD)                   | 5                | 16               |
|                           | Policy Plan Monitoring and Evaluation Department (PPMED) | 7                |                  |
|                           | Health Program experts                                   | 4                |                  |
| Regional Health Bureau    | ITD  | 3                | 10               |
|                           | PPMED  | 2                |                  |
|                           | Health Program experts                                   | 5                |                  |
| Zonal Health office       |  | 2                | 2                |
| Wereda Health office(WHO) |  | 2                | 2                |
| Partner organization      | HISP   | 3                | 10               |
|                           | JSI-DUP  | 2                |                  |
|                           | JSI-DHA  | 1                |                  |
| Total                     |  | 36               | 40               |

**Table 1. Data Collection Details**

Nvivo 10 has been used to organize and code the large amount of collected qualitative data (Brandão, 2015). The interview data has been transcribed verbatim by listening and pausing the interview records for several times and generate emergent insights to guide the subsequent data-collection efforts that enabled to modify the subsequent interview guides to get quality data (Klein & Myers, 1999). Pattern inducing technique is applied to capture logics by categorizing and coding the qualitative data gained through interview, document and observation (Reay & Jones, 2015). The institutional logic dimensions (principle, assumption, identity and domain) are used as a guide to identify, describe the institutional logics of heterogeneous actors (Reay & Jones, 2015).

## Case Description

### ***Background: E-HMIS Implementation and Challenges***

The earliest multiple partner organizations e-hmis implementation efforts were generated multiple fragmented systems in the health sector. The absence of MOH involvement in e-HMIS implementation effort was considered as a prime factor for such negative e-hmis implementation implication (Lagebo and Molla, 2005). However, the MOH national harmonized HMIS design and implementation effort began in 2006 aiming to avoid fragmentation ended up with two fragmented systems deployed by two different dominant partner organizations in different regions of the country. Partner organization A was assigned in eleven regions and the other was responsible for one region(SNNP) where it had been working for. Such uneven share for e-hmis implementation initiated contradiction between the two partner organizations and ended up with generating two un-communicable systems which created difficulty for MOH to generate the periodic national level report. The two systems had used different technologies to develop the systems.

In addition to the fragmentation problem, these systems had many frequent technical problems such as aggregation problems, missed indicators, reports, summation problems, system failures, and so on. Some of these problems were caused by power failures, and new users' requirement in relation to the dynamic nature of the sector. These technical problems required the partner organization IT professionals' physical presence at each health institution. This support system together with frequent system failures made the running cost too high, though it was becoming stable at the end. Staff expressed their views on technical issues as follows revealed how the staff had difficulty to use the system.

*Besides the fragmentation, the system was not at expected level. Actually the programme was stable at the end.(data manager, MOH).*

*The previous one has many gaps, ....the password was only with Tulane staff. For instance if it is failed in Bale 700km from Addis, one can go from Addis to Bale for maintenance.(Health Program staff).*

*When the power is off while running the system, soon the system will be corrupted that required the Tulane staff help to maintain.*

These system fragmentation and technical failures became an agenda in various HMIS meetings to come up with sound solution. MOH employed various mechanisms to overcome the fragmentation and technical problem of these systems with huge investment.

In the mean while, MOH revised the data collection and reporting formats in 2014 to incorporate new data elements, indicators and modifying the existing ones in relation to the changes in health programs services. Such indicator revision would require modifying the existing e-HMISs as well. Consequently, MOH decided to have centralized system which can overcome the existing system fragmentation and technical problems in cooperation with both partner organizations instead of incorporating changes in the existing fragmented system. However, partner organizations did not allow collaborating for one system development. MOH tried out various mechanisms (system evaluation, system integration by local IT capability, introducing new system) to resolve the partner organizations' conflicts and to overcome the existing technical and system fragmentation problem.

### ***Organization Response to E-HMIS challenges***

#### ***1. Acquiescence and Defiance***

Although, all stakeholders reached on consensus to have only one system to avoid the fragmentation issue at national level, actors couldn't easily reach-on agreement to select one system over available potential systems and partner organizations. The problem lied on which system and whose system would be the future system. Initially, they established an evaluation committee to select one of the better systems from the two already deployed systems. The evaluation result found many technical failures of the Partner B system and inclined to support the Partner A system. However, Partner B complained over the system evaluation result due to the absence of trust over evaluators. Therefore the acquiescence and defiance

strategy based on system evaluation was not materialized which forced MOH to consider other alternative.

