

A Model of the Impact of Corporate Culture on Information Technology Adoption

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Working Paper #57
Louisiana Forest Products Laboratory

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December 2, 2002

Introduction

The forest products industry is often characterized as being reactive rather than proactive when it comes to implementing inter-organizational (IOS) technologies. The industry generally lags in IOS adoption relative to most other industries. This is supported by Vlosky (2002) who finds the industry lagging in adopting information technologies such as the universal product code (UPC), bar coding for inventory management, electronic data interchange and the Internet (Vlosky and Westbrook 2002). In addition, recent data from the Department of Commerce show the pulp and paper sector ranked 14th with regard to percent of transactions conducted using the Internet. The solid wood products sector ranked dead last (Anonymous 2002).

This late-adopter behavior has been attributed to a number of reasons including the industry's history of complacency emanating from the concept of timber primacy (Bennett 1965), a lack of understanding of eBusiness and other IOS technologies, a lack of adequately trained information technology staff, expense of IOS development (Vlosky 2000a, Juslin and Hansen 2002) and a production-oriented culture that does not require intensive customer/supplier electronic communication. It is this notion of corporate culture as a moderating variable in the context of an IOS adoption model that we present in this paper.

An Overview of Information Technology (IT)

Information technology (IT) is defined as "all forms of technology used to create, store, exchange and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations and other forms, including those not yet

conceived).” It is a convenient term for a rapidly expanding range of equipment, applications services and basic technologies that process information. The elements of IT fall into three principal categories: computers, telecommunications and multimedia data and many combinations of the building blocks that may be used to create the IT resource across an organization (Keen 1995).

Information technology (IT) has become the tool used to manage change in business strategies and internal corporate processes by many companies (Vlosky 1999). Gates (1997) considered IT as the nervous system of a company, and that its excellence determines a company’s competitiveness. Companies using IT are able to learn about the market, the competition, the internal and external customers, leveraging it for competitive advantage to increase market share and profits (Mahmood and Soon 1991). Information technology is used to speed communications between trading partners, shorten product life cycle, establish better relationships with customers, suppliers and partners and reduce expenditures (Franklin 1997) as shown in business-to-business (B2B) and business-to-consumer (B2C) transactions.

Corporate Culture

One common thread that greatly affects many of the organizational aspects that enhance performance and increase productivity is the widely shared and strongly held values that underlie and define an organization’s culture. Desphandé and Webster (1989) reviewed several studies and defined organizational (or corporate) culture as “the pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide them with the norms for

behavior in the organization.” Schneider and Rentsch (1988) describe culture as “why things happen the way they do,” and organizational climate as “what happens around here.” Cultures can be determined by the values, assumptions and interpretations of organization members (Hales 1998).

These factors can be organized by a common set of dimensions on both psychological and organizational levels to derive a model of culture types to describe organizations (Cameron and Freeman 1991). Corporate culture is an important predictor of organizational capabilities and outcomes such as customer orientation (Desphandé et al. 1993) and new product development (Moorman 1995). For many years, scholars in organizational behavior have also attempted to demonstrate the link between an organization’s culture and its performance. It has been argued that the success of an organization’s strategy depends, to a significant extent, on the culture of the organization (Yip 1995). In considering culture in the light of a strategic management paradigm, Barney (1986) argued that for an organization’s culture to provide sustained competitive advantages, it must add value. It must be rare or unique and be difficult to imitate by competitors.

Marketing and Production-oriented Corporate Cultures

In model we define two corporate cultures, marketing and production. Marketing cultures include a market orientation where organizations develop and maintain a viable fit between the organizations’ objectives, skills and resources to the changing market opportunities (Jaworski and Kohli 1993). In effect, market-oriented organizations design their products and

service offerings to meet customer needs with a profit. Business success depends on effective analysis of marketing opportunities, researching and selecting target markets, designing marketing strategies, planning marketing programs and organizing, implementing and controlling the marketing effort (Kotler 2000). Waldera (2000) credits corporate culture as “the single most important determinant of a company’s ability to adapt to market forces.”

The production-oriented businesses on the other hand, concentrate on achieving high production efficiency, low costs and mass distribution. They operate on the assumption that consumers prefer products that are widely available and inexpensive. Success is based on technological efficiency through cost cutting. Customer-oriented culture serves to make organizations more responsive to customer needs (Webster 1988, Kutner 1987), whereas a competitor-oriented organization works to perform well relative to the competition (Armstrong and Collopy 1996, Hendon 1986) instead of profit maximization (Mueller 1992) or market share.

