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IDENTIFYING AND DISTINGUISHING MANIFEST AND LATENT EFFECTS OF IT: A CASE STUDY OF PACKAGED SOFTWARE IMPLEMENTATION

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Abstract

In small businesses, IT often results in end-users having increased responsibility in multiple aspects of a business process and across functional areas. End-users may prefer the autonomy they gain by having more control over their business responsibilities, however, at the same time they may feel isolated. As a result of "end-user isolation" the need for social interaction becomes more pronounced creating "end-user distraction". This is counterproductive to the intended goals of the IT investment. Qualitative data from a case study are used to demonstrate the importance of identifying both intended and unintended consequences. The paper employs a systems dynamics approach to explain how inadvertent second-order (latent) effects such as unproductive social habits can be predicted and prevented. A key result of the study is that, ironically, end-users discover ways to use IT as a social mechanism. Managerial implications of this study are discussed that can help both IT practitioners and management when implementing commercial packaged software in small businesses.

Introduction

A key goal of IT implementation in small businesses is to increase the efficiency of a limited number of end-users handling specialized tasks. Information technology enables the reorganization of business functions by allowing end-users to handle more aspects of the business processes. Additionally, end-users enjoy increased autonomy as they perform more work on their own (Kling 1996). The end-user's job is often considered enriched and enlarged.

Conversely, IT-enabled job enlargement may lead to employee dissatisfaction (Clement 1996). Employees may feel that they are taken advantage of as the number of tasks they are responsible for increases. This rearrangement of responsibility often alters previously established social structure (Zuboff 1982). It is also possible that new patterns of communication will emerge among end-users, including a decrease in human interaction (Zuboff 1982, Kling 1996). In a small business, employees may feel isolated as they perform many aspects of business processes.

IT enables managers to establish new work areas. The physical arrangement impacts the dependence of managers on employees as well as employees on one another. Independence along with a sense of empowerment may actually result in employees feeling more isolated.

This paper investigates how an organization can identify and sustain the desired effects of packaged software implementation and simultaneously recognize unintended consequences. A key finding that emerged from this study is that isolated employees find a way to offset decreased social interaction. Ironically, end-users became "hooked" on the socialization that ensued from system related problems.

Although the intent of implementing IT was to increase employee productivity it resulted in decreased productivity. IT problems were exaggerated to justify a group effort. Individuals who have the capacity to learn the packaged software either through manuals or on-line interactive help insisted on individualized IS training. Redundant training due to continual system adaptation problems impeded the ability of the consultant to work on business process reengineering (BPR) initiatives and reduced employee productivity.

The paper has three goals. First, data from a case study is used to identify and distinguish between the manifest and latent consequences that arise from IT implementation. We learned that the employee's use of IT to increase social interaction results in forming a counterproductive habit. Second, the findings from the qualitative analysis are integrated in a systems dynamics modeling approach. The development of this model provides a tool that could be used by management when identifying and planning for second-order (latent) effects. Finally, based on this analysis we offer propositions to guide practitioners when designing IT that takes into account the kind of workplace culture that they want to foster.

Research Background

Manifest and Latent Effects

Sociological underpinnings support the findings of this case study. The social theories examined refer to manifest and latent effects. Identifying and distinguishing manifest and latent effects help managers to direct observations toward important elements of a situation and to prevent the inadvertent oversight of these elements (Merton, 1957).

The manifest effects of IT correspond to the intended consequences of using IT. These planned objectives, which encourage IT adoption in a small business, include increased productivity and increased accuracy and timeliness of information. In addition, the small business owner may consider adopting IT in order to become less reliant on any one employee, and/or to facilitate employees becoming less reliant on their co-workers.

Latent effects of IT reflect the unintended consequences, which may result in unexpected circumstances and give life to the notion of "irony" (Merton 1957). Irony as a social science phenomenon requires attentiveness to motives and consequences. Latent effects may become apparent when the purpose of the adopted IT and the resulting consequences do not coincide. For example, one motive that small business owners have for implementing IT is to gain more control over their businesses. Collaboration and conversation among end-users, which is necessary to complete business processes, might be viewed as a loss of this control. Small business owners may seek increased managerial control by exploiting IT to break apart the work groups. On the other hand, end-users will seek some control over their day-by-day lives. Ironically, they find a way to use IT as a vehicle to increase social contact.

