

IT-ENABLED HEALTHCARE INTEGRATION: THE CASE OF NATIONAL ELECTRONIC HEALTH RECORDS IN SINGAPORE

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Abstract

Information Technology (IT) is considered as an important enabler towards achieving integrated health care. Consequently, Electronic Health Record (EHR) systems, which serve as the foundation for integrated care across organizations, regions, or nations, have received much attention globally. However, many EHR systems have failed to be implemented successfully. The buy-in of different stakeholders has been identified as an important factor to smoothen the IT healthcare integration process. By employing stakeholder and institutional theories as theoretical lenses to examine the influence of different stakeholders in EHR implementation, we aim to form a deeper understanding of how EHR initiatives can be managed for healthcare integration. A positivist, exploratory, case study approach was chosen to analyze the till date successful implementation of the National Electronic Health Record (NEHR) initiative in Singapore. Based on both primary and secondary data, we report preliminary findings about the salience and institutional influences for key stakeholders in this context. This study contributes to research by extending stakeholder theory through including the dynamic view of institutional theory. Moreover, it can provide practitioners with insights to implement EHR programs for healthcare integration effectively.

Keywords: healthcare integration, National Electronic Health Record (NEHR), institutional theory, stakeholders, healthcare IT

1 INTRODUCTION

The past two decades in global healthcare have seen an aging of the population and increase in the average life expectancy (Lutz et al. 2008) alongside the rise of chronic diseases (Huber et al. 2011). Correspondingly, this has resulted in greater consumption of healthcare services, resources and hence expenditure (Porter 2013). The Organization for Economic Co-operation and Development (OECD) predicts that by 2060, healthcare expenditure of member countries will reach 9.5% of their Gross Domestic Product (GDP), up from the current 6% (OECD 2013). In tandem, patient centered care, recognized as being able to reduce financial costs (Bertakis and Azari 2011) and improve the quality of care (Robinson et al. 2008) has gained traction (Davis et al. 2005). However, this requires a level of coordinated care (Davis et al. 2005), which is challenging given the fragmented state of most countries' healthcare systems (Van Lerberghe 2008). Fragmentation also leads to degradation of care quality (Cebul et al. 2008) and increase in preventable medical errors (James 2013).

In response, efforts have been made to explore healthcare integration as a viable solution (Economist 2010), which can be defined as having a "high degree of collaboration and communication" between healthcare providers (APA 2014). Integration can improve delivery efficiency and cost efficiency by increasing interconnectivity among departments and organizations (Currie et al. 2011). It can also improve the effectiveness and quality of care for patients by fostering a continuum of care (Suter et al. 2009). Increasingly, these efforts have been leveraging on Health Information Technology (HIT) as seen in the increase of HIT assuming "central roles" in healthcare (Ryan et al., 2011).

Electronic Health Record (EHR) systems are a foundational HIT for healthcare integration, which seeks to support healthcare integration by facilitating the electronic transfer of patient medical information among different organizations (AHRQ 2014) so that health care encounters of each patient across a longitudinal period are seamlessly linked. Countries have invested large amounts of resources in EHR systems. For example, the UK National Health Service (NHS) has spent more than £10 billion on a patient medical record system so far (Syal 2013). However, even with the anticipated benefits and government-led initiatives for the implementation of EHR systems, their adoption and diffusion are persistently low and slow (Hung et al. 2014). For example, only 23.5% of physicians in the US had fully functional EHR systems in 2012 (Hsiao and Hing 2014).

A key challenge during the healthcare integration process is managing different stakeholders' involvement, their influences on each other (Shirey 2012) and potential change resistance (Hung et al. 2014). Consequently, there have been attempts to understand stakeholder relationships in healthcare integration (Yeow and Faraj 2011). However, these studies analyzed HIT issues within a specific organization such as a hospital (Hung et al. 2014) instead of at an inter-organizational, regional, or national context. Moreover, these studies focussed more on cases where HIT was not able to realize its envisioned potential, with a lack of understanding from successful cases (Hanseth et al. 2012). In order to address the above gaps, we propose the following research question:

How can EHR implementation among key stakeholders be managed for healthcare integration?