## **2. Compromising**

The next alternative was compromising, MOH planned to use the two systems better feature and to take a leading role in system implementation besides the coordinating and legitimating role. This approach considered two fold benefits, one to use the developed IT capability and infrastructures for ten years in relation to the existing systems and to give recognition for the partner organizations work. Second, to settle the system ownership issue by transferring from partner organizations to MOH. Thus, MOH gave deadline for the two organizations to submit their source code for system integration. However partner organization didn't handover the source code within specified deadline. Thus like that of system evaluation, the compromising approach was not successful rather extended the contradiction from within partner organizations to MOH and partner organizations

In the mean while, the MOH high level official who was exposed to new system called District Health Information System-2 (DHIS-2) in international conference and suggested DHIS-2 to be considered as alternative system. DHIS-2 is an open source web based system developed by Health Information System Program (HISP) which is an international project situated in Oslo University, Norway. The system has been used in more than seventy low income countries of Africa, Asia and Middle East countries since 1994. The previous version of DHIS-2, DHIS 1.4 was also used in Ethiopia from 2003-2005 different regions till MOH launched harmonized system and DHIS-2 was presented as potential system in 2005 and rejected by MOH at that time.

## **3. Manipulative**

The high level official who became to power after e-hmis implementation used his personal contact to surf about the technology. DHIS-2 international developer who is an Ethiopian origin has resided in Oslo, Norway stated how the first communication was initiated "*Dr. ????? the previous Minister of health communicated ?????, Norwegian foreign Minister staff who forwarded the email to HISP directorates. They forwarded to me.. that is how we started*". Though DHIS-2 was new to the MOH high level official, some of the MOH , regional health bureaus and existing partner organizations senior managers have known DHIS-2 and HISP during harmonized system selection in 2005. Thus, these groups challenged the idea of DHIS-2. The high level official who didn't have the history of DHIS-2 in Ethiopia demanded the concerned MOH directorates, ITD and PPMED, to start communication with HISP to learn about DHIS-2. Based on the high level request, the former HISP members informal communication with these directorates to consider DHIS-2 was changed to formal communication. Furthermore, some donor organizations, who have known the DHIS-2 implementation in other developing countries, had showed interest to support DHIS-2 implementation. The high level official initiation in cooperation with willing donor organizations support, DHIS-2 demonstration, training, piloting, training and evaluation had been carried out for about three years without making final decision to adopt DHIS-2. This DHIS-2 introduction process was carried out in reluctance, and suspicious due to the big challenges from high level officials and stakeholders who have decision making rights.

### **• Demonstration**

For instance the DHIS-2 demonstration was challenged by participants for the absence of some DHIS-2 functionality in reference to the existing e-HMIS. Some of the raised issue were the absence of disease reporting, top ten disease, special aggregation, the lay out, and formatting issues. The HISP team described the possibility of addressing these functionalities in DHIS-2 through customization due to the open source feature of the system. The DHIS-2 demonstration was followed by formal and informal communication with DHIS-2 developers, HISP leaders and African countries who have already deployed DHIS-2, to enhance the system understanding. After certain level of system awareness through demonstration and communication, MOH decided to pilot DHIS-2 in four regions' (Gambela, Addis Ababa, Afar, and Oromia) of selected weredas comprised with good and poor resources.

- **Piloting and System Evaluation**

DHIS-2 was customized for the pilot sites from August- September 2015 guided by two local HISP staff who were hired by HISP. System installation and configuration was made at sites and with MOH head quarter for online version. A five days pilot training was conducted in Kuyera training center for staff comprised from pilot regions in December, 2015.

After six month DHIS-2 piloting, in-house system evaluation was conducted to see the functionality of the system in the diversified context. The evaluation result depicted the success of the system by diminishing the 28 days reporting time in hours, the analysis capacity, visualizing feature, the online and offline capacity of the system to serve both resourced and poor resourced health facilities. The informants expressed their interest towards dhis-2 as follows.

