Are You Solving the Right Problem?
A Study of Packaged Software Implementation

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ABSTRACT

Packaged software is used by small businesses to lead business process reengineering and knowledge management initiatives, gain strategic advantage, and increase productivity. Studies suggest, however, that these implementations often fail to yield expected benefits. In this study, MIS consultants were interviewed to explore packaged software implementation problems. Data from a qualitative study are used to demonstrate the importance of identifying both intended and unintended consequences. The paper employs a system dynamics approach to explain how inadvertent effects, such as unproductive social habits, can be predicted and prevented. The findings of the case study provide valuable information that helps with the development of a conceptual model for solving packaged software implementation problems. A key finding that emerged is that stakeholders employ technology as a tool to combat upsetting social changes resulting from the implementation. Ironically, end-users became "hooked" on the control they gain, and new habits developed that eventually evolved into strong subcultures. Managerial implications of this study are discussed that can help both IT practitioners and management when implementing packaged software in small businesses.

Keywords: Packaged Software, System Dynamics, Problem Structuring, Case Study, Small Business.

INTRODUCTION

Some studies suggest that innovations, such as packaged software implementations, often fail to yield expected benefits and may even result in financial loss (1, 6). Two identified causes for failure in the case of packaged software are functional weakness and incompatibility between the vendor and/or consultant and the organization (4, 6). More importantly, small businesses usually do not adequately prepare for the impact of a packaged software investment (4).

This paper investigates how a small business can identify and achieve the intended effects of packaged software implementation. This requires recognizing the unintended consequences. Identifying intended and unintended consequences helps IS professionals and managers to direct observations toward important elements of a situation and to prevent the inadvertent oversight of these elements (9). In this study, MIS consultants were interviewed to explore the engagement dynamics in packaged software implementations. A key finding that emerged is that stakeholders employ the technology as a tool to combat annoying and upsetting social consequences. Ironically, end-users became "hooked" on the control they gain and new habits developed that eventually evolved into strong subcultures.

The presentation of this study is organized as follows. First, we employ causal loop diagramming to understand the dynamic relationships among variables in a packaged software implementation environment. Second, data from a multiple case study are used to demonstrate the importance of identifying both the intended and unintended consequences. The findings from the qualitative analysis are integrated in a systems dynamics modeling approach. Finally, based on this analysis we offer suggestions for practitioners to help them foster a business culture that supports packaged software implementation success.

PROBLEM STRUCTURING WITH SYSTEMS THINKING

Managers constantly face problems, some of which are difficult to define. The same problem is often perceived differently depending on the managerial perspective. Mitroff, et al. (10) [1979] suggest including as many important perceptions of a problem in its formulation so that important aspects will not be overlooked or excluded outright. This is especially relevant when the problem is critically important to the organization. The conceptual modeling approach based on system dynamics can be applied to help define problem structures (3, 13, 12). This may aid in identifying the nature of unintended consequences in packaged software initiatives.

A causal loop diagram for the packaged software implementation domain is shown in Figure 1. The causal loop diagram represents the causal relationship between variables, which are linked by arrows. The variables that appear at the tail and at the point of the arrow may participate in either a positive (+) or negative (-) relationship. A positive causal relationship occurs when both variables increase or decrease in the same direction. For example, an increase (decrease) in the variable *'problems with information dissemination and information system processing'* will increase (decrease) the variable *'call MIS consultant'*. A negative causal relationship indicates that the variables change in opposite directions. This occurs when an increase in one variable causes a decrease in the other variable. For example, an increase (decrease) in the number of *'calls to the MIS consultant'* will lessen (aggravate) *'problems with information dissemination and information system processing.'*

The feedback loops can take two forms: Negative (balancing) or positive (reinforcing). Balancing feedback indicates a stabilizing structure arising from a goal-oriented behavior. In other words, we take actions to improve our performance whenever there is a difference between what we want and what we have. The 'goal' can be explicit, such as a desired level of end-user productivity and system use, or it could be implicit, such as an acceptable level of job satisfaction or decision effectiveness. A positive loop indicates a reinforcing process in that the effects of the initial variable are amplified resulting in further escalation of the initial variable. Usually, the reinforcing loop accelerates an increase, such as growth of companies or accelerates a decline, such as extinction of corporations (12). The loops may involve a 'delay' that reflects that the consequences of actions may not be realized immediately or that the consequences will continue for a while even when the actions stop.

