

The Effects of Non-Volitional Use on Perceptions and Intentions of End Users¹

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This report describes and discusses the results of a field study on the implementation of a compulsory end user application. Both Perceived Usefulness and Perceived Ease of Use had significant effects on Intention to Increase Use although the effect of PEU was stronger. Both PEU and PU were significantly affected by Training, Technical Support and Work Experience.

In the early days of end user computing (EUC) the users were mainly workers, such as accountants, who were proactive concerning computer support of their function. They were comfortable with computer-based applications, interested in how they could help them work more effectively and willing to put extensive effort into their development and use. However, as hardware has become less expensive, more powerful and more portable and software applications have been developed for more and more specific functions, a new class of “hybrid” EUC has begun to emerge. It is end user computing because the complexity and flexibility of the applications require extensive effort and involvement by the user but, because they are imbedded in the day to day operations of the organisation, use is not voluntary. To date little research on the management and evaluation of such “non-volitional EUC” can be found in the IS literature.

A model that has been used for decades as a framework for studying the adoption of changes by individuals and organizations is “diffusion of innovation” theory (Rogers, 1983). Rogers (pg. 30) identifies a series of activities from original awareness through persuasion and adoption to actual implementation. When the decision maker is an individual he or she performs all aspects of the process but, as Rogers points out, the situation is more complex when the innovation process takes place in an organization. He identifies four types of decision processes organizations use in dealing with innovations: optional decisions in which each individual has the right to adopt or not; collective decisions in which the adoption choice is made by consensus; *authority decisions* [emphasis added] in which the adoption choice is made by a small group who possess power, status or technical expertise; and contingent decisions in which an adoption decision is made only after another, related decision is made (Rogers, pp. 347-348).

The study reported here examined the compulsory adoption of a computer application used to support record keeping and decision making by the members of a field sales force - a group with little history of involvement with high technology. Each salesperson was supplied with a laptop computer and a set of software packages intended to enhance his/her performance

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in acquiring, servicing and retaining business. The people who are required to actually use the software and hardware on a daily basis (that is, implement the innovation and contribute to its evaluation and evolution) had little input into any of the preceding stages of the adoption process.

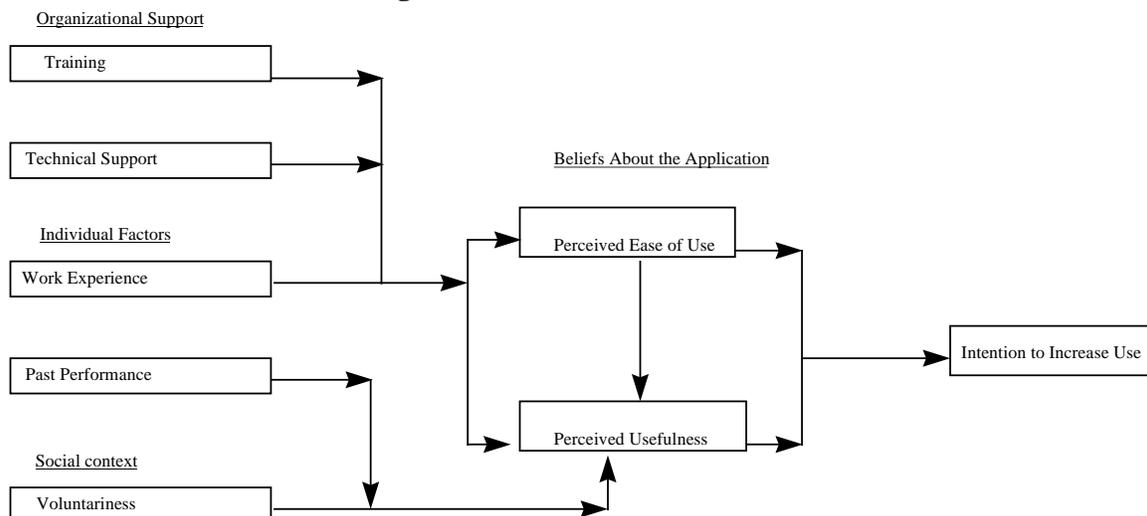
Five aspects of this research combine to set it apart from previous investigations into IS implementation:

