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Influence of Institutional Forces on Managerial Beliefs and Healthcare Analytics Adoption

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The 2010 passage of the Affordable Care Act provided strong motivation for healthcare organizations to improve operational efficiency and enhance organizational performance. Large and medium-sized organizations nationwide have adopted healthcare analytics to obtain operational benefits, with the Cleveland Clinic as a prime example of a successful adoption. Both Delos M. Cosgrove, chief executive officer, and James Merlino, chief experience officer, were instrumental in the adoption and use of healthcare analytics to improve patient satisfaction scores (Merlino and Raman, 2013). Another example is Forest Laboratories, which, in collaboration with Converge Health and Intermountain Healthcare, developed a rapid-learning system based on data analytics to improve outcomes for patients with respiratory diseases (PR Newswire, 2014). Jeff Elton, managing director of Accenture Life Sciences, claims that to improve patient outcomes, healthcare requires accurate data and predictive analytics from a range of resources available in the organization (Accenture, n.d.).

Data analytics is of high value to healthcare organizations because big data in healthcare is overwhelming in terms of volume, the diversity of data types, and the speed at which it must be managed (EMC, 2012). Healthcare analytics has the potential to

transform the way healthcare providers use sophisticated technologies to gain insights from their data repositories and make informed managerial decisions (An, 2013; Raghupathi and Raghupathi, 2014). The information healthcare analytics provides can be used to allocate resources, distribute funds for healthcare services, and guide policy formulation and implementation (Fos and Zúniga, 1999; Srinivasan and Arunasalam, 2013). One of the best examples of using healthcare analytics for improving firm performance is Premier, the U.S. healthcare alliance network. Premier has more than 2,700 members, hospitals, and health systems; 90,000 non-acute facilities; and 400,000 physicians in its network. Healthcare analytics is employed to analyze clinical, financial, patient, and supply chain data, to gain a comprehensive understanding of resource utilization, clinical outcome measures, and transaction-level cost data. Using healthcare analytics, Premier saved 29,000 lives, resulting in a cost savings of $7 billion through 2013 (IBM, 2013).

However, a high level of variance is associated with the level of healthcare analytics adopted by U.S. hospitals and clinics ((Raghupathi and Raghupathi, 2014). Some research indicates that top management beliefs may play a role in the adoption of technology, such as healthcare analytics in hospitals and clinics (Chatterjee *et al.*, 2002). Less understood, however, is the potential influence of institutional pressures on framing top management beliefs, particularly the level at which technology (e.g., healthcare analytics) is adopted. Therefore, the current research examines the influence of institutional pressures (i.e., mimetic, coercive, and normative pressure) on top management beliefs and level of healthcare analytics adoption in U.S. hospitals and clinics.

This study integrates institutional forces and the influence of top management beliefs on the level at which healthcare analytics is adopted, thus reconciling previous research's presumption of independency. This study demonstrates that some external institutional forces manifest their influence on top management beliefs while others do so on the level of healthcare analytics adoption itself. As more healthcare organizations contemplate the adoption of data analytics, understanding how institutional forces influence top management beliefs and subsequent adoption of healthcare analytics in organizations also increases in importance.

LITERATURE REVIEW

Research has extensively used institutional theory to explain organizational form and adoption of practices (DiMaggio and Powell, 1983; Grob and Benn, 2014; Messerschmidt and Hinz, 2013; Verbeke and Tung, 2013). Institutional theory traces its origin to the disciplines of economics, sociology, political science, history, and ecology. It mainly deals with either the "effects" or the "processes" of institutionalization (Currie, 2009). Several researchers in other disciplines have used institutional theory to explain technology adoption in organizations (Oliveira and Martins, 2011; Silva and Figueroa, 2002). The theory posits that organizations are constrained by social rules and adopt "taken-for-granted" conventions (Berger and Luckmann, 1967; Selznick, 1949) that shape their form and practice to achieve legitimacy (DiMaggio and Powell, 1983). Previous studies have also shown how pressures act through processes (DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Zucker, 1987), influencing structural characteristics of organizations (Meyer *et al.*, 1987; Scott, 1987; Scott and Meyer, 1994;

Singh *et al*., 1986), and bring organizational change (Greenwood and Hinings, 1988; Tolbert and Zucker, 1983). Commitments of institutions develop over time as the organization faces external constraints and pressures from its environment or from the changes in the composition of its personnel, their interests, and their informal relationships (Scott, 2003).