*when you compare it with DHIS-2, the analysis feature of the previous system was too limited, I did not know the pivot table, dash board before DHIS-2.*

*Previously I did not know about pivot table, I know it in DHIS-2. it was a wonderful tool for analysis*

Though the demonstration and the system evaluation garnered a significant proponents to support DHIS-2, the opponents of DHIS-2 at different levels of decision making positions were kept resisting the DHIS-2 adoption. The big investment that had already put in the existing e-hmis, the possibility of improving the existing e-hmis and considering DHIS-2 as a foreign system were presented as the main justifications to challenge DHIS-2. The following excerpts taken from different informants described how DHIS-2 was challenged and supported by different stakeholders

*Regions like Tigray was highly resistant to adopt DHIS-2 and also Oromia at certain level (PPMED, manager)*

*Tigray and Harar did not want to get DHIS-2 (PPMED, manager)*

*I think those who supported the existing system was...due to the absence of knowledge about open source software. They were saying DHIS-2 is not ours why not developed locally...honestly speaking the existing system was also not ours, because we don't have even a privilege to create username and password((Partner organization, expert)*

These balanced opponent and proponent groups needed to be resolved to bring change in HIS. Ultimately an international consultant was hired from San Francisco commissioned by USAID to evaluate the three systems; the JSI e-HMIS, the Tulane e-HMIS, and the HISP, DHIS-2. The international consultant submitted the 60-70 page evaluation report that recommended open source software for low income countries that vividly inclined to DHIS-2. However, it was not a trivial task to adopt DHIS-2 in place of the dominant partner organizations e-systems' which had well established network for lengthy period of time. One of the former directorate expressed the resistance as “ It was a great challenge from internal staff to replace partner organization A because it has a big power even to dismantle the position of the Minister”. The decision making position of the opponent groups(partner organizations, regional health bureau and MOH managers) delayed the adoption of DHIS-2 for about three years.

- **DHIS-2 Adoption**

The Annual Review Meeting of MOH in which all stakeholders were participated in December 2016, donor organizations such as USAID, GATES FOUNDATIONS requested reasons for the delay of DHIS-2 implementation and expressed their interest funding the DHIS-2 implementation. Unfortunately, the high level official, the proponent of DHIS-2, left the Ministry without making final decision on DHIS-2.

DHIS-2 adoption was then became the prime activity required the new minister urgent decision due to the absence of any system after December 2016 for Ministry to collect, collate and report monthly data to MOH. This period was the deadline of the existing e-hmis project and the system was also locked not to function after the deadline. Furthermore, the previous systems donor organizations, USA government, was not willing to support two systems for one country.

Based on these institutional pressures, the new appointed Minister who was new to the Ministry politics called the JSC meeting to make decisions on DHIS-2 adoption. As usual, both the opponents and proponents provided their ideas, ultimately the Ministry announced the decision to adopt DHIS-2 in reference to the external evaluation result and gave direction for urgent design and implementation of DHIS-2. The three years ups and down was ended up with a one hour meeting firm decision based on the external evaluation result.

## Data Analysis and Discussion

### Multiple Institutional Logics

Multiple logics may be simultaneously in play, contributing to institutional contradictions (Friedland & Alford, 1991). Accordingly, this study identified three major institutional logics as partner organization, manager and entrepreneur logic as shown in the Table 2.

| Institutional Logics   |  |   |   |
|--|--|---|---|
| Dimensions   | Partner Organizations  | Managerial  | Entrepreneur  |
| Principle  | Centralized system   | Centralized system  | Centralized system  |
| Assumption   | Improving the existing system with the existing routine and infrastructure                     | Government owned system with either merging the existing systems or from scratch to benefit from the already developed in-house capability and infrastructure(Modification)   | Use the public good(DHIS-2) which has been used in many low income countries (Radical change)   |
| Identity   | Competitive seek to monopolize   | Highly affiliated with the existing system and partner organizations to implement e-hmis  | New to the existing and new systems and partner organizations and understood the existing system problems through dialogue, discussion, meeting, evaluation, piloting |
| Domain   | Huge investment and experience for a decade in designing and implementing E-hmis in 11 regions | Understood the system implementation challenges with participating in the previous system design and implementation including capacitating the health sectors with infrastructure, human, and technical resource capacity | Exposed to new system, attempting to understand the new system through network externalities, personal ties, the designers of the system,                             |
| <b>Table 2. Institutional Logics in Ethiopian Health Care Settings</b> |  |   |   |