- it focuses on a clear example of the hybrid version of end user computing - an application imposed via Rogers' authority decision concept described above.
- A major interest of this research is the effect of the nature of the implementation process on the attitudes of the users toward the innovation, rather than on either the innovation or the process themselves.
- The effect of work experience and past performance on users' attitudes toward the application was another major point of interest in the research.
- because use of the basic functions of the application is compulsory it was felt that it would be inappropriate to use behaviour as the dependent variable. Therefore, as discussed below, Intentions To Increase Use was chosen as the dependent variable which would best operationalize user attitudes.
- the data were gathered in a survey-based field study rather than a university or lab setting such as those used in much of the research into IS implementation (Adams, Nelson & Todd, 1992; Davis, Bagozzi & Warshaw, 1989).

Theoretical Framework & Hypotheses

The concepts underlying this research are derived from the Diffusion of Innovation theory as described by Rogers (1983). Because this theory is too broad to be operationalized in a specific project we have used a modification of the Technology Acceptance Model (Davis, 1989) to provide the framework for the relationships among the factors being studied.

Figure 1: Theoretical Framework



Intention to Increase Use

In the models commonly used to evaluate the adoption of a new IS tool, primarily the Theory of Reasoned Action (Fishbein & Ajzen, 1975), The Theory of Planned Behaviour (Ajzen, 1985) and the Technology Acceptance Model (Davis, 1989) the dependent variable is behavioural - use of the tool. This was deemed inappropriate in this research since use of the tool being studied is mandatory. As Doll & Torkzadeh (1998) have commented “where use is mandatory, measures of system use may indicate only compliance, not system success.” (pg. 172)

In all of these models, intention is an intervening variable between beliefs and actions (Taylor and Todd, 1995). Because of this linkage Intention to Increase Use was chosen as the dependent variable in our model. It was also felt that Intention to Increase Use goes beyond specific perceptions or beliefs to capture the users’ attitudes concerning the imposed information system.

Beliefs about the application

Researchers investigating the implementation of Information Systems have drawn on theories from a variety of fields including social psychology (Fishbein & Ajzen, 1975; Bandura, 1982), implementation theory (Baroudi, Olson & Ives, 1986) and diffusion of innovation theory (Rogers, 1983). However, Agarwal and Prasad (1998) have pointed out that:

“Despite the existence of several models and despite some divergences in hypothesized relationships, a common theme underlying these models is the inclusion of *perceptions* of an innovation as key independent variables.” (pg. 16)

Rogers (1983, pp. 213-232) identified five attributes of an innovation that he believed affected the adoption decision: relative advantage, complexity, compatibility, trialability and observability. Agarwal and Prasad (1998) point out that, of these factors, only three (Relative Advantage, Complexity and Compatibility) have been shown to be consistently relevant.

Perceived usefulness. Rogers’ concept of *Relative Advantage* captures the users’ perceptions of how well the new tool will improve existing ways of performing the task(s) in question. However, Moore and Benbasat (1991) point out the similarity between this concept and that of *Perceived Usefulness* from Davis’ Technology Acceptance Model (1989). Because of its general use in IS implementation research Perceived Usefulness is used in this model to represent the effect of Relative Advantage. The Theory of Reasoned Action, the Theory of Planned Behaviour and the Technology Acceptance Model all propose a direct relationship between Attitudes (Perceived Usefulness in TAM) and Intentions. Therefore the first hypothesis is:

H1 - Perceived Usefulness will have a positive effect on Intentions to Increase Use.

