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Explaining Web Technology Diffusion: An Institutional Theory Perspective

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Abstract:

This article uses institutional theory as a basis to understand organizational processes that influence the extent to which web technologies that support the organization-customer relationship are adopted and subsequently diffused within an organization. The effect of coercive, mimetic, and normative processes that lead an organization to initially implement web technologies, referred to as adoption, differ from how those processes influence an organization to integrate evolving web technologies with business activities, referred to as diffusion. Adoption is presented as homogeneous across organizations and organizational populations, whereas diffusion is homogeneous within organizational populations. A theoretical model and related propositions are provided to guide future research.

Keywords: Institutional theory, organizational process, Web technology, technology adoption, diffusion

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I. INTRODUCTION

To date, organizations that have not employed some sort of business-to-consumer web technology are few and far between. In this sense, the organizational question is not whether an organization has or feels the need to adopt web technologies, the question is to what extent are organizational web technologies being developed. *Web technologies* is a term that refers to web-enabled features that range from static presentation of content to dynamic, interactive, and personalized presentation [Chatterjee et al. 2002; Hong and Zhu 2006; Saeed et al. 2005] to support the organization-customer relationship. As an organization moves across the spectrum of web technology development from static to dynamic, the features can add value to the customer's online experience and can differentiate a web site from that of a competitor's [Saeed et al. 2005]. For example, a site that contains static, textual product information and a limited or no-purchase process may have less value to the customer than a more dynamic site that provides up-to-date product information, access to other customer comments, and options for making purchases. Web technologies consist of a myriad of functionalities [Chatterjee et al 2002], and firms vary in their ability and/or willingness to provide the web technologies to accommodate customer needs [Chatterjee et al. 2002; Hong and Zhu 2006]. For the purposes of this article, movement along this development spectrum from static to dynamic is identified as *diffusion,* and it is assumed those organizations that have higher levels of web technology diffusion are generally better prepared to benefit from their web presence [Hong and Zhu 2006]. In this article, *diffusion* refers to the post-adoption development of web technologies to support the organization–customer relationship—how the web technologies evolve and are developed to fit business activities.

Ultimately, the purpose of this article is to explore the processes that influence the adoption and diffusion of web technologies, an area lacking in research. Specifically, we argue that the adoption of web technologies and the diffusion of these technologies are a result of organizations attempting to maintain or gain legitimacy in their respective institutional field. In their presentation of institutional theory, DiMaggio and Powell [1983] explain that isomorphic processes (coercive, normative, mimetic) influence the homogeneity of organizations, even at the expense of efficiency, and they cite Hawley [1968] in defining *isomorphism* as a process that forces one entity to resemble other entities facing similar environmental situations.

Extant literature and anecdotal evidence support the influence of isomorphic processes on the adoption of web technologies. As described by DiMaggio and Powell [1983], organizations may feel pressured by competitors or customers to implement web technologies to gain legitimacy regardless of whether or not the implementation is best suited for the organization or its efficiency. Organizations may also model their web technologies after other organizations. Institutional theory [DiMaggio and Powell 1983; Meyer and Rowan 1977] states that organizations facing uncertainties or challenged by ambiguous problems within their processes tend to import institutionalized rules and practices. DiMaggio and Powell [1983] hypothesized that organizations will model other organizations rather than expend the time and effort to fully analyze the focal organization's own needs.

However, once web technologies are initially adopted, organizations must continue to make sense of evolving web technologies [Chatterjee et al. 2002] and develop them to fit business needs [Armstrong and Sambamurthy 1999]. At the same time, online customers have become more skilled in their use of [Hargittai and Shafer 2006; Sanchez-Franco 2006] and preferences for web site technologies [Saeed et al. 2005; Agarwal and Venkatesh 2002; Palmer 2002; Turban and Gehrke 2000]. In addition, research indicates differing technologies are needed to support product [Girard et al. 2003] and information requirements [McKinney et al. 2002]. As web technologies evolve, organizations adjust related strategies to fit specific needs, which causes the diffusion of web technologies across all organizational populations to be less homogeneous and more idiosyncratic. However, new web technology applications will begin to emerge around characteristics such as the ones mentioned above. In the context of this article, new web technology applications are viewed as developing within organizational populations, which can be simply defined as a group of organizations that have similar fundamental attributes (e.g., business strategy, product offerings, information requirements, etc.). In their essay on the importance of industry context in information systems research, Chiasson and Davidson [2005: 593] cite Scott [2001] in their definition of an organizational population as a "set of organizations…that produce similar products and services, operate in similar technical and institutional environments, share systems of meaning, and take actions that are influenced by shared normative, cognitive, and regulatory structures."