To address the research question, we chose to study the case of National Electronic Healthcare Record (NEHR) implementation in Singapore, as its healthcare system has been rated as the most efficient in the world by Bloomberg (2014). We are in the process of conducting a positivist, exploratory study on NEHR by employing the lenses of stakeholder and institutional theories. Specifically, stakeholder theory guides our identification of stakeholders and their salience, while institutional theory explains how stakeholders influence each other in NEHR implementation for healthcare integration. Our analysis shows how the relationships among stakeholders evolve during the NEHR implementation.

In terms of theoretical contributions, this study employs stakeholder theory to explain healthcare integration on a regional and nationwide basis, and hence extends the extant literature based on this theory. Moreover, we supplement stakeholder theory by incorporating the dynamic view of institutional theory. The expected practical implications include informing involved practitioners in order to enhance their understanding and management of the influences and inter-relationships of stakeholders in NEHR implementation for healthcare integration.

2 LITERATURE REVIEW AND THEORETICAL BACKGROUND

Stakeholder theory offers insights for healthcare integration by guiding the identification and prioritization of stakeholders. This is particularly important for healthcare integration, where multiple stakeholders with diverse interests are involved. On the other hand, institutional theory, which investigates the influence of external forces on organizations in a historical way, supplements the stakeholder view by incorporating the dynamics of healthcare integration (Currie 2009). In this section, relevant literature based on stakeholder and institutional theories will be reviewed followed by the creation of an integrative framework to explain the inter-relationships among stakeholders.

2.1 Stakeholder Theory

Stakeholder theory's origins have been largely credited to Freeman (1983). A stakeholder can be either an individual or a group (such as an organization) that can affect or is affected by an organization's actions (Brugha and Varvasovszky 2000) and resultantly have a "stake" or "claim" (Donaldson and Preston 1995). Considering the concurrent existence of various stakeholders, organizations need to weigh the priority of different stakeholders so that they can achieve clear management objectives. Mitchell et al. (1997) further discussed this issue and identified 3 attributes that each stakeholder can be characterized by. The first attribute is *power*, with which one party can get another to do something that they would not normally have done. The second attribute, *urgency*, refers to the degree to which stakeholder claims call for the immediate attention of the organization based on time sensitivity and criticality. The third attribute, *legitimacy*, refers to a generalized perception or an assumption that actions of a party are desirable and proper within some socially constructed system of norms, values, beliefs and definition.

Even though prior literature on healthcare integration has employed a stakeholder view (Hung et al. 2014), these studies analyzed HIT issues from an individual organization's perspective instead of at an inter-organizational, regional, or national level. Moreover, the studies largely focused on cases where HIT or EHR did not achieve the intended benefits and suffered failure. Thus, prior research has paid less attention to successful cases, which can provide useful insights about how to manage EHR implementation (Hanseth et al. 2012). In this study, we aim to address the above gaps by using the stakeholder lens supplemented by institutional theory to examine the implementation of NEHR, which is a national EHR program that has achieved initial success.

2.2 Institutional Theory

Institutional theory fundamentally seeks to explain the similar behaviors of organizations in a given environment even though initially there may have been greater diversity or that such behaviors may not be efficient and hence appear illogical (DiMaggio and Powell 1983). Institutions as defined by Hodgson (2006) are systems of established and embedded social rules that structure social interactions. This relates to organizations in that they are interactive participants in such an institution given their established boundaries. *Isomorphic pressures* exerted on organizations are proposed to determine these interactions, where there exist three kinds of pressures: coercive, mimetic, and normative pressures (DiMaggio and Powell 1983). *Coercive pressure* refers to pressure from entities who have resources on which an organization depends. *Mimetic pressure* refers to pressure to imitate or copy other successful organizations when an organization is uncertain about what to do. *Normative pressure* refers to pressure to follow professional standards and practices established by education and training methods, professional networks, and movement of employees among firms. Researchers have observed isomorphic pressures in healthcare IT implementation e.g., Currie (2009), Jensen et al. (2009). However, the prior work has utilized this perspective to explain how hospitals influence each other in healthcare IT adoption, rather than for examining the implementation of healthcare IT in a large scale e.g., national, effort as in our study. Seen from the perspective of a focal organization, external power or pressures can be reflected through the *institutional environment*.