The first two logics, partner organizations and managers, have been existed since the previous e-hmis where as the entrepreneur logic was introduced in order to resolve the contradictions between the partner organizations sub logics and to change the prevailing undesirable situations. Initially, the partner organization logic has sub logics labeled as A and B and MOH; co-existed together in the previous e-HMIS for about a decade first through separation in geography and role and later through loose coupling strategy. This finding, the co-existence of multiple institutional logics ,is similar to Reay and Hinings(2009) and Berentee and YOO, 2012 findings in health and military settings using different types of IT governance mechanisms. However, loose coupling strategy works merely for temporarily (Boxenbaum, E. & Jonsson, S. 2017). Similarly, the MOH loose coupling strategy did not respond to new data collection tools introduced to the sector which was a source for searching alternative system.

Ultimately, the study showed how manipulative strategy was initiated from the managerial group to resolve the contradiction which also separated the managers group into two as entrepreneur and managerial logic. This is similarly with Ray and Trish finding as when the provincial government launched a large-scale change initiative, other key actors in the field responded in varying ways(Reay & Trish, 2005).

The study also noticed how all the four competitive logics had a consensus to deploy centralized system where as the logics difference was lied in the means to achieve the goal. Which system and whose system

was the prime issue to be resolved. These four logics were co-existed each other for three years while some waiting for decisions by providing the usual e-hmis maintenance and support service for their respective regions and the entrepreneur logic was devising various strategies(demonstration, piloting, system evaluation) to reveal the importance of the new system.

### **1. The Partner Organization Logic**

Partner organizations are considered as dominant actors in e-hmis implementation as it fulfilled the technical and resource constraint of the public health sector of Ethiopia. The partner organization dominance was expressed by most of this study informants' as follows.

*“Let alone the source code, even the IT department does not have a password to change the user name” (Directorate, MOH). Other informant said “Partner A was so powerful organization in HIS implementation, it had big arm till house of federation and PM office” (Director, MOH).*

*“Partner organization was on the driving sit during e-hmis implementation” (Team leader, MOH).*

Other stated how partner organization had high support even from regional health bureaus in relation to resource donation.

*“There are some regional health bureaus who received various resources during e-hmis implementation supported their respective partner organizations as a return back or expecting future resource donation. These regions were very loyal for the partner organization than for MOH” (former directorate, MOH). “Region A, B were not willing to adopt DHIS-2 to support the partner organization systems”(former directorate, MOH).*

In addition to the informants' perspectives, the partner organizations' dominance was manifested in different MOH decisions. The competitive institutional logics conflict results change or new account of activities, and their consistency brings stability to an organization field (Thornton & Ocasio, 2012). The two partner organizations assigned in different regional states generated two un-communicable systems which challenged the MOH to generate national health report. Thus, MOH developed an integrator system with huge investment for the co-existence of the two dominant partner organizations. An integrator solution can be considered as loose coupling strategy which is distinct from the partner organizations' system (e-HMISs) and yet required their co-existence to generate the national level report. Though such loose coupling strategy provided a “working space” (Seo & Creed, 2002) for partner organizations to co-exist, later it required long lasting solution when the MOH revised its data collection tools in 2014. This finding confirmed how the loose coupling strategy works merely for temporarily (Boxenbaum, E. & Jonsson, S. 2017).

Furthermore, despite the effectiveness of DHIS-2 was revealed in different mechanisms (demonstration, system evaluation, piloting), DHIS-2 adoption took significant period of time due to a great challenge from partner organizations and their proponent regional health bureaus, MOH high level officials who had strong affiliation with partner organizations. This showed how senior managers act of IT governance mechanism design was affected by dominant stakeholders beliefs, values, and norms (Boonstra, Eseryel, and Offenbeek, 2017).