Institutional theory, either directly or indirectly, suggests a temporal component to the development of institutions such as web technology adoption and diffusion. For example, Lawrence and Suddaby [2006] suggest that institutions can be created, maintained, or disrupted; and Scott [2004] describes the institutionalization process in a similar manner by stating that the process has "necessarily, a beginning and an end as well as a middle" [Scott 2004: 471]. This notion of what Scott [2004] refers to as an "arc of institutionalization" [2004: 472] is especially appropriate in the context of this article, as the evolution of web technologies from adoption to diffusion is an interesting example of an institution moving along the arc of institutionalization from beginning or creation toward the middle or maintenance. Based on these perspectives, this article argues that, as web technologies move through the institutionalization process, new web technology applications will emerge that will cause web technology adoption and diffusion to be affected differently by isomorphic processes across organizational populations, but similarly within an organizational population. A theoretical model and related propositions indicating how the isomorphic processes uniquely influence the institutionalization of web technology adoption and diffusion are presented. No extant literature examines the isomorphic effects on the adoption of web technologies and the subsequent diffusion of those technologies as they relate to different periods of institutional evolution. This article contributes to institutional theory literature by focusing on two distinct stages of the institutionalization process and also offers an increased understanding of how organizations can gain the full potential of their web technologies.

The article is composed as follows. The next section describes institutional theory and web technologies. Then there is a discussion of the initial adoption of web technologies relative to institutional theory, followed by a discussion of the diffusion of these technologies relative to factors such as customers, product, and information. Propositions are presented for both sections. Finally, a discussion and conclusion are provided.

II. LITERATURE REVIEW

Two streams of research provide the theoretical foundation for this study: institutional theory and diffusion of information technology.

Institutional Theory

Institutionalization is defined as the "process through which components of formal structure become widely accepted, as both appropriate and necessary, and serve to legitimate organizations" [Tolbert and Zucker 1983: 25]. Institutionalization is a process of social change in which rules and behaviors become taken-for-granted [Meyer and Rowan 1977; Tolbert and Zucker 1983], even when those behaviors may not be in the organization's best interest of efficiency [DiMaggio and Powell 1983; Oliver 1991]. Institutionalization is evident in the functional operations of organizations. Similar functional areas exist across organizations, and the processes employed by these functional units are taken-for-granted means of achieving organizational goals [Meyer and Rowan 1977]. For example, the technical processes of the accounting department or the information systems department would be similar across most organizations.

Institutional theory has evolved since its inception [Scott 1995]. For example, Scott [1995] cites mid-1900 theorists, Durkheim [1950] and Parsons [1951], for recognizing that individual organizations could differ from broader social institutions and from individuals. He acknowledges another shift in institutional theory in the 1970s: the neo-institutional theory. The change encompassed recognition of institutions as being influenced by cultural belief systems rather than only normative and regulative belief systems, as previously thought. In other words, neo-institutional theory recognizes that organizations are influenced by social knowledge rather than just intraorganizational processes. An *institutional perspective* refers to organizations choosing behaviors that do not necessarily serve the organization's best interest or contribute to its efficiency; and these choices are not market based or strategically applied [Oliver 1991]. More recently, Scott [2004] suggested that two variants (west-coast and east-coast) of institutional theory exist. He describes the west-coast variant, as being largely based on "rationalized myths" [2004: 462], and the east-cost variant [2004: 463], which is used in this article, is focused on DiMaggio and Powell's [1983] perspective of "making organizations more similar without necessarily making them more efficient" [Scott 2004: 463].

DiMaggio and Powell [1983] write that organizational rationalization creates organizations that are more homogeneous than heterogeneous. They explain that organizations within a similar industry tend to create an environment that limits change. Concerning innovations, organizations may adopt a process to stay current with peers, but often this adoption occurs without regard for the efficiency of the organization. Furthermore, as more organizations within the field adopt the same process, the organizations become more homogeneous. DiMaggio and Powell [1983] explain that as organizations become more similar to each other, it is easier for them to conduct business with each, attract qualified employees, maintain a favorable reputation, and be identifiable to governmental and other agencies.

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DiMaggio and Powell [1983] identified three types of isomorphic change: coercive, mimetic, and normative. *Coercive* isomorphism occurs when organizations upon which the focal organization depends or the culture in which the focal organization resides exert pressure on the focal organization. These pressures take the form of force, persuasion, or invitation. Scott [1995] states that coercive isomorphism is about force and expedience. However, he explains that rules prevent the exercise of such demands by organizations; instead there are informal mores or formal laws that pressure organizations. The rules are accepted in order to establish legitimacy on the part of organizations to conform. He describes legitimacy as a resource that reflects an organization's cultural alignment and adherence to pertinent rules. Attaining legitimacy may result in organizations having to choose which authoritative bodies to honor because conforming to one set of rules may result in undermining another set of rules [Scott 1995].

Mimetic isomorphism [DiMaggio and Powell 1983] refers to an organization modeling itself after another organization because of prevailing uncertainty about technologies, goals, or the environment. *Modeling* is the term used to define a "response to uncertainty" [DiMaggio and Powell 1983: 151]. Modeling can be unintentional and occur as a result of employee transfers and turnovers; or it can be intentional through association with consultants and industry trade associations.

