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RESISTANCE TO CHANGE AND ERP IMPLEMENTATION SUCCESS: THE MODERATING ROLE OF CHANGE MANAGEMENT INITIATIVES

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ABSTRACT

Enterprise Resource Planning (ERP) is a useful tool that builds strong capabilities, improves performance, supports better decision making, and provides competitive advantage for businesses. ERP aims to help the management by setting better business practices and equipping them with the right information to take timely decision. In any new technology implementation, one of the issues that need to be addressed is the resistance to change. Many implementations have failed due to strong resistance from the end users. Thus, the main purpose of this paper is to test the impact of resistance to change on ERP's implementation success and how change management initiatives acts in the capacity of a moderating role. Using data collected from 69 manufacturing organizations through a mail survey, it was found that resistance to change is negatively related to achievement of predetermined goals ($b = -0.930, p < 0.01$) and user satisfaction ($b = -0.952, p < 0.01$). Further, change management initiatives did not moderate the relationship between resistance and predetermined goals but it moderated the relationship between resistance and user satisfaction. In addition, change management initiatives have a direct positive impact on user satisfaction. This research concludes that the human factor is very important in ERP's implementation.

Keywords: resistance to change, change management initiatives, implementation success, moderating effect

INTRODUCTION

The business environment has become increasingly complex and the marketplace has changed from local setting to a global one. Constant pressure is applied on the management to improve competitiveness by lowering operating cost and improving logistic. Organizations therefore have to continuously realign their operations to meet all these challenges by being responsive to the customer and competitors. A useful tool that businesses are turning to in order to build strong

capabilities, improve performance, undertake better decision-making and achieve competitive advantage is Enterprise Resource Planning (ERP) (Al-Mudimigh, Zairi, & Al-Mashari, 2001). This was reaffirmed by *The Star* (January 15, 2002), Malaysia's leading English daily, which reported that ERP has become the prerequisite for companies to compete in global economies, especially in e-commerce era. In addition, ERP application is expected to grow by 32% over the next five years with total market value reaching USD66.6 billions by 2003 (AMR Research, 1999a). In other words, ERP represents 43% of organization's application budget (AMR Research, 1999b). In May 2001, Boston-based AMR Research predicted that total ERP company's revenue will grow at a 14% compounded annual growth rate, increasing to USD36 billion in 2005 from USD21 billion in 2001.

Successful business organizations recognize the importance of technology in running an efficient operation and maintaining their competitive edge. The exploitation of technology is a necessity and one can try new technologies only when an individual is ready to adopt the new technology. Successful exploitation of technology occurs at the individual level, as it is the individual employee who operates the various technologies purchased by organization. Thus, adoption of technology leads to another aspect of this whole scenario; that is, how to enhance an individual's desire to use a given new technology. It has been argued that increases in technology usage commensurate with increases in productivity. As such, the next section will touch on the productivity measurement issues before concluding with the objective of the current research.

Productivity is the fundamental economic measurement tool of a technology's contribution. In view of that, chief executive officers (CEOs) and line managers have increasingly begun to question their huge investments in computers and related technologies. It means that success of any organization today is largely dependent on their ability and willingness to exploit and adopt new technology in their day-to-day operations. Despite much investment in technology, returns on technology investment have been minimal. This is evidenced in Weill's (1990) study that significant productivity could be attributed to transactional types of information technology (IT) (e.g. data processing), but was unable to identify gains associated with strategic systems (e.g. sales support) or informational investments (e.g. e-mail infrastructure). The primary reason behind this dilemma is the human factor, that is, operators/users of the technology refuse to wholly adopt the technology to fully utilize the potentials of the technology. As noted by Rogers (1962), the degree to which an invention is perceived, should not be difficult to understand, learn, or operate. In a later stream, the adoption of IT has been defined as the extent to which a person believes that by using a certain technology will result in free of effort (Davis, 1989). This reluctance can be explained in various ways; one of it could be that operators/users of the

technology are not usually involved (participate) in its adoption process. This could be one reason why technology implementation fails in any given organization, as employees are reluctant to change.

Therefore, we seek to address resistance to change in ERP's implementation on the perceived success as well as the moderating effect of change management initiatives.

LITERATURE REVIEW

Implementation Success

The measurement of information systems success has been an area of research for over 30 years (Zviran & Erlich, 2003). The definition and measurement of ERP implementation success is dizzy, given that success can be defined differently depending on who defines it (Markus & Tanis, 2000). For instance, project managers and implementation consultant "often define success in terms of completing the project on time and within budget" (Markus & Tanis, 2000, p. 2). On the other hand, end users emphasize on the degree to which they are able to adopt the newly implemented ERP system. Some measures used to measure implementation are discussed next.