Perceived ease of use. The concept of *Complexity*, from Diffusion of Innovation theory, refers to the users’ perception of how easy or difficult the user finds the tool is to use. Again

Moore and Benbasat (1991) note the similarity between this concept and that of *Perceived Ease of Use* from TAM (Davis, 1989; Davis, Bagozzi & Warshaw, 1989). Consequently, Perceived Ease of Use is used to capture the effect of Complexity. According to the TAM Perceived Ease of Use directly affects both Perceived Usefulness and Intention to Increase Use. Therefore this research proposes that the end users' perceptions of the complexity (ease of use) of the compulsory application will affect both their perceptions of the usefulness of the application in their job and their intentions for increased use of the application in the future.

H2 - Perceived Ease of Use will have a positive effect on Perceived Usefulness.

H3 - Perceived Ease of Use will have a positive effect on Intentions to Increase Use.

Causes of User Perceptions.

Past research into IS implementations has shown potential effects on attitudes can arise from a number of sources. The factors examined in this research came from three of these sources.

Organizational support. Much past IS research (DeLone, 1988; Lee, 1986) has shown that training is a major factor in the success or failure of information systems. More specifically, in TAM both training and support for end users have been shown to have a positive effect on both Usefulness and Ease of Use (Igarria, Guimaraes & Davis, 1995). In addition, Compeau & Higgins (1995) found that EUC support has a positive effect on Perceived Usefulness. Considering that many of the subjects had limited experience with technology it was felt that **Training** and **Technical Support** would be key factors in creating positive perceptions of the application.

H4 - Training will have a positive effect on Perceived Ease of Use.

H5 - Training will have a positive effect on Perceived Usefulness.

H6 - Technical Support will have a positive effect on Perceived Ease of Use.

H7 - Technical Support will have a positive effect on Perceived Usefulness.

Individual Factors. For more than twenty years the characteristics of individuals have been reported to play a significant role in the success of an MIS (Zmud, 1979). In creating a model to capture and test a specific situation the difficulty arises in determining which of the many characteristics available are relevant. Because this research dealt with workers in the field facing a major change in the way they have done their jobs it focused on two job-related factors, experience and past performance, which were felt to have potentially significant effects on perceptions and intentions.

The third significant innovation characteristic in Diffusion of Innovation theory identified by Agarwal and Prasad (1998) above is *Compatibility* which Rogers defines as "the degree to which an innovation is perceived as being consistent with the existing values, needs

and past experiences of potential adopters”. (Rogers, 1983, pg. 223). Although the effect of computer experience on users’ perceptions of an application has been well documented (Igarria, Guimaraes and Davis, 1995), the effect of experience in a particular job has remained almost unexplored. Considering that experience is generally related to age and that age has been found to be negatively related to system usage (Guimaraes and Igarria, 1997), it is probable that the most experienced salespersons will have more negative perceptions concerning the compulsory application. That is, they would find it to be incompatible with their values, needs and experience. Furthermore, since job security is generally related to length of employment, the salespeople with the most experience with that employer would feel less pressure to respond positively to the new technology.

Based on these premises it is proposed that salespersons with more **Experience** in sales and more time with the employer would perceive the application as more difficult to use and less useful than would less experienced sales staff.

H8 - Work experience will have a negative effect on Perceived Ease of Use.

H9 - Work experience will have a negative effect on Perceived Usefulness..

Prior research provides little evidence concerning the effects of **Past performance** in a job on the individual’s attitudes toward using a new tool in that job. However, presuming that the adoption of an innovation is directly related to its Relative Advantage (Rogers, 1983, pg. 211), it seems reasonable to assume that the extent of the perceived benefits (usefulness) will have a positive effect on the attitude toward the application.

However, will the salespeople who have had the most success in the past have the most positive attitudes toward the tool? Based on the premise that, in a direct sales environment, the high performers generally have a more extensive client base and have a greater need for efficient record keeping and processing, it seems reasonable to assume that they would perceive significant benefits arising from the new technology. On the other hand, in a field in which remuneration is based on sales commission, the higher performers may consider themselves to already be very successful and believe that they can continue on as they have. In addition they may believe that the time required to learn to use the application beyond the minimum will be time that could be used dealing with current or potential clients.