Earlier studies (Hu *et al.*, 1997; Loh and Venkatraman, 1992) found that senior managers make adoption decisions on a rational basis based on the information they receive through communication and social networks (Rogers, 2003). A major drawback of this approach, however, is that it assumes that organizations are independent and free to choose what to adopt and what not to adopt (March, 1978), which is not true for most healthcare technology adoptions. Institutional theory can help clarify information and communication technology adoption in healthcare organizations (Meyer and Scott, 1983). Noir and Walsham (2007) find that technology adoption in healthcare organizations is a social and material phenomenon that functions empirically and can develop beyond instruments of technical rationality. Meyer and Scott (1983) argue that an organization's environment contains two main components: institutional, which involves social and political structures, and technical, which focuses on market and production concerns. Although both components are important in U.S. hospitals, the current study focuses on institutional constraints. Scott (1987) was instrumental in developing institutional theory through the mid-1980s, with further development provided by DiMaggio and Powell (1991). The analysis of multiple institutional pressures to which organizations must respond has been useful for explaining technology adoption, particularly in health care. Institutional pressures may be a tool to help understand and evaluate the level at which an organization adopts healthcare analytics. These may be particularly beneficial because of the complex organizational and political environment in which healthcare information systems are situated (Heathfield *et al*., 1999).

DiMaggio and Powell (1983) identify major pressures leading to institutionalization that are triggered by the drive for organizational legitimacy. A central assumption of institutional theory is that organizations pursue legitimacy to obtain external support and recognition and to increase their capacity to survive in a competitive business environment (Meyer and Rowan, 1977). Institutional theory assumes that "high levels of competitor knowledge exist and guide strategic decision making" (Bloodgood and Bauerschmidt, 2002: 421). Institutional theory posits that organizations respond to pressures arising from both their internal and external business environments. Organizations respond to external pressure by adopting appropriate structures and practices exhibited by other organizations and deemed legitimate in their respective fields (DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Zucker, 1987).

Institutional pressures can be classified into three categories that help guide organizations toward legitimacy and industry appropriate isomorphism. First, mimetic pressure represents the drive to imitate successful competitors. Mimetic pressure becomes increasingly relevant in industries that operate with high levels of uncertainty. Senior managers identify high levels of uncertainty when future actions or substantive changes are underdeveloped or vague and when a clear course of action is uncertain (Bloodgood and Morrow, 2000). In organizations with an unclear definition of success associated with a technological or system adoption, top management often adopts a strategy of mimicry of identified industry leaders (Flood and Fennell, 1995).

Second, coercive pressure stems from political power exerted by governments and regulations. Coercive represents formal external pressures generated through interactions with or dependency on other organizations or government regulations and policies as a standard industry practice. An example of coercive pressure from multiple constituencies would be the drive to adopt healthcare information systems such as Computerized Physician Order Entry (CPOE), which has been encouraged by the government, healthcare administrators, and the public (Bloodgood and Bauerschmidt, 2002; Doolan and Bates, 2002). An example of coercive pressure from a single constituency on healthcare organizations is the governmental requirement for electronic medical record adoption to reach "meaningful use" (Adler-Milstein *et al.*, 2014; Blumenthal and Tavenner, 2010).

Third, normative pressure reflects professional, industry, and/or religious norms that exist within the organization's business environment (DiMaggio and Powell, 1983). In general, normative pressures stem from attitudes and approaches of professional groups and associations influencing organizations in the same industry (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). Regarding the extent of CPOE adoption, for example, physicians exerted normative pressure in response to coercive pressure for the adoption of CPOE (Yang and Kankanhalli, 2013). This example is relevant because it demonstrates that not all institutional pressures act in the same direction. Mimetic pressures arise from the tendency of organizations in the same industry to copy successful forms. In combination, however, institutional pressures drive firms in the healthcare industry toward isomorphism (DiMaggio and Powell, 1983) as firms adopt common practices.