Packaged Software Implementation Issues

Many small businesses implement packaged software as an alternative to developing a custom information system. (Wintrobe 1996). Small businesses that do not have technical and financial resources for an in-house development can adopt a packaged software to meet their information processing needs (Janson and Subramanian 1996). The implementation process usually involves choosing software, vendor, and/or MIS consultant.

In practice packaged software is often implemented without any formal planning process. Management expects the systems functionality to be built, that technical issues are already ironed out, and that the software is compatible with the organizational requirements (Janson and Subramanian 1996). The perception of managers is that commercial packaged software is a pre-designed system ready to be implemented.

Studies suggest that innovations, such as IT implementations, often fail to yield expected benefits and result in financial loss (Attewell and Rule 1984, Janson and Subramanian 1996). Two significant causes for failure in the case of packaged software are functional weakness and incompatibility between the vendor and/or consultant and the organization (Gable 1991, Janson and Subramanian 1996). Additionally, small businesses often do not adequately prepare for the impact of a packaged software investment (Janson and Subramanian 1996).

Commercial software can be used by organizations as part of business process reengineering initiatives. IT supports the separation of functions into multiple departments as well as the integration of diverse responsibilities into one process, and as such facilitates organizational change (Attewell and Rule 1984). This may result in more differentiated and complex organizations where control over the business becomes more demanding. Small businesses that purchase commercial software do not effectively address the social response to organizational change and business process reengineering.

Methodology

In this paper we employ a case study approach to identify second-order (latent) effects of an IT implementation, “how” they may derail the implementation process, and “how” they may support the process. Yin (1994) recommends case study as the preferred research strategy when “the focus is on a contemporary phenomenon within some real-life context,” when “how” questions are being posed (p. 1), and when the context involves events over which the investigator has little or no control. Case study research focuses on understanding the dynamics present within single settings (Eisenhardt 1989), such as gaining insight into the reasons why an IT implementation resulted in decreased productivity. A qualitative investigation is required in order to suggest ways to offset and manage the negative output generated by latent effects.

The primary method for inquiry and data gathering used in this study was participant observation. Participant observation is considered an essential element of all qualitative studies because it demands first hand involvement in the social world chosen for study (Marshall and Rossman 1995, Rubin and Rubin 1995). Data was derived from participant observations while one of the authors was working as a management information systems (MIS) consultant at ITEX. By being immersed in the organizational setting, the researcher was able to hear, see and experience reality as the subjects carried out their daily tasks (Marshall and Rossman 1995). The notes taken over a three-year period provided a large amount of expansive and contextual data. This method of inquiry uncovered the business processes and culture that developed in response to both management and end-user's reaction to the packaged software implementation.

A second method used for data collection was focused observation. The researchers had no special role other than being accepted as unobtrusive observers. Sixteen focused observations were conducted, each lasting for two to three hours. Events and behaviors were systematically recorded. Using this approach it was possible to check analytic themes that emerged from the participant observations.

The critical essence of the study "bubbled up" during the observations. The initial purpose of the study, which was to explore the interaction of the employees with new technology, changed to an examination of the interaction of employees among themselves. This new focus provided a revelation into the problems small businesses have with the implementation of packaged software when productivity does not increase as expected.

Data analysis was conducted by first organizing the information contained in the transcripts. Second, critical categories were defined and the relationships among them established. The credibility of the study is supported by in-depth descriptions that present the complexity of the interaction among end-users, management and IT. To control for bias in the interpretation of data the researchers critically questioned the analyses and continuously searched for negative instances of the phenomenon and rival hypotheses (Glaser and Strauss 1967). Subsequently, these findings were represented using a systems dynamics modeling approach (Lyneis 1997, Senge 1990). The use of an underlying theoretical modeling approach supports the dependability of the study's findings to be applied in other settings.