A Model of IT Adoption

Figure 1 provides an overall illustration of how an organization adopts information technology and the numerous factors that influence the adoption process (Vlosky 2001). An organization is surrounded by a whole range of economic, social, political and technological factors that influence decision making and performance. Other factors in the external environment constitute the organization’s customers, distributors, suppliers and the competition. These forces constitute the external macro-environment as well as microenvironment forces. They need to be scanned to determine opportunities and threats for the business (Kotler 2000).

The internal environment of the organization could be made up of tangible factors such as the physical plant and equipment and the intangible such as the skills of the employees within the organization. To be able to survive in the highly competitive business world, a business must identify its strengths and weaknesses, hone in on its core competencies and leverage them for competitive advantage (Grant 1991). The important role IT plays in business has been emphasized in literature (Rockart and Short 1989, Benjamin et al. 1984).

Thus, the current information technology system of an organization constitutes the corona of IT influences (**step 1**). Such influences could be made up of old legacy systems, integrated systems, semi-integrated systems or stand-alone IT systems. Depending on the organizational size, the market nature and type of products being produced and the perceived benefits of IT, certain portals are able to penetrate the organization to varying degrees to influence adoption (**step 2**). Penetration and adoption are typically facilitated by top management, cultural orientation of the organization, management information systems or the information technology itself as alluded to in earlier sections of this report. Once these factors have successfully penetrated the organization to influence the adoption of IT, internal diffusion occurs (**step 3**). The diffusion is tremendously affected by the cultural orientation of the organization to create strong or weak relationships of the factors that lead to the penetration, adoption and diffusion. Based on the corporate culture with respect to IT adoption, the organization may utilize IT for internal consumption (Intranet), external consumption (Extranet), a network of computer networks for global application (Internet) database management, enterprise resource planning and many other IT applications (**step 4**). In the highest order application of IT, eBusiness takes

place with interorganizational connectivity (**step 5**). This can be done with its exchange partners, such as its customers, which include order taking, order process, order payment, dispatch, order tracking and after-sales customer support. Others include suppliers for procurement processes and overall supply chain management.