Although the result of the influence of institutional pressures for firms may be isomorphism and, thus, legitimacy (DiMaggio and Powell, 1983), organizations may differ in their strategic responses to those institutional forces. Oliver (1991) suggests that while organizations may yield to the demands of the institutional environment, they may also choose to cooperate, challenge, manipulate, or even avoid the institutional environment. The coercive pressure stemming from regulations is a prime example of institutional pressure in which "law appears as a system of substantive edicts, invoking societal authority over various aspects of organizational life" (Edelman and Suchman, 1997: 483).

Covaleski *et al*. (1993) use the institutional framework to examine the impact of various regulations shaping hospital management. A growing body of research, both conceptual and empirical, uses institutional theory to assess the organizational adoption consequences associated with information technology (IT) (Robey and Boudreau, 1999), enterprise information systems (Benders *et al*., 2006; Gosain, 2004), and globalization of IT innovation (King *et al*., 1994). The current research examines the influence of institutional pressures on isomorphism to provide a theoretically sound explanation for the institutionalization of healthcare analytics (DiMaggio and Powell, 1983)—specifically, how institutional pressures influence top management beliefs and the level of healthcare analytics adoption in U.S. hospitals and clinics.

HYPOTHESIS DEVELOPMENT

Granovetter (1978) and Krassa (1988) suggest that organizations working in similar environments tend to mimic the behavior of others in that same environment. Mimicry

is primarily driven by two factors: the perceived similarity among organizations and the number of organizations engaged in mimicking behavior. The sample drawn for this research contains U.S. healthcare organizations. Furthermore, high levels of mimicking behavior can be anticipated, as nearly all U.S. healthcare organizations engage in some form of analytic adoption. Teo *et al*. (2003) suggest that managers in organizations have a tendency to imitate behaviors by structurally equivalent organizations perceived as successful. In their study of Chinese organizations, Liang and Xue (2004) find that many organizations follow a strategy of mild organizational transformation when determining the level of technology adoption. This strategy allows increases in adoption level to be based on the perceived success of other organizations prior adoption levels. Liang and Xue (2004) clearly demonstrate that an organization's strategies toward and levels of technology adoption are dependent on perceived adoption successes in similar organizations. In this way, Liang and Xue (2004) confirm the work of Haunschild and Miner (1997), who demonstrate that organizations choose to imitate certain behaviors depending on their perceived outcome. Therefore, organizations engage in mimicking behaviors predicated on the number of organizations perceived as similar that have already adopted the behavior, in an effort to avoid being regarded as less innovative or responsive (Fligstein, 1985). Thus, with regard to mimetic pressure and the level of adoption of healthcare analytics:

> *Hypothesis 1: Higher levels of mimetic pressure in the healthcare environment will have a direct and positive impact on the level of adoption of healthcare analytics.*

The highly regulated U.S. healthcare sector (Walshe and Shortell, 2004) faces many regulatory interventions such as the Health Insurance Portability and Accountability Act, which may require organizations to make significant structural changes associated with standardization, processes, and IT assets. Standardization involves conformity and helps establish legitimacy (Zucker, 1987), which in turn helps develop peer approval from similar organizations in the industry and also from society at large (Droege *et al*., 2011). Mishra and Chin (2008) argue that institutional theory can help explain regulatory effects on IT management. Liang *et al*. (2007) find that coercive pressures influence top management beliefs about the levels of technological adoption. This is especially prevalent when two conditions are present: (1) peer organizations are adopting similar technologies, and (2) societal expectations of the technology are high. These conditions are directly relevant to this study because U.S. healthcare organizations are required by law to adopt new technologies, and this requirement is widely acknowledged by U.S. citizens. U.S. healthcare organizations exhibit high levels of institutional dependence from a resource-dependent perspective and therefore are likely to adopt policies and technology at higher levels for survival (Palmer *et al*., 1993). Chwelos *et al*. (2001) and Hart and Saunders (1997) investigate the role of coercive isomorphism in technology adoption. Coercive pressures may stem from dominant suppliers, customers (Krassa, 1988), and industry associations (Liang *et al*., 2007). They can also result from the influence of government regulation or agencies (local or national), as is the case with U.S. hospitals (Liang *et al*., 2007). Management beliefs are the focal point of these coercive pressures, as managers are forced to participate in meta-structuring activities (Liang *et al*., 2007) while adopting increasing levels of technology in the organization.