Research Site and Subjects

The site for this study is ITEX, a trading company that specializes in the import and export of textiles. The company is a US subsidiary of a Turkish company. ITEX upgraded its financial and accounting system to a client-server packaged software called OFIS (Operating and Financial Information System). The installation of OFIS reflected management's increasing reliance on IT to coordinate and consolidate business functions and information. The OFIS implementation, for example, resulted in organizational change, empowered users, and enriched job responsibilities. OFIS required management to address unexpected organizational changes and adaptations to the work processes and procedures. Employee productivity, however, did not improve as expected.

The two principal business functions are sales and finance. Sales activities involve purchasing and importing fabrics from countries, such as Turkey, Brazil, and Egypt. Financial activities include credit management, accounting, treasury functions, and inventory management. Other financial responsibilities are maintaining accounts for customers, textile agents and shipping brokers. Decision making in the company is centralized. There are two levels of management under the President, which are the Vice President and the Controller. The Controller reports to the Vice President and is responsible for IS functions. Table 1 presents the participants of the study, their job title, and primary business function.

Prior to the OFIS implementation a high degree of employee collaboration was necessary. The office space was broken up into five separate rooms. The financial staff (i.e., end-users) worked together in one room. The sales staff worked close by in another large room. When the end-users required additional help they relied on the sales staff. The end-users often used the sales office as an extra work area. The other three rooms were the President's office, the Vice President's office and the customer and reception area.

Table 1. Participants and Job Titles

Participant	Job Title	Primary Business Function
Tal	President (Owner)	Sales and Financial
Moham	Vice President	Sales
Os	Controller (also in-charge of IS)	Financial (end-user)
Mutak	Accounting and Administrative Assistant	Financial (end-user)
Ann	Accountant	Financial (end-user)
Betty	Accounts Receivable Clerk	Financial (end-user)
Fara	Inventory and Credit Manager	Financial (end-user)
Jane	Liaison between offices (US and Turkey)	Financial
Marc	Sales Assistant	Sales
Stephie	Receptionist	Sales
Ken	Salesperson	Sales

Discussion

In this section, we address the analysis and interpretation of data. Table 2 presents both the manifest and latent effects that emerged from the data analysis. We explore how these latent effects of IT can be detected by examining patterned and repetitive social interactions.

Table 2. Coping with Packaged Commercial Software Implementation

Possible Manifest Effects
Increasing productivity
Implementing organizational change/BPR
Increasing end-user effectiveness
Carrying out system modifications and organizational adaptation
Improving Efficiency
Creating Autonomy
Cultivating Empowerment
Possible Latent Effects
Separating work groups
Generating feelings of isolation
Carrying out system modification and organizational adaptation
Managing system and business process related crisis
Depending on vendors and consultants
Exploiting IT as a social mechanism

Separation and Isolation

The implementation of OFIS reduced and even eliminated the need for employee collaboration in some work processes. End-users became much less reliant on one another to perform their jobs (PO – participant observation). This resulted in end-user isolation (FO – focused observation). For example, business transactions that Fara or Betty enter in OFIS are available on-line for Ann to view. Ann can immediately act on this data without speaking to either Fara or Betty. Further, Fara indicated that she does her job and that's it. "I put the purchase order on the system and I don't worry about it anymore. Fara then pointed out, "Ann worries about the transactions and accounting for them. That is her thing."

The segregation of business functions also influenced employee isolation. OFIS was implemented solely to assist the Finance area. Os, the Controller, clearly stated that he is not planning to implement system features that would help the sales function. The lack of IS support for sales separated the sales staff from the financial group. By isolating these two functions management fosters a culture that inhibits rather than promotes the effective use of the IS (FO).