In Figure 1, both the 'symptom correcting loop' and the 'problem correcting loop' are balancing loops. Unintended consequences such as *'end-user distractions'* are modeled as a reinforcing loop. This is because distractions reduce the ability of the MIS consultant to focus on the fundamental solutions. This causes an increase in the *'problems with information dissemination and information system processing,'* which in turn requires *'calling MIS consultants for short-term solutions'* resulting in more *'end-user distractions.'*

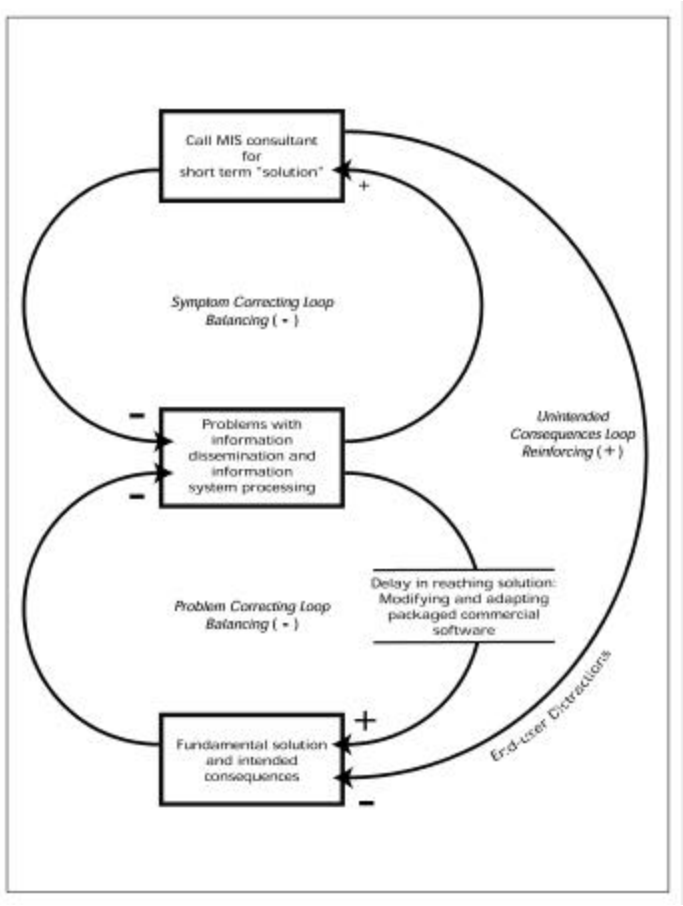
METHODOLOGY

A multiple case study is used to uncover intended and unintended consequences of packaged software implementations. This methodology was chosen because of its emphasis on illuminating a set of decisions and understanding why they were taken, how they were implemented, and with what result (8, 11). Case study research focuses on understanding the dynamics present within single settings (2). Combining a qualitative investigation with system dynamics modeling achieves an especially intriguing approach suited for solving the "right problem."

Twenty MIS specialists were chosen at random from an initial pool of fifty MIS specialists. The pool of candidates was formed from lists supplied by the Association of Management Consultants, by the IT Consultants and Contractors World Conference, and from professional contacts. The MIS specialists

collectively provided case data for twenty-five packaged software implementations. In this paper, we present four of these cases to illustrate our approach. Table 1 shows data by engagement, type of IS, size of business, and industry sector.

Figure 1 Causal Loop Diagram



The primary data collection method employed in this study was open-ended interviewing. Other data collection methods used were scripts from an Internet-based discussion service called *list serve*, observations, and documents. The use of multiple data collection methods enabled triangulation and provided stronger substantiation of constructs (2).

Table 1. Case Data for Engagement Context

Case	Type of IS	Size (# Employees)	Industry
1. ITEX	Operating and Financial System	21	Import/Export of Textiles
2. Door Co.	Accounting Information System and MRP II	46	Manufacturing: Doors
3. FinTrade	Trading and Analytic Information System	180	Financial Trading company
4. RETA	Accounting Information System	200	Retail Distributor and Supplier

Data analysis was conducted by first organizing the information contained in the transcripts. Second, variables were defined and the relationships among them established. 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 (5). Subsequently, these findings were

represented using a system dynamics modeling approach (7, 12). The use of an underlying theoretical modeling approach supports the dependability of the study's findings to be applied in other settings.

CASES

Case 1. ITEX upgraded its financial and accounting system to a client-server operating and financial information system (OFIS). The installation of the IS reflects management's increasing reliance on IT to coordinate and consolidate business processes and information sources. **Intended Consequences:** A key goal of the implementation is to reengineer business processes and to increase end-user productivity. OFIS enabled management to empower users and enriched job responsibilities.
Unintended Consequences: Unplanned system customization became necessary. Business functions had to be adapted in order to work with the system. The customization and organizational adaptations created confusion that required immediate attention. The fast paced business environment created a feeling of urgency for information. This further fueled the need for crisis management. End-users created distractions and exaggerated system problems, which enabled socialization and justified maintaining the old IS. Employee productivity decreased.

