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Implementing Packaged Software

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Abstract

This article presents a model of the implementation process for dedicated packages and describes a research project to test the model undertaken with the cooperation of a major computer vendor. Data were collected from 78 individuals in 18 firms using the package and from the package vendor. The results of the study offer some support for the model, along with suggestions for package implementation for both the customer and package vendor.

Keywords: Software package, implementation

ACM Categories: H.2.4, H.4.m, J.1

Introduction

There have been many problems with the development of information systems in organizations. In particular, the custom design of systems has been associated with cost and schedule overruns and with systems that do not meet user requirements. Evidence suggests that there is a large backlog of applications awaiting development in many organizations.

A number of solutions to difficulties with custom designed systems have been suggested including the use of packaged software. Packages can be classified into two broad categories: general purpose and dedicated. A general purpose package is a tool that a user or systems professional employs to solve a problem. A program like Lotus 1-2-3 or an applications generator falls into this category.

A dedicated package offers a solution to the user's information processing problem; the package is dedicated to some particular function like accounts receivable, order entry or production planning. Because the dedicated package is focused on a particular business function, rather than being general, an organization adopting the package may have to change its procedures or modify the package. The customer faces a trade-off between faster implementation at lower cost with a package and more flexibility with a custom-developed system.

The purpose of this article is to describe a study of the implementation process for a packaged system, called Production System (PS). A major computer vendor designed and programmed PS and offers it to its customers. PS consists of multiple, integrated modules, with each module dedicated to a different aspect of the manufacturing process. Customers can order all or parts of the package for installation on the vendor's computers.

Implementation

An increasing body of research on the implementation of information systems has been developed over the last decade. For example, Schultz and Slevin (1975), Docktor, et al. (1979), Lucas (1982), and Schultz and Ginzberg (1984) are individual studies and summaries of much of this research.

A significant amount of the work to date has focused on the general problem of implementation for information systems; most of the sys-

tems in the literature were custom designed (Lucas, 1981). A few studies, however, have been concerned with the question of package program implementation. For instance, Gross and Ginzberg (1984) identified 38 issues as potential obstacles in the acquisition of a package. They reported that a key obstacle to adoption is uncertainty about package modification time and cost, vendor viability, and the ability of the package to meet user needs. Lynch (1984) argued that financial packages had hidden implementation costs.

As described earlier, the implementation of a dedicated package differs from the implementation of a custom system in several ways:

- The user may have to change procedures in order to work with the package.
- The user is likely to change some of the programs in the package to fit his or her unique requirements.
- The user becomes dependent on the package vendor for assistance and for updates to the package.

Research Model

Figure 1 is a model of the implementation of packaged software. The model is based on past research (see previous references) and the unique characteristics of package implementation described above. The model focuses on two key classes of variables: the implementation process and the success/impact of the package. The model is based on past research that suggests certain variables are associated with implementation strategies, and the implementation process is related to the ultimate success of a system. Lucas (1982) summarizes much of this research.

In Figure 1, four classes of variables are expected to be associated with implementation strategies. First, the organization has certain characteristics that are likely to influence its approach to implementation. These characteristics include variables such as the work environment, the nature of manufacturing technology, and the decision-making process. The unique environment of the organization should be important in the firm's approach to implementation.

Second, the potential adopter has certain processing needs that will be important in implementation. If a firm already has a good work-in-process tracking system, a complete production control system may not be of interest. Past research (Gross and Ginzberg, 1984) suggests that uncertainty about needs is an important barrier to package adoption. Identifying an organi-