In addition to isomorphic pressures from other entities, the existence of *institutional logics*, which are defined as principles held by individual stakeholders collectively, also influence the behaviors,

beliefs and daily activities of stakeholders (Reay and Hinings 2009). Yeow and Faraj (2011) note that in any healthcare environment, there exist two vastly polarized institutional logics: *professionalism* and *market-managerialism logics*. The former prioritizes patient issues and healthcare as a profession while the latter perceives healthcare from a business perspective. Currie and Guah (2007) used these logics to explain the stagnation of the National Programme for IT within an organization in the UK, which impeded the subsequent implementation of EHR.

2.3 Integrative Framework

The combination of institutional and stakeholder theories is mutually advantageous because they share commonalities (Doh and Guay 2006). Accordingly, we suggest that stakeholder theory provides attributes to describe the salience of stakeholders, while institutional theory helps to identify the pressures through which organizational stakeholders mutually influence each other. For example, the power attribute of stakeholder salience is related to coercive pressures the stakeholder exerts in its external environment, while legitimacy can be used to explain normative pressures related to institutional logics. By weaving these theoretical lenses together, we aim to form a comprehensive viewpoint of national healthcare integration, especially for the implementation of NEHR. Figure 1 shows our theoretical framework integrating stakeholder and institutional theories.

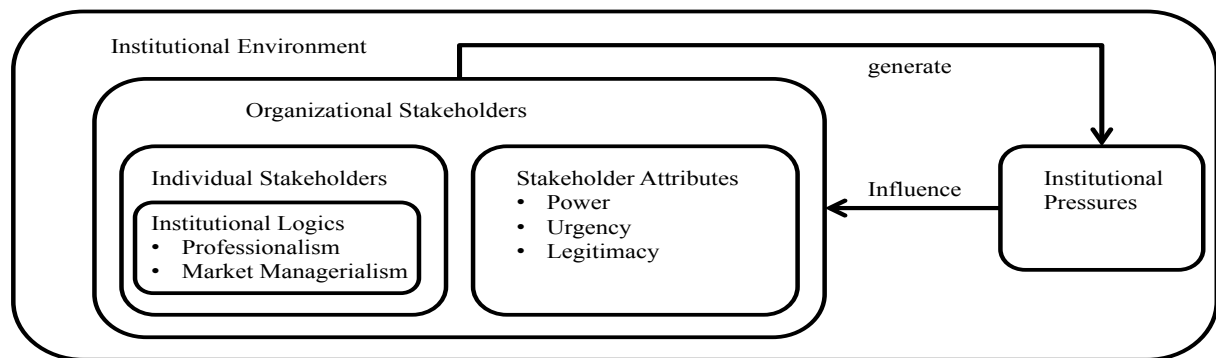


Figure 1 Theoretical Framework

3 METHODOLOGY

Healthcare integration through NEHR reflects a "complex real-life activity" within the context or environment of a country or an area. To investigate this process, the case study approach was selected because of its ability to study a phenomenal occurrence in a given context (Yin 2014). Based on stakeholder and institutional theories, a positivist approach is followed to form a substantial ground for a systematic study of relevant issues while at the same time an exploratory view is also adopted to enrich the findings.

In Bloomberg's annual ranking of countries with the most efficient health care in 2014, Singapore was ranked as having the most efficient healthcare in the world (Bloomberg 2014)¹, which provides an appropriate success case for our study. Singapore is implementing the National Electronic Healthcare Record (NEHR) in an integrated care vision of Regional Health Service (RHS) clusters. Currently it has achieved initial success and is moving towards the next stage for a wider implementation. The success of the NEHR roll out thus far is considered a revelatory case, one that warrants a single case study design (Yin 2014).

¹ The criteria for this ranking are life expectancy, healthcare cost as percentage of GDP, healthcare cost per capital, change in life expectancy, change in healthcare cost per capital, change in healthcare cost per capital (percentage), change in GDP per capital, and inflation of a country. Singapore has achieved high life expectancy while keeping healthcare cost as percentage of GDP low, thus obtaining the topmost rank in 2014.