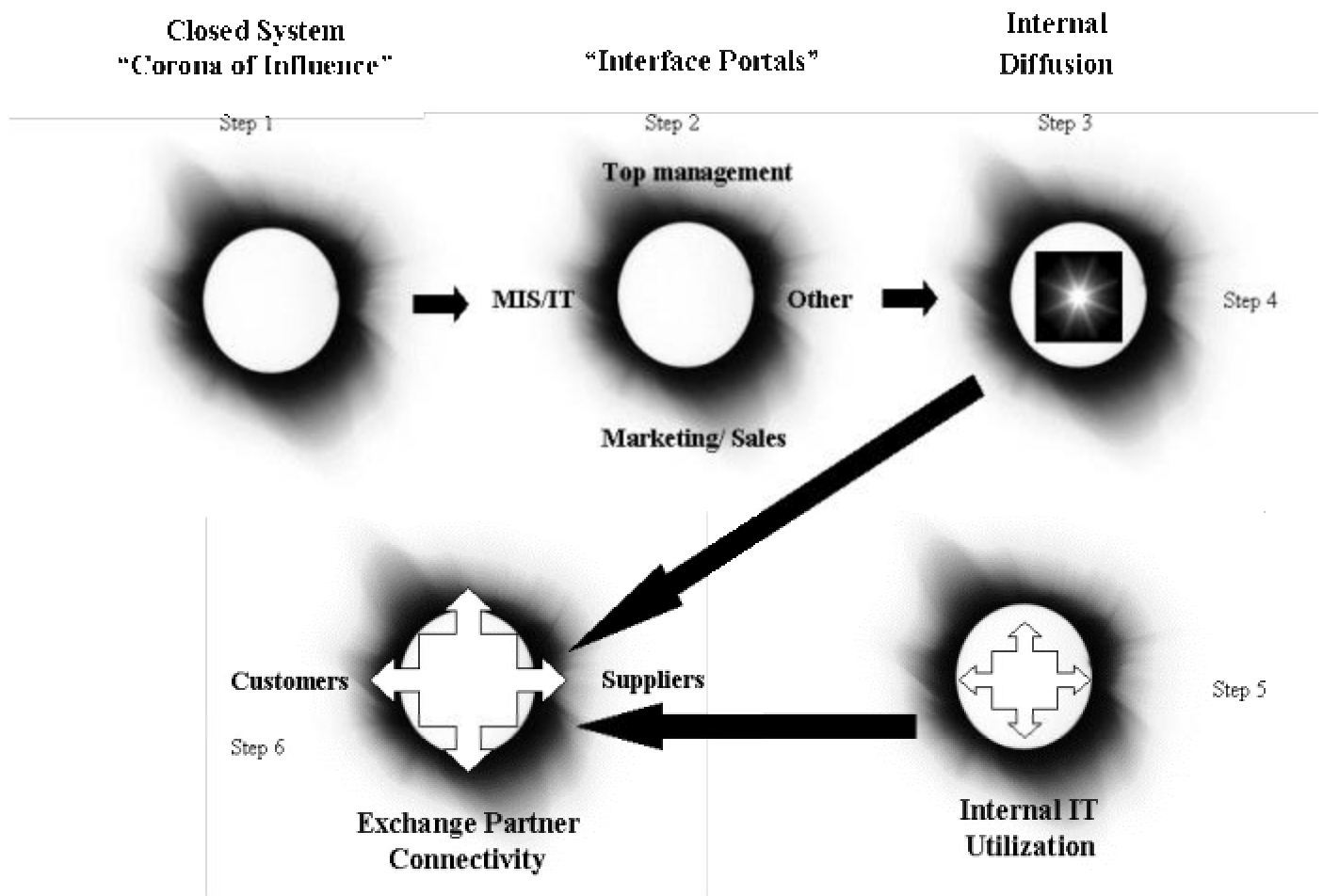


Fig. 1. Model of IT Adoption (Vlosky 2001)

Conceptual Model of Corporate Culture Effects on IT Adoption

In this study we build on the model posed by Vlosky (2001) to include a set of constructs related to IT adoption related to corporate culture (**Figure 2**). In this model, corporate culture plays a moderating role in systematically modifying either the form and/or strength of the relationship between the predictor variables (perceived effectiveness of IT adoption) and the criterion variables that influence IT adoption (such as extent of IT application, user participation, perceived ease of use, perceived usefulness and adoption diffusion) (Sharma et al. 1981) and the interaction between the criterion variables and the predictor variable.

There are various cultures that organizations can adopt. However, for the purpose of this study, organizational culture is defined in terms of the dichotomy in the market/production orientation.

The items to measure cultural orientation in this research have been adapted from McCarthy and Perreault (1987) and other marketing and management literature such as Kotler et al. (1997), Kotler (2000), Keegan et al. (1992), and Elliot (1990). Since IT adoption constructs could be perceived to be rather broad, a modified version of a similar instrument developed by the Computer Science and Telecommunications Board of the National Research Council in 1991 (Anonymous 1994) was adapted as well as other items from the Technology Acceptance Model (TAM) by Davis (1989) and Davis et al. (1989).