The physical space and layout of an office setting has the potential to affect socialization among employees. OFIS enabled new physical work arrangements. In conjunction with the implementation, the business moved to a new location. Two key changes to the office were: 1) the separation of the sales staff from the end-users and 2) the separation of end-users from one another. Although the number of employees did not change, twelve separate offices were built (rather than five). The sales staff and end-users work in rooms at the opposite ends of a long hallway. The hallway is split by two large show rooms filled with fabric, yarn, and garments. The end-users were divided into three small offices. Employees shared an office with only one other person. There was very little communication among these offices (PO and FO).

The usual "hum" of business that the researcher (PO) was accustomed to hearing at the previous location no longer existed. The office had become quiet due to the partitioning of end-users into small offices. The office silence was broken only intermittently by a ringing phone or the Vice President yelling from his office to another employee in a different office.

The lonely employees looked forward to an opportunity to socialize (FO). For example, Fara came out of her office walked down the hall past Ann's office to the reception area. Fara declared, "I thought I heard the bell." The receptionist was away from her desk, which required the visitor to ring the doorbell. A minute later Ann came out of her office to the reception area and also said, "I thought I heard the bell."

System Modifications and Organizational Adaptation

Management approved the purchase and implementation of OFIS without conducting a thorough determination of system requirements (PO). This resulted in some business processes not properly supported by the new technology. Unplanned customization became necessary. Some business processes also had to be adapted in order to work with the system. These modifications and adaptations created confusion and required immediate attention (FO).

The following incident illustrates the confusion that arises from tweaking both system and business functions. Ann asked the researcher (PO) to help her find a number of purchase orders that Fara put on OFIS. The transactions were missing from the accounting records and appeared to have been deleted. The purchase orders remained in the account balance of the customer. Ann commented calmly, "I don't like that no one tells me anything." Fara joined in the conversation and supported Ann's feelings, "Os knows that the transactions were not entered in the system. I don't like the way these people do business. It seems that 'these people' act as though they do not work in the same company." Fara was annoyed that the controller was not sharing business information with the other end-users (PO). As a result it became impossible to rely on OFIS for accurate financial data.

The lack of incentives provided by management to identify areas where the new technology could support business processes resulted in unproductive operations. Os indicated that ITEX's Federal Express bills were approximately \$1,500 per month and that the company's long distance phone bills were also very high. He said, "I know integrating an Intranet with OFIS could be used to reduce both these expenses. I am just too busy with my own responsibilities to look into this."

The difficulty in achieving productivity increases were blamed on modifications the vendor made to the packaged software (FO). Custom modifications to OFIS produced numerous problems for the financial staff. Ann complained about the hours she had to spend correcting error caused by the customization. Management addressed this dilemma by hiring part-time help to work with Ann.

Managing Crisis

End-users created distractions and exaggerated system problems, which conveyed the impression that continuous IT crisis were occurring (FO). Emergency situations required meetings among the end-users, IT vendors, consultant, and sales staff. For instance, Os installed an anti-virus program on the local area network (LAN) in response to a problem he was having on his computer. He did this without finding out if the installation would impact anyone else in the business. Sure enough Os stated, "We are having a problem with OFIS. Maybe you know what the error is?" The program was installed incorrectly, so the researcher (PO) suggested that Os remove the anti-virus program. Os later commented, "I am going to have the IT vendor come in and take a look at it." He could have easily removed the software himself, however he chose to increase social interaction by bringing in the vendor to solve the problem (PO).

The fast paced import-export business environment created a feeling of urgency for information. On a daily basis management was distressed because they could not quickly locate important financial and accounting data. This fueled the need for continual crisis management and became part of the culture of the organization (FO). The following illustrates how end-users in response to inefficient system use actually instigated the crisis. Os insisted that Ann handle the accounting transactions on OFIS in a way that does not interfere with his treasury work. Deviating from the recommended system procedures resulted in the elimination of transaction details from OFIS. Since Ann is aware that she cannot use the system in the correct manner she has an alibi for the numerous problems that occur with the system. Ann doubles her workload by keeping all transactions on both manual ledgers and on OFIS. Ann told the researcher (PO), "I cannot find information on OFIS by handling the accounting transactions the way Os wants me to." Ann presented her manual ledger and proudly noted, "I can find anything on these ledger sheets."