In the absence of empirical evidence it is difficult to determine *a priori* how the high performers would perceive the relative benefits of adopting a new technology. Therefore, at this stage we can only propose that:

H10 - Past performance will affect Perceived Usefulness.

Social context In addition to discussing the five characteristics of an innovation described above Rogers also points out that, in organizations, **Voluntariness** is an aspect of the innovation process that can have a strong effect on users of the innovation (1983, pg. 348). It was not until almost a decade later that voluntariness was recognized as a factor meriting specific analysis. Moore and Benbasat define voluntariness as “the degree to which use of the innovation

is perceived as being voluntary, or of free will.” (1991, pg. 195). Although, in the study reported here, the organization requires that the application be used by all sales staff it was felt that agents, being independent business people, might interpret this requirement differently. It was believed that a user who perceived the package as compulsory would perceive it as being more useful, partly because it would be considered to be the organization norm and partly to reduce cognitive dissonance.

H11 - The users' perception of the voluntariness of the application will have a negative effect on Perceived Usefulness

Method

Sample

This study is based on a sample of insurance sales agents working full time for a major Canadian Life Insurance Company. Questionnaires were distributed to 1,508 agents working in the branches through the company's internal mail system. The agents completed the questionnaire in private and returned it directly to the researchers (in a pre-addressed return envelope). Only those agents with one or more years of service with the company were asked to participate in the study.

Of the 1508 questionnaires were mailed out 443, or 29%, were returned. The sample was predominantly male (81.9%) less than 55 years of age (82.8%). Most had less than 10 years of experience in selling life insurance (61.9%) and more than five years of experience with the company (51.2%).

The particular software for which results are reported here was designed to process Life Insurance applications. It had been introduced one year prior to this study. Although, all life insurance applications had to be processed using this particular software, agents had the choice of entering the information themselves or submitting the application to the branch secretary for electronic processing.

Measures

Intention to Increase Use, Ease of Use and Perceived Usefulness were measures adapted from prior research (Davis, 1989). They were modified so as to make them more relevant to this particular study.

Intention to Increase Use measured the degree to which agents intended to process their life insurance applications in the future using the application. It consisted of one item.

Ease of Use was measured using the following three items “I believe that learning to use this software is easy”, “I believe that it is easy to get this software to do what I want it to do” and “I believe that it is easy to use this software in front of a client”. **Usefulness** included the following two items: “Using this software allows me to process applications more efficiently”, and “Using this software allows me to process applications more promptly”. Agents were asked

to indicate the extent of their agreement or disagreement with each item using a 5-point Likert-type scale ranging from strongly agree to strongly disagree.

Two indicators of **Training** were included in this study. Agents were asked to assess (a) the quality of the training that they had received on this software and (b) the time they spent training. For both items a 7-point Likert type scale was used. The quality scale ranged from (1) “very low quality to (7) “very high quality”. The time scale ranged from (1) “very little time” to (7) “a large amount of time”. **Technical support** was measured by a 4-item scale related to general organizational support for the computer equipment as well as the software applications used in the branches. Agents were asked to indicate on a 7-point Likert-type scale the extent they agreed or disagreed with the following items: “I find the computer hardware easy to use”, “I can easily get assistance when I experience hardware difficulties”, “I can easily get assistance when I experience software difficulties ” and “I can easily get assistance when I need specialized instructions”.

Work Experience was assessed by asking respondents to indicate how long they had been selling life insurance and how long they had been selling life insurance for the company. **Past Performance** comprised two dimensions (a) customer service and (b) sales of life insurance products. The customer service scale included five items related to after-sale service. Included in this scale were items measuring the agent’s performance in terms of financial advising and needs based selling. The sales dimension included two items. Agents were asked to rate their sales of life insurance in terms of (a) the number of applications and (b) the amount of adjusted first year commissions. Both dimensions of performance were measured on a 7-point Likert-type scale ranging from “much below the others” to “much above the others”.

