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Digital Empowerment: Modeling the Relationship Between
Information Technology Use and Employee Empowerment

This paper presents a model describing the relationship between information technology (IT) use and empowerment. It draws from a cognitive theory of empowerment and suggests that the relationship between IT use and empowerment is influenced by functionality, work role, and implementation context. Hypotheses are presented for future testing.

Introduction

Employee empowerment has become a commonly prescribed approach to maximizing the productivity and performance of a firm's workforce. A 1996 Business Week report reveals that more than half of surveyed executives anticipate greater emphasis on empowerment in their own organizations over the next ten years, as well as a shift toward more consensual management styles (Light & Saunders, 1996

Modern computerized information technology (IT) has been hailed as an important tool for empowering employees. As a means for facilitating communication between employees, automating repetitive data processing tasks, and providing informational and analytical support to decision-makers, computers have the ability to bring more and better information to employees than ever before possible. Armed with this new resource, workers may be able to make more complex decisions within their areas of responsibility and do so with more facility and accuracy. At the same time, they may no longer depend on the organizational hierarchy for access to information related to activities in other business units, functional areas, or even other firms. Freer access to information coupled with the ability to use more sophisticated computer-based applications positions employees to better understand the business of the firm and to contribute to cross-functional process improvement and decision making (Champy, 1996; Thompson, Sarbaugh-McCall, & Norris, 1989).

The portrayal of computers as instruments of "digital empowerment" is an appealing one for workers, managers, and, of course, technologists. It is unclear, however, whether or not this view is supportable based on actual implementations of computers and information systems in various workplaces. The research literature addressing the social impacts of computer technology has grown considerably over the past decade. The progress made to date, however, in clarifying the relationship between the use of such technology and specific working conditions, performance levels, and worker attitudes has been limited by predominantly descriptive research approaches, as well as inconsistent and overly simplistic methods and designs (Kraemer & Danziger, 1990).

A model of information technology impact on user empowerment is developed and presented in this paper. This model is designed to address identified gaps in the existing body of research by:
1. Incorporating a clearly defined, theory-based approach to the construct of empowerment;
2. Presenting a more comprehensive picture of the relationship of IT use and empowerment by identifying and modeling mediating variables in the relationship;
3. Attempting to both explain how the use of IT effects either an increase or decrease in user empowerment and to predict what changes in employee empowerment managers can expect should they choose to increase employee interaction with IT; and

4. Offering a framework around which various research findings can be organized and interpreted, and new research questions can be formed.

Definition of Constructs and Prior Research

Empowerment

Empowerment is a term that has entered the common parlance of academicians and practical managers. Perhaps because of its broad acceptance, arriving at a precise definition of the term has become a challenge. Zemke and Schaaf (1989), for example, describe empowerment as a management activity that encourages employees to develop and use initiative and creativity on the job. Waterman (1987) also characterizes empowerment as a form of managerial intervention that encompasses increased delegation, reduced direct supervision, and flexible job descriptions. During the past several decades, researchers interested in understanding employee behavior and motivation have called for a more cognitive approach to studying to the empowerment construct (Parker & Price, 1994; Roberts & Glick, 1981). Thomas and Velthouse (1990) argue that an understanding of cognitions and perceptions is important for both evaluating the probable effectiveness of managerial interventions, as well as for designing new approaches to improve the effectiveness of workers.

A fairly recent and particularly insightful model of empowerment at the cognitive level has been developed and validated by Thomas and Velthouse (1990) and Spreitzer (1992, 1995, 1996). This model maintains that empowerment is a form of intrinsic motivation, manifested in a set of four individual-level cognitions, which are directly shaped by the individual's task environment. These four task-related cognitions are:

1. Meaning: the individual's determination of the intrinsic value or importance of a particular work role or purpose (Hackman & Oldham, 1980);
2. Competence: self-belief in the individual's ability to successfully perform specific tasks or to achieve certain goals (Gist, 1987);
3. Self-determination: the individual's belief that they have control or autonomy over decisions concerning work-related activities and behaviors (Deci, Connell, & Ryan, 1989); and
4. Impact: the individual's belief that their actions can make a difference in terms of strategic, administrative, and operating outcomes at work (Ashforth, 1989).

These dimensions of empowerment are neither global orientations nor enduring personality characteristics. They are, rather, employee perceptions of their specific task-related environment, which are measurable on a continuum from low to high and combine additively to create cumulative indices of employee empowerment (Spreitzer, 1995, 1996).