Normative isomorphism [DiMaggio and Powell 1983] refers to the similarities of professionals across organizations. Specifically, individuals across organizations that have similar education and training, career expectations, and drive for success will exert pressures on organizations to conform. Pressures to conform can also come from consultants or trade associations [DiMaggio and Powell 1983]. Normative isomorphism consists of values and norms [Scott 1995]. Values are the combination of preferred behaviors and standards to which behavior can be compared. Norms are rules on how things should be done, and they specify objectives. Some norms apply to all members of a collective; other norms apply to individual positions. Norms confer rights as well as responsibilities. They empower and constrain [Scott 1995].

DiMaggio and Powell [1983] state that organizations become more homogenized in terms of "structure, culture, and output" [1983: 143] over time. They state that these isomorphic processes can result in creating an environment that limits change. This current article suggests that although organizations may adopt a process initially in order to conform, over time that process may not remain similar among all organizations. The adoption and diffusion of web technologies is one example.

In addition to the structurally-focused view of institutionalization presented by DiMaggio and Powell [1983], Zucker and Darby [2004] describe a more micro view of institutional theory that focuses on the process of institutionalization. This process view focuses on how institutions evolve over time and is a substantial part of the theoretical basis of this article. As previously mentioned, several authors [Lawrence and Suddaby 2006; Scott 2004; Scott 2001; Zucker and Darby 2004] consider how institutions evolve and change over time. Scott [2001] notes the importance of time in process theories of institutions: "in process theories, time is of the essence, in particular, the time ordering of contributory events" [2001: 93]. This process-based perspective of institutions is used to explain the idiosyncratic diffusion of web technologies across organizational populations.

Institutional theory has been used in other information systems research. King, Gurbaxani, Kraemer, McFarlan, Raman, and Yap [1994] discussed the influence and regulatory powers of institutions, including governmental institutions, on information technology innovations. Orlikowski and Barley [2001] challenged the information systems (IS) and organizational sciences (OS) researchers to consider what each can learn from the other field. Specifically, they challenged IS researchers to include institutional research in their studies, and they challenged OS researchers to incorporate the physical components of technology into their research. Teo, Wei, and Benbasat [2003] used institutional theory as a basis to study what pressures top executives experienced prior to their decision to implement financial electronic data interchange (FEDI). Chiasson and Davidson [2005] used institutional theory to argue that more information systems (IS) theory research should be based on industry rather than the organizational level. They included several examples of industry specific IS implementations that reflect industry-wide implications and generalizations rather than organization-specific uniqueness.

Two articles pertain specifically to institutional theory and web technologies. Butler [2003] used institutional theory as a basis for a case study which examined the commitment of a single organization's employees to the development of their company's Intranet- and Internet-based information system. They found that the development process for Intranet and Internet systems encounters problems similar to the development of other information systems and that the process requires top management leadership. Son and Benbasat [2007] explored the impact of isomorphic processes in the adoption of business-to-business electronic marketplaces. They found that mimetic and normative processes influenced the adoption, as late adopters modeled successful organizations and adjusted beliefs to match those of network members.

No extant literature examines the differing effects of isomorphic changes on the initial adoption of web technologies and the subsequent diffusion of those technologies. It is important to examine these differences to increase organizations' abilities to achieve the full potential of their web technologies.

Diffusion of Technologies

Adoption and diffusion are separate activities. As Premkumar, Ramamurthy, and Nilakanta [1994] explain, adoption is a one-time event, while diffusion takes time. They describe the adoption of technology as referring to an organization's receptivity to change. They describe diffusion of technology as understanding factors that promote or restrict the spread of the technology throughout an organization.

Diffusion of technology has been described by various researchers in various ways. In their research on assimilation and diffusion of web technologies in supply chain management, Ranganathan, Dhaliwal, and Teo [2004] define diffusion as the extent to which web technologies cross organizational boundaries to support activities of external business partners. Cooper and Zmud [1990] defined diffusion as consisting of six stages: initiation, adoption, adaptation, acceptance, routinization, and infusion. It includes the initial adoption, but stresses that diffusion takes time and involves several stages: adaptation through infusion. Premkumar, Ramamurthy, and Nilakanta [1994] use the term *diffusion* to describe the extent to which information technology is used to improve organizational effectiveness. That is the definition of diffusion used in this article.

Web Technologies

In their research on the assimilation of web technologies, Chatterjee et al. [2002] explained that the application of web technologies aids organizations in better understanding customer needs, marketing products and services, and taking customer orders. Many web sites provide interactivity with the customers without the completion of transactions; examples of these sites include UPS.com and creativememories.com. Whether sites offer the completion of a transaction or provide information, they are similar in that they include various web technologies to communicate with and serve the customer; they differ in the selection of and combination of web technologies employed. Web technologies are complex and can be used to create a variety of features to develop web sites. Web technologies can create sites that range in features from static presentation of content to dynamic, interactive, and personalized features [Chatterjee et al. 2002].