Voluntariness consisted of one item. Agents were asked to indicate the Company’s attitude toward the use of the software by the sales force. This was a 5-point Likert-type scale ranging from (1) completely voluntary to (5) required. The calculated sample mean for the software application used in this study was 4.08. By comparison the average scores obtained on this item for the other three software packages that agents were using at the time were 3.42, 3.68 and 2.74.

Data Analysis

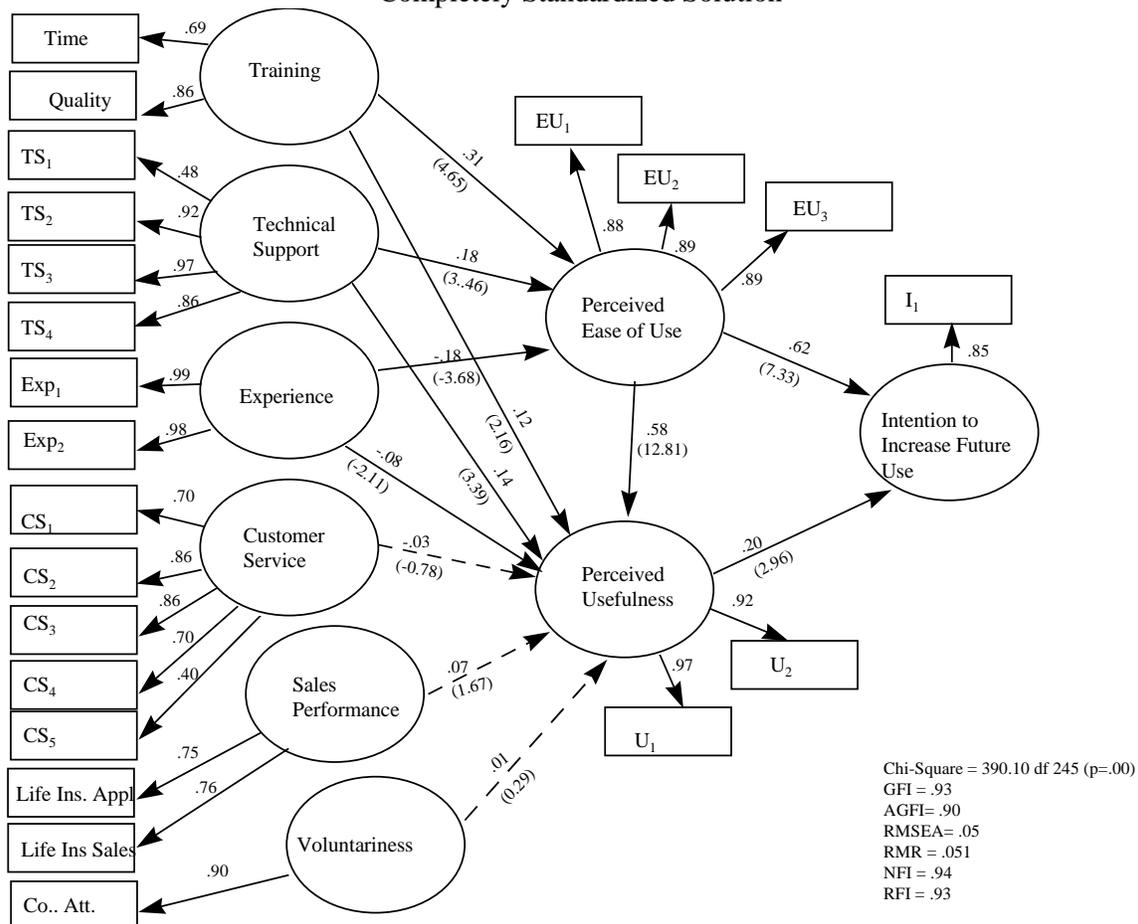
The data analysis involved three stages. (a) assessment of the reliability of the measures (b) assessment of the measurement model, and (c) assessment of the structural model. In the first stage, the reliability of the measures were based on an analysis of their Cronbach Alphas. Cronbach Alphas greater than 0.7 are generally considered adequate. (Peter, 1979). This stage of the data analysis was done using SPSS. In stage two, the individual items were loaded on their respective constructs and construct validity was assessed using LISREL VIII confirmatory factor analysis (Jöreskog and Sörbom (1993). Because the chi-square fit test is somewhat inappropriate for large sample sizes (Taylor and Todd, 1995) four indices were used to assess the model. According to Chin and Todd (1995) fit values equal to or greater than .90 for GFI (Goodness of Fit Index), AGFI (Adjusted Goodness Fit Index) and NFI (Normed Fit Index) represent a relatively good fit. The last index that was used is RMSEA (Root Mean Square Error of Approximation) where a value less than .05 (Chin and Todd, 1995) suggest a reasonable fit