Case 2. Door Co. implemented an accounting information system (AIS) and a material requirements planning system (MRPII). Management decided that a new IS was necessary in order to remain in business. A major aspect of this project is the conversion from a mainframe legacy system to a client-server environment. **Intended consequences:** The goal is to enable management to use information for strategic planning and managerial control. Management is frustrated with the lack of information provided by the legacy system and knows that business performance can be improved by integrating manufacturing and customer data to support effective decision-making. The new system will also eliminate some manual tasks. **Unintended consequences:** The new IS necessitated decentralized decision authority to exploit end-user expertise. A business culture developed that strongly supports the belief that manufacturing is an art form. A statement made by an employee reflects a tone of resistance to technology: "I make doors, that is what I do and now I have to make sure that inventory control is in-line." End-users are not trying to learn how to use the new system.

Case 3. FinTrade enhanced the standard financial information system and database with specialized analytics, which are mathematically based financial trading programs. Many of the mathematical functions were performed manually. This resulted in unreliable information and reduced decision quality. An additional enhancement to the packaged software is a web based reporting module.
Intended Consequences: The primary goal of the system is to gain competitive advantage by supporting operations with customized advanced mathematical algorithms. A second objective is increased accuracy and speed of the financial trading process. Additionally, information is expected to be quickly disseminated to end-users. **Unintended Consequences:** End users became increasingly more demanding for financial modeling features to be incorporated in the system and they wanted each request to be worked on immediately. The strong desire to incorporate sophisticated modeling evolved into the development of a compulsive organizational culture. The MIS consultant stated that," I cannot build a quality customization. By the time I finish evaluating the preliminary requirements or show the end-user what I'm doing, while I'm in the development process, they have moved on to another whim."

Case 4. RETA implemented an accounting information system (AIS). When RETA planned to acquire several other companies a new IS was necessary to standardize and consolidate various procedures. The new system provided strategic information that enabled a successful takeover and new business arrangements. **Intended Consequences:** A key goal of the software implementation is to enhance business intelligence. The system improved the effectiveness of invoice, purchase and order processing. The reengineering of business processes automated manual tasks and reduced the number of mediating activities. Additionally, accepting and sending purchase orders electronically required new organizational

arrangements among clients, vendors, and affiliated companies. **Unintended consequences:** The mindset of management became 'my way or the highway.' As a result of new skill requirements, unplanned and unannounced changes were made to staffing levels. End-users were required to take different positions. Employees became afraid they would lose their positions and even refused to share business information.

DISCUSSION

We explore how the unintended effects of IT can be detected by examining patterned and repetitive behavior, such as social habits. A qualitative modeling approach provides a forum to discuss and assess the feasibility of the initiatives and its likely outcomes.

Conceptual Model

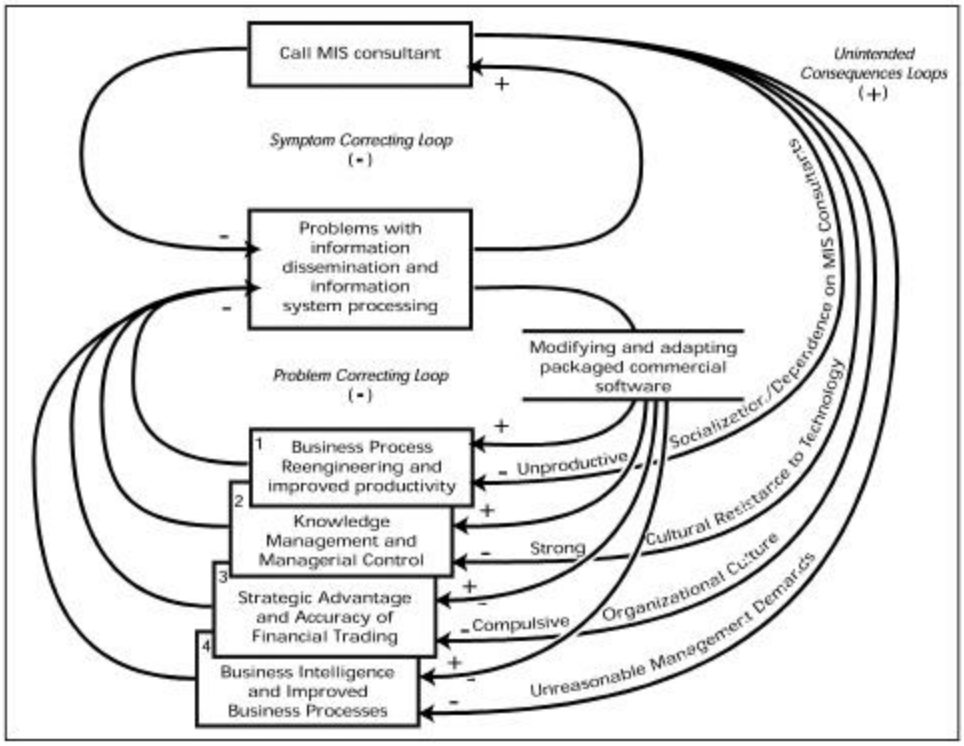
The representation of complex social system behavior with feedback loops helps in understanding the possible relationships among many variables of non-linear type. The qualitative interpretation of the causal loop diagrams can provide valuable insights pertaining to the behavior of a system.