Information Technology

Information technology is a term that can be applied to a broad array of manual, mechanical, and electronic means of facilitating the collection, processing, storage, manipulation, and dissemination of information. This paper specifically targets the potential impacts of increased employee interaction with computer-based information technologies on the job. A working definition of information technology is therefore constructed that captures its computer-related orientation, its multi-component structure, as well as its data, text, and teleprocessing functions. A definition originally offered by Huber (1990, p. 48) focuses somewhat exclusively on decision and communication support features of IT; therefore, an expanded version of Huber's definition will be used to clarify this term. In this paper, then, information technology is defined as follows.

> Information technologies are the computer-based systems that
> transmit, manipulate, analyze, or exploit data and information to
> support communication, decision-making, data-handling, and

other tasks. The concept encompasses the hardware, including the computer and associated peripheral devices, the operating and applications software required for its use, and the procedures and work rules implemented to structure workers' interactions with the devices.

While authors, consultants, and many managers are enthusiastic about the empowering potential of information technology (e.g., Currid, 1992; Lawler, 1986; Losey, 1995), research has not been able to establish whether or not such enthusiasm is warranted. Researchers generally agree that information technology has the potential to support significant redistributions of knowledge, decision making authority, and resources in organizations, but little evidence can be cited in support of these expectations (Malone, 1997). Based on limited case studies or professional experiences, some authors have reported that the empowering potential of computerization has simply not been fully realized (Ickes & Riley, 1990; McClimans, 1995). In one of the few studies to attempt direct measurement of the effects of IT on user empowerment, Frans (1993) finds that more advanced stages of IT diffusion among social workers are associated with higher levels of employee-reported empowerment.

Researchers have investigated the impacts of computer use on various employee emotional states and work attitudes, but none have clearly linked their work to a consideration of empowerment. One benefit of working with the definition of empowerment adopted in this paper is that it specifies a set of constituent dimensions (meaningfulness, competence, self-determination , and impact) that can be used to create meaningful linkages between our research objectives and the existing IT-social impacts literature. A brief review of this literature is organized and discussed next according to the empowerment dimension with which it is most closely related.

Meaningfulness. Millman and Hartwick (1987) and Gattiker, et al., (1988) report that computer use by managers is related to higher levels of interest in their specific tasks and jobs. Other researchers have found evidence that IT has significant negative impacts on employee attitudes towards their jobs. Klopping (1989) finds that higher levels of technology use among managerial workers are associated with lower levels of task meaningfulness. In studies of clerical workers, Irving, et al., (1986), and Kraut, et al., (1989) report that IT use is associated with lower reports of job satisfaction. Service representatives studied by Feldberg and Glenn (1989) view their jobs as less interesting after IT was introduced. Several studies also claim that job pressure and stress are increased by the introduction of IT (Danziger & Kraemer, 1986; Irving, et al., 1986; Majchrzak, et al., 1987; Millman & Hartwick, 1987; Perolle, 1987). Perrolle's (1988) caution that IT has the potential to create "intellectual assembly lines" apparently has become a reality in at least some, mainly clerical, job environments.

Competence. Professional observations and anecdotal reports by managers, consultants, and researchers have consistently found IT to be an effective tool for increasing the quantity of outputs associated with information-related work. Empirical research examining productivity impacts at the individual job or activity level tends to support these observations. Significant increases in the quantity of general clerical output after conversion to computerized systems have been reported (Attewell, 1991; Bjorn-Anderson, et al., 1986; Danziger & Kraemer, 1986; Majchrzak, et al., 1987). Bikson (1986) determined that almost 90% of work groups studied experienced perceived increases in productivity. Other researchers, specifically studying the effects of IT use on middle managers, report that 76% of their subjects claimed increased productivity and only 22% reported reduced output (Millman & Hartwick, 1987).

Self-Determination. Using autonomy as a dependent variable, Carter (1986) finds that in large offices, clerical employees who are frequent users of IT experience decreased autonomy, while in small offices, technology use is associated with increased autonomy. Looking specifically at clerical workers, Smith, et al. (1981) find that video-display-terminal use is associated with decreased levels of reported autonomy when compared to clerical workers who

complete their tasks without the use of computer terminals. Other researchers have found similar results, namely that the use of IT applications inhibit worker discretion and feelings of self-control (Mann & Williams, 1960). In a study of clerical workers, however, Rafaeli and Sutton (1986) report that perceptions of personal control are positively related to the use of word processors rather than typewriters. Interestingly, this study determined that certain computer attributes, including system dependability, ease of use, and screen quality, are also related to user perceptions of general control. Other studies report no significant relationship between perceived autonomy and IT use (Kling, 1978; Medcof, 1989; Sheppard, 1971). Work by Turner (1984), on the other hand, has found a positive relationship between IT use and work discretion.