although lower values are preferable. In Stage three, the hypothesized paths in the model described (see Figure 1 above) were tested using Maximum-Likelihood estimation.

The first stage of the data analysis revealed that the Cronbach Alphas for all the measures were greater than .80 except for training ($\alpha=.74$). The Confirmatory analysis showed that generally the data were consistent with our hypothesized measurement structure. Although chi-square was significant ($p= 0.00$) the other goodness of fit measures were indicative of a relatively good fit (GFI=.93; AGFI = .91; RMSEA=.047; NFI=.0.95).

The Maximum-likelihood procedure used to estimate the structural model also showed that the model fitted the data reasonably well (chi-square = 390.10 df. 186 $p=0.00$; AGFI = .90; NFI = .94; RMSEA=.050). As indicated in Figure 2 most path coefficients were as hypothesized.

Figure 2: Estimated Structural Model
Completely Standardized Solution



Notes:

1. A dashed line indicates a path which is not statistically significant at $\alpha=0.05$
2. The numbers in brackets are the "t" values

Results

The path analysis results (Figure 2) confirmed the predicted positive effects of perceived Ease of Use on both Intention to Increase Use (H3) and Perceived Usefulness (H2) as well as the positive direct effect of Perceived Usefulness on Intention (H1). It also revealed that Perceived Ease of Use had a relatively more powerful effect on Intention $(.74)^2$ than Perceived Usefulness (.20).

Results also confirmed the positive effects of Training (H4) and (H5) and Technical Support (H6) and (H7) on Perceived Ease of Use and Perceived Usefulness. Ordering these positive direct effects according to the magnitude of their estimated coefficients showed that both Training and Technical Support had a more powerful effect on Perceived Ease of Use (.31 and .18 respectively) than on Perceived Usefulness (.12 and .14 respectively).

While the hypothesized negative effect of Work Experience on Perceived Ease of Use (H8) and Perceived Usefulness (H9) was also confirmed its effect on Perceived Usefulness was relatively small (-.08) compared to its negative effect on Perceived Ease of Use (-.18).

Further examination of significant path coefficients revealed that the effect of Past performance on Perceived Usefulness (H10) was marginal as the negative effect of “customer service” was not significant and the coefficient of “sales” performance reached a low level of significance level ($\alpha=.10$). Finally, the effect of Voluntariness on Perceived Usefulness (H11) was not confirmed.

Discussion

This study examined an example of a class of applications that falls between end user computing, with the creativity and independence that implies, and traditional, highly structured compulsory applications such as Transaction Processing Systems. As more organizations adopt this type of application an understanding of how to manage employees in this situation will become essential.

The first notable findings were the strong effects which both Technical support and Training had on the subjects' perceptions of the Ease of Use of the application and of its value (Perceived Usefulness). For users who are neither technically trained nor the traditional enthusiastic end users, individual training with the tools and solid support from the computer staff are essential. When these are available and well done they would produce an increased level of comfort and self confidence, which would lead the workers to feel that the application is a useful addition to their tool set.

The results also provide support for the hypothesis that Work Experience had a negative effect on both Perceived Ease of Use and Perceived Usefulness. Combined with the findings concerning Training and Technical support, it is clear that organizations which intend to impose

² The total effect of Ease of Use on intention is obtained by adding the direct effect (.62) and the indirect effect (.58x.20).

end user applications must have a strong training plan in place and must ensure that the users understand that support will be available on an ongoing basis. In addition, the primary focus of the training should be on the most experienced staff, since they are most likely to resist the changes the new tool represents.