Factors Influencing IT Adoption

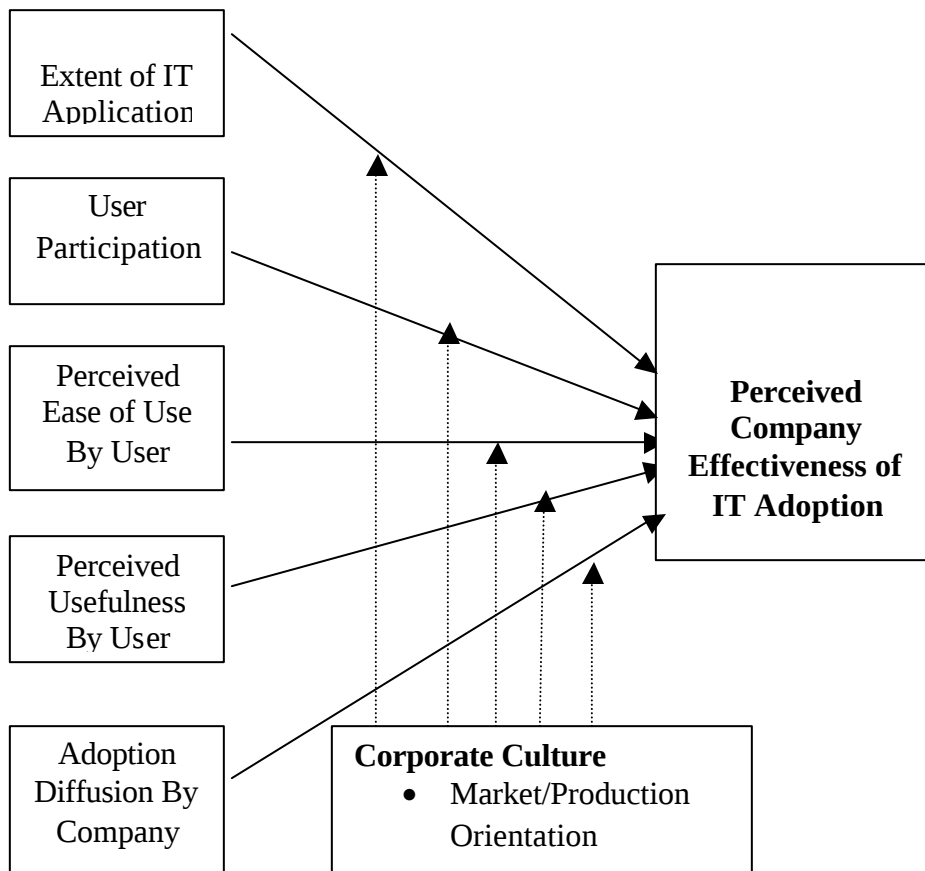


Figure. 2. Model of IT Adoption Influences and Corporate Culture

Model Constructs

Extent of Application

The “extent of application” construct describes the extent to which an organization applies IT to making, implementing and evaluating organizational decisions. Its benefits are commonly based on enhanced decision making or improved business performance. The use of

information in decision making involves integrating information sources and selecting among alternative strategies, whereas information use in decision implementation concerns how decisions should be carried out (Nutt 1986). Information use in evaluation, on the other hand, refers to the determination of positive and negative performance outcomes and the reasons for the outcomes (Zaltman and Moorman 1989).

The development of IT comes with a significant risk of whether the end users will actually use it or not. To ensure continued use, external variables (such as technical features and organizational environment), internal psychological variables (such as past education and attitude to system use) and past usage (prior experience) must be considered (Bajaj and Nidumoli 1998, Taylor and Todd 1995).

Past research has found inconsistent associations between usage and other measures of system success. There still remains a significant gap in establishing the relevance of the way of measuring usage to the task or study (Szajna1993). According to the theory of reasoned action, the perceived usefulness of the system and its impacts on valued skills affect attitudes toward use of IT (Liker and Sindi 1997). This means that for users of IT to realize the full potential of the technology, they must be willing to use the technology and become effective users. Unfortunately, many IT applications are misused, underutilized or abandoned (Martinsons and Chong 1999, McDermott, 1987).

User Participation

The relationship between user participation and information system (IS) has drawn

attention from researchers for some time because of its potential impact on the success of systems. Yet, empirical results have drawn a lot of controversy as a result of conflicting findings, weak measures and methodological and theoretical differences. Hence, over two decades of research have still not convincingly demonstrated the benefits of user participation (Ives and Olson 1984, Torkzadeh and Doll 1994, Saleem 1996). User participation has been reported to be situation dependent and not equally effective in all situations (McKeen and Guimaraes 1997).

There is much controversy surrounding the definition of user participation in organizational behavior literature (Locke and Schweiger 1979, Vroom and Jago 1988). User participation could be considered as “taking part” in some activity. Such participation may be direct or indirect, formal or informal, performed alone or in a group, covering varying scopes of activities during systems development and implementation (Vroom and Jago, 1988). Ives and Olson (1984) suggested that assessing a wide variety of specific behaviors, activities and assignments is more accurate, reliable and valid than measures assessing general opinions during user participation evaluation (Cote and Buckley 1987, Barki and Hartwick 1994).