Impact. Little research related to IT users' perceptions of impact was unearthed in the literature. Studies of IT-related organizational change reveal that rather than enabling decentralization or realignment of power relationships inside organizations, IT implementations more frequently act to cement and reaffirm centralized decision making and existing chains-of-command (Bjorn-Andersen, et al., 1986; Kraemer & Danziger, 1984; Kraft, 1987). Possible relationships between increased use of IT and users' perceptions of their ability and opportunity to influence organizational outcomes has simply not been addressed.

This quick survey of the IT-empowerment literature highlights two key points. First, direct examination of the possible impacts of IT use on empowerment is under developed. Second, research that has been completed is fragmentary and inconsistent. Kraemer and Danziger (1990), in their review of research concerning the impacts of computer technology on information-based work, call for the building of an analytical framework around which research results can be organized and compared. They also argue that the failure of researchers to produce consistent results may reflect inattention to factors that intervene in the relationship between increased computer use and social outcomes. Researchers in the area of technological innovations and practitioners responsible for managing the introduction of new technologies in the workplace have expressed similar disappointment with overly simplistic models that do not attempt to capture the joint influence of technology, organization, and individuals in shaping how new technology is accepted and used (Turner, 1984).

It-Empowerment Model

This model posits that the direction and intensity of the relationship between information technology use and user empowerment is influenced by three classes of intervening factors. A graphical representation of the proposed model is presented in Figure 1. The following factors are hypothesized as being particularly important for determining the empowering potential of information technology use:

1. The specific task-related function the technology is employed to perform by the user (functionality);
2. The nature of the user's work role in the organization (user work role); and
3. The characteristics of the implementation context, including discretion, participation, training, and rewards (implementation context).

Functionality

Mankin, Bikson, and Gutek (1984), in their review of IT-social impacts research, criticize researchers for treating IT as a uniform set of tools with undifferentiated features and functions. This model suggests that the impact of IT use on user empowerment will vary systematically based, in part, on the specific task-related functions that the technology is employed to perform. IT functionality is operationalized here into three categories: automation, decision-support, or communication. These categories are consistent with Browning's (1990) functional description of computers as assistants, advisors, and communicators, and also represent a condensation of Davenport and Short's (1990) classification of IT capabilities.

Figure 1

IT-Empowerment Model
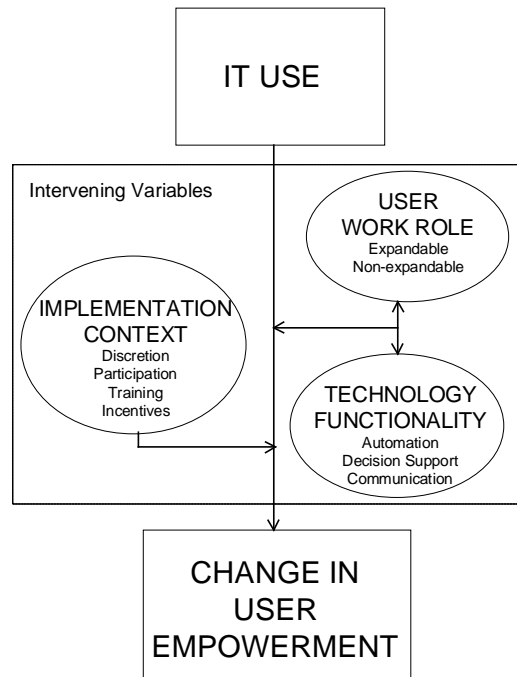
Automation represents uses of IT to replace human labor, activities, and judgements. IT has been successfully applied in many work environments to automate routine data handling tasks, including text processing, data storage and retrieval, transaction record processing, and machine control. Decision support represents the use of information technology as a computerized advisor, providing decision-critical information and expertise to its user. Decision support applications typically encompass data storage, manipulation, and modeling capabilities with a highly interactive interface. Examples of IT decision support implementations include statistical calculations and forecasting, spreadsheet analysis, sales force automation tools, management simulations, and expert systems. Communication involves the transmission of messages between individuals or groups either across space, time, or both dimensions. A communication medium is the physical channel that facilitates the exchange of these interpersonal messages. Common implementations of information technology as a communication medium include electronic mail, teleconferencing, on-line meetings or discussion groups, and electronic bulletin boards.

