



Technology alignment in the presence of regulatory changes: The case of meaningful use of information technology in healthcare

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ARTICLE INFO

Keywords:

Strategic IT alignment
Planning sophistication
IT adoption strategies
IT use
Empirical methods

ABSTRACT

Objectives: Using the context of the healthcare sector, this study examines the impact of regulatory change on technology implementation and use. Hospitals are now federally mandated to showcase meaningful use of information technology (IT). We theorize that IT plan scope structured prior to a regulatory change by means of a long-term planning horizon, top management involvement, and steering committee engagement impacts organizations' ability to fulfill meaningful use requirements three to five years later. Furthermore, we contend that this impact is contingent on the specific IT adoption strategy.

Methods: Data from the HIMSS and HITECH Act databases were combined to analyze 688 hospitals. Regression analyses were used to test the hypotheses.

Results: The results of this longitudinal study show that frequency of steering committee meetings and length of planning horizon broaden IT plan scope. Broader IT plan scope is positively associated with the ability of organizations to meaningfully use IT.

Conclusions: The link between IT plan scope and meaningful use metric is particularly significant for organizations that adopt a more integrated approach towards IT adoption. Average reimbursement amount differences are provided and discussed between the different IT adoption strategies.

1. Introduction

Strategic IT alignment has been an area of active research investigation. Several scholarly studies have shown alignment to be an important managerial concern [1,2] and have documented its value to a firm in the form of increased sales revenue and profitability [3–5], improved operational efficiency and cost reductions [3,4] and customer value [5]. IT planning and alignment are important to develop a robust IT strategy [6–9].

Strategic IT alignment has been conceptualized in several ways in extant literature. According to Reich and Benbasat [10], alignment refers to the degree to which the mission, objectives, and plans contained in the business strategy are reflected in the IT strategy. Benbya and McKelvey [11, p. 263] conceptualize IT alignment to comprise of a strategic dimension (e.g., the alignment of IS strategy with business strategy), an operational dimension (e.g., alignment between organizational structure and IS structure as well as the alignment between actors' communication and degree of involvement with IS strategy domains), and an individual dimension (e.g., alignment between IS

infrastructure and user's needs). Chan and Reich [12] note that alignment leads to more focused and strategic use of IT which, in turn, leads to increased performance (p. 298). In their strategic alignment model, Henderson and Venkatraman [13] consider alignment at three levels: alignment between business and IT strategies (external or intellectual alignment), alignment between organizational and IS infrastructure (internal or operational alignment), and alignment between strategies and infrastructures (cross-domain alignment). Research studies have examined the impact of fit between two or more of these components in fulfilling organizational needs and achieving improved performance [12,14].

This study extends the strategic IT alignment literature by considering the role of externally induced changes. Specifically, we examine how strategic IT alignment can help organizations address environmental changes, such as those created by new regulations. Given the recent regulatory changes in the healthcare sector, it presents an ideal setting for the study. We examine how alignment of business strategy, IT strategy, and IS infrastructure prior to the Health Information Technology for Economic and Clinical Health (HITECH)

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Act in 2009 affect post-HITECH fulfillment of meaningful use requirements during the time-frame from 2011 to 2013. By effectively using IT in the healthcare setting, hospitals can improve safety, quality, and cost of medical care [15,16]. However, there seems to be a disparity between investments made in IT and their eventual use by service providers due to failed IT implementations [17]. To a large extent, this occurs due to organizational factors that play an important role in how IT is eventually used [16,18]. In the healthcare setting, the successful use of electronic health records (EHR) systems has particularly been hampered by IT misalignment [9]. These systems are implemented without a careful consideration of clinical and administrative processes, which create path dependent constraints and limit their ability in fostering collaborative delivery of medical care to patients [8,17]. This study sets out to empirically explore how IT plan scope creates opportunities and constraints for achieving targeted IS strategic objectives, by examining meaningful use of information systems in healthcare organizations. IT plan scope may be defined as the number of IT capabilities [19]. These capabilities may manifest themselves as unique skill sets and diversity of opinions [20].

We focus on IT planning climate that plays a pivotal role in the creation and acceptance of a sophisticated IT plan [19]. Factors such as the length of IT planning horizon, top management involvement, and the engagement of steering committee members encompass the IT planning climate and set the overall direction of the IT plan. Hospitals vary in terms of their IT planning activities in such varied areas as business office applications (such as document management), cardiology picture archiving and communication systems (PACS), emergency department, operating room, respiratory care, electronic medical record, financial decision support, human resource management, laboratory, nursing, radiology PACS, revenue cycle management, capacity management, risk management, and supply chain management. This research investigation considers these applications to capture the breadth of IT plan scope and examines the association of IT planning climate on the IT plan scope.