Enzweiler Group stated that achieving the objectives on time and within budget are successful factors for ERP implementation. A summary of other measures are listed below (<http://www.enzweiler.com/faq/managing.html>):

- i. Objectives are used to measure people improvements, process improvements, and system implemented. People improvement objectives can be defined as new skill sets, for example, learning the skill to use the ERP system's configuration tool sets. Process improvement objectives can be defined as improved resources utilization, improved relationships, or cost reductions. For example, reduce inventory from USD5 million to USD1.5 million or reduce customer service errors from 4% to 1%, or eliminate transaction processing in the payroll and human resource business unit by implementing employee self service and workflow. Systems implemented can be defined by modules, for example, implementation of employee self-service, payroll and human resource system. In order to be effective, objectives have to be understood and measurable.

- ii. Work plans define the start date and the completion date for each task and are used to measure an on-time implementation. Project management tools such as Microsoft Project can be used to maintain work plans.
- iii. Budgets for staffing the teams and for external implementation services are used to measure a within budget implementation goal.

In this study, two measures of ERP success were used. The first measure for ERP successful implementation was adopted from Hong and Kim (2002). ERP implementation success was measured in terms of the perceived deviation from the expected project goals such as cost overrun, schedule overrun, system performance deficit and failure to achieve the expected benefits. This indicates the usefulness of exploring the rationales used in the deployment of ERP. The rationale is due to the fact that without a clear distinction of why certain systems are deployed and the nature of their intended effects, it is difficult to predict to make sure of the perceived outcomes (Oliver, Whymark, & Romm, 2005).

Besides measuring ERP impact directly from cost and benefits, user satisfaction has received widespread acceptance as a surrogate measure of information systems success (Wu, Wang, Chien, & Tai, 2002). As noted by Powers and Dickson (1973), Holsapple, Wang, and Wei (2005), user satisfaction is one of the key factors affecting the management information systems' success. In addition, this was further concurred by Nolan and Seward (1974) that user satisfaction is feasible and practical to be used as a tool for evaluating information systems success. Several models for measuring user satisfaction were developed, including the user information satisfaction instrument by Ives, Olson, and Baroudi (1983), and a 12 items satisfaction EUCS (end-user computing satisfaction) instrument by Doll and Torkzadeh (1988). In this study for the second implementation success measure, user satisfaction method was adapted from Doll and Torkzadeh (1988) as it is a widely used instrument and has been validated through several confirmatory analyses and construct validity tests.

As proposed by Holsapple et al. (2005), directly measuring the success of an information systems success has been found to be impractical and perhaps impossible because of intangible costs, and benefits of information systems are difficult to recognize and convert to monetary equivalent (Galletta & Lederer, 1989; Ives et al., 1983). It is believed that satisfied users will be more productive, especially where usage is mandatory (Holsapple et al., 2005). Following this suggestion, successful ERP implementation measurement should be evaluated based not only on cost of ownership and quantifiable benefits, but should also take into account the time required to implement the system and also user acceptance in terms of satisfaction.

The next section will discuss why resistance to change is important in implementation and related literature on the impact of resistance to change on implementation success.

Resistance to Change

In today's business environment, change has become an everyday part of organizational dynamics and any resistance from employee can cripple an organization. In order to have a better understanding of the term organizational resistance, it is important to look at the definition first. Zander (1950) defined resistance to change as: "Behavior, which is intended to protect an individual from the effects of real or imagined change". Another researcher Folger and Skarlicki (1999, p. 36) defined resistance as: "Employee behavior that seeks to challenge, disrupt or invert prevailing assumptions, discourses and power relations". B. Fowke and D. Fowke (1991) proclaimed that "The old bugaboo, resistance to change, is alive and well".

Chawla and Kelloway (2004) posited that resistance may be viewed from two different angles, such as attitudinal and behavioral responses to change. Resistance is defined as a phenomenon which can deter the overall change process, either by delaying or slowing down its beginning, obstructing or hindering its implementation, and increase its costs (Ansoff, 1990).

According to Dent and Goldberg (1999), employees aren't really resisting the change, but rather they may be resisting the loss of status, pay, or comfort. Zander (1950) offered six primary reasons for resistance to surface if:

- i. the nature of the change is not made clear to the people who are going to be influenced by the change,
- ii. the change is open to a wide variety of interpretations,
- iii. those influenced feel strong forces deterring them from changing,
- iv. the people influenced by the change have pressure put on them to make it instead of having a say in the nature or direction of the change,
- v. the change is made on personal grounds, and
- vi. the change ignores the already established institutions in the group.

In an MRP (Manufacturing Resource Planning) study, Cooper and Zmud (1990) suggested that lack of MRP understanding had more explanatory power of impeding MRP blend within its work environment than the task fit of MRP. ERP implementation will affect most of the company's business functions and influence users directly (Hong & Kim, 2002). The same study showed that organization and process changes induced by ERP implementation force involuntary changes and frequently lead to different power and resource

allocations. ERP implementation usually triggers a diverse group of overt and covert opponents within the organization. Hence, lower organizational resistance is expected to increase implementation success over the critical success factors.