User Work Role

The concept of work role represents the set of social and work-related expectations that surround an employee's position in his or her organization (Gist & Mitchell, 1992; Sawyer, 1992). In considering the impact of IT on user attitudes and task perceptions, it is reasonable to suggest that different types of roles will be impacted by IT in varying directions and to varying degrees (Brousseau, 1983; Kraut, 1987; Millman & Hartwick, 1987). One operationalization of the work role construct is suggested by Whelan (1993) . In his study of the impact of technology enhancements in the health care industry, Whelan (1993) categorizes work roles based on the relative expandability of dominant work tasks. The expandability of a task is a continuous

measure of the concreteness of completion criteria or constraints on the output that is produced. Tasks classified as having low expandability are those that have quantitative completion criteria and standards for satisfactory performance. Workers whose performance is evaluated primarily based on the completion of tasks that have low expandability are classified as occupying non-expandable work roles. Typical non-expandable roles include clerks, assembly workers, sales personnel, and other production-oriented workers.

Highly expandable work roles, on the other hand, are more typical of professional, managerial, and creative occupations. In practice, most highly expandable tasks are deemed complete only when resources allocated for their completion are exhausted or when output meets generally established qualitative standards. Therefore, improvements in methods, technology, or skills in such work roles will tend to result in higher quality or broader scope of outputs more so than increased quantity of outputs.

Implementation Context

A third intervening factor represents the organizational contexts into which IT innovations are implemented and used. It has also been suggested by numerous IT researchers that organizational context may be a critical factor in determining how IT is perceived, accepted, and utilized by workers (e.g., Amick & Ostberg, 1987; Barki & Hartwick, 1994 & 1994b; Markus and Robey, 1988; Strassman, 1985; Thompson, et al., 1989).

This model suggests four dimensions of organizational context as particularly important moderators of the IT-empowerment relationship. Each dimension represents a continuously measured variable, which can be combined additively to create an overall evaluation of the organizational context as either supportive or non-supportive of an empowering technological implementation. The four dimensions of implementation context identified in the model are:
1. The level of discretion users have over their use of the technology (discretion);
2. The level of user participation in technology-related decision-making (participation);
3. The amount of technology-specific training provided to users (training); and
4. The level of organizational incentives offered to encourage acceptance of the technology (incentives).

Discretion. The first aspect of implementation context captures how much individual control the user is able to exert over how and when they interact with the implemented technology. Kraut (1987) suggests that managers and professionals tend to be more supportive of IT implementation because of their high level of discretionary control over its use, while clerical workers are less supportive because their use of IT is less voluntary. This model suggests that discretion in IT use will impact the empowering potential of information technology use in two ways. First, by creating an opportunity for the user to exercise control over this aspect of the job, perceptions of job-related self-determination are enhanced. Secondly, the ability to choose whether or not to use the technology as a tool for a specific task may enable a better match between tasks and tools and, as a result, enhance the employee's ability to successfully perform their assigned tasks.

Participation. Participation represents the amount of active involvement users of an IT system are able to exert during the planning, design, implementation, and maintenance stages of system development. User participation in information system development has consistently been identified as an important determinant of overall information system success and user acceptance (Cushing, 1990; Ives & Olson, 1984; Swanson, 1974). In a recent study, Hunton and Price (1997) extend Hartwick and Barki's (1994) findings by determining that increased user participation leads to enhanced user performance via its direct impact on increased perceptions of control. Participative users are more likely to exercise their influence to satisfy their personal needs and preferences for the system (Robey & Farrow, 1982).

Participation, then, can have positive impacts on how users perceive their interaction with the information technology, namely seeing it as increasing the meaning of their tasks, their self-determination over their work, and competence. If the development process results in an IT system that is used by others in the organization, it is also arguable that participation can lead to increased perceptions of organizational impact.