For some examples of web technologies, the research by Saeed et al. [2002–2003, 2005] can be reviewed. The authors identified how web technologies can be used to create various web site features, using the customer service life cycle (CSLC) [Ives and Mason 1990] as a framework. The CSLC is one of several models used to understand the phases a customer goes through in making a purchase: requirements, acquisition, ownership, and retirement. In applying the CSLC to online shopping, Saeed et al. [2005] identified site features specific to each stage of the CSLC. Some of these features were shown to be generic across all stages of the CSLC, while other features were specific to individual stages of the CSLC. For example, their study found that features like e-mail, frequently asked questions (FAQs), registration mechanisms, and chat mechanisms supported each of the four stages of the CSLC. Other features were specific to individual stages of the CSLC. For example, mechanisms for searching product literature and search mechanisms were specific to the requirements stage; the shopping cart and mechanisms for understanding the buying process were specific to the acquisition stage. An interesting adjunct to the work by Saeed et al. was that during their early work [2002–2003], they found web technologies supported only three of the four stages of the CSLC. By the time they engaged in their second research effort on this topic [2005], web technologies were also supporting the retirement stage, an indication that web technology evolves.

Web technologies are complex; to fully appreciate this complexity, it is helpful to understand Swanson's [1994] information systems (IS) typology. This typology distinguishes among three types of IS innovations. Type I innovations are process innovations that are restricted to the IS function. Examples of this type of innovation include activities within the IS department, such as software maintenance or systems programming. Even though these activities may influence other departmental functions, the activity itself is limited to the IS department. Type II innovations include IS products and services that apply to the administrative processes and infrastructure, but not directly to the production of goods and services. Examples of Type II IS innovations include payroll and financial accounting systems. Type III IS innovations integrate the products and services of the IS department with the core business technology (production of goods and services), as well as the administrative processes and infrastructure. Examples of Type III IS innovations include material requirements planning, real-time reservation systems (such as the systems used by airlines), and computer integrated manufacturing. The application of web technologies to understand customer needs, market products and services, and complete transactions is classified as a Type III innovation because of the strategic involvement of multiple functional departments and management [Chatterjee et al. 2002; Hong and Zhu 2006].

Although all types of IS innovations evolve, Type III IS innovations are affected by and influence organization-wide processes, strategies, and activities. Web technologies continue to evolve; and this evolution can be viewed as an organizational process, and stages of the process can be influenced by various factors [Swanson 1994].

III. TOWARD A THEORY FOR THE DIFFUSION OF WEB TECHNOLOGIES

This article suggests that the adoption of web technologies is a taken-for-granted phenomenon that is a result of isomorphic processes (coercive, mimetic, and normative) related to applications of web technologies that have been exogenously developed and as such have been previously legitimated by other organizational populations. As organizations respond to isomorphic pressures to adopt web technologies exogenously developed in other organizational populations, the institutionalization process is set into motion. Additionally, this article argues that over time, the previously described exogenously adopted web technology applications evolve within organizational populations to create new, endogenously developed web technology applications around common organizational attributes (customers, products, information) that are then diffused within organizational populations. This follows the arguments of Chiasson and Davidson [2005] in their contention that IS applications can be industry-specific, or applied differently, based on the industry. They argued that industry effects should be "taken seriously" to provide context in information systems research. Peng, Sun, Pinkham, and Chen [2009] also noted the contextual implications of applying institutional theory in developing strategy.

The theoretical model in Figure 1 illustrates the proposed relationships presented in this section. Conceptually, exogenous or previously legitimated web technology applications enact isomorphic processes that influence the organizational adoption of web technologies (Propositions 1–3); consequently, the adoption of web technologies then triggers the process of institutionalization. Once the process of institutionalizing web technologies is underway, new or endogenously developed web technology applications emerge around common fundamental attributes (customers, products, information) that enact isomorphic processes that shape the institutionalization process of web technologies through diffusion within organizational populations (Propositions 4–6). As stated by DiMaggio and Powell [1983: 150], these isomorphic processes tend to "derive from different conditions" yet "are not empirically distinct." Therefore, each process and its association with web technologies will be discussed separately; however, there is some overlap in the discussion. Although not explicitly addressed in the current article, Figure 1 conceptually "closes the loop" relative to the process of institutionalization by illustrating that at some point in the future, the institutionalization process will presumably move from diffusion toward a new form that will lead to the deinstitutionalization of the current web technology application, and the institutionalization process will begin again at adoption.