Systems development, as a result of being marked by cost overruns, late deliveries, poor reliability and user dissatisfaction, in many cases, does not achieve the expected strategic benefits. It has been suggested that the participation of users in the design and implementation of IT promotes greater user acceptance, IT usage, system quality, organizational impact and increased user satisfaction, which could lead to increased IT implementation success (Hwang and Thorn 1999, Lin and Shao 2000, Amoako-Gyampah and White 1997). Cultures that are high in trust

and mutual supportiveness foster higher levels of communication, shared identity and commitment (Mohr and Nevin 1990) which enhances user participation (Moorman et al. 1992). Literature from social exchange and organizational behavior suggests that the greater the user participation in the project, the greater will be the establishment of trust in the success of the project (Moorman et al. 1993) because the users will be able to identify loopholes in the project before final implementation and will also feel committed to make it work (Moorman et al. 1992). This also generates confidence in the users that the IT system is reliable (Rotter 1971) and encourages users to take risks (Ring and Van De Ven 1992).

According to Foster and Franz (1999), analysts and users have different perceptions of the user's participation and acceptability of the system to the user. From the point of view of users, the level of user participation has a direct, positive and significant impact on user satisfaction, whereas analysts' perceptions portray otherwise (Amoako-Gyampah and White 1993). This is because it is believed that the successful implementation of IT projects depends, to a large extent, on the learning processes and the accumulation of knowledge at the firm level (Panopoulou 2001).

User participation facilitates organizational learning by bringing together all dispersed knowledge from the various units within the organization to one spot where employees can access information, learn from one another and benefit from new knowledge developed by other units (Becker 2001). This provides opportunities for mutual learning and interunit cooperation that stimulate the creation of new knowledge and, at the same time, contribute to organizational units' abilities to innovate (Kogut and Zander 1993, Tsai and Ghoshal 1998, Huber 1991).

Perceived Ease of Use

Perceived ease of use has been established from previous research to be an important factor influencing user acceptance and usage behavior of information technologies (Igbaria et al. 1995). It describes the individual's perception of how easy the innovation is to learn and use. This includes support, complexity and change. The Technology Acceptance Model (TAM) by Davis et al. (1989), which places emphasis on the roles played by perceived ease of use and perceived usefulness in influencing technology adoption decisions, has been widely used to predict user acceptance in much of the literature (Plouffe et al. 2001, Karahanna and Straub 1999, Thompson et al. 1991, Venkatesh and Davis 1996). Venkatesh (2000) reported that six variables contribute significantly to how users perceive the ease of use of specific IT systems over time in an actual corporate setting. These variables include computer self-efficacy, facilitating conditions, intrinsic motivation/computer playfulness, emotion/level of computer anxiety, objective usability and perceived enjoyment (Wexler 2001). Self-efficacy has a strong direct effect on perceived ease of use, but only an indirect effect on perceived usefulness through perceived ease of use (Igbaria and Iivari 1995). Another factor, past usage (prior experience), also apparently influences the ease of use of the system, and this is a key factor in determining future usage (Bajaj and Nidumoli 1998).

Perceived Usefulness

The Technology Acceptance Model (TAM) is one of the most influential research models in studies of the determinants of information systems/information technology (IS/IT) acceptance

(Igbaria and Iivari 1995, Davis et al. 1989). Sets of antecedent constructs drawn from both TAM and the perceived characteristics of innovating (PCI) inventory show that the PCI set of antecedents explains substantially more variance than does TAM while also providing managers with more detailed information regarding the antecedents driving technology innovation adoption. Technology Acceptance Model (TAM) provides a poor fit for the model until the introduction of an additional construct, computer self-efficacy (Fenech 1998). Furthermore, a review of the IS and psychology literature suggests that perceived usefulness can be of two distinct types: near-term usefulness and long-term usefulness (Chau 1996).

The Social Exchange Theory posits that IT managers are able to influence both the perceived usefulness and the perceived ease of use of an IT application through a constructive social exchange with the user such as developer responsiveness (Gefen and Keil 1998).

Perceived usefulness describes the perceptions of the individual to the innovation and has been found to influence an individual's adoption behaviors. Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her performance." It is an example of extrinsic motivation which is found to play a greater role in an individual's behavior (Igbaria et al. 1995). According to Liao and Cheung (2002), the most important consumer attitudes underlying perceived usefulness of and willingness to use IT are expectations of accuracy, security, network speed, user-friendliness, user participation and convenience. Expectation-confirmation theory adapted from the consumer behavior literature and integrated with theoretical and empirical findings from prior IT usage research suggests that users' continued intention is determined by their satisfaction with IT use

and perceived usefulness of continued use. User satisfaction, in turn, is influenced also by the user's confirmation of expectation from prior IT use and perceived usefulness, and this is influenced by the user's confirmation level (Bhattacharjee, 2001). According to Igbaria et al. (1996), perceived usefulness (rather than perceived fun or social pressure) is the principal motivator of increased use of microcomputers by professionals and managers.