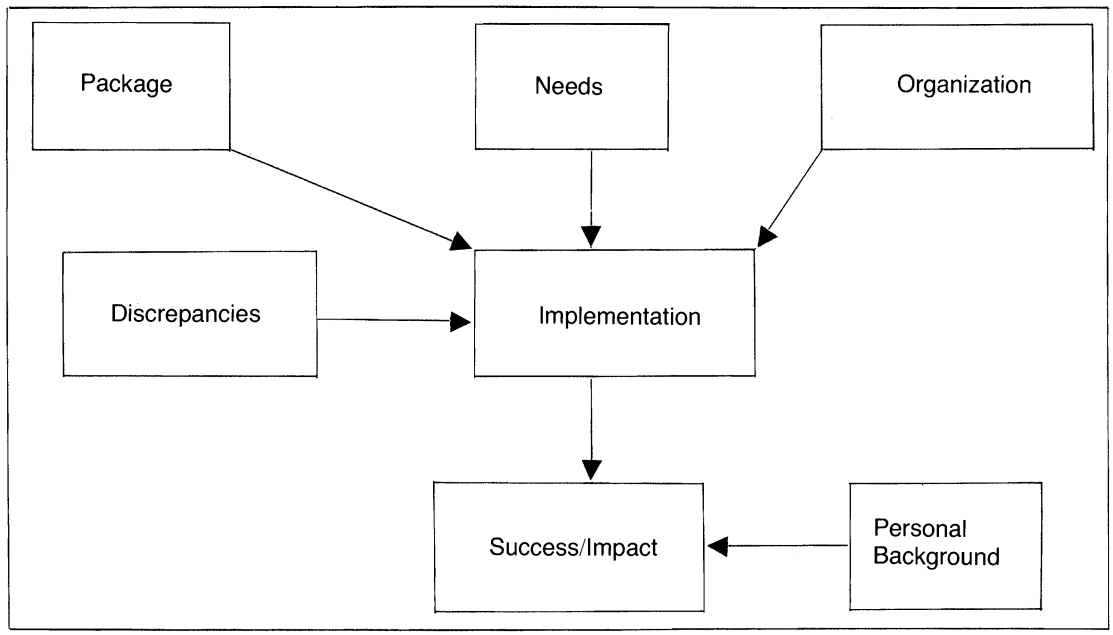

Figure 1. The Research Model

zation's needs and evaluating a package against these is an important part of implementation.

Third, characteristics of the package under consideration will affect implementation. The package is the vendor's proposed solution to the users' problems. Certain aspects of a package will influence the implementation process, especially the functions that it offers. For example, the customer may use modules that support accounting, engineering, and materials-requirements planning.

Fourth, there are likely to be discrepancies between the needs of the organization and the features of the package. It is expected that the extent of these discrepancies will influence whether the organization decides to acquire a package. If the decision to adopt is positive, the implementation process will require that discrepancies be resolved — either the organization has to change its procedures, compromise on processing needs satisfied, or modify the package.

The implementation process is expected to influence the measures of success and impact of a package. The firm that concentrates on factors associated with implementation success and on the process of implementation should rate the package a success. The personal characteristics of employees and their experiences with computers are also likely to have an influence on package success.

Research Design

A major computer vendor participated in this research and arranged for data to be collected from its account representatives and customers. The vendor offers the PS system, which includes modules for engineering and inventory control, materials-requirements planning, work-in-process control, shop-floor-data collection, capacity-requirements planning, master-production scheduling, forecasting, and various accounting applications, among others.

According to the package vendor, 59 clients were already using PS. After phoning the vendor's branch offices to obtain names of the PS users, the research team sent instruments to 47 of these clients. The median firm in the sample manufactures 47 different products and holds about a 40 percent market share in its primary market. Products have a median life of five years and the firm has six main competitors. The median plant has 225 employees at the location using the package, with 136 of them in the production department.

Instruments

The research team met frequently with vendor marketing managers and also visited two PS users to discuss their implementation experiences with the package. A set of five questionnaires resulted from this effort. To the greatest extent possible, the questionnaires contained scales used in past research (Van de Ven and Ferry, 1980; Lucas, 1982). The instruments were pre-tested at the site of a PS client, and a final revision was mailed to vendor representatives. The instruments were to be completed by: the vendor's account representative, the senior plant manager, the manager of the unit adopting PS, the plant human resources manager, and the information systems manager at the plant.

