

Improving information sharing in Chinese hospitals with Electronic medical record: The Resource-Based View and Social Capital Theory Perspective

Honglei Li¹[0000-0003-3126-0764] and Julie Walters¹

¹ Northumbria University, Newcastle Upon Tyne, NE1 8ST, United Kingdom
Honglei.li@northumbria.ac.uk

Abstract. This research aims to investigate how the usage of electronic medical records can facilitate the intra-organizational information sharing in Chinese hospitals. Based on the resource-based view and social capital theory, a specifically designed questionnaire was sent to fifty subjects in a large hospital in China. Results from the survey demonstrated that 1) EMR augmented social capitals of employees from the structural dimension, cognitive ability dimension and relation-based motivation dimension; 2) EMR generated two IT-enabled intangibles - information synergy between departments and knowledge assets of the hospital.

Keywords: Case Study, electronic medical record, intra-organizational information sharing, social capital theory, the resource-based view

1 Introduction

An electronic medical record (EMR) refers to a repository of patient and citizenry's electronically stored health information in a digital format which can store a range of data in patients' electronic clinical documentation, including the patients' medical history, immunization status, medication and allergies, radiology images, laboratory test results and personal statistics such as weight and age [1]. Apart from storing patients' electronic clinical records, EMR forms a complete health information system (HIS) with hospitals' established systems such as decision support systems (DSS), picture archiving and communication systems (PACS) and computerized physician order entry (CPOE) [2]. Since the information stored in EMR can be shared immediately and accurately cross all departments of a hospital to facilitate intra-organizational communication and clinical research, EMR now plays a significant role in hospitals' information system network and has been regarded as a key foundational facilitator to enhance the quality and safety of healthcare in China. Most important of all, several sources have indicated that EMR has the potential of facilitating cross-boundary information sharing and integration within hospitals [3, 4].

Information sharing has been reported to have multiple benefits including acquiring and retaining competitive advantages [5], prompting inter-department collaboration inside organization [6], passing on tacit knowledge [7-9], and promoting social interactions among employees [10]. It has also been reported that information and knowledge

sharing in the hospital can elevate the quality and efficiency of healthcare in hospitals [11]. Moreover, information sharing can also facilitate organizational learning to make hospitals increase innovative knowledge for long-term success [12]. Despite there are many benefits reported for the benefits information sharing, there lacks a theoretical framework to explain the rationale and logic of intra-organizational information sharing, especially in the health industry. The nature research question to ask is why information sharing, especially the information sharing in hospitals can facilitate organizational competitive advantages?

This paper proposed that the social capital theory from the employee level and the resource-based view from the organizational level could answer the research question. A case study was conducted in a large capital hospital in the Central China and 50 respondents have filled in the questionnaire. The social capitals have been measured from three dimensions, structural, cognitive ability, and relation-based motivation. The regression analysis with SPSS 22.0 has proved information sharing through the EMR has augmented the social capitals of employees inside an organization and the overall resources of the hospital have been increased. Specifically, results from the survey demonstrated that 1) EMR augmented social capitals of employees from the structural dimension, cognitive ability dimension and relation-based motivation dimension; 2) EMR generated two IT-enabled intangibles - information synergy between departments and knowledge assets of the hospital. This research implicates that in large Chinese hospitals, in the individual level, EMR is able to make clinicians get access to more sources of information and knowledge to increase their working efficiency and make the right decision; in organizational level, EMR helps Chinese hospitals achieve effective cross-boundary information sharing and integration and promotes organizational learning and organizational memory in these hospitals.

2 Literature Review

Since the introduction of Electronic Medical Records (EMR) has been regarded as one of the most important information technology initiatives in the healthcare industry, a number of existing researchers [4, 13-16] have proved EMR's capability in improving performance of healthcare organizations. However, few studies have considered how the use of EMR systems could improve information sharing performance in Chinese hospitals. This study will focus on a large affiliated hospital of a Chinese University, which is the largest hospital in a province in the middle area of China. Due to the size and number of departments this hospital relies on a bureaucratic structure to coordinate its complex systems [17].

A number of studies have considered information sharing within bureaucratic organizations which have a formal structure. Several problems with sharing information in an organization of this type have been identified. Many bureaucratic organizations are divided by hierarchy and departments [18], which has been identified as creating barriers and obstacles that block information sharing activities of an organization [17] [9]. The number of complex regulations and processes associated with bureaucratic organizations is also cited as a barrier to sharing information [17].