Socialization and Established Communication Processes

The end-users were not eager to learn about many of the system features because they felt that the system was interfering with their ability to socialize with co-workers (FO). They continued to use the old system and established methods of communication that support socialization. This hinders the business from realizing desired manifest effects.

Fara showed the researcher (PO) a spreadsheet on Excel (soon to be integrated with OFIS) that she updates by entering shipping data from her manual notes. The researcher (PO) asked her if anyone else in the company looks at the spreadsheet. Fara said, "she has no idea if anyone uses the spreadsheet but that the Vice President always looks at and discusses her manual notes."

The problems that the end-users had with OFIS became fun (PO). Fara walked in to Ann's office and said "Problems." Ann with a smile on her face said, "oh yes." Fara smiled and replied, "There are always problems." Sometimes when the researcher (PO) was working with Ann on an IS problem Fara would come in and say "Oh good you are looking at this. Remember Ann I told you there was a problem with this." Ann and Fara often discuss OFIS problems.

Mutak complains that his computer accesses OFIS very slowly. This provides Mutak with an excuse that allows him to work on another computer in the sales office (PO). Ann walks to the other side of the office when she has additional data for Mutak. Ann never mentioned that she had to leave her desk and walk over to the other end of the office. She did not see this inconvenience as a problem because it promoted social interaction (PO).

Fara resisted new electronic data interchange (EDI) technology that reduces the need for human involvement. EDI is a standard for transmitting inter-organizational transactions through computer networks. Fara indicated that she obtained each credit approval with the factor banks (i.e., factor banks provide credit to ITEX's customers) through both EDI and by telephone. She said that she wanted to "maintain contact with the folks." This doubles the amount of work required to get her task done (PO).

Although Ann knows how to correct many of the accounting problems herself, each day Ann insisted that these problems be resolved with the researcher (PO). Management accepted end-users working with either IT vendor or the researcher (PO) because there was no IS department. "Questions and Answer" sessions relating to the IS were also acceptable by management. Management perceived this as training that would eventually lead to better system use. The Vice President sometimes informally asked the researcher (PO), "So how are we doing?" He never asked for detailed explanations or written reports on the progress of IS problems or end-user satisfaction and use of the system.

Results

A key result of the study is that, ironically, end-users discover ways to use IT as a social mechanism. In small business, management should eliminate unproductive social interactions, yet have the ability to encourage productive social communications.

Conceptual Model

The conceptual modeling approach based on systems dynamics can be applied to help identify the nature of second-order effects, such as ineffective social habits (Forrester 1992, Senge and Sterman 1992, Senge 1990). Figure 1 illustrates that the IS implementation resulted in unintended consequences: dependence on MIS consultants and unproductive socialization habit. These are the result of reacting to system crisis instead of focusing on the fundamental issues.