Variables

Each instrument contained a number of questions related to the classes of variables in Figure 1. Related items were combined to form scaled variables, or scales were constructed based on their definition in previous studies (Van de Ven and Ferry, 1980). Table 1 contains a list of the variables used in the study. The letter subscript in the symbols column indicates the source of the variable as follows:

M = MIS director
A = Adopting unit manager
V = Vendor representative
P = Senior plant manager

Results

With a concerted effort, including a number of site visits, partial or complete responses from 18 firms were finally received in time for analysis, representing a 38% response rate. The 18 firms provided a total of 78 questionnaires. Several reasons for non-response were apparent: some non-respondents had discontinued the package; for others the package had not been installed long enough for participation; several respondents did not want to participate because of the time required to complete the questionnaires.

The data from the firms were analyzed using non-parametric correlation coefficients. A non-parametric correlation requires less restrictive assumptions than parametric statistics and is well

Table 1. Variables in the Study

Symbol	Variable	No. of Items	Alpha
Organizational			
O_{1P}	How rapidly manufacturing technology is changing	—	—
O_{2A}	Unit performance	7	.91
O_{3A}	Dependence of work unit on adopting manager	3	.86
O_{4M}	Already had vendor's hardware	—	—
Needs			
N_{1M}	Engineering functions at plant	2	.69
N_{2M}	MRP performed	—	—
Discrepancies			
D_{1M}	Extent of changes to software	—	—
D_{2VM}	Amount spent to modify software through vendor	2	.92
D_{3VM}	Amount spent to modify internally	2	.60
Package			
P_{1M}	System provides support for manufacturing	16	.85
P_{2M}	Ordered engineering modules	2	.75
P_{3M}	Estimated hardware purchase price	—	—
P_{4M}	Estimated software price	—	—
Implementation			
Decision			
I_{1M}	IS involvement in systems requirements	2	.81
I_{2M}	Vendor's participation/influence installation	—	—
I_{3M}	Non-IS involvement in hardware decision	4	.67
I_{4M}	Vendor asked (0) or unsolicited proposal (1)	—	—
I_{5M}	Number of vendors considered other than one chosen	—	—
I_{6M}	Consultant recommended vendor's package	—	—
I_{7M}	Selected because of price	—	—
Customer			
I_{8V}	Capabilities of customer	4	.83
I_{9V}	Customer understanding of package	3	.78
I_{10M}	Users have skills; need no training	—	—
Support			
I_{11V}	Extent of vendor support	5	.94
I_{12M}	Extent of installation assistance	8	.91
I_{13M}	Support requested from vendor	3	.94
I_{14M}	Satisfaction with vendor's support before installation	—	—
I_{15M}	Satisfaction with vendor's support after installation	—	—
Success			
Satisfaction			
S_{1A}	Satisfaction with software purchase price	—	—
S_{2A}	Satisfaction with software, installation, training	9	.93
S_{3M}	Satisfaction with system's characteristics, features	7	.87
S_{4M}	Satisfaction with operating and maintenance costs	7	.57
S_{5M}	Overall satisfaction with system	—	—
Impact			
S_{6V}	Estimated new staff to maintain system	—	—
S_{7V}	Estimated new staff to operate system	—	—
Personal/Background			
B_{1M}	Previous applications of computers in plant before package	4	.85
B_{2MA}	Number of organizations in which previously employed	—	—
B_{3MA}	Years working full-time	—	—

Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

suited to the small sample size of the study. The data tables contain correlations that are significant at the .10 level or better, and for which there are at least 13 valid responses.

In testing the hypothesized relationships from the model, the number of statistically significant results exceeds chance at the 10 percent level by more than two times in each of Tables 2-6. That is, there is a minimum of over 2 times as many significant responses as predicted by chance. If one assumes a population effect of .5, the power of the study is approximately .5. As a result, the study should be regarded as an exploratory test of the model.

Organization

Table 2 contains Kendall correlations between organizational and implementation variables.