From the definition provided by Bourdieu and Wacquant [19], social capital is the aggregate of physical or virtual resources which belong to a person or a community by means of holding a durable network of more or less institutionalized relationships of mutual acquaintance and recognition. On the personal level, social capital allows an individual to take advantage of resources from other individuals of the networks to which he or she belongs. As the social capital theory suggested, social capital, the network of relationships owned by a person or a network and the resources embedded in it, significantly affects the extent to which inter-personal information sharing happens [20]. From the research paper of Sherif, Hoffman and Tomas [21], IT contributes to building up social capital, which, in turn, helps the generation and sharing of information; organizations adopting IT seem to be able to capture and diffuse information more effectively than others. Based on the three-dimensional framework of social capital, benefits from IT applications on social capital can be reflected in the corresponding three aspects. On the structural dimension, IT provides a structural opportunity to make network members able to locate, communicate, or cooperate with each other. Since several IT applications are projected to augment social capital through bridging temporal and spatial boundaries by driving individuals conscious of each other or of artefacts others have produced [22]; With IT implementation, employees are connected to more network members who have a greater capability to capture information with both high quantity and quality at a low cost [23].

At the organizational level, as Wernerfelt [24] pointed out, the resource-based view is a basis for an organization to acquire competitive advantages through applying a number of useful resources at the organization's disposal. Grant [25] categorized resources of organizations into personal based (knowledge assets and technical knowhow), tangible (physical assets and financial capital) and intangible resources (product quality, reputation and brand image). As Barney [26] pointed out, if the resources required to create, develop and execute strategies are heterogeneously located across organizations and these organizational distinctions will not change in a short period, the organizations holding these resources could acquire competitive advantages. According to the VRIN model, if some resources of an organization are valuable (enable an organization to apply a value-creating strategy), rare (rare by definition), inimitable (difficult to be duplicated) and non-substitutable (difficult to find substitutes), through effective assembling, integration and deployment of these valuable resources the organization could convert a short-term competitive advantage into a persistent competitive advantage [27].

3 Research Method and Analysis Results

A proposed research framework in Figure 1 is presented and detailed explanations not given here due to word limit. Social capital theory and resource-based view are adopted at the theoretical lens respectively at the micro level and macro level. Questionnaires were sent to fifty employees in a large hospital in the capital city in China. The respondents include 15 doctors, 20 nurses, 12 administrative staffs and 3 other staffs. A large proportion of the respondents are female (40/50) because there are few

male nurses in the hospital. Due to the fact that younger employees are familiar with and able to use information systems readily, most respondents (40/50) are under the age of 40 and have worked for the hospital for 1 to 10 years. In this research, social capital of organizational members was measured by three dimensions: structural dimension, cognitive dimension and relational dimension. Each of these dimensions was measured by one or few questions in the questionnaire. Likewise, resource utilization was measured by two types of IT-intangibles which information synergy and knowledge assets are, and questions were designed to measure these IT-intangibles. As the research applied a seven-point style scale to design the closed questions, each option was counted by a number from 3 to -3 (Strongly agree = 3, agree = 2, partly agree = 1, neutral = 0, partly disagree = -1, disagree = -2, strongly disagree = -3). The results are demonstrated in figure 2 and figure 3 (IS = information synergy, SO = structural opportunity, CA = cognitive ability, RM = relational motivation). Weight least square was used to establish regression equation and the reciprocal of residual was chosen to remove the issue of heteroscedasticity of the independent variables. All of the data has been normalized as the gap between individual figure and mean of series divided by series standard deviation.

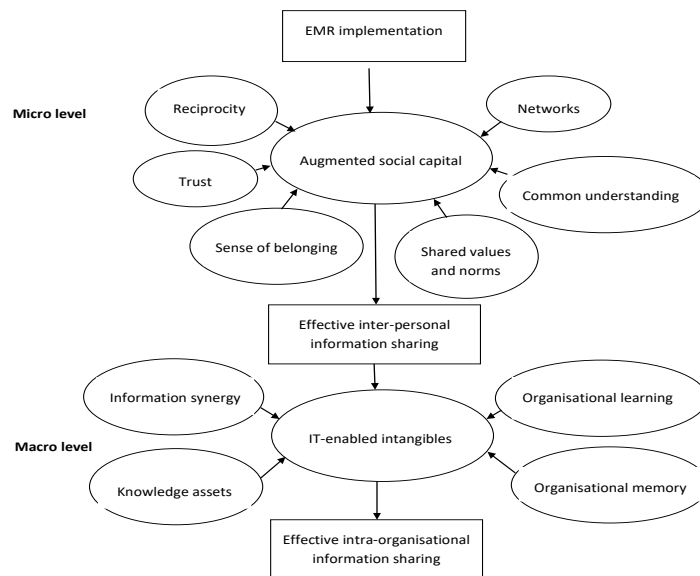


Figure 1. A theoretical framework of EMR's impacts on information sharing

Regression with SPSS has shown that EMR's capability on providing structural opportunities can significantly affect information synergy and knowledge assets (effect size 0.39&0.38). Meanwhile, relational motivation to share information and knowledge are also positively influencing information synergy and knowledge assets (0.21&0.17 effect size).