Training. The training construct can be operationalized in terms of users' perceptions of training effectiveness, outstanding needs for additional assistance in learning about system features, and self-reported comfort with using the system. Training programs designed to increase employee skills and understanding of information technology have been identified in a number of studies as essential components of successful technology implementation programs. Appropriate and effective training is associated with improved skills and knowledge, enhanced self-efficacy, reduced technology-related anxiety (Davidson & Walley, 1986; Howard, 1986), increased reports of ease of use, enjoyment, and perceived usefulness (Igbaria, 1993; Lee, 1986; Webster & Martocchio, 1992), and reduced resistance to technology use and more positive attitudes toward such technology (Igbaria, Parasuraman, and Baroudi, 1996).

The amount and effectiveness of training made available to IT users is, therefore, predicted to have a positive impact on the relationship between IT use and perceived empowerment. This impact is predicted to result primarily from the impact of training on perceptions of increased competence (via enhanced skills, knowledge, and self-efficacy, and reduced anxiety) and task meaning (via increased enjoyment and perceived usefulness).

Organizational incentives. Incentives refer to the financial and non-financial considerations managers may extend to prospective users to encourage and reinforce learning and use of the new technology. Organizational incentives inform employees about what their managers perceive to be important activities and tasks. Associating increased incentives with IT use communicates to users that their activities are valued by the organization. Employees who perceive their tasks to be important to the organization are also likely to perceive that these tasks have a high degree of meaning. In addition, the receipt of rewards by users may also affect users' perceptions of their work-related competence in two ways. First, incentive-motivated use of the technology will support enhanced proficiency in its use, and second, rewards can be interpreted generally as positive performance feedback.

Hypothesized Impacts Of Intervening Variables

This theoretical model suggests that employee empowerment is, at least partially, a function of the level of IT use mediated by the interaction of the technology's implemented functionality and the user work role. The impact of information technology use on perceived empowerment is further moderated by the nature of the implementation context. This proposed relationship between IT use and user empowerment can be represented in the following equation:

$$EMP = f[USE[(FNC \times ROLE) + CONTEXT]]$$

where:

EMP=	user empowerment
USE =	level of IT use
FNC =	functionality of IT
ROLE =	user work role
CONTEXT =	implementation context

Based on this proposed relationship, empowerment outcomes associated with increased IT use can be predicted. These predicted outcomes can form the basis of a set of testable hypotheses:

Hypothesis 1a: Use of information technology as a means of automating tasks performed by users in non-expandable work roles is negatively associated with user empowerment.

Hypothesis1b: Use of information technology as a means of automating tasks performed by users in expandable work roles is not associated, either positively or negatively, with user empowerment.

The introduction of IT as a means of automating the work of employees in non-expandable roles is frequently associated with increased formalization and rationalization of their tasks. Workers in non-expandable roles are particularly vulnerable, because their tasks tend to be more routine and hence "automatable" and because they have less organization power to mold technology introductions to serve their interests. It is predicted that users in non-expandable work roles will experience reduced meaningfulness of tasks, reduced perceived difficulty of tasks, and diminished control over how tasks are performed.

Increased automation of tasks for those employed in expandable roles is likely to have a more ambivalent relationship with perceived empowerment. If professional or managerial workers are able to increase the efficiency of their routine data handling tasks, they can focus more attention toward improving the quality of their work product or expand the boundaries of their jobs. Alternately, however, workers in expandable roles may use information technology to complete routine tasks that had previously been performed by support personnel or other specialists working in auxiliary capacities. Given the nature of the automated tasks and the level of effort required for their completion, upwardly rationalized tasks may be transparent to workers in expandable work roles and have little or no effect on how these users perceive their work environment.

Hypothesis 2a: Use of information technology as a means of supporting decision making by users in expandable work roles is positively associated with user empowerment.

Hypothesis 2b: Use of information technology as a means of supporting decision-making by workers in non-expandable work roles is positively associated with user empowerment.

For users in expandable work roles, decision support technology may enhance empowerment in several ways. By providing access to more sophisticated, accurate, and timely information, decision support technology can effect efficiencies in decision making processes and effectiveness in problem solving outcomes for the user (Gattiker, et al., 1988; Millman & Hartwick, 1987). Enhanced efficiency and effectiveness should both lead directly to elevation of perceptions of work-related competence and the creation of slack personal resources for the user. It is predicted that the use of IT to provide improved access to modeled and formatted information by decision makers will increase perceptions of competence and organizational impact among users employed in expandable work roles.