### **2. Managerial Logic**

The managerial logic in this study is refereed as the MOH as well as the regional health bureau managers' logic who considers resource and established network and infrastructure as a basic element for e-hmis implementation. Berente and his colleagues (2007) framework describes how strong institutional pressure with logic incongruence leads to employ compromise and avoidance (loose coupling) strategy. Similarly, MOH with resource and IT capability constraint delivered the full fledged e-hmis implementation responsibility to two different partner organizations in different geographical context. This full-fledged geographic specific e-hmis implementation assignment generated two dominant partner organizations in their respective regions that did not give a room for collaboration. As a result two fragmented e-hmis were implemented in different regions of the country that hindered to generate the national level report. The study noted how merely geographic separation mechanism didn't help for the lengthy co-existence of the two organizations instead generated dominant competitive organizations.

Consequently, MOH unable to choose one over the two systems based on system evaluation result due to the dominance of partner organizations which forced MOH to consider other alternatives. MOH incurred huge investment to develop an integrator system to please both partner organizations. The integrator system solution can be considered as a loose coupling strategy enabled the co-existence of the two partner organizations. First the integrator system developed distinctively from the two e-hmis that allowed the co-existing of the two fragmented e-hmis. Second, the integrator system made to overlook the fragmentation problem as the MOH got a way to generate the national level report though it was not efficient. Like that of geographical separation, the loose coupling strategy worked only for temporarily purpose.

In sought of long lasting solution for system fragmentation, the managerial logic different compromising mechanisms had revealed the dominance of the partner organizations and exposed the partner organization stand "partner organization was not willing to submit the system source code to MOH within specified deadline"(Manager, MOH). This partner organizations act extended the contradiction from within partner organizations to between partner organization and MOH. The exposure to different institutional logics may increase the awareness of shortcomings of the dominant logics and enable central actors to become institutional entrepreneurs (R. Greenwood et al., 2002; Thornton & Ocasio, 2008). Similarly, MOH planned to take the driving sit from partner organization by playing a leading role in the future system implementation in addition to the coordinating and legitimating role. The manager who handled multiple institutional logics simultaneously will become entrepreneur that is another source for change. This finding depicts how the MOH managerial logic IT governance mechanisms such as geographic separation, integrator system, system selection and hybrid IT governance mechanisms generated or extended the dominant partner organizations which compete to win instead of to collaborate for system implementation. Scholars suggested managers to distance from any prevailing institutional logic that symbolically and/or materially prevents them from engaging with other logics (Lepotre and Valente(2012). However, the managerial logic revealed how senior managers were unable to distance themselves from the prevailing institutional logics and couldn't see new alternatives. The next section described how entrepreneur logic enabled senior managers to distance from the prevailing institutional logic and bring new institution.

### **3. Entrepreneur Logic**

The entrepreneur logic is lead by the MOH high level official and managers who sought to overcome the existing e-hmis fragmentation problem, technical failures and partner organizations' dominance with new system, DHIS-2, which has been used in many developing countries. To engender change in stable institutional settings, institutional entrepreneurs need to reveal the existing institutional context and its in-efficiency and provide an alternative solution that solves the identified problems (R. Greenwood et al., 2002). Similarly, MOH employed various mechanisms(demonstration, piloting, experience sharing, system evaluation) for lengthy period of time to depict the benefits of DHIS-2 to overcome the MOH existing system fragmentation and technical problems and to resolve the stakeholders contradictions as well as to reveal the in-efficiency of the existing e-hmis.

Entrepreneurship is beyond creating business organization rather it focuses on new organizational models and policies to bring fundamental change in organization activity (Hwang & Powell, 2005). Similarly, one of the MOH entrepreneur mechanism, the external evaluation result, brought fundamental change to adopt open source software for public health care setting in Ethiopia where there is resource constraint. Institutional entrepreneurship is a process of creating new institutions or transforming the existing institutions through leveraging resource (Maguire et al., 2004) where as entrepreneurs are responsible actors, individuals, groups or organizations, who have resources, abilities and skills for new or changed institutions (Hardy & Maguire, 2008).

Accordingly, the high level official, the initiator to consider DHIS-2 as alternative system and its proponent of DHIS-2 with required decision making rights, technical abilities and resource replaced the existing fragmented systems and dominant partner organizations by adopting DHIS-2 system for the public health sector of Ethiopia. The entrepreneurs' resource, technical and decision making position had

significant role for DHIS-2 demonstration, experience sharing, piloting, internal and external system evaluation to reveal the importance of the new system and the in-efficiency of the existing system.