In a recent study on impediments to successful ERP implementation Kim, Lee, and Gosain (2005) found five critical impediments which were in order of criticality; conflict of interest, inadequate human resources commitment, lack of organizational change management expertise, business processes not redesigned to take advantage of ERP, and resistance of users. B. Fowke and D. Fowke (1991) summed up that resistance to change is but a manifestation of cultural values and cultural strengths. "Stamping out resistance is about like stamping out corporate culture: possible, but maybe fatal" (B. Fowke & D. Fowke, 1991). They also concluded that resistance is an artifact of corporate culture and is largely unconscious. Due to this nature, resistance and cultural variables generally are hard to discern. In order to facilitate a smooth ERP implementation, organizations must be competent in effective change management that involves all the affected personnel to accept the introduced changes as well as manage any resistance to them.

Change Management Initiatives

Effective change management is critical for implementation of technology and business process reengineering (Grover, Jeong, Kettinger, & Teng, 1995). Without appropriate change management processes, enterprises may not be able to adapt to the new systems and to capitalize on performance gains (Kim et al., 2005). Many ERP implementation failures have been caused by the lack of focus on "the soft issues" such as the business process and change management (Summer, 1999). Appleton (1997), and Pawlowski and Boudreau (1999) estimated that half of ERP projects failed to achieve the expected benefits due to companies significantly underestimating the effort involved in change management. Acknowledging the need for a change is very important as the stronger the need for change, the more likely top management and stakeholders will support the ERP implementation (Falkowski, Pedigo, Smith, & Swanson, 1998). Early user involvement in the design and implementation of new business processes as well as extensive top-down and cross-functional communication may generate enthusiasm for ERP (Stratman & Roth, 2002). Wee (2000) advocated that establishing a support organization such as help desk, online user manual, etc. is also critical to meet users' needs and manage organizational change. Norris, Hurley, Dunleavy, and Balls (2000) pointed out that the tools of management are leadership, communication, training, planning, and incentive systems. They argued that these tools can be leveraged and are able to remove great obstacles with minimal effort when applied properly. Researcher such as Aladwani (2001) has used change management strategies as a moderator in his

research framework. This is also congruent with other researchers (e.g., Al-Mashari & Zairi, 2000; Aladwani, 1999) that responsiveness to internal customers is critical for an organization to avoid the difficulties associated with this change.

Research Model and Hypotheses

Based on the review of the literature we propose the following research model.

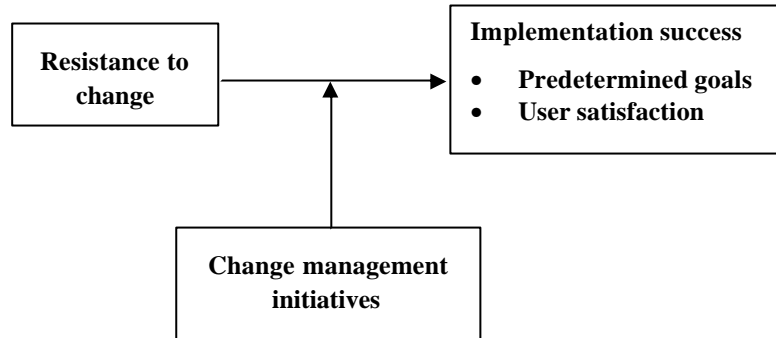


Figure 1. Research model

Even the very best system in the world will fail if end users do not believe in it. ERP implementation will affect most of the company's business functions and users directly (Hong & Kim, 2002). Since the organization and process changes induced by ERP implementation force involuntary changes and frequently lead to different power and resource allocations, it will trigger a diverse group of overt and covert opponents within the organization. Therefore, organizational resistance is expected to be negatively related to implementation success.

H₁: Resistance to change will be negatively related to achievement of predetermined goals.

H₂: Resistance to change will be negatively related to user satisfaction.

The change management initiatives such as getting the employees involved, attending to employees concerns, and making available support groups will mitigate the effect of resistance to change and enhance implementation success. Early user involvement in the design and implementation of new business processes as well as extensive top-down and cross-functional communication may generate enthusiasm for ERP (Stratman & Roth, 2002). Wee (2000) advocated that establishing a support organization such as help desk, online user manual, etc. is also critical to meet users' needs and manage organizational

change. Norris et al. (2000) pointed out that the tools of management are leadership, communication, training, planning, and incentive systems. They argued that these tools can all be used as levers to remove obstacles with minimal effort when applied properly. As such we expect that:

- H₃: The negative relationship between resistance to change and achievement of predetermined goals will be lower when change management initiatives are higher.
- H₄: The negative relationship between resistance to change and user satisfaction of predetermined goals will be lower when change management initiatives are higher.