References

1. Gunter, T.D. and N.P. Terry, *The emergence of national electronic health record architectures in the United States and Australia: models, costs, and questions*. Journal of medical Internet research, 2005. **7**(1).
2. Li, J.-S., et al., *The Meaningful Use of EMR in Chinese Hospitals: A Case Study on Curbing Antibiotic Abuse*. Journal of Medical Systems, 2013. **37**(2): p. 9937.
3. Häyrynen, K., K. Saranto, and P. Nykänen, *Definition, structure, content, use and impacts of electronic health records: A review of the research literature*. International Journal of Medical Informatics, 2008. **77**(5): p. 291-304.
4. Yang, P., et al., *The effect of electronic medical record application on the length of stay in a Chinese general hospital: a department- and disease-focused interrupted time-series study*. Journal of Medical Systems, 2014. **38**(5): p. 53.
5. Han, B.M. and V.S. Anantatmula, *Knowledge sharing in large IT organizations: a case study*. Vine, 2007. **37**(4): p. 421-439.
6. Dewett, T. and G.R. Jones, *The role of information technology in the organization: a review, model, and assessment*. Journal of management, 2001. **27**(3): p. 313-346.
7. Klischewski, R. and H.J. Scholl, *Information quality as capstone in negotiating e-government integration, interoperation and information sharing*. Electronic Government, an International Journal, 2008. **5**(2): p. 203-225.
8. Nonaka, I. and H. Takeuchi, *The Knowledge Creating*. New York, 1995.
9. Willem, A. and M. Buelens, *Knowledge sharing in public sector organizations: The effect of organizational characteristics on interdepartmental knowledge sharing*. Journal of public administration research and theory, 2007. **17**(4): p. 581-606.
10. Zawawi, A.A., et al., *The study of barrier factors in knowledge sharing: A case study in public university*. Management Science and Engineering, 2011. **5**(1): p. 59-70.
11. Ryu, S., S.H. Ho, and I. Han, *Knowledge sharing behavior of physicians in hospitals*. Expert Systems with applications, 2003. **25**(1): p. 113-122.
12. Yang, J.-t., *The impact of knowledge sharing on organizational learning and effectiveness*. Journal of Knowledge Management, 2007. **11**(2): p. 83-90.
13. Adams, W.G., A.M. Mann, and H. Bauchner, *Use of an electronic medical record improves the quality of urban pediatric primary care*. Pediatrics, 2003. **111**(3): p. 626-632.
14. Hillestad, R., et al., *Can electronic medical record systems transform health care? Potential health benefits, savings, and costs*. Health affairs, 2005. **24**(5): p. 1103-1117.
15. Xue, Y., et al., *Effects of electronic medical record in a Chinese hospital: a time series study*. International journal of medical informatics, 2012. **81**(10): p. 683-689.

16. Shi, C., et al. *Current Electronic Medical Record in China*. in *2014 IEEE 38th International Computer Software and Applications Conference Workshops*. 2014.
17. Tsai, W., *Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing*. *Organization science*, 2002. **13**(2): p. 179-190.
18. Miller, D. and C. Dröge, *Psychological and traditional determinants of structure*. *Administrative science quarterly*, 1986: p. 539-560.
19. Bourdieu, P. and L. Wacquant, *An Invitation to Reflexive Sociology*. 1992: Chicago und London: The University of Chicago Press.
20. Nahapiet, J. and S. Ghoshal, *Social capital, intellectual capital, and the organizational advantage*. *Academy of management review*, 1998. **23**(2): p. 242-266.
21. Sherif, K., J. Hoffman, and B. Thomas, *Can technology build organizational social capital? The case of a global IT consulting firm*. *Information & management*, 2006. **43**(7): p. 795-804.
22. Huysman, M. and V. Wulf, *Social capital and information technology*. 2004: Mit Press.
23. Ahuja, M.K., D.F. Galletta, and K.M. Carley, *Individual centrality and performance in virtual R&D groups: An empirical study*. *Management science*, 2003. **49**(1): p. 21-38.
24. Wernerfelt, B., *A resource - based view of the firm*. *Strategic management journal*, 1984. **5**(2): p. 171-180.
25. Grant, R.M., *Toward a knowledge - based theory of the firm*. *Strategic management journal*, 1996. **17**(S2): p. 109-122.
26. Barney, J., *Firm resources and sustained competitive advantage*. *Journal of management*, 1991. **17**(1): p. 99-120.
27. Peteraf, M.A., *The cornerstones of competitive advantage: a resource - based view*. *Strategic management journal*, 1993. **14**(3): p. 179-191.