These IT governance mechanisms enhanced the DHIS-2 awareness in the sector that enabled to garner potential donor organizations and staff around the DHIS-2. Furthermore, these strategies exposed the inadequacy of the existing e-HMISs in terms of consistency, analysis, and timeliness. Regardless of certain high level MOH, regional health bureaus and partner organizations challenge, these stage by stage proactive IT governance mechanisms such as experience sharing, piloting, in-house and external system evaluation diminished the dominant actors group from time to time. Effective IT governance proactively design IT governance mechanisms such as committee, process, etc to that encourage behaviors consistent with the organization strategies, mission, values, norms and cultures.

In Multiple institutional logics different organizational groups exhibit “competitive commitment patterns” (Royston Greenwood & Hinings, 1996) that lead them to fight against each other to make the template they favor prevail. Accordingly, external system evaluation was used to evaluate the previous e-hmis systems and the new DHIS-2 to come up with better system. The major justification given to system evaluation result was the open source feature of DHIS-2 that is suitable for low income countries. Regardless the entrepreneur logic used various manipulative mechanisms to reveal and confirm the importance of the system, the adoption of DHIS-2 was delayed for significant period of time due to balanced competitive institutional logic representatives in decision process.

*It took a long period of time without implementation and decision but I do not know why.*

*First the partner politics were one of the problem because Tulane might not be willing to bring one system as they were involved in a long period of time, the high managers might have the resource problem, and the internal IT technical capacity was limited*

Pasch and Santos, 2010 model response to conflicting institutional demands suggested how compromising mechanism is suitable when institutional logic is incongruent and internal representation is balanced. Different from this model, the new appointed minister who had no affiliation with all logics and pressured by in need of urgent system called a JSC meeting for urgent decision to adopt DHIS-2. The Minister used the external evaluation result as a departure to make firm and instant decision to adopt DHIS-2 regardless of consensus.

*The New minister was new to the politics of MOH and he was purely academician just called the JSC meeting.....as of today DHIS-2 will be considered as national system and it should be implemented .*

This finding is similar to the research result managers first need to distance themselves from any prevailing institutional logics that symbolically and/or materially prevents them from engaging with other logics (Boonstra et al., 2017; Lepoutre & Valente, 2012). Furthermore, the decision was facilitated by the entrepreneur logic activities such as demonstrating, piloting, internal and external system evaluation result that supported the new minister for prompt decisions.

## Conclusion

The study identified how the MOH IT governance driven by resource constraint generated dominant partner organizations in e-hmis design and implementation. This partner organization dominance incurred MOH for huge investment to devise IT governance mechanism to the co-existence of the two competing institutional logic. However, such co-existence stand by its dominance can't withstand the dynamic nature of the health sector which required new institution. Although, the dominant competitive institutional logics challenged and slowed the adoption of new system for three years, the new system benefits was proven in various mechanisms that outweigh the existing e-hmis.

This study highlights the importance of entrepreneur and entrepreneurship when organizations faced with dominant multiple institutional logics. Entrepreneurship is a mechanism to reveal the in-efficiency of the existing institution and the benefits of the new. High level official initiative with entrepreneur quality challenged the dominant logics, and brought new actors, new tool, and new resource to bring fundamental change in HIS design and implementation. However, changing the prevailing system associated with dominant actors was not an easy task rather took three years while devising various strategies (such as silencing, formal informal communication with DHIS-2 designers, African countries who used dhis-2, donors who exposed to DHIS-2 in other African countries, piloting). These the

entrepreneur mechanisms did not bring consensus among stakeholders but bring significant proponents around the new system and paved way for managers to distance themselves from the prevailing institutional logics and to make prompt decision for adopting new system.

Furthermore, it provided suitable conditions (internal and external system evaluation result) for high level official new to the existing politics and institutional logics to make urgent decisions to urgent issues. This illuminates how distance from the prevailing institutional logics is important to better IT governance design which incorporates all actors. This study suggested employing the entrepreneurship mechanisms (experience sharing, demonstration, and piloting, internal and external system evaluation) in complex sector where multiple dominant actors are in play to distance themselves from prevailing institutional logics and consider various alternatives. This study is limited in scope by exploring one region situation, it should have brought many new insights if the scope includes more region. This study can be generalized for other sector which has complex in nature.

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