While IT planning climate helps in strategic and intellectual alignment, the plan in itself is not enough to manage dynamic requirements. The infrastructure and processes associated with IT adoption strategy play a critical role in shaping and structuring IT plans. Brown and Magill [21] characterize them as centralized, decentralized, and hybrid forms of IT structures. These structures differ in their ability to provide adaptive capability for managing dynamic changes as well as their ability to sustain changes over the long-term. In the healthcare sector, hospitals have adopted three distinct IT adoption strategies – single-vendor, best-of-breed, and best-of-suite [22]. The resulting operational and cross-domain alignment helps in addressing dynamic requirements and translating the scope of IT plan into specific deliverables [23]. Using the precepts of contingency theory [24,25], we theorize that an IT adoption strategy that is congruent with regulatory environmental changes enables an organization to link their IT plans with the fulfillment of strategic IS objectives. We examine how the distinct adoption strategies adopted by hospitals create different IT architectures, infrastructure, and processes [21,22]. Thus, our research questions are: 1) how does IT planning climate influence the scope of IT and 2) how does the scope of IT influences a hospital's meaningful use metrics with respect to its IT adoption strategy.

2. Background

The healthcare sector is facing a dynamically changing environment. The United States Congress introduced the Health Information Technology for Economic and Clinical Health (HITECH) Act as a part of the American Recovery and Reinvestment Act (ARRA) of 2009. The Act includes \$34 billion in financial incentives for hospitals and healthcare professionals to achieve *meaningful use* of certified electronic health records (EHRs). The congressional framework for meaningful use considers healthcare providers as meaningful users of information

technology (IT) if they satisfy the following three general requirements: (i) use EHR certified technology in a meaningful manner; (ii) demonstrate capability of exchanging electronic health information to improve quality; and (iii) submit information on clinical quality measures to the Center for Medicare and Medicaid Services (CMS). To encourage meaningful use, the Act includes eventual penalties and substantial Medicare/Medicaid payment reductions for those hospitals that fail to become meaningful users of IT by the end of the year 2013. The incentives and penalties are based not merely on the installation of EHRs, but also on the ability of hospitals to meet the three criteria listed above.¹

In light of the federal mandate, hospitals are striving to fulfill the meaningful use of IT requirements. In this regard, strategic IT alignment prior to regulatory changes set a sequence of events in motion that influences the ability of hospitals to fulfill the regulatory requirements. The breadth of IT plan scope achieved by means of long-term orientation, top management involvement and the engagement of steering committee can help in creating a robust planning climate to weather changes induced by new regulatory requirements. On the other hand, IT adoption strategy can result in distinct IT structures in organizations that can create self-enforcing opportunities or constraints in responding to regulatory changes. With the emergence of enterprise resource planning (ERP) software in the service sector, the single-vendor adoption strategy represents the centralized form of structural arrangement and is the dominant IT adoption strategy in which technology purchased from one organization supports various clinical and administrative processes within a hospital. In the single-vendor adoption strategy, the technology sourced from a single-vendor is managed through a single contract. While this strategy helps in reducing transaction costs, application budgeting complexity, and management uncertainty, it has been criticized for its lack of adaptability to specific administrative and clinical requirements of hospitals [26].

In contrast to the single-vendor strategy, the best-of-breed IT adoption strategy represents the decentralized structure. It avoids the need for massive business process reengineering and seeks to integrate technology components from multiple vendors as well as custom development within the hospital. The best-of-breed adoption strategy has been credited with reducing organizational resistance and allowing closer alignment of IT with administrative and clinical procedures of hospitals [22]. However, in most cases this adoption strategy does not lend to a coherent IT platform due to the emergent nature of new vendor engagements. The decision regarding the best technology for a given application is taken without explicitly accounting for integration of this technology with others already in place.

The best-of-suite adoption strategy represents the hybrid approach for healthcare IT structure in which hospitals use one technology as the basis for subsequent IT implementations. Instead of relying on a single-vendor or dealing with several vendors who are best-in-class for specific applications, this strategy overlays new technologies on top of a particular foundational technology [22].

The three IT adoption strategies differ in their ability to adapt to changing requirements and therefore exert contingent effects on how the technology will be used by hospital staff. Structural contingency theory with its emphasis on environment-structure fit has long been the predominant conception of fit within organization theory [27–29]. Consideration of environment-strategy relationships present another perspective of contingency theory which takes into account the level of fit between strategies adopted by firms in the face of dynamic changes in the environment [30]. HITECH Act triggers many changes in the healthcare IT domain. The problems and opportunities that are addressed as a part of the planning and implementation process act as catalysts for action and change during IT use. The ability of hospitals to use IT as per newly prescribed requirements in the HITECH Act is

¹ Details are presented in the Research Design section of the paper.

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