Adoption Diffusion

The process of information technology adoption and use is critical to deriving the benefits of information technology. Understanding how users form perceptions of an IT innovation would help designers, implementers and users in their evaluation, selection, implementation and on-going use of IT. The diffusion and infusion of IT, however, is a complex process that is influenced by numerous factors such as perceived characteristics of the innovation, subjective norms, stages of adoption, user competence, implementation processes and organizational factors (Chiasson and Lovato 2001). Each factor has a direct effect on IT diffusion. Other findings suggest that migration costs (Chau and Tam 2000), earliness of adoption, top management support and organizational size are positively associated with diffusion (Eder and Igbaria 2001, Knol and Stroeken 2001). However, advocacy by middle management is seen not to have a positive effect on the success of implementation (Carter et al. 2001), but rather having the right organizational and individual incentives could cause a widespread adoption (Wong et al. 2000).

The most commonly found model to explain the s-curve pathway of new technology use

(Geroski 2000) is the so-called epidemic model, which builds on the premise that what limits the speed of usage is the lack of information available about the new technology, how to use it and what it does. The leading alternate model is often called the probit model, which follows from the premise that different firms, with different goals and abilities, are likely to want to adopt the new technology at different times. In this model, diffusion occurs as firms of different types gradually adopt it.

Rogers' (1995) work on diffusion theory has provided an important set of theoretical constructs, called "perceived characteristics of an innovation," which is important in influencing adoption and diffusion. These constructs include relative advantage, compatibility, complexity, trialability and observability.

Explanation of adopter attitudes on innovation adoption and diffusion has long converged on a core set of theoretical frameworks that stems from Diffusion of Innovations (Rogers 1983) and Technology Acceptance Model (Davis et al. 1989), which have been explained in an earlier section of this report. Other theories include the Theory of Reasoned Action (Ajzen and Fishbein 1980), which posits that personal attitudes and subjective norms play major roles in determining intentions to use; the Theory of Planned Behavior (Ajzen, 1985, Taylor and Todd 1995), which suggests that a behavior is a direct function of behavioral intention, which in turn, is formed by attitude, which reflects feelings of favor or disfavor toward a behavior; and Social Cognitive Theory (Compeau and Higgins 1995), which proposes that contextual supports and barriers play key roles in behavior formation. Specifically, Social Cognitive Theory suggests that behavior is affected by both outcome expectations and self-efficacy, while outcome

expectations and self-efficacy are in turn influenced by prior behavior. However, these frameworks have been reported to neglect the realities of implementing technology innovations within organizations when adoption decisions are not made at the individual level but at organizational, division or workgroup levels (Orlikowski 1993, Fichman and Kemerer 1997), where authorities make the initial decision to adopt and targeted users have few alternatives but to adopt the innovation and make the necessary adjustments for using it to perform their jobs (Zaltman et al. 1973).

Corporate Culture

Aligning corporate culture with new strategic decisions is a complex problem that requires an understanding of four important aspects of corporate culture: “that corporate culture is the basic pattern of shared beliefs, behaviors and assumptions acquired over time by the members of an organization; that the organization’s cultural development may result from its day-to-day operations; that cultural change confronts an organization when a strategic decision requires a major shift in the way that management and/or employees operate; and that managing culture is a complex and expensive process that must be initiated from the top as a high priority project and that it is measurable, with meaningful, tangible objectives” (Conner et al. 1987).

If the introduction of planned change and management initiatives with significant organizational implications are to have the full impact, corporate culture and IT intensity must be given serious consideration (Smith 1998, Weber and Pliskin 1998).

Production Orientation Culture

Production orientation, even though one of the oldest concepts in business, is still evident in high capital intensive industries and where demand exceeds supply. It is especially useful when consumers favor products that are available and highly affordable. In such circumstances, businesses can focus on improving production and distribution efficiencies. Manufacturing industries elected to manufacture goods based on their ability to be produced stressing standardization and specialization. The challenge becomes finding ways to promote the products to potential purchasers in such ways as to create a perceived need for the good in the minds of potential buyers. Today, the advertising industry still finds itself constantly battling social critics who suggest that advertising, especially as practiced in the United States and Europe, creates false needs, resulting in society's unnecessary expenditures for unneeded products or services (Pope 1994).