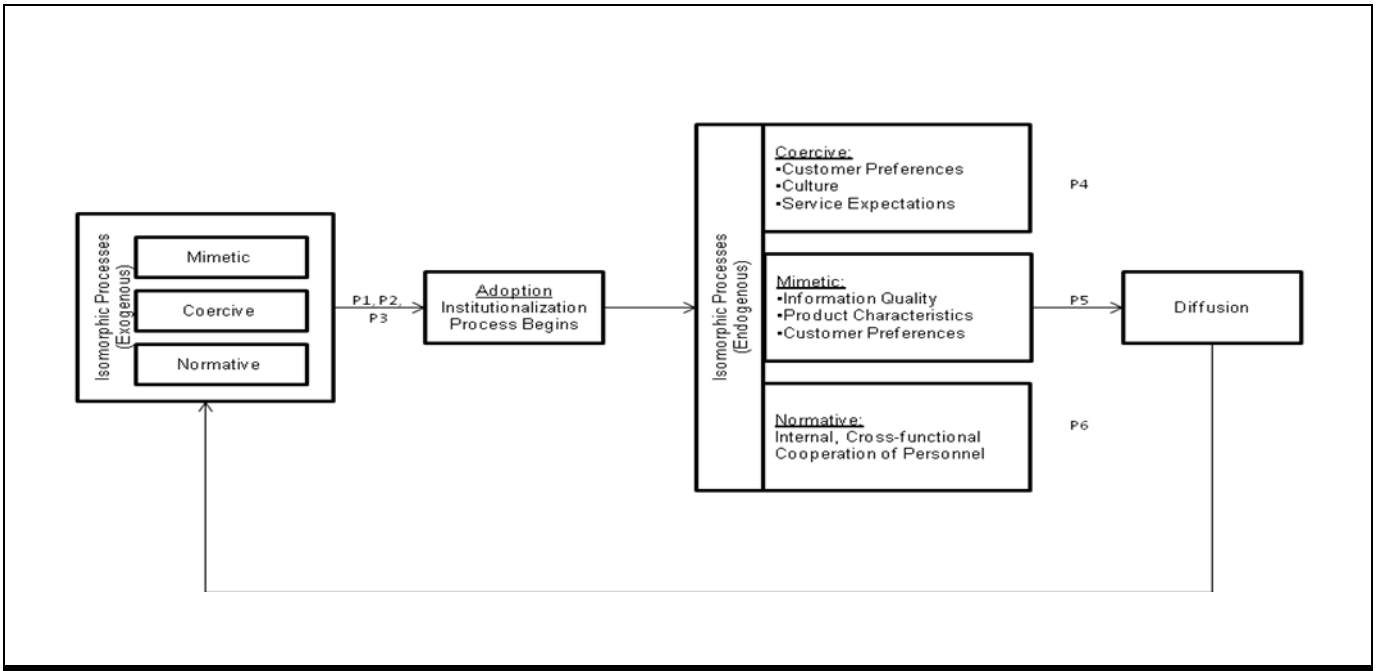

Figure 1. Institutional Evolution of Web Technologies

Coercive Processes and Web Technologies Adoption

Many organizations were initially pressured to implement web technologies due to the expectations of the society in which the organizations resided. In the late 1990s, a U.S. Midwestern university hosted a panel discussion on web

site deployment. The discussants were representatives of well-known firms like Cargill, General Mills, Federated Insurance, and 3M. A striking comment during the discussion was that these companies felt pressured into implementing web technologies. The pressure came from competing companies and customers. These companies responded to the pressure by just getting something on the web—to become legitimate. In their discussion of industry and IS, Chiasson and Davidson [2005] explain that IT/IS applications tend to support the organization's core competencies; thus these applications are common across organizational populations.

Pressures for implementing web technologies can also come from the government. In some countries, like Thailand, the government established programs to promote web technology implementation among government, businesses, and the general population [Sutanonpaiboon and Pearson 2006]. These types of pressures are consistent with coercive isomorphism described by DiMaggio and Powell [1983] and Scott [1995]. Therefore,

Proposition 1: Coercive isomorphic influences positively shape the adoption of web technologies across organizations and organizational populations.

Mimetic Processes and Web Technologies Adoption

Information systems literature generally accepts that, by itself, physical information technology is imitable [Barney 1991]. When uncertainty exists on how to implement web technologies, initial implementation of simple web technologies could be achieved by purchasing computer hardware across markets and examining simple web sites of competitors. Firms could also rely on partners or contractors for modeling their initial web technology implementations [Hong and Zhu 2006].

Strom [2000] describes the early design of web sites. He states that in the mid-1990s, web sites consisted mostly of text with the emergence of graphics later in the 1990s. These sites were basic and simple; they were easy to copy. Web technologies have continued to evolve as suggested by Swanson [1994]. Research shows that navigation [McKinney et al. 2002; Tarafdar and Zhang 2005; Turban and Gehrke 2000] and ease of use [Agarwal and Venkatesh 2002; Venkatesh et al. 2003] are attributes that online customers favor. These were characteristics of the Yahoo.com site that so many other sites (Excite, Netscape, Lycos, and other) modeled [Strom, 2000].

The fact that modeling of web technologies has continued to be a concern is illustrated by the court case between Amazon and Barnes and Noble [Mykytyn et al. 2002]. In 1999, Amazon.com was granted a patent for its 1-Click mechanism, a web technology application. This feature allowed shoppers to enter their credit card number and address information just one time so that on subsequent visits to Amazon.com customers would complete a purchase with a single keystroke (1-click). A court case resulted when BarnesandNoble.com unveiled its "Express Lane" feature; Amazon.com claimed barnesandnoble.com violated the 1-Click patent.