In order to gain a holistic understanding of the case (Noor 2008) as well as to instantiate our framework of Figure 1, data from both primary and secondary sources are being collected. Primary data is being collected through interviewing key personnel of different organizations involved in the NEHR implementation, while secondary data is obtained from public documents, such as policies, presentations, and news articles.

To augment the collected secondary data, we have interviewed 10 personnel at management level or higher across the Ministry of Health (MOH), Ministry of Health Holdings (MOHH), Agency of Integrated Care (AIC), Integrated Health Information Systems (IHIS) and Acute Public Hospitals. In addition, we have also interviewed 3 doctors among General Practitioners practices (GP) and from Family Medicine Clinics (FMC). These interviews serve to uncover additional perceptual information and personal stakeholder viewpoints absent in the secondary data, refine issues to be explored for subsequent interviews and enable findings triangulation so that the study remains objective and biasness is reduced.

The analysis is being carried out through an inductive process. Prior to data collection, a set of a-priori codes were compiled from existing literature of stakeholder and institutional theories to form our preliminary research framework of Figure 1. Thereafter, through an iterative process, findings emerging from our analysis of primary and secondary data sources are being used to instantiate and refine the initial research framework (Eisenhardt 1989). This rigorous process ensures our research quality.

3.1 Case Description

Singapore is a developed Asian city state with a population of 5.47 million (DOS 2014) and is regarded as having an effective healthcare system even when contrasted to other developed nations (Abeyasinghe et al. 2010). This can be attributed in part to the government's policies that attempt to balance both the public and private healthcare interests (Abeyasinghe et al. 2010).

Singapore aims to achieve its national integrated care vision through the RHS framework. The framework encompasses 6 clusters that are spread across the island (“regions”) with each cluster offering a comprehensive set of healthcare services (from primary to long term care). Thus, patients need not travel outside each region to seek further medical services. Each region will be anchored by an acute public hospital that works closely with other healthcare organizations, government agencies, and volunteers, with participants from both the public and private sectors.

Critical to this integrated care vision is the implementation of a NEHR, an EHR system which would allow patients to transit seamlessly between care organizations as per NEHR’s “One Patient – One Record” mission (Kwee 2009). NEHR seeks to build a longitudinal care dossier centered around each patient (Kwee 2009) by extracting and consolidating all relevant healthcare information through the secure flow of information between organizations. As NEHR is provider agnostic, it is intended to be used by all public and private healthcare providers (Muttitt et al. 2012). As of September 2014, NEHR has been rolled out to all public hospitals, specialist centres, polyclinics, several community hospitals, nursing homes and 230 GPs (CNA 2014). In total, 280 healthcare institutions and 14,000 clinicians have access to the NEHR (CNA 2014). In terms of its time, cost, and scope goals, currently the NEHR implementation can be considered as an initial success. By examining how the NEHR is being implemented and managed among different stakeholders, we aim to form a better understanding of how IT can be implemented to support healthcare integration among multiple healthcare stakeholders.

4 PRELIMINARY FINDINGS

At first, we identified the stakeholders involved in the healthcare integration through NEHR. At the organization level, there are: (1) Acute public hospital systems, which are at the center of the RHS cluster; (2) Other healthcare providers in each cluster, such as Community Hospitals, FMCs, GPs, Nursing Homes, and Polyclinics; (3) Public agencies in charge of the implementation of NEHR, such as MOHH, MOH, and IHIS. We also identify individuals who are salient in the NEHR implementation, such as CMIOs (Chief Medical Information Officer) of hospitals, healthcare

professionals (e.g., doctors) and patients. We also identified influence relationships among organizational stakeholders based on our data, which are summarized in Figure 2.