Thus, with regard to coercive pressure and top management beliefs:

Hypothesis 2: Higher levels of coercive pressures resulting from government regulation will have a direct and positive influence on top management beliefs about higher levels of adoption of healthcare analytics.

Norms embraced by firms and professional organizations can positively influence top management beliefs about technology adoption. This is especially true when the organizations adopting the technology have high visibility, recognition, and substantive influence (DiMaggio and Powell, 1983), all elements associated with U.S. hospitals. Top managers are keenly aware of institutional norms and their role in integrating new with existing technology (Davenport, 1998; Mitchell, 2006). Normative pressure associated with technology adoption arises from professionalization, which is directly related to the establishment of legitimacy (Lai *et al.*, 2006). Normative pressure associated with technological adoption may originate from and can permeate a variety of channels, including professional associations, conferences, suppliers, and member customers (Liang *et al*., 2007), as well as interpersonal relationships between top-level managers (Lee and Dawes, 2005; Park and Luo, 2001). Hikmet *et al*. (2008) find that system membership (stand-alone vs. system-affiliated) is a major factor in U.S. hospital organizations adopting healthcare information technologies. Teo *et al*. (2003) find that norms among similar organizations exert pressure on the top management to adopt not only similar technology but also the same level of adoption within their institutions. Thus, with regard to normative pressures and top management beliefs:

Hypothesis 3: Higher levels of normative pressures related to technology adoption in U.S. hospitals will exert a direct and positive influence on top management beliefs about the benefits of adoption of healthcare analytics.

Walsh (1988) demonstrates that top managers develop "belief structures" to respond to environmental stimuli and use these beliefs as a basis for inferences. Shrivastava (1983) argues that top managers' mental image of a desired future organizational state guides organizational strategies, decisions, and behavior. Government regulation and the stated desire for how data should be used may be the foundation for top managers' images in U.S. hospitals. This indicates that top management behavior is intentional and that these stated beliefs may result in intentional engagement of behaviors, such as technology adoption (e.g., healthcare analytics) (Fishbein and Ajzen, 1975). Hambrick and Mason (1984) assert that the choices made in organizations reflect top management's values and cognitive biases. Top managers' positive beliefs about the benefits to be derived from increasing the level of a technological adoption can drive organizations' adoption of the given technology (Liang *et al*., 2007). Thus, with regard to top management beliefs and the level of healthcare analytics adoption:

Hypothesis 4: Higher levels of top management beliefs about the benefits of healthcare analytics will have a direct positive influence on the level of technological adoption within the healthcare organization.

DATA AND METHODS

This study employed an online survey methodology to provide enhanced generalizability and replicability (Teo *et al.,* 2003). Participants were individuals currently employed in healthcare management. Contact information for 370 employees enrolled in an online healthcare MBA program was used to send a link to an online survey from Qualtrics. Individuals not currently employed in the U.S. healthcare industry were eliminated from the sample with screening questions. Of the 255 responses received, 32 respondents failed to complete the survey and were excluded from the sample, resulting in a 60% (n = 223) response rate. Respondents represented a wide range of employee roles, including directors, field training officers, health information management professionals, lead technicians, nurse managers, hospital managers, patient care coordinators, pharmacy operations coordinators, registered nurses, business office specialists, and so on. Disclosure of organization identity was optional, though 138 respondents disclosed 45 hospitals (32.6%), 28 medical centers (20.3%), seven medical schools (5.1%), four clinics (2.9%), 11 home-health and hospice (8%), 15 healthcare systems (10.9%), one nursing college (0.7%), 17 healthcare services (12.3%), two public health service (1.4%), five veteran health administration (3.6%), and others (i.e., blood centers, health-insurance provider, medical marketing, and consulting [2.2%]).