Table 2. Organization and Implementation Results

		O_{1P}	O_{2A}	O_{3A}	O_{4M}
	Implementation	Changing Manufacturing Technology	Performance Unit	Depend on Manager	Vendor's Hardware
I_{1M}	IS involvement				
I_{2M}	Vendor participation				
I_{3M}	Non-IS hardware		** −50 (13)		** −51 (15)
I_{4M}	Vendor proposal	** −60 (13)	** −69 (14)	** −51 (14)	
I_{5M}	Number of vendors			** 57 (13)	** −70 (14)
I_{6M}	Consultant recommendations				
I_{7M}	Select on price	* −43 (13)	* −38 (13)		
I_{8V}	Capabilities	*** 61 (14)		* 39 (14)	
I_{9V}	Understanding				* −42 (13)
I_{10M}	User skills software	** 45 (14)			
I_{11V}	Vendor support		* 38 (14)	* 45 (14)	
I_{12M}	Installation assistance	* −41 (13)	* −43 (14)		
I_{13M}	Support requested				
I_{14M}	Support before			* 50 (13)	** −50 (15)
I_{15M}	Support after			* 38 (13)	** −49 (15)

Kendall correlation coefficient × 100: * = p<.10; ** = p<.05; *** = p<.01.
Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

Faster-changing manufacturing technology is positively related to the vendor's ratings of the customer's capabilities, but is negatively related to installation assistance from the vendor as seen by the MIS manager. Faster-changing technology is associated with the vendor being asked for a proposal and with package selection not being based primarily on price. At plants where the manufacturing technology is changing rapidly, the MIS manager sees users as skilled.

Unit performance is negatively associated with involvement in decisions about hardware acquisition by non-information systems professionals; it is positively correlated with vendor support and negatively related to installation assistance. Unit performance is associated with a request for the package proposal and with selecting a package not primarily on price.

Dependence of the work unit on the adopting unit manager is positively related to the vendor's ratings of customer capabilities, vendor support provided, and the MIS manager's satisfaction with support before and after installation of the package. Dependence on the manager is associated with the vendor being requested to make a proposal and with the number of vendors contacted.

Already having the vendor's hardware has a strong negative correlation with the number of vendors contacted by the customer. Having vendor hardware is associated with less input from non-IS personnel on the decision and with a lower rating by vendor personnel of the customer's understanding. Having vendor hardware is also negatively related to vendor support and satisfaction with vendor support before and after installation.

Processing needs

Table 3 contains the results of correlating variables in the needs category with those in the implementation category. The presence of engineering at the plant is associated with IS involvement in systems requirements definition, a higher ranking of customer capabilities and more support provided by the vendor. Engineering at the plant is negatively correlated with MIS managers' satisfaction with vendor support after installation.

Having MRP (manufacturing resource planning) performed in the organization is associated with higher ratings by the vendor of the capabilities of clients and their understanding of the system and higher ratings of user skills by the MIS manager. MRP at the plant is related to less vendor contact for a proposal and less influence of price in selecting a system.

Package

Table 4 presents the results of correlating package and implementation variables. High ratings of manufacturing support from the system are associated with less IS involvement in requirements analysis and higher user skills. Manufacturing support is also associated with recommendations on the package from the consultant and high satisfaction with support before and after installation.

Ordering the engineering modules is positively associated with non-IS involvement in the hardware decision, client understanding, installation assistance, and before-installation satisfaction with the vendor.

Higher estimated hardware costs are associated with less input from non-IS personnel on hardware and a higher rating of client capabilities by the sales representative. Higher estimated hardware cost is associated with asking the vendor for a proposal, relying less on a consultant's recommendations, not selecting the package based on price, and requesting support.

A higher estimated software cost is associated with lower IS and vendor participation in decision making. Higher software price is associated with the IS manager rating user skills as lower and with the client asking for and the vendor providing more support.

Discrepancies

In Table 5 the extent of actual modifications reported by the MIS manager is positively related to the vendor's rating of the client's capabilities, and support requested of and provided by the vendor. Greater modifications are related to higher satisfaction with support prior to installation. The extent of actual modifications is associated with asking the vendor for a proposal and contacting a larger number of vendors.