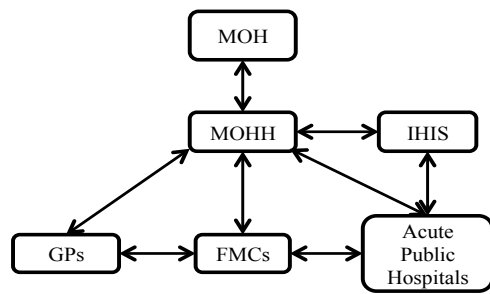


Figure 2 Relationship of Stakeholders

Furthermore, in order to gain historical insights in our institutional analysis of the implementation of NEHR, we divide its progress into four phases. The first phase is pre-NEHR (before 2009), with a focus on NEHR planning and requirements collection. The second phase, NEHR Phase 1 (beginning in 2010), mainly focused on involving public healthcare providers. The third phase, NEHR Phase 2 which was started in 2012, is aimed at bringing private healthcare providers on board. In the last phase, NEHR Phase 2+ (2015 onwards), the emphasis is to utilize the healthcare information in NEHR to provide clinical analytics and better decision support tools for clinicians.

At the start of our case study, we first analysed the linkage between MOHH and the acute public hospitals, which are the most salient stakeholders during the NEHR phase 1. We will describe this dyad first followed by complete analysis of the other linkages in our continuing research. Here we derive and show in Figure 3 the influences between MOHH and acute public hospitals during phase 1 as an instance of how stakeholder attributes influence institutional pressures for the implementation of NEHR (the interview quotes as evidence are provided in Table 1).

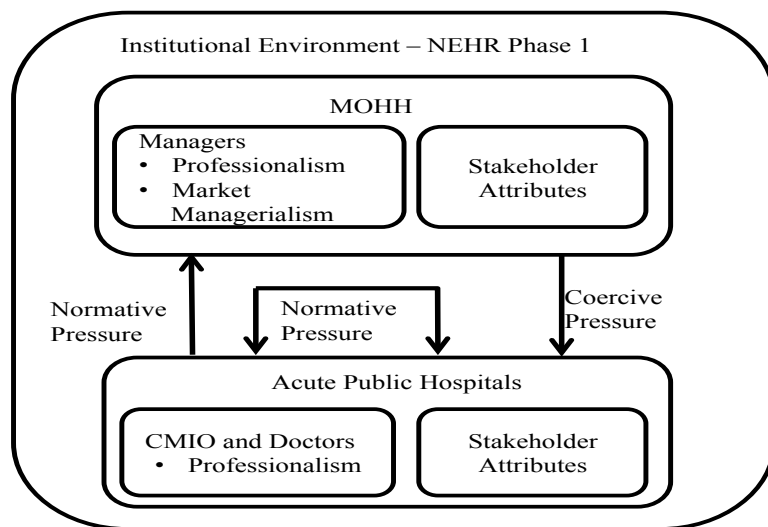


Figure 3 Stakeholder Attributes and Institutional Pressures of MOHH and Acute Public Hospitals

Before we clarify the institutional pressures, we describe the stakeholder attributes, which partly determine the institutional pressures as per the theoretical framework. Since the focus of this phase is on how MOHH engaged (bought-in) public healthcare providers in the NEHR effort, we choose MOHH as the focal organization to examine the salience of acute public hospitals in this effort. In terms of *power*, on one hand, since the content of EHR is largely obtained from acute public hospitals, these hospitals hold higher power in the NEHR implementation than other healthcare providers. On the other hand, in terms of this dyad, as MOHH has been appointed by the MOH to be the holding company of all public healthcare assets and the leader for the NEHR effort, acute public hospitals hold lower power than MOHH. In terms of *urgency*, in order to alleviate the rapidly increasing healthcare burden, acute hospitals have high urgency to achieve integrated healthcare for successful

transfer of care to other providers (e.g., FMCs) and hence implement NEHR. Moreover, whether NEHR can provide accurate information and ensure work efficiency is critical for doctors in acute public hospitals, since they need to serve many patients everyday and have limited time for each patient. In terms of *legitimacy*, since acute public hospitals are explicitly claimed as the anchor for RHS and serve as the hub for each cluster, they hold high legitimacy in the NEHR effort. Further, as most of Singapore's population uses public healthcare services and public institutions hold the majority of health records, acute hospitals with the necessary data are best positioned to contribute to the NEHR. In sum, acute public hospitals hold high salience in the first phase of NEHR implementation.