Today, even the “best” firms sometimes backslide into a production orientation because in today’s highly competitive markets it is often difficult to keep up with changing customer needs, beat aggressive competitors to the punch, find the right focus that matches the firm’s objectives and resources to market opportunities and offer customers superior value (Perreault and McCarthy 2000).

Market Orientation Culture

The dynamic nature of the marketplace needs requires a continuous tracking and responsiveness of these needs with superior value in a consistent manner at a profit. A market-

oriented organization generates market intelligence, disseminates the intelligence across departments and provides the appropriate response to the needs of the market at a profit (Kohli and Jaworski 1990). The strategy is to survey markets to identify unfilled needs and then to produce products that satisfy those unmet needs. It is believed that if a product or service sufficiently satisfies consumers, the product or service will basically sell itself because people with the need will seek it for fulfillment. To be effective, more resources are required to focus on what potential consumers want and then translate product traits, packaging characteristics, price levels or availability of products to the consumers. Though market orientation has been posited to lead to greater customer satisfaction and organizational commitment of employees (Narver and Slater 1990), arguments have been advanced in literature to the effect that a market orientation may have a strong or weak effect on business performance. This depends on the environmental conditions such as market turbulence and competitive intensity (Houston 1986). Narver and Slater (1990) reported that for an organization to be considered market oriented, it must possess three behavioral components - customer orientation, competitor orientation and interfunctional coordination- and two decision criteria: long-term focus and a profit objective.

Perceived Effectiveness of IT Adoption

Perceived effectiveness of IT adoption is the extent to which individuals believe that the adoption of IT has been successful. Despite remarkable advances in information technology, many IT projects still fall short of performance expectations. A growing share of these implementation failures are caused by to nontechnical factors. Griffith et al. (1999) believe that

technology implementation success could be improved with active top management support, clear implementation goals and user participation and training. Other success factors include a good understanding of the intended end-users, their tasks and the interdependencies between the two, together with the appropriate business strategy (Martinsons and Chong 1999). This should lead to adding value to the firm and positive influences on user behavior.

Unfortunately, IT success can sometimes be elusive (Davis (1991). An effective IT application is expected to improve performance, but if poorly planned, developed or implemented without due recognition to increase human resource effectiveness, it can breed disaster and retard individual and/or group performance (Templer 1989).

The literature in social psychology and marketing suggests through the cognitive dissonance theory that individuals' expectations on a task are influenced by performance expectations (Aronson and Carlsmith 1962, Brock, et al. 1965, McLeod and Fuerst 1982). Thus, before considering the products and the technology to be offered, the IT department must develop an understanding of its customers and their expectations (Panko 1987).

While utilization of an information system is widely regarded as an indicator of its success, effectiveness or acceptance (Szajna1993), the realization of user expectation has been suggested as one possible means of assessing the eventual success or failure of an IT (Van De Ven 1976) .

Miller and Doyle (1987) reported that IT success correlates with the perceived performance and importance of these factors in each firm. Though different firms have different levels of appreciation of importance of performance factors, their overall attitude toward IT is

strongly influenced by how well those factors are handled. The firms that concentrate their resources in the most important areas will achieve greater success than those that spread their resources too thinly. Performance factors include: 1. functioning of existing transaction/reporting systems, 2. linkage to strategic processes of the firm, 3. the amount and quality of user participation, 4. the responsiveness to new systems needs, 5. the ability to respond to end-user computing needs, 6. IS staff quality and 7. the reliability of services. Other factors include identity, significance, autonomy and feedback (Ryker and Nath 1995).

Other research findings further suggest that the payoffs from end-user computing has a significant relationship with performance. This provides more opportunities for organizations to work to improve performance (Guimaraes and Igbaria 1994).

Saarienen (1996), by studying the IT development projects in major Finnish companies, also provides measurement scales for four dimensions of success - the development process, use process, IT product quality and impact of the IT on the organization.

Conclusion

When corporate culture is considered in conjunction with the relationship between the independent and dependent variables of information technology adoption, the culture of an organization may play a major role in the adoption of information technology. This paper describes a model that examines how corporate culture impacts IT adoption. Future research will include testing the model in the forest products industrial sector in the United States.

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