Higher costs of vendor modification are associated with greater vendor participation in installation and lower ratings of the client's capabilities

Table 3. Needs Versus Implementation Results

		N_{1M}	N_{2M}
	Implementation	**Engineering at Plant**	**MRP Performed**
I_{1M}	IS involvement	* 41 (15)	
I_{2M}	Vendor participation		
I_{3M}	Non-IS hardware		
I_{4M}	Vendor proposal		
I_{5M}	Number of vendors		** −42 (16)
I_{6M}	Consultant recommendations		
I_{7M}	Select on price		** −49 (16)
I_{8V}	Capabilities	* 37 (15)	** 44 (16)
I_{9V}	Understanding		* 40 (14)
I_{10V}	User skills software		* 39 (17)
I_{11V}	Vendor support	* 35 (15)	
I_{12M}	Installation assistance		
I_{13M}	Support requested		
I_{14M}	Support before		
I_{15M}	Support after	* −44 (14)	

Kendall correlation coefficient × 100: * = p<.10; ** = p<.05; *** = p<.01.
Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

by the vendor. Vendor support and installation assistance are positively associated with payments to the vendor for modifications. This type of expenditure is also associated positively with support requested. The picture that emerges shows the less capable client drawing heavily on the vendor to modify the package.

Spending more internally for package modification is associated with lower levels of vendor participation in installation, the customer contacting more vendors and relying less on a consultant's recommendations, and selecting less by price. Internal spending is positively related to higher ratings of the client's capabilities by the vendor. Requested support is highly and positively correlated with internal modifications, possibly because the client needs input from the vendor to make changes in the system. The data suggest that the more capable clients tend to make the modifications themselves, though help from the vendor is still needed.

Success / impact

Implementation

Table 6 shows the correlation of success and impact variables with implementation variables. More IS involvement in setting requirements is associated with higher estimates of staff to operate the system. Greater vendor participation

Table 4. Package and Implementation Results

	Implementation	P_{1M} Mfg. Support	P_{2M} Engineering Ordered	P_{3M} Est. Hardware Cost	P_{4M} Est. Software Cost
I_{1M}	IS involvement	* −44 (14)			* −53 (14)
I_{2M}	Vendor participation				* −40 (13)
I_{3M}	Non-IS hardware		* 37 (15)	** −50 (14)	
I_{4M}	Vender proposed			** −48 (15)	
I_{5M}	Number of vendors				
I_{6M}	Consultant recommendations	** 51 (14)		* −38 (14)	
I_{7M}	Select on price			* −37 (15)	
I_{8V}	Capabilities			* 35 (15)	
I_{9V}	Understanding		* 37 (15)		
I_{10M}	User skills software	* 37 (14)			** −53 (15)
I_{11V}	Vendor support				** 47 (14)
I_{12M}	Installation assistance		** 44 (16)		
I_{13M}	Support requested			* 41 (15)	* 42 (14)
I_{14M}	Support before	** 56 (14)	* 44 (15)		
I_{15M}	Support after	** 53 (14)			

Kendall correlation coefficient × 100: * = $p<.10$; ** = $p<.05$; *** = $p<.01$.
Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

in installation is associated with higher levels of satisfaction with system features and with higher estimates of staff to maintain and operate the system.

Requesting a proposal from the vendor is negatively related to satisfaction with operating and maintenance costs and with estimates of staff needed to maintain the system. Contacting more

Table 5. Discrepancies Versus Implementation Results

	Implementation	D_{1M} Extent of Modification	D_{2VM} Spent On Vendor	D_{3VM} Spent Internally
I_{1M}	IS involvement			
I_{2M}	Vendor participation		** 50 (15)	* −36 (15)
I_{3M}	Non-IS hardware			
I_{4M}	Vendor proposal	** −36 (16)		
I_{5M}	Number of vendors	** 48 (15)		* 35 (16)
I_{6M}	Consultant recommendations			** −52 (15)
I_{7M}	Select on price			* −34 (16)
I_{8V}	Capabilities	* 37 (15)	* −33 (17)	** 48 (17)
I_{9V}	Understanding			
I_{10M}	User skills software			
I_{11V}	Vendor support	*** 58 (15)	** 46 (17)	
I_{12M}	Installation assistance		** 56 (16)	
I_{13M}	Support requested	*** 64 (16)	* 41 (16)	*** 61 (16)
I_{14M}	Support before	** 52 (15)		
I_{15M}	Support after			

Kendall correlation coefficient × 100: * = $p<.10$; ** = $p<.05$; *** = $p<.01$.
Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

vendors, however, is positively related to these two variables! Attaching more importance to a consultant's recommendation is associated with higher estimates of operations staff. It is interesting to note that selecting by price is negatively related to three satisfaction variables.