We now describe the institutional pressures from the perspectives of both MOHH and acute public hospitals. For acute public hospitals, since MOHH holds higher *power* in the public healthcare systems, and these hospitals depend on the resources from MOHH to implement NEHR, they experience *coercive pressure* from MOHH to join the NEHR effort. On the other hand, for MOHH, since acute public hospitals have high *legitimacy* and *urgency* during this phase, and CMIO and doctors hold professional skills in healthcare, they can place *normative pressure* on MOHH, which drives MOHH to improve the NEHR design according to their professional requirements. This normative pressure from acute public hospitals benefits the design of NEHR to make it fit healthcare demands better and hence enhances the odds of successful implementation of NEHR. Moreover, it also alleviates the conflicts between the institutional logic of acute public hospitals and that of MOHH managers. Specifically, CMIO and doctors in acute public hospitals mainly subscribe to *professionalism logic*, while MOHH managers follows both *professionalism* and *market managerialism logics*. At the same time, doctors in acute public hospitals also experience *normative pressure* from CMIOs to increase the use of NEHR, as the CMIO is professional in both healthcare and technology. Sample quotes for these findings are listed in Table 1.

Stakeholders	Code	Quote	Source
MOHH	Power	It (MOHH) is the effector arm of policies.	1
		It (MOHH) is the holding company of Singapore's public healthcare assets. (- from presentations)	2
	Institutional Logics	Professionalism: We're (Ministry) investing in a base system and doing it because we believe that it is the right thing to do (for healthcare).	3
		Market Managerialism: If it is going to cost us significantly to build another polyclinic, cheaper to just partner with private provider.	
Acute Public Hospitals	Power	(What you going to put into NEHR) will depend very much on all these hospitals (Acute public hospitals) and what they ... put in there.	4
	Urgency	Doctors need to turn around very fast... As such constrained during that short time, it is very critical to have the appropriate, right information. They need selective information. At the same time, doctors have limited time to add all details. (- from meeting minutes)	5
	Legitimacy	It has a set of primary care services, community services that build around the RH (regional hospital) to provide a core set of providers.	3
		The NEHR is successful thus far because a lot of Singaporeans go to public health institutions...It (NEHR) started off with public health institutions and initially captured more than 90% of the population's healthcare data. (- from meeting minutes)	6
	Institutional Logics	From my perspective, patient care comes first, and we aim to do that and then if they can pay us, that's good.	4
MOHH -> Acute Public	Coercive Pressure	When the instruction/the policy directions have been made at the government level...you're with it.	7

Hospitals		It was planned, designed and managed, top-down from here (MOHH).	
Acute Public Hospitals (CMIO, Doctors) -> MOHH	Normative Pressure	(CMIO) They will specify ... their requirements on what they want, right down to how things are displayed on screens. (- <i>from meeting minutes</i>)	5
		Every time they (MOHH) launch one version they make us (Doctors) test it.	8
CMIO -> Doctors	Normative Pressure	I (CMIO) am also supposed to be the change champion (in the hospitals).	8

Table 1 Examples of Quotes for Codes

(*Source 1-MOH Senior Clinician; 2-MOHH Manager A; 3-MOHH Manager B; 4-GP Doctor; 5-IHIS Senior Manager A; 6-MOHH Senior Clinician; 7-MOHH Senior Manager; 8-Acute Public Hospital Senior Clinician)

5 EXPECTED CONTRIBUTION

This study intends to contribute to both theory and practice. In terms of research contributions, this study aims to extend the stakeholder theory through employing it to explain healthcare integration through NEHR on a national basis. Stakeholder literature in healthcare integration has typically focussed on single organizations (Hung et al. 2014), rather than examining HIT implementations across multiple organizations. Additionally, we aim to supplement the perspective of stakeholder theory by incorporating the dynamic view from institutional theory, which guides us in understanding the NEHR implementation.