Measures

Top management beliefs were measured by means of a three-item reflective scale derived from the scale used by Liang *et al*. (2007). Scale items for institutional pressures were derived from the institutional pressures scale by Srinivasan *et al*. (2002) and Liang *et al*. (2007). A two-item reflective scale from Liang *et al*. (2007) measured the level of adoption. All scales were adapted to fit the study's setting. The top management beliefs, institutional pressures, and level of adoption scales were rated on a seven-point scale. The questionnaire was refined through expert review and a pretest (n = 17). The questionnaire is available in the Appendix.

Model and Hypotheses Testing

This study used structural equation modeling (SEM) for data analyses to examine the effects of each multi-dimensional construct on top management beliefs and level of adoption (Anderson and Gerbing, 1988). SEM is a two-step process in which a measurement model is first constructed to examine the fit of the data to the model. Second, a structural model is developed to examine the hypothesized relationships in the model (Raju *et al*., 2000). Amos 21 served to examine both the measurement and structural models.

Two estimates of reliability were calculated for each construct used in the study: Cronbach's alpha and composite reliability. Convergent validity was examined through average variance extracted (AVE). Each construct had a Cronbach's alpha of 0.6 or higher, indicating acceptable internal consistency (Black and Porter, 1996). Table 1 presents the Cronbach's alphas. A commonly accepted reliability threshold value for composite reliability is 0.7 or greater, which was demonstrated for each latent variable

in the data (Hair *et al*., 1998). Latent variable shared or common variance (AVE) was also calculated. According to research, measures demonstrating an AVE of 0.5 or greater possess adequate convergent validity (Dillon and Goldstein, 1984). All measures in the study exceeded this standard (see Table 1).

Table 1
AVE and Cronbach's Alpha

Constructs	Number of Items	Cronbach's Alpha	AVE
Mimetic pressure	2	0.693	0.530
Coercive pressure	2	0.706	0.545
Normative pressure	3	0.762	0.517
Beliefs	2	0.888	0.799
Level of adoption	2	0.736	0.585

Common Method Bias

To determine whether common method bias is a problem in the study, the study examined a common latent factor model using AMOS 21.0. The fit indexes for the single-factor model indicate an unacceptable fit ($\chi^2(df)$ = 263.832 (22), χ^2/df = 5.996, NFI = 0.792, RFI = 0.740, IFI = 0.820, TLI = 0.773, CFI = 0.819, and RMSEA = 0.145). The chi-square difference between the single- and seven-factor models was statistically significant ($\Delta\chi^2$ = 192.24; Δdf = 10; $p < 0.001$). These results indicate that common method bias does not have a significant impact in the data.

Measurement Model

The goodness-of-fit indexes for the measurement model demonstrate an acceptable fit (χ^2 (df) =71.593 (34), $p < 0.000$; χ^2/df = 2.106; see Kline, 2005). The relative fit indexes (NFI = 0.944, CFI = 0.969) both exceed the recommended threshold of 0.9, and RMSEA is 0.068 less than the recommended 0.08 (Hu and Bentler, 1999). Table 2 reports the means, standard deviations, and correlations for and among all variables in the study. All variables exhibit positive and statistically significant correlations (at $p <$ 0.01). With the measurement model demonstrating adequate fit, the second step in SEM was undertaken by fitting a structural model to test the hypothesized relationships among the constructs.