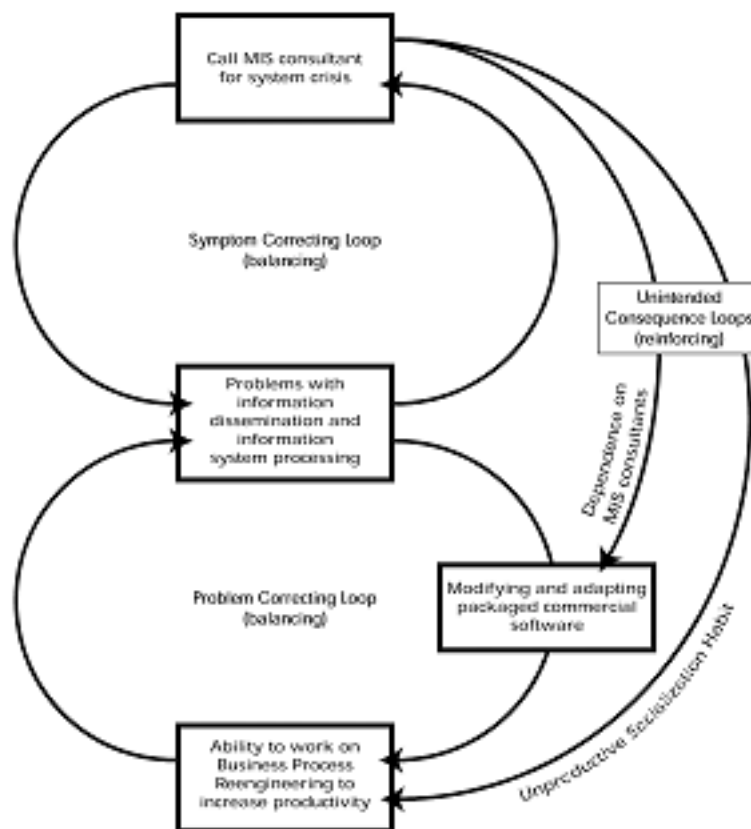


Figure 1. Manifest and Latent Effects of IT Implementation at ITEX

In the beginning, temporary intervention by the consultants (i.e., IT vendor and researcher) was needed to assist end-users with system related problems. Soon after, the end-users relied on generating crisis to offset their isolation, and the crisis culture became an essential part of the group dynamics. In particular, dependence of the end-users on the IT vendor to tweak the system for quick fixes significantly reduced the time that the vendor could allocate to modifying the packaged software for longer term productivity benefits. Furthermore, unproductive socialization habit also affected the ability to focus on business process reengineering efforts to improve productivity that would have in turn reduced problems with information dissemination and information processing. Consequently, the latent effects of IT implementation, such as isolation and crisis management, reduced the ability of the organization to achieve its goals.

Managerial Implications

ITEX management (with the help of the researchers) realized that the unproductive socialization impaired overall performance and they took actions to remedy the situation. The following recommendations assisted ITEX in encouraging productive socialization and improving business performance by keeping operations simple and efficient. These guidelines, which emerged from the findings of this case study, can help both IT practitioners and management when implementing commercial packaged software in small businesses.

- Use temporary IT liaisons to help establish and maintain relationships among functional departments. Temporary partnering among employees alleviates the stress of isolation and reduces end-user distractions by promoting positive communication.
- Highlight any information technology related activity of a department when it is likely that the results will help the productivity of another department. This should be promoted even if the potential benefits expected appear to be very small. Communicate this initiative to all employees.
- Enlist an IT support person within each department. In small businesses, IT functions are usually a part-time responsibility of an employee. Provide incentives for these employees to take a proactive attitude towards their IT responsibilities. For example, reward IT related suggestions, encourage both on-site and off-site meetings with management, and secure the IT support person's credibility and authority.
- Most IT problems that occur will be informally or formally exposed, make sure that the solution to the problem is formally publicized.

Conclusion

A sub-culture developed at ITEX that focused on IT problems. Employees discovered that problems with IT led to increased employee interaction and collaboration, and they took advantage of this situation. These employees then repeated actions that led to more IT problems. This habit, which was unproductive to the business, was identified and cured. The study shows that although IT was implemented to increase business productivity by reducing the amount of time employees spend working together, ironically, the isolation of the employees resulted in the same IT used as a tool to increase social interaction!

Future conceptual research might examine various system dynamics modeling archetypes and their application to IS settings to qualitatively assess the impact of technology and organizational response. A possible extension of this research would be a quantitative examination of latent effects of IT implementations. Another interesting study could examine temporal issues pertaining to latent effects to help facilitate better IT implementation planning.

Habits and attitudes of the employees in a small business exist long before they are recognized and shape the organization's culture. Habits and attitudes may quickly become ingrained in the work environment. Unproductive habits negatively affect the business by creating interference to planned activities and initiatives. Small business managers are usually surprised when they realize that the IT investment is not going to deliver the expected results. Understandably they want to know why promised expectations are not attained. Some of the most common reasons refer to insufficient resources, lack of formal planning, and inadequate training. Even though these deficiencies are remedied, IT investments may still not lead to improved productivity. It is necessary to examine the latent effects of IT.

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