



Applying institutional theory to the adoption of electronic health records in the U.S.



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ARTICLE INFO

Article history:

Received 22 January 2015

Received in revised form 13 January 2016

Accepted 17 January 2016

Available online 23 January 2016

Keywords:

Institutional theory
Electronic health records
IT adoption
Mimetic
Normative
Coercive

ABSTRACT

This study uses institutional theory to explain adoption of electronic health records (EHRs) in ambulatory medical practices in the U.S. Health care is a highly institutionalized industry, subject to multiple regulatory forces, high levels of professionalism, and growing network externalities that can influence adoption decisions. We found that mimetic forces were more critical predictors when there was greater uncertainty, coercive forces were significant predictors after the U.S. government established incentives, and normative forces have continually influenced adoption. This study demonstrates the impact of the institutional effect of government policies and industry norms on adoption of critical technologies.

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1. Introduction

The U.S. health-care industry has lagged behind other industries in its adoption of information technology (IT) in the workplace [92], particularly for clinical record systems. Electronic health records (EHRs) have long been hyped as a critical factor for decreasing health-care costs and improving health-care quality, by enabling clinical analytics using “big data.” The Institute of Medicine’s 2002 report “Crossing the Quality Chasm” identified health IT as one of four critical forces that could significantly improve health-care quality [51]. Nevertheless, the adoption of EHRs in the U.S. was slow: <15% of U.S. physician offices used any type of EHR system in 2005 [30], even as studies were predicting significant efficiency and safety savings [45]. It was not until after the passage of the HITECH Act in 2009 through which the U.S. government created financial incentives and penalties associated with EHR adoption (or lack thereof) that adoption increased. By 2012, 72% of the U.S. physicians had adopted some type of EHR system [73].

The diffusion of EHRs across the health-care industry provides an opportunity to investigate technology adoption decisions within a highly institutionalized and regulated industry with a high level of professionalism. A unique aspect of EHR adoption is that the benefits do not accrue primarily to the adopters, nor are they shared primarily with suppliers and customers. The physicians and staff who adopt EHR systems traditionally have not received most of the benefits even though their opinions significantly influence the likelihood of adoption, and they bear the burden of reengineering their business processes to accommodate the new technology [8]. However, this is changing to some extent as providers begin to receive incentives/penalties from the U.S. government under the HITECH Act. The payers of health-care services, who are public and private insurers and employers, are often the primary beneficiaries of EHR-related efficiency gains or patient safety and quality improvements because these advancements typically lower health-care costs and improve access to care [70]. The customers, or patients, have traditionally not directly witnessed the benefits, but this may change in the future as more patients gain access to their records through patient portals. This contrasts with adoption decisions in other industries, where, for example, a business that adopts an enterprise resource planning (ERP) system expects to be the prime beneficiary of the quality and cost improvements. When adopting interorganizational systems in a supply chain, it is often expected that suppliers

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(and/or customers) will share the benefits. The complexity of the health-care industry, with the separation of payers and customers, adds a unique element to the adoption decision, particularly from an institutional standpoint, as the payers are not direct suppliers or customers of the services.

The health-care industry is also highly institutionalized, in terms of regulatory oversight and professional roles, and also operationally and technically complex [82]. The impact of the government financial incentives distributed through Medicare and Medicaid is unique to this industry. In addition, ambulatory medical practices are embedded in various institutional networks that may influence adoption. Physicians have a high level of professionalism and they often affiliate within their own specialties via professional training and participation in specialty-focused organizations. Successful adoption of EHRs by others within their own specialties may sway their decisions, particularly if they are uncertain about individual benefits. As regional networks adopt EHRs and begin to share information among hospitals, pharmacies, and other health-care providers, it is expected that independent physician practices experience pressure to participate. There have been numerous studies on both individual and organizational factors that affect technology adoption [74,99], but due to the reasons discussed above, their application to health-care IT has generated mixed results [46].

Given the strength of the institutional forces and the uniqueness of this industry, our study views adoption as an institutional effect and aims to explain how institutional forces affect adoption of EHRs in ambulatory physician practices. External institutional forces are critical, especially as EHR systems are required to interoperate with others to be eligible for government subsidies and to avoid regulatory penalties. We focus on the important forces and also the way they drive adoption of EHRs. Our approach addresses the call for more information systems (IS) research using institutional theory [19] and, in particular, the need to recognize the unique aspects of the health-care industry [15]. This study is an empirical assessment and extension of Ref. [83].