The structural model demonstrated acceptable fit (χ^2 (df) =75.885 (37), $p < 0.000$; χ^2/df = 2.050; NFI = 0.940; CFI = 0.968; RMSEA = 0.067; Kline, 2005). Figure I displays the values associated with each of the relationships hypothesized in the structural model. As Figure I shows, Hypothesis 3, representing the relationship between normative pressure and management beliefs, was non-significant and rejected. All other hypotheses were significant and therefore accepted. Hypothesis 1 represents

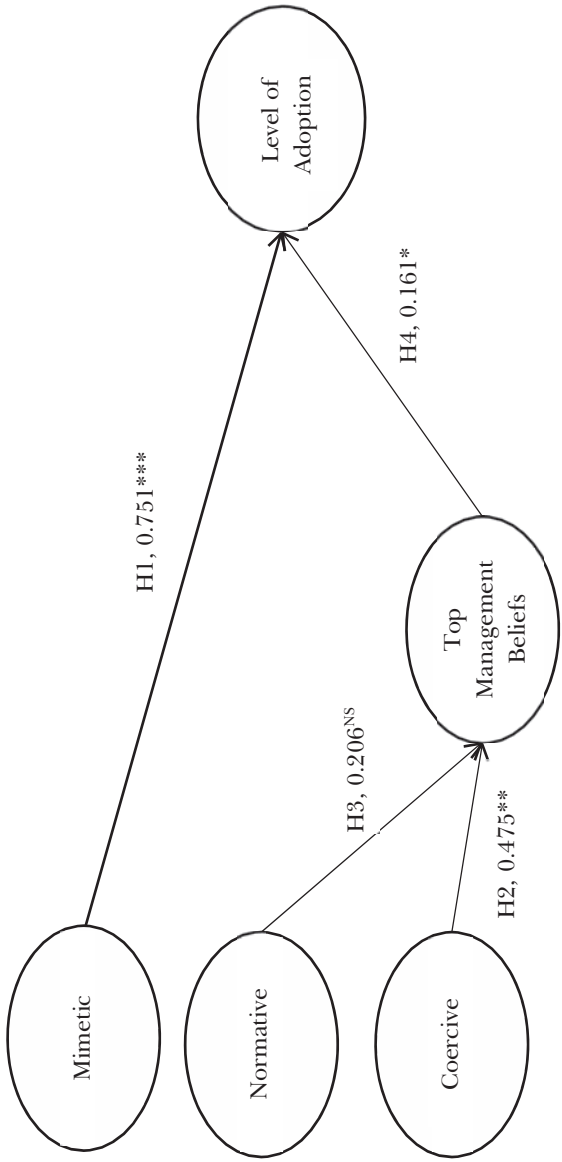
the positive relationship between mimetic pressure and level of adoption, Hypothesis 2 represents a positive relationship between coercive pressure and top management beliefs, and Hypothesis 4 represents the positive relationship between top management beliefs and level of adoption.

Table 2
Means, Standard Deviations, and Correlations among the Variables

	M	SD	Normative Pressure	Coercive Pressure	Mimetic Pressure	Top Management Beliefs	Level of Adoption
Normative pressure	5.2449	1.11444	1				
Coercive pressure	5.4147	1.17366	0.569**	1			
Mimetic pressure	5.2559	1.14125	0.589**	0.669**	1		
Top management beliefs	5.7299	1.12960	0.487**	0.523**	0.445**	1	
Level of adoption	4.9667	1.17780	0.592**	0.580**	0.585**	0.487**	1

Correlation is significant at the 0.01 level (**).