Another method of modeling of web technologies occurs through outsourcing. Kishore, Agrawal, and Rao [2005] found that in 1999–2000, organizations outsourced their e-commerce processes to gain access to knowledge that vendors possessed. This knowledge was sought to find solutions to uncertain business practices, but the same solution could be applied for different clients [Kishore et al. 2005; Sakthivel 2007].

This evidence supports the argument that adoption of web technologies can result from modeling other organizations and coincides with the mimetic isomorphism described by DiMaggio and Powell [1983] and Scott [1995]. Therefore,

Proposition 2: Mimetic isomorphic processes positively shape the adoption of web technologies across organizations and organizational populations.

Normative Processes and Web Technologies Adoption

Normative rules about organizational behavior are often initiated as a result of active participation in programs such as workshops, conferences, educational programs offered by trade and professional organizations [DiMaggio and Powell 1983]. If one considers the era in which many organizations first implemented web technologies, the influence of information systems personnel was quite strong because of the lack of technical understanding by many functional managers [Ranganathan et al. 2004; Armstrong and Sambamurthy 1999]. In addition, information systems departments tended to be centralized, so roles of individual IS personnel were more homogeneous across organizations [Kahai et al. 2001–2002]. This homogeneity of professional positions is central to normative processes as described by DiMaggio and Powell [1983]. Professionals across organizations tend to strive for similar goals within their fields.

The IS professional environment is shown to provide expertise to the information systems department of an organization [Swanson 1994]. When this relationship is strong, the information systems unit is characterized as professionally oriented and likely to seek state-of-the art information technology and staff [Swanson 1994]. Therefore,

Proposition 3: Normative isomorphic processes positively shape the adoption of web technologies across organizations and organizational populations.

Coercive Processes and Web Technologies Diffusion

As online customers have gained experience with using web technologies, they have also developed preferences that cannot be addressed with the homogeneous diffusion of web technologies. The targeted audience of a web site can influence the web technology diffusion of an organization due to customers' skill level, culture, gender, and technology-related preferences. Skill level and technological preferences of customers vary. In their study of shopping orientations, Girard et al. [2003] indicate some shoppers are interested in low prices and convenience that online shopping can easily address through web technologies supporting textual and graphical presentations. These shoppers are not interested in complex searching features. On the other hand, these authors state some shoppers (known as recreational shoppers) prefer more web technology that simulates the interaction experienced in the traditional shopping environment—they enjoy the online shopping experience.

Web technology diffusion has also been influenced by customer culture. Research found that among Japanese online shoppers, the most frequent online shopping is completed by individuals who enjoy the experience of online shopping rather than the ability to find the lowest prices [Gehrt et al. 2007]. This indicates that web technologies that enhance the online shopping experience would be appreciated by these shoppers. This same study also found that, unlike US shoppers, in Japan the socioeconomically upscale shoppers tend *not* to be technically savvy; and, therefore, web technologies supporting features like the shopping cart or the order process need to be very straightforward rather than "recreationally" enhanced [Gehrt et al. 2007: 175]. These rather conflicting research findings emphasize that customers differ in skill level and technological preferences when using online shopping sites. Organizations that understand their target audience will diffuse web technologies accordingly.

The gender of the customer base of a web site could influence how organizations diffuse web technologies. Research shows that gender differences do exist regarding the usage and comfort levels of shopping online as follows. Generally, females perceive more risk associated with online shopping [Garbarino and Strahilevitz 2004; Rodgers and Harris 2003] and have a propensity to process textual information better than graphical information [Rodgers and Harris 2003]. Rodgers and Harris explain that this latter tendency relates to how the brain processes differ between the genders with females relying primarily on left-hemisphere processing. Consequently, females prefer detail and emotional cues. Males, on the other hand, prefer graphics and better tolerate the hassles of online shopping; and men, more than women, find online shopping to be more practical [Rodgers and Harris 2003].

There is another stream of literature that supports customer influence on web technology diffusion: electronic service quality. This literature indicates the extent to which online customers have matured in their understanding and expectation of service from online shopping sites. Parasuraman, Zeithaml, and Malhotra [2005] found that online customers have preferences about issues like accurate delivery of products and security. Lepkowska-White [2004] found there are numerous online customers still wary of supplying personal information. She suggests that organizations have options for addressing this issue. These options can be relatively simple such as providing product coupons in exchange for customer information; or the option can be more complex, such as implementing software that allows customers control over the information they submit.

In summary, due to experience with online shopping, technological skill levels are diverse among online customers while their preferences for shopping experiences and service expectations have become refined. Consequently, different web technology applications emerge around these variables where organizations that target customers with similar culture, service expectations, and preferences are likely to develop their web technologies differently. Therefore, homogeneous diffusion and further institutionalization of web technologies across all organizational populations is unlikely. Rather, homogeneous diffusion of web technologies is more likely to occur within organizational populations instead of across populations. Therefore,

Proposition 4: Coercive isomorphic processes in the form of customer preferences, culture, and service expectations positively shape the homogeneous diffusion of web technologies within organizational populations.