A high rating of customer capabilities by the vendor is associated with software installation satisfaction, as well as overall satisfaction. Greater levels of customer understanding as rated by the vendor are associated with lower estimates for additional staff to maintain and operate the system.

High user skills as rated by the MIS manager are positively and strongly associated with satisfaction — four out of five possible correlations are significant. Higher levels of vendor support are negatively related to satisfaction with the purchase price of the software and positively related to the vendor's estimate that new staff will be needed to operate and maintain the system.

Table 6. Success/Background and Implementation Results

Implementation	S_{1A} Satisfaction Software Price	S_{2A} Satisfaction Software Installation	S_{3M} Satisfaction Features	S_{4M} Satisfaction/ Operating Maint. Costs	S_{5M} Overall Satisfaction	S_{6V} Staff to Maintain	S_{7V} Staff to Operate
I_{1M} IS involvement							* 44 (15)
I_{2M} Vendor participation			* 41 (15)			* 43 (14)	* 61 (14)
I_{3M} Non-IS hardware							
I_{4M} Vendor proposal				** −55 (15)		* 41 (15)	
I_{5M} Number of vendors				* 42 (14)		** 50 (15)	
I_{6M} Consultant recommendations							* 39 (14)
I_{7M} Select on price			* −36 (15)	* −37 (15)	** −48 (15)		
I_{8V} Capabilities		*** 70 (13)			* 43 (14)		
I_{9V} Understanding						* −41 (15)	** −51 (15)
I_{10M} User skills software		*** 69 (13)	*** 84 (15)	** 51 (15)	*** 67 (15)		
I_{11V} Vendor support	*** −67 (13)					*** 84 (17)	** 42 (17)
I_{12M} Installation assistance			* 37 (15)				* 35 (15)
I_{13M} Support requested	** −48 (14)				* 39 (15)		
I_{14M} Support before							
I_{15M} Support after			** 57 (15)	* 43 (15)	** 53 (15)		
Background/Personal							
B_{1M} Prior use		** 55 (13)	*** 58 (15)		*** 55 (15)		* 35 (16)
B_{2MA} Number organizations	*** 63 (14)	* −40 (14)	*** −42 (15)		** −56 (15)	** −51 (16)	
B_{3MA} Years worked		* 58 (14)	** 57 (15)	*** 80 (15)	* 39 (15)	** −67 (16)	** −53 (16)

Kendall correlation coefficient × 100: * = p<.10; ** = p<.05; *** = p<.01.
Subscript key: M = MIS director; A = adopting unit manager; V = vendor representative; P = senior plant manager.

Assistance with installation is positively related to satisfaction with system features and with estimates of additional operating staff. Requested support is negatively related to satisfaction with the software price and positively related to overall satisfaction.

The MIS manager's ratings of support just before installation are not significantly correlated with any of the success measures. Support after installation is positively associated with the MIS manager's satisfaction with features, satisfaction with operating and maintenance costs, and overall satisfaction.

Background/Personal

Table 6 also contains the three background and personal variables correlated with success and impact variables. The prior use of computers at a plant is positively and highly correlated with satisfaction, as are the respondent's number of years with the firm. Years worked at the firm is negatively related to the need for more staff.

Respondents with more experience in other organizations have lower satisfaction with the package in general, but higher satisfaction with the price of the software. Individuals who have worked other places have probably seen more systems, are aware of other ways to operate, and have more experience with information systems. They may tend to judge the PS package more harshly as a result of their prior experience with other hardware and software, and contact with other vendors.

Implications

The primary limitation of this study is the small sample size of companies, although there are 78 responses from different individuals. The results, however, do show significant relationships among different individuals' reactions to the PS package. The fact that variables come from independent participants in the study increases confidence in the results.

Findings

The variables in the success/impact class are used in this study to evaluate the outcome of the PS package implementation. It is interesting to note how strongly the prior use of computers correlates with satisfaction measures as does greater length of service by respondents. These results suggest that experience does, in fact, help in package implementation. Results also indicate that experience in a number of other firms may create skepticism or heighten expectations resulting in lower levels of satisfaction with a package.