Figure I
Structural Model with Standardized Path Loadings



Post Hoc Analysis

Post hoc Model 1. In light of the finding that the relationship between normative pressure and top management beliefs was non-significant, the authors reviewed the relevant literature to examine whether there is any support for the influence of normative pressure on the level of adoption. Normative pressures can arise from dyadic relationships between organizations and relational channels, thereby facilitating consensus between various organizations and potentially influencing organizational behaviors, such as extent of technology adoption (DiMaggio and Powell, 1991). Therefore, for the post hoc examination of the data, a new hypothesis, representing a direct positive relationship between normative pressure and level of adoption, was posited. For this examination the non-significant path between normative pressure and beliefs found in the structural model was removed. The newly hypothesized path between normative pressure and level of adoption was added. The result of these changes left the degrees of freedom constant between the structural model and the present examination at 37. The new model was run, and it demonstrated an acceptable fit ($\chi^2(df) = 75.634\ (37)$, $p < 0.000$; $\chi^2/df = 2.044$; NFI = 0.940; CFI = 0.968; and RMSEA = 0.066; Kline, 2005). Table 3 contains the standardized estimates and their p values for the hypothesized relationships in post hoc Model 1. As the values in Table 3 indicate, this examination further supported the relationships demonstrated in the first study. Particularly interesting is the continued non-significant relationship normative pressure continues to exhibit, in this case with level of adoption. As such, the normative pressure construct of institutional pressure has no significant influence on either top management beliefs or the level of technology adoption.

Table 3
Post hoc Model 1 Relationship with Standardized Path Loadings

			Standardized Estimate	p
Coercive pressure	→	Beliefs	0.657	***
Beliefs	→	Level of adoption	0.162	0.046
Mimetic pressure	→	Level of adoption	0.531	0.002
Normative pressure	→	Level of adoption	0.247	0.108

Post hoc Model 2. Because the findings from the initial and the first post hoc studies demonstrate that normative pressure has no significant relationship in the model, another examination was initiated having removed normative pressure entirely from the model. Thus, only the significant relationships among coercive and mimetic pressure, top management beliefs, and level of adoption remain in the model. Table 4 contains the standardized estimates and p values associated with the modeled relationships. The results from this model indicate an acceptable and improved fit ($\chi^2(df) = 33.379\ (16)$, $\chi^2/df = 2.086$, CFI = 0.980, and RMSEA = 0.068; Kline, 2005). The second post hoc examination provides further support for the lack of influence of normative pressure on the relationships between top management beliefs and level of technology adoption.

Table 4
Post Hoc Model 2 Relationship with Standardized Path Loadings

			Standardized Estimate	p
Coercive pressure	→	Beliefs	0.639	***
Beliefs	→	Level of adoption	0.208	0.012
Mimetic pressure	→	Level of adoption	0.693	***

DISCUSSION

The primary contribution of this research lies in the novel application of institutional theory to explain variability in the extent of healthcare analytics adoption in the U.S. healthcare sector. These findings provide new insights into which specific external pressures affect top management beliefs and the level of technology adoption such as healthcare analytics in organizations. This study extends institutional theory applicability to the healthcare context related to technology adoption. The findings lend support to the idea that institutional pressures do influence the extent to which organizations adopt healthcare analytics by affecting top management beliefs. The findings also add insight into the substantive problem organizations face when responding to external pressures. As a result, this study helps elaborate on the nature of the relationships between institutional forces and how they may or may not influence top management beliefs and the level of technology adoption. Investments in technology such as healthcare analytics are not possible without top management belief and commitment. The influence of institutional pressures in this relationship has wide implications for organizations.

This study illuminates the increasing institutional pressure healthcare organizations are experiencing to adopt new technologies such as healthcare analytics. Given these results, it can be argued that hospitals competing for business in the current regulatory environment will face increasing mimetic pressure to conform to peer organizations and therefore not only adopt healthcare analytics but also increase the level of adoption in the organization. The lack of influence of normative pressure on top management beliefs and level of adoption may be a reflection of the lack of regulatory mandate at either the state or federal level to adopt healthcare analytics. Currently, technology such as data analytics is considered a business tool and less a patient care tool, leaving it optional for healthcare institutions to adopt. No single technological solution currently exists for healthcare organizations to exercise successful implementation of healthcare analytics. Each institution can adopt a technological application deemed suitable for the analytics it believes best meets its needs and requirements.