The customer service aspect of Past Performance was negatively correlated to Perceived Usefulness but not at a statistically significant level. It may be that sales staff who feel they are giving good service now see no need to use another method while those who feel they are providing less adequate service are willing to try the new tool. On the other hand the second aspect of performance, Sales, has a positive effect on Perceived Usefulness ($p < .10$). Salespeople who are selling the most may be more willing to take a risk, to be creative, and try even more new ways to become better producers. More practically, the best producers may be so busy that they are happy to use any tool that will help them organize records and communicate more successfully. Additional research is needed to improve our understanding of the relationship between Past Performance and user attitudes.

Although both Rogers (1982) and Moore and Benbasat (1991) identified Voluntariness as a possibly important factor in the adoption process our research did not support this. The predicted negative relationship between Voluntariness and Perceived Usefulness was not demonstrated. That is, those who believed that the organization required strict use of the application did not perceive it as more useful. This may be because the salespersons' perceptions of voluntariness were low or it may be that the one item used failed to capture the true feelings of the subjects as well as Moore and Benbasat's four item scale would. On the other hand, the user's perception of the voluntary nature of the tool may not affect her/his belief about the tool's value. A more detailed examination of this issue is needed in future research.

The effect of Ease of Use on Usefulness is particularly strong in this situation. Although this relationship has been found in almost all IS implementation research based on TAM it has rarely been as intense as in this study. An even stronger effect is found in the relationship between Ease of Use and Intention to Increase Use.

Furthermore, the proposed positive effect of Perceived Usefulness on Intention to Increase Use is also supported by the data although it is not as strong as the effect of Ease of Use. This has not normally been the case in IS implementation research but it is not unique. For example, Igbaria, Zinatelli, Cragg & Cavaye (1997) found the same result, also in a field study.

These findings seem to indicate that, unlike business students in a lab setting, business people facing a major change in the way a task is actually performed focus first on whether or not they can get the application to work for them. Only then do they focus on its functionality. The fact that this research examines a package may also have had an effect on the importance of Ease of Use. The functions of the software would have been explained in task-related terms. Their ability to learn to use it well would be a matter of greater concern than "what it does". Because of this Ease of Use would have a stronger effect, for good or bad, on their Intentions to Increase Use than would Usefulness. To the extent that they found it non-threatening (easy to use) they adopted a more positive attitude toward it as a useful tool for the job. Simplicity, user friendly menus, help messages and other user support are of more value than a tool that includes an extensive but difficult set of functions.

In conclusion this research showed that, in a work situation, the users' perceptions of how easy a tool is to use were more important than their beliefs about its usefulness. While Past performance had a slight positive effect on the users' perceptions and Work experience had a small negative effect, beliefs about Ease of use and Usefulness were affected primarily by the Training and the extent of ongoing Technical support provided to the users. The most obvious implications of this study for management are that adequate training, competent support and applications that are user friendly are the keys to ensuring that non-technical staff will develop a positive attitude toward their use, whether such use is compulsory or voluntary.

Limitations

The field study approach presented the normal advantages and disadvantages of field work - the data are based on the extensive experience and backgrounds of hundreds of subjects but the researchers had only limited control over the data definition and gathering processes. Because involvement by individual sales staff was voluntary the questionnaire had to be relatively brief and even then many ignored it as the response rate described indicates.

The results of this study apply only to large life insurance organizations and, more specifically, to the sales aspects of those organizations. The validity of generalizing these results to other fields or even smaller organizations is yet to be determined.

Finally, this study is a "snapshot" of one organization in the early stages of imposing an end user application on their sales force. Returning to the site for a follow up evaluation of the value of the application to the sales force and to the organization would allow us to evaluate and refine our model and develop a protocol for applying it on a broader base.

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