We show that mimetic forces were more critical in predicting EHR adoption prior to the passage of the HITECH Act, particularly when there was more uncertainty about the benefits from these systems. Coercive forces, particularly revenue from Medicare and Medicaid, were significant predictors of EHR adoption after the HITECH Act. However, even after the HITECH Act, normative forces continue to play an important role in predicting EHR adoption, especially given the potential for network externalities within health networks or through health information exchanges.

2. Background

2.1. Adoption of EHRs in the United States

EHRs act as repositories of information on patient attributes and improve communication across groups of service providers. The most basic functionality of an EHR system is the ability to electronically store clinical information documented at patient encounters such as ambulatory office visits. In the ambulatory setting, physicians typically enter information into the EHR during the patient interview. It is easier to retrieve electronic records than paper records, and they are less expensive to back up and secure. EHRs also have a multitude of more advanced capabilities. In particular, they can be used to transmit orders for laboratory and diagnostic tests; issue prescriptions; and both transmit and receive information from other care providers at inpatient or outpatient facilities. They can also contain clinical decision support tools and can be used to facilitate the reporting of quality and cost metrics. As more information is captured digitally, these “big data” can be analyzed to detect population health patterns and trends. A system that lacks the ability to exchange information is now typically

referred to as an electronic medical record (EMR) system, whereas a system that conforms to the interoperability standards and can be managed across more than one organization is now referred to as an EHR system [3].

The U.S. has lagged as much as a dozen years behind other industrialized countries in health information technology (HIT) adoption, particularly as other governments took an earlier role in establishing adoption protocols and standards and health insurers and/or government taxes in these countries paid most of the cost [4,7,14,89]. In 2008, a national survey of almost 3000 U.S. physicians reported that only 13% of physicians had a basic electronic record system and only 4% had a fully functional system with some interoperation for prescriptions and images [27].² U.S. providers tend to respond negatively to clinical reporting mandates, particularly compared to their international counterparts [31], but the biggest barrier in the first decade of the century was financial reimbursement as physicians paid for the EHRs, but most of the benefits accrued to payers and purchasers. Other barriers included lack of interoperability, low risk tolerance, time concerns, fears about privacy, system maintenance, and the number and transience of vendors [7].

In February 2009, the U.S. government began to take a more active role by signing into law the HITECH provisions of the American Recovery and Reinvestment Act (ARRA). The HITECH provisions established a process for benchmarking or making meaningful use of specific health record functions. Meaningful use means that providers must show they are using certified EHR technology in ways that can be measured significantly in quality and in quantity. The incentive programs were implemented in three stages, each with their own goals and priorities. In each stage, there is a core set of requirements as well as a list of menu requirements. Stage 2 requirements began on January 2014 and focus more on information exchange and patient engagement as well as increasing compliance thresholds, compared to stage 1 requirements. Stage 3, released in March 2015, focuses on some of the more difficult aspects of stage 2 and requires providers to greatly improve their adoption and care delivery by 2018.

The HITECH Act made substantial financial incentives available to providers. Physicians who contract with Medicare can now receive up to \$44,000 each in higher reimbursements over 5 years if they adopt certified EHR systems that are “meaningfully used.” Furthermore, physicians who fail to adopt any meaningfully used certified EHR systems would experience Medicare payment reductions beginning in 2015.³ Physicians who serve at least 30% Medicaid patients (20% for pediatricians) or work in a Federally Qualified Health Center (FQC) or Rural Health Center (RHC) with 30% needy patients can receive up to \$63,750 over 6 years. While physicians and physician groups must choose to participate in either the Medicare or Medicaid incentive program, hospitals may participate in both incentive programs simultaneously (with payments apportioned based on the percentage of Medicare and Medicaid patients served).

Adoption rates have increased since the law was enacted. Between 2009 and 2012, the percentage of office-based physicians with basic EHRs almost doubled from 21% to 40%. The percentage

² Basic systems include patient information such as demographics, problem lists, medications, and clinical notes; orders for prescription; and viewing lab and imaging results. Fully functional systems also include patient notes with medical history and follow-up; orders for laboratory and radiology tests; sending prescriptions and orders electronically; returning electronic images; and clinical decision support.

³ Medicare payments for noncompliant physicians will be reduced 1% per year between 2015 and 2017, and penalties will remain at 3% thereafter, assuming that at least 75% of eligible professionals are meaningful users. If, however, <75% of eligible professionals are meaningful users, Medicare payments will drop an additional 1% in 2018 and 2019, and penalties will remain at 5% thereafter.

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