On the other hand, our study will also provide practical implications for healthcare integration through IT. First, this study aims to clarify how various stakeholders are influenced in the implementation of NEHR, so practitioners can gain insights from this study to better understand the ways to garner buy-in from stakeholders for such large-scale healthcare integration efforts, e.g., utilizing different institutional pressures to engage different stakeholder so as to realize desired integration outcomes. Second, this study will provide government agencies with insights into the appropriate integration policies. Last, aspects of our proposed framework can be adapted for future, larger scale healthcare integration implementations.

6 FUTURE WORK

At first, more data will be collected from stakeholders and clusters involved in the various NEHR phases to enrich our findings. Second, the codes derived from stakeholder and institutional theories will be employed to analyze the collected data. Specifically, the theoretical framework used in the previous section will be expanded to capture NEHR issues and challenges, enacted resolutions and the resulting outcomes.

By instantiating this framework for the various NEHR phases, analysis of other linkages among the remaining stakeholders can be realized. This can then form a comprehensive picture of how stakeholders influence and are influenced in the implementation of NEHR across a longitudinal period through multiple phases. This process will also reflect the linkages between stakeholder and institutional theories alongside with HIT related matters. Last, we intend to carry out a comparison with NEHR implementations in other countries e.g., the UK, to supplement our findings.

References

- Abeysinghe, T., Himani, & Lim, J. (2010). Singapore's healthcare financing: Some challenges. Department of Economics, National University of Singapore. Retrieved from <http://courses.nus.edu.sg/course/ecstabey/Singapore%20health%20chapter-earlier%20version.pdf>
- AHRQ. (2014). Health Information Technology Integration. 2014, from <http://www.ahrq.gov/professionals/prevention-chronic-care/improve/health-it/>

- APA. (2014). Health Care Reform: Integrated Health Care. 2014, from <http://www.apa.org/about/gr/issues/health-care/integrated.aspx>
- Bertakis, K. D., & Azari, R. (2011). Patient-centered care is associated with decreased health care utilization. *The Journal of the American Board of Family Medicine*, 24(3), 229-239.
- Bloomberg. (2014). Most Efficient Health Care 2014: Countries. from <http://www.bloomberg.com/visual-data/best-and-worst/most-efficient-health-care-2014-countries>
- Brugha, R., & Varvasovszky, Z. (2000). Stakeholder analysis: a review. *Health policy and planning*, 15(3), 239-246.
- Cebul, R. D., Rebitzer, J. B., Taylor, L. J., & Votruba, M. (2008). Organizational fragmentation and care quality in the US health care system: National Bureau of Economic Research.
- CNA. (2014). IT helping to address Singapore's evolving healthcare needs: Gan. Retrieved from <http://www.channelnewsasia.com/news/health/it-helping-to-address/1362576.html>
- Currie, W. (2009). Contextualising the IT artefact: towards a wider research agenda for IS using institutional theory. *Information Technology & People*, 22(1), 63-77.
- Currie, W. L., & Guah, M. W. (2007). Conflicting institutional logics: a national programme for IT in the organisational field of healthcare. *Journal of Information Technology*, 22(3), 235-247.
- Currie, W. L., Finnegan, D. J., & Koshy, M. A. (2011). Applying sense-making to integrated health IT: Renal care in the UK and Sweden. Paper presented at the AMCIS 2011 Proceedings - All Submissions. Paper 243.
- Davis, K., Schoenbaum, S. C., & Audet, A. M. (2005). A 2020 vision of patient-centered primary care. *Journal of general internal medicine*, 20(10), 953-957.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American sociological review*, 147-160.
- Doh, J. P., & Guay, T. R. (2006). Corporate Social Responsibility, Public Policy, and NGO Activism in Europe and the United States: An Institutional-Stakeholder Perspective. *Journal of Management Studies*, 43(1), 47-73.
- Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of management review*, 20(1), 65-91.
- DOS. (2014). Latest Key Indicators. 2014, from <http://www.singstat.gov.sg/>
- Economist, T. (2010). The future of global healthcare delivery and management. <http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/Global-healthcare-delivery-management-O-201010.pdf>
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(4), 532-550.
- Freeman, R. E. (1983). Strategic management: A stakeholder approach. *Advances in strategic management*, 1(1), 31-60.
- Hanseth, O., Bygstad, B., Ellingsen, G., Johannessen, L. K., & Larsen, E. (2012). ICT standardization strategies and service innovation in health care. Paper presented at the Thirty Third International Conference on Information Systems, Orlando.
- Hawley, A. (1968). Human Ecology in: Sills, DL (ed.) *International Encyclopedia of the Social Sciences*: New York: Macmillan.
- Hodgson, G. M. (2006). What Are Institutions? *Journal of Economic Issues*, 40(1), 1-25. doi: 10.2307/4228221
- Hsiao C., & Hing E. (2014). Use and Characteristics of Electronic Health Record Systems among office-based offician practices: United States, 2001-2013. NCHS Data Brief, Jan 2014, No. 143. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db143.pdf> on Feb 25, 2015
- Huber, M., Knottnerus, J. A., Green, L., Horst, H. v. d., Jadad, A. R., Kromhout, D., . . . Meer, J. W. v. d. (2011). How should we define health? *BMJ-British Medical Journal*, 343(6), d4163.
- Hung, S.-Y., Chen, C., & Wang, K.-H. (2014). Critical Success Factors for the Implementation of Integrated Healthcare Information Systems Projects: An Organizational Fit Perspective. *Communications of the Association for Information Systems*, 34(1), 39.
- James, J. T. (2013). A new, evidence-based estimate of patient harms associated with hospital care. *Journal of patient safety*, 9(3), 122-128.