Figure 2 illustrates that the IS implementations resulted in unintended consequences: unproductive socialization, dependence on MIS consultants, resistance to technology, compulsive business culture, and unreasonable management demands. These consequences arose because the symptoms were masked by a persistent focus on short-term solutions. In particular, dependence of the stakeholders on the MIS consultants to tweak the packaged software for quick fixes significantly reduced the time allocated to modifying the packaged software for fundamental objectives, which would have in turn reduced problems with information dissemination and information processing. In the beginning, temporary intervention by the MIS consultants was needed to assist management and end-users with system related problems. Soon after, the end-users relied on the technology to offset the discomfort from changes that were occurring in the business and to gain control of their lives. In ITEX, for example, end-users felt isolated from one another as a result of enlarged job responsibilities. Problems with the system, however, led to increased employee interaction and collaboration that alleviated the isolation they felt. The end-users then took advantage of this situation and purposefully repeated actions that led to more IT problems. These distractions affected the ability to focus on business process reengineering efforts and reduced the ability of the organization to achieve its goals.

At Door Co., for instance, end-users did not want to learn the new system because they felt that the system was conflicting with their belief that 'what they do' is an art and cannot be replaced with technology. Employees resisted using the new system unless the MIS consultant was at the business directly in front of them. Additionally, end-users developed a camaraderie that increased their resistance to technology. This hindered the business from realizing intended consequences.

Importantly, it is possible that there may be major shifts in the dominance of the loops. "For instance, a positive loop which at first has a relatively minor effect, might become dominant … and radically change the systems behavior" (12, page 48). At RETA, management provided software training to ensure the system was accepted and routinized in the business. The delay in achieving the fundamental solution necessitated management to take unplanned quick fixes, such as giving authority to MIS consultants and placing unreasonable demands on employees. The abuse of power led employees to be fearful of their jobs and prevented them from wanting to experiment with the new system. In this case, instead of focusing on the problem correcting loop, the symptom correcting loop and unintended consequence loop became dominant.

Figure 2 Intended and Unintended Consequences: Case Study



Managerial Implications

Table 2 presents a summary of the findings that emerged from the data analysis. A key finding that emerged is that stakeholders employ the technology as a tool to combat annoying and upsetting social consequences. Ironically, end-users became "hooked" on the control they gain and new habits developed that eventually evolved into strong subcultures.

Table 2. Summary of Findings

Case	Intended:	Unintended:		
	Goals	Symptoms	Culture	Result
ITEX	Employee empowerment; increased end-user responsibility	Fast paced environment End-user isolation	Social interaction; Decreased desire to learn IS	Decreased employee productivity
Door Co.	Managerial control; improved decision; strategic planning	Change to decentralized decision -making	Anti-technology; Decreased desire to learn IS	Decreased IT acceptance
FinTrade	Increased speed and accuracy of business processes	Fast -paced environment	Want more and faster; never finish projects	Decreased quality
RETA	Increased purchase and order processing effectiveness	Managerial mindset change to increased power and authority	Decreased desire to learn and share knowledge	Decreased corporate knowledge

The following recommendations, which emerged from the findings of this multiple case study, can help both IT practitioners and management when implementing commercial packaged software in small businesses.

- Involve end-users in the packaged software purchase phase.
- Establish a formal planning and implementation process.

- Focus on the current business culture so that you aware of 'hot spots' that may erupt and derail the initiative.
- Explore, rather than ignore, repetitive actions and new habits that surface in the business.

CONCLUSION

The approach introduced in this paper is meant to inject a new perspective to understanding IT implementation issues. An empirical investigation of the issues should prove to be fruitful and extend the boundaries of our understanding. 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.

Small business managers are usually surprised when they realize that the packaged software 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 packaged software investments may still not achieve intended goals. Habits of both end-users and management in a small business may exist long before they are recognized and shape the organization's culture. Habits may quickly become ingrained in the work environment. Unproductive behavior negatively affects the business by creating interference to planned activities and initiatives. Therefore, it is necessary for IS professionals to examine the unintended consequences of technology.

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