Mimetic Processes and Web Technology Diffusion

As web technologies continue to evolve and online customers become more technologically savvy, this article argues that modeling other organizational populations to implement web technologies is not as feasible. Factors like information quality, product characteristics, and customer preferences impact how organizations implement web technologies as explained below.

Because there is no physical contact with store personnel during an online shopping experience, information quality of web sites is important in providing adequate, relevant, understandable, reliable, and useful information [McKinney et al. 2002]. This information is particularly important to consumers in deciding on product purchases [Szymanski and Hise 2000] and in relaying up-to-date price and product information [Gulati and Garino 2000]. McKinney et al. [2002] considered the information quality of a site so important that they developed an instrument to measure it.

Information quality of a web site is related to the product being sold. Based on work by Stigler [1961] and Nelson [1970] a classification system for durable goods identifies three types of goods: search, experience, and credence goods [Girard et al. 2003]. Search goods are goods that consumers can inspect prior to purchase. Examples include books and personal computers. Experience goods are goods with qualities that cannot be determined prior to purchase. In other words, these goods must be used or sampled before satisfaction can be determined. Examples include clothing, perfumes, cell phones, and televisions. Credence goods possess qualities that cannot be determined even after use. Examples of these products include vitamins and water purifiers.

We argue that web technologies used to transfer information requirements would differ for the types of products, especially in selling the credence goods. Organizations would need to understand their product and use quality information technology to sell that product. For example, using the research described by Saeed et al. [2005], the mechanisms to submit and retrieve product reviews might be helpful in selling credence goods because the customer is unable to experience the product but can rely on the opinions of others; these same mechanisms would not be as important in the purchase of search goods [Girard et al. 2003]. The information provided for experience products might serve as supplemental information because customers are expected to make in-store visits to be able to experience the product [Girard et al. 2003].

To understand the difference of information quality relative to product, one can compare the purchase of a book to that of a mattress. Interest in a book is focused on the content and author's style. A sample of the writing may be all that is needed to get the interest of the online customer. However, when buying a mattress, customers need to visit the mattress store and physically try out the bed before making a purchase. The web site serves to share quality information about the mattress, and the information can take many forms (video, recommendations, technical explanation of sleep system, etc.) that vary greatly from those used to sell a book.

The product shopped for online would influence web technologies in two other ways. First, as consumers become more environmentally aware, they are increasingly looking to the web for ways to retire used products [Saeed et al. 2005]. Organizations that sell products that are recyclable or resalable may need to incorporate web technologies that support this activity. Second, research shows that shoppers perceived more security and service risk when shopping involved brand name products (rather than non-branded products) [Huang et al. 2004]. The authors offered one reason for this finding: Because the customers were content with the actual products, their concerns focused on the security and service instead of on the products. Following this logic, organizations with non-brand products might need less emphasis on web technologies dealing with security and service.

It becomes apparent that adoption and subsequent diffusion of web technologies are impacted differently by mimetic processes across organizational populations. Organizations that relied on partners or outsourcing to implement initial web technologies run the risk of not fully aligning the web technologies with business processes, incorporating organizational culture, or getting employee buy-in [Hong and Zhu 2006]. Considering the above discussions of information and product (and also the customer preferences discussed earlier), the diffusion of web technologies becomes less homogeneous and more idiosyncratic across organizational populations, but becomes more homogeneous within an organizational population. Diffusion requires interaction with business processes or culture and becomes too complex and difficult for other organizations to model [Piccoli and Ives 2005], especially when considered across all organizational populations. For example, an organization that highly values customer service will incorporate that service into their web site and back it up with the necessary business processes—the simple presence of a phone number on a web site indicates the presence of a customer service department with processes in place for handling requests from online customers (see CharlesSchwab.com). Time, experience, and learning by organizations become embedded in the web technologies [Ravichandran and Lertwongsatien 2005]. Therefore,

Proposition 5: Mimetic isomorphic processes in the form of information quality, product characteristics, and customer preferences positively shape the homogeneous diffusion of web technologies within organizational populations.

Normative Processes and Web Technology Diffusion

The information systems departments have changed structure over the last several years [Kahai et al. 2001–2002]. There has been a shift from centralization to decentralization to a hybrid form of centralized data and networking and decentralized hardware, software, and personnel. The placement of IS personnel in functional units has generated the dual benefit of providing close proximity to technical support while enlightening IS personnel about business processes [Kahai et al. 2001–2002; Lederer and Mendelow 1988]. The homogenization of titles and roles as described by DiMaggio and Powell [1983] has been reduced. As discussed by Wade and Parent [2001–2002], the roles of IS personnel have evolved to require more organizational skills and less concentrated focus on technical skills. In addition, Stewart and Gosain [2006] found that software development teams that were overcommitted to professional norms rather than business goals tended to produce less effective projects. Moreover, in their research, Wade and Parent [2001–2002] explain, for example, the difficulty in defining the role of a webmaster. This role has evolved quickly and adopted many descriptions. Due to the variety of descriptions for webmaster, Wade and Parent needed to conduct a job-content analysis from help-wanted advertisements in order to create a description of webmaster useable for their study.