The MIS managers' ratings of user skills were strongly correlated with satisfaction measures. The vendor's ratings of customer capabilities are also positively related to success. While causality cannot be demonstrated with this type of research design, the data suggest that a highly skilled work force will be more successful in package implementation. The vendor's participation in installation and support for the project is also associated with satisfaction. Satisfaction with vendor support after installation is highly correlated with the success/satisfaction variables in Table 6, much more than is satisfaction with vendor support before installation.

Approaching more than one vendor is associated with greater satisfaction, as is requesting bids. Organizations that already had the vendor's hardware tended not to look at other vendors, were rated as having less capable staff by the vendor, and tended to receive less support before and after installation. Firms investigating a package are well advised to take advantage of the differences among vendors in order to find the software package that best suits their needs.

The importance of price in selecting a vendor is negatively associated with three satisfaction variables. Given the large investment required for acquiring and installing a major package, it appears unwise for customers to be too sensitive to the advertised price of the package, particularly given the cost of modifications and the cost to the customer for training and installation.

The model

The model receives some support from this research. Personal/background and implementation variables do seem to be associated with measures of package success while discrepancies are related to implementation. There is some support for the role of discrepancies in the implementation process and the demands that discrepancy resolution place on the vendor for support. Package and needs variables are associated with implementation variables. Characteristics of the organization such as the nature of tasks, performance, and the unit manager's influence and support also relate to some of the implementation variables.

The number of relationships obtained between sets of variables in the model well exceed those expected by chance alone. As in all empirical research of this type, data can only support or refute a model; it cannot prove the model to be correct. More research on a larger sample of firms is necessary to further evaluate the model.

Recommendations

Users

While the findings of this research must be viewed as tentative, what actions do the model and results suggest if the findings are valid? The customer should undertake a requirements analysis, at least at a high conceptual level, so that it is possible to identify discrepancies between a package and user needs prior to making a commitment to a particular package. The customer should also contact multiple vendors and should not necessarily choose the package because his/her current hardware vendor sells it or because it has a low "base" price.

If the customer does not have knowledge of the functions supported by the package, it would be advisable for the firm to hire or train individuals who do have this knowledge. For example, for the PS package a firm could enroll potential users in courses on MRP. The customer should expect the need to make modifications in dedicated packages, though he/she should also consider the alternative of changing existing procedures to avoid the high costs and delays of changing the package.

Vendors

The package vendor needs to work closely with the client in comparing the package to customer needs. After jointly identifying discrepancies, the two parties should estimate the extent of modifications necessary and their cost.

The package vendor must be prepared to offer substantial support for the customer when selling a dedicated package. Interviews at several of the research sites suggest the importance of support. Both customer and vendor representatives complained that the vendor had problems supporting the installation and the operation of the package. Support was a major source of conflict between customers and the vendor.

The vendor may want to evaluate the capabilities of the client and recommend special education or consulting help to prepare for package installation. These assessments of clients' expertise, support, and installation assistance provided by the vendor are most clearly related to characteristics of the client's work environment, tasks and technology, and decision-making process. These organizational features provide clues as to client experience and subsequent needs for support. In providing this support, the vendor may want to calculate and include the cost of sufficient consulting help for each customer in its bid.

Future Research

There has been little research on the implementation of packaged software, yet this strategy for systems development is becoming increasingly important due to the high costs of custom-programmed systems. Research is needed to evaluate models like the one in Figure 1.

This article identifies several key variables to be included in other models of package implementation including vendor support for the package, customer capabilities, prior user computer experience and discrepancies between the needs of the user and the features of the package. Future efforts should explore more fully the role of discrepancies and should attempt to find variables that actually reflect the differences between the package's features and user needs.

Conclusions

This article reports a study of packaged software implementation. Though the sample size is small, the research model receives some support from the data. Dedicated software packages remain one of the most promising solutions to reducing the applications backlog, but their implementation is critical to the ultimate success of this approach to systems development.

Vendors propose that a package is a "problem solution," something that consists of more than just software. The customer is buying software, possibly hardware, and vendor expertise. The recommendations arising from this research suggest that the "solution" should come with an implementation strategy that recognizes the challenges of implementing packaged software.

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