Practical Implications

This study provides several practical implications for both healthcare analytic vendors and adopters. Technology vendors would find benefits from working closely with key regulatory bodies and healthcare professional associations. These partnerships

can help institutionalize the benefits sought from the adoption of analytic technology. As a result, these vendors would gain influence over top management beliefs about the benefits of adopting healthcare analytics. Given the importance of mimetic forces in the level of adoption, targeting leading organizations in an industry would benefit vendors, as these influential market participants would provide the model for the other organizations to follow. Because organizations are embedded in social networks (Granovetter, 1985), successful involvement of early adopters could increase the adoption of healthcare analytics. Vendors could provide success stories about the high levels of healthcare analytics adoption by top organizations to encourage other competing potential adopters. This approach would reduce the uncertainty about the extent of adoption of healthcare analytics in organizations.

Further Research

Further research could consider other external influences (e.g., network externalities, competitive environment, etc.) to improve precision in predicting the extent of adoption behaviors to institutional pressures. Rubach and Sebora (2009) note that not all institutions act the same when faced with institutional pressures, and even similar institutions react in different ways to the same stimuli for action. It could also be speculated that idiosyncrasies associated with absorptive capacity, leadership, internal politics, and top management participation of each organization may also influence the level of adoption of healthcare analytics. Such factors generate inertia or resistance that can result in varying levels of adoption despite institutional pressure to change. Consideration of these factors along with institutional pressures could enhance the understanding of how organizations determine the level at which they will adopt technology such as healthcare analytics.

Appendix
Questionnaire Scale Items

Constructs (CR, AVE)
Mimetic Pressure (0.693, 0.530)
Having a state-of-the-art healthcare analytics confers status for our business unit with our stakeholders.
Our competitors have greatly benefited from adopting healthcare analytics in their organizations.
Coercive Pressure (0.706, 0.545)
The competitive conditions require our firm to use healthcare analytics.
The industry associations require our firm to use healthcare analytics.
Normative Pressure (0.762, 0.517)
Our partners have adopted healthcare analytics to a large extent in their organizations.
Government and industry associations' promotion of healthcare analytics influences the adoption and usage of healthcare analytics in our organization.
Our relationships with our customers would have suffered if we had not implemented healthcare analytics initiatives.
Top Management Beliefs (0.888, 0.799)
The senior management of our firm believes that healthcare analytics has the potential to provide significant business benefits to the firm.
The senior management of our firm believes that healthcare analytics will create a significant competitive arena for firms.
Level of Adoption (0.736, 0.585)
Relative to the potential of healthcare analytics adoption for our business, our healthcare adoption is extensive.
Healthcare analytics adoption has substantially changed our business processes.

The top management beliefs, normative pressure, coercive pressure, mimetic pressure, and level of adoption scales were rated on a seven-point Likert scale (1 = "strongly disagree"; 7 = "strongly agree").

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The purpose of the paper is to discuss the use of information technology and the role of inter-functional and inter-organizational cooperation in supply chain organizations. A brief review of relevant literature is offered on cooperative relationships among supply chain organizations. The study explores the concept of cooperation as an approach to improving relationships and performance outcomes. The paper attempts to answer the question: Does information technology, communications methods, and cooperation contribute to supply chain performance? Based on the literature, a model depicting the relationships between information technology, communications methods, cooperation, and performance is presented along with the research hypotheses. Survey data is analyzed from 225 organizations. The respondents are asked to focus on their relationship with their most important supplier. Structural equation modeling is used to test the hypotheses. The research findings support four of the six hypotheses. The results of the study are provided along with a discussion of the theoretical and managerial implications.

This research builds a healthcare analytics adoption model, drawing insights from institutional theory literature to identify the key institutional drivers of managerial beliefs and subsequent healthcare analytics adoption in U.S. hospitals. A sample of 223 healthcare employees completed a survey to test how institutional forces in the business environment influence managerial beliefs and adoption of healthcare analytics at any given point in time. The study results indicate that mimetic pressure positively influences the level of adoption of healthcare analytics and coercive pressure positively influences managerial beliefs. The findings also show that though healthcare organizations are embedded in organizational networks, normative pressure has no significant role in shaping managerial beliefs in healthcare analytics adoption.