- Jensen, T. B., Kjærgaard, A., & Svejvig, P. (2009). Using institutional theory with sensemaking theory: a case study of information system implementation in healthcare. *Journal of Information Technology*, 24(4), 343-353.
- Kwee, H. H. (2009). Transforming Healthcare Delivery in Singapore. SMA News: Ministry of Health.
- Lutz, W., Sanderson, W., & Scherbov, S. (2008). The coming acceleration of global population ageing. *Nature*, 451(7179), 716-719.
- Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of management review*, 22(4), 853-886.
- Noor, K. B. (2008). Case study: a strategic research methodology. *American Journal of Applied Sciences*, 5(11), 1602.
- OECD. (2013). What Future for Health Spending? OECD Economics Department Policy Notes, Economics Department Policy Notes(19).
- Porter, E. (2013). A World of Rising Health Care Costs. *New York Times*. Retrieved from http://economix.blogs.nytimes.com/2013/06/27/a-world-of-rising-health-care-costs/?_php=true&_type=blogs&_r=1
- Reay, T., & Hinings, C. R. (2009). Managing the rivalry of competing institutional logics. *Organization Studies*, 30(6), 629-652.
- Robinson, J. H., Callister, L. C., Berry, J. A., & Dearing, K. A. (2008). Patient-centered care and adherence: Definitions and applications to improve outcomes. *Journal of the American Academy of Nurse Practitioners*, 20(12), 600-607.
- Ryan, J., Doster, B., Daily, S., & Lewis, C. (2011). Perioperative Patient Transparency and Accountability via Integrated Hospital Information Systems. Paper presented at the AMCIS 2011 Proceedings - All Submissions. Paper 421.
- Shirey, M. R. (2012). Stakeholder analysis and mapping as targeted communication strategy. *Journal of Nursing Administration*, 42(9), 399-403.
- Suter, E., Oelke, N. D., Adair, C. E., & Armitage, G. D. (2009). Ten key principles for successful health systems integration. *Healthcare quarterly (Toronto, Ont.)*, 13(Spec No), 16.
- Syal, R. (2013). Abandoned NHS IT system has cost £10bn so far. *The Guardian*. Retrieved from <http://www.theguardian.com/society/2013/sep/18/nhs-records-system-10bn>
- Tobin, R. (2010). Descriptive case study. *Encyclopedia of case study research*, 289-290.
- Van Lerberghe, W. (2008). The world health report 2008: primary health care: now more than ever: World Health Organization.
- Yeow, A., & Faraj, S. (2011). Microprocesses of healthcare technology implementation under competing institutional logics.
- Yin, R. K. (2014). *Case study research: Design and methods*: Sage publications.