Among employees whose primary responsibilities involve tasks low in expandability, the impact of decision-support tools is problematical. The technology should support improvements in process efficiency as well as outcome effectiveness. User perception of competence should be positively affected by the realized performance improvements. Similarly, better support for decision making may be instrumental in creating an expanded decision making role for these users. Expanded decision making authority could result in enhanced perceptions of task meaning, self-determination, and impact. Unlike users in expandable roles, however, non-expandable roles do not provide workers with the same opportunities for creating or redistributing slack resources. As a result, it is predicted that this class of technology will have a moderately positive impact on user empowerment.

Hypothesis 3: Use of information technology as a medium of communication by workers in expandable and non-expandable work roles is positively associated with user empowerment.

This model predicts that the implementation of information technology as a medium for enhancing the flow and exchange of communication, horizontally or vertically, will have positive impacts on perceptions of empowerment that transcend role differences between employees. Computer-mediated communication has been recognized in the organizational literature as an enabler of richer and more complex communication within and between organizations (Fulk & DeSanctis, 1995; Sproull & Kiesler, 1991). Information on organizational mission creates a sense of perspective and context for employees, enabling them to better understand how their efforts can be directed toward supporting and influencing the mission (Bowen & Lawler, 1992; Conger & Kanungo, 1988; Kanter, 1983; Lawler, 1992). Individual awareness about his or her role in the larger organization's mission is critical for motivating employees to act creatively and assume responsibility for organizational outcomes (Kouzes & Posner, 1987), as well as attributing meaning to their particular work tasks (Conger & Kanungo, 1988). Information concerning individual performance is also critical for directing individual efforts toward self-development and building a sense of competence in performing tasks (Spreitzer, 1995). As a result, it is postulated that increased use of information technology serving a predominantly communications function will result in increased perceptions of empowerment regardless of the type of work role occupied by the user.

Hypothesis 4a: A supportive implementation context will positively influence the relationship between information technology use and user empowerment, in that it will increase the otherwise positive effect of IT use on user empowerment or, alternatively, reduce its negative effect.

Hypothesis 4b: A non-supportive implementation context will negatively influence the relationship between information technology use and user empowerment, in that it will increase the otherwise negative effect of IT use on user empowerment or, alternatively, reduce its positive effect.

A supportive context is made up of organizational interventions that have been identified by many management researchers as ingredients of generalized employee empowerment (e.g., Bowen & Lawler, 1992). As part of the introduction or enhancement of IT tools, a supportive implementation context is predicted to further the empowering nature of IT when the function and work role factors lead to a prediction of increased empowerment or diminish its disempowering impact when function and work role lead to a prediction in the opposite direction. Conversely, a non-supportive context will diminish the positive impact of an empowering technology or, alternately, reinforce its empowerment-reducing effects.

Conclusions & Discussion

The paper has outlined the initial steps taken to develop a better understanding of the relationship between IT and user empowerment. A model of empowerment was adapted for use as the outcome variable in this study, which draws from the cognitive empowerment literature. The model clearly specifies employee cognitions about their work environment that combine to create the state of employee motivation that researchers and practicing managers have come to refer to as employee empowerment. By decomposing empowerment into its constituent dimensions, the construct becomes more operational and meaningful, for both researchers and practitioners.

The relationship between IT use and empowerment has been the subject of much speculation, but little empirical research, in the academic and practitioner literature. Much of the prior research on the social impacts of computer use, including the small body of work that directly addresses the IT-empowerment relationship, suffers from a lack of control for possible moderating and mediating factors. In response to criticism of overly simplistic models of IT impacts in previous work, one objective in creating the IT-empowerment model was to capture the complexities of the information technologies, of the organizational roles affected, and of the situational characteristics of any technology implementation.

Immediate recommendations for future research entail the examination of different examples of information technologies, implementations, and use in various settings to test the hypotheses presented. Challenges of these undertakings include identifying field settings that are appropriate for exploring the specific research questions; developing survey instruments that are meaningful and usable for the subjects participating in the study; and developing survey distribution techniques to facilitate high response rates and yet ensure confidentiality and efficient processing of the survey responses.

In light of the increased investments in IT implementation and continued managerial interest in building an empowering work environment for their employees, the nature of this relationship is crucial. Popular assumptions about the role of computers in supporting meaningfulness of work-related tasks, competence, and self-determination, while, at the same time, distributing information and influence throughout the organization must be subjected to more than critical speculation.

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