The role of information systems has also changed over the past decade to a strategic alignment with the business [Ravichandran and Lertwongsatien 2005; Piccoli and Ives 2005]. Consequently, business managers have better understanding of information systems capabilities, and information systems managers have a better understanding of the organization's objectives. The result is that information systems application is a component of competitive advantage [Ravichandran and Lertwongsatien 2005; Piccoli and Ives 2005]. Chatterjee et al. [2002] found that the expertise and authority of organizational personnel *across departments* were important in integrating web technologies with business activities. This is contrary to research that supported outsourcing for early web technology adoption which promoted the implementation of best practices by vendors [Kishore et al. 2004/2005].

The diffusion of web technologies can contribute to strategic objectives of an organization. As mentioned previously, product offerings and customer preferences can influence web technology diffusion. The strategy for addressing these factors will likely relate closely to organizational goals and involve many individuals. Kishore et al. [2004/2005] found that the development of competitive web technologies tended to be an in-house activity in order to protect vital tacit knowledge. The more tacit the knowledge held within an organization, the more difficult it is to imitate. Zucker and Darby [2004] refer to this as "natural excludability" [2004: 552]. As a result of natural excludability, knowledge related to the diffusion of web technologies will be confined to the creators of the knowledge within an organization.

Due to the structural changes of the information systems department, the increased understanding of information systems and business across organizational personnel, and the strategic alignment of IS with business objectives, there will be greater focus internally on diffusion of web technologies to achieve organizational goals rather than pursuing similarity across organizations based on the professionalism of organizational personnel or application of norms for getting work done. Therefore,

Proposition 6: Normative isomorphic processes in the form of internal, cross-functional cooperation of personnel positively shape the homogeneous diffusion of web technologies within organizational populations.

IV. DISCUSSION

Web technologies include a wide variety of functionalities that range from static delivery of content to dynamic, interactive, or personalized activities. Many organizations do not leverage the full potential of web technologies [Chatterjee et al. 2002]. Web technologies are considered to be a Type III innovation [Chatterjee et al. 2002; Swanson 1994], which refers to technologies that are fully integrated with the administrative and business aspects of an organization.

McKeen and Smith [2009], in their analysis of how organizations have changed their use and application of information technologies over the past decade, suggested that the success of information technology will be measured by the value it adds to an organization. McKeen and Smith suggest that, in the future, the application of technologies must be better than in the past. In other words, technologies such as web technologies must continue to evolve. These technologies must be integrated across the organization even to the point of transforming business. As shown in Figure 1, the diffusion of technologies will continue. At some point in the future, the institutionalization process will presumably move from diffusion toward a new form that will lead to the deinstitutionalization of the

current web technology application and the institutionalization process will begin again at adoption. Moreover, this evolution also includes personnel. As suggested by McKeen and Smith [2009] and proposed in this article, the role of technology professionals will continue to evolve as these individuals take a major leadership role due to their understanding of technology to support business processes.

The academic contribution of this research is the support for and challenge of previous institutional theory literature. While propositions 1 through 3 support previous institutional theory research which shows isomorphic influences shape organizations and organizational populations to become more homogenous through the adoption of exogenously developed web technology applications, propositions 4 through 6 suggest that the diffusion of web technologies becomes more idiosyncratic across organizations and organizational populations as new, endogenously developed web technology applications emerge. The homogeneity of web technologies does not remain constant (meaning it is not a permanent, lasting phenomenon) across organizations and organizational populations. Researchers may investigate whether the idiosyncratic diffusion of web technologies is a deviant reaction to conformity in an effort to differentiate the organization for competitive advantage, a concept likely to be considered by agency scholars.

Future research could expand the proposed model to investigate how the adoption of web technologies is moderated by organizational level factors such as an organization's receptivity to change, and how the diffusion of web technologies is moderated by factors that promote or restrict the spread of the technology throughout the organization as suggested by Premkumar, Ramamurthy, and Nilakanta [1994] or organizational population level factors such as industry as suggested by Chiasson and Davidson [2005]. More research in this area may also focus at the processual level rather than the organizational level, an area rarely researched [Heugens and Lander 2009]. In this effort, the focus would be on how organizations experience isomorphic pressures at this level, how they interpret them, and how these pressures are managed over time.

V. CONCLUSION

Research on web technologies is still quite young. Organizations can and did initially adopt web technologies by responding to pressures of customers or professional personnel or by modeling other organizations. This article has theoretically examined the institutionalization of web technologies over time from adoption to diffusion and considered how the influence of isomorphic processes change and evolve. Specifically, this article attempted to untangle the influence that factors like the need for information quality, the characteristics of products, internal personnel, and the preferences and usage skills of the customers have on the institutionalization of web technologies through diffusion within and across organizational populations. Consequently, as organizations develop awareness of their customers and products and align these with internal business processes and culture, web technology diffusion becomes more idiosyncratic than homogeneous across organizational populations.

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