METHODOLOGY

Malaysia is divided into West Malaysia and East Malaysia. West Malaysia where Penang is situated also has 11 other states. Manufacturing companies in Penang were chosen because Penang has been identified as the top region for the electronics industry in Malaysia and is commonly referred to as the "Silicon Island". Penang is known to possess a pool professional and relatively skilled labour force that is capable of handling and developing state-of-the-art technologies. The non-probability convenience sampling design was chosen as a more practical option in view of the fact that the research site known as Bayan Lepas Free Industrial Zone, Penang is crowded with foreign as well as local manufacturing companies. Questionnaires were sent to manufacturing organizations which have implemented ERP. Respondents comprised of managers/executives from the following departments: quality control, production, materials, engineering, IT, who are aware of the ERP implementation. The questionnaire items were derived from published literature and a summary is provided in Table 1.

A pilot test was conducted to verify the various dimensions of the questionnaire such as language used and layout as well as ease of completing the questionnaire. Three ERP executives were asked to fill in the questionnaire followed with an interview session. Feedback was obtained with regards to the clarity, wordings, interpretation, and appropriateness of the questions.

TABLE 1
SUMMARY OF MEASURES USED

Variable	Number of items	Sample question	Source
Resistance to change	5	There have been many users resisting the ERP implementation	Hong & Kim (2002)
Change management	3	Management actively works to alleviate employee concerns about ERP	Stratman & Roth (2002)
Predetermined goals	4	The cost of ERP project was significantly higher than the expected budgets	Hong & Kim (2002)
User satisfaction	5	Satisfied with the outputs provided by ERP system	Doll & Torkzadeh (1998), Zhang et al. (2002)

Goodness of Measures

To test the goodness of the measures, factor and reliability analyses were conducted. Since there were only five items for the independent variable and three items for the moderator, convergent validity respectively was tested. For resistance to change, the Measure of Sampling Adequacy (MSA) was 0.90 ($\chi^2 = 450.945$, $p < 0.01$) whereby all three items loaded onto one factor with the lowest loading of 0.925 and the highest being 0.959 explaining a total variance of 89.37%. Next, the change management had three items with an MSA value of 0.72 ($\chi^2 = 194.897$, $p < 0.01$) whereby all five items loaded onto one factor with the lowest loading of 0.908 and the highest being 0.968 explaining a total variance of 88.83%. The Cronbach alpha values were 0.97 for resistance to change and 0.93 for change management, respectively. As for the dependent variable, we hypothesized for two dimensions, i.e., predetermined goals and user satisfaction. The factor analysis yielded a 2-factor solution with a MSA value of 0.96 ($\chi^2 = 1000, 502$, $p < 0.01$) explaining 92.522% variance. The detailed results are presented in Table 2.

TABLE 2
FACTOR AND RELIABILITY ANALYSIS FOR THE DEPENDENT VARIABLES

Items	Loading	Communality	Alpha
F1 – User satisfaction			
Happy using the ERP system	0.824	0.930	
Gain satisfaction from using the ERP system	0.820	0.937	
Satisfied with the efficiency of report generation using the ERP system	0.840	0.932	
Satisfied with the accuracy of information provided by the ERP system	0.833	0.912	
Satisfied with the outputs provided by the ERP system	0.841	0.940	
(Eigen value = 4.807; Variance = 53.414%)			0.96
F2 – Predetermined goals			
The cost of ERP project was significantly higher than the expected budgets	0.859	0.924	
The ERP project took significantly longer than expected	0.817	0.928	
The system performances of ERP is significantly below the expected level	0.746	0.918	
The anticipated benefits of ERP have not materialized	0.604	0.905	
(Eigen value = 3.520; Variance = 39.108%)			0.98

FINDINGS

Some necessary changes were made accordingly before the final copy of the questionnaire was posted on the web page at <<http://www.myplanet.com.my/Sawaridass>>. A link to this URL was then sent to 113 manufacturing organizations who have implemented ERP in their organizations. However, only 69 responses were received and all of them are used in the analysis. Therefore, the response rate in this study is 61.06%. The respondent's and organization's profile are summarized in Tables 3 and 4.

TABLE 3
PROFILE OF RESPONDENTS

Variables	Frequency	Percentage
Gender		
Male	60	86.96
Female	9	13.04
Age		
20-25	7	10.14
26-30	18	26.09
31-35	17	24.64
36-40	16	23.19
40-45	8	11.59
> 46	3	4.35
Position		
Executive	21	30.43
Engineer	12	17.39
Lower management	12	17.39
Middle management	19	27.54
Senior management	5	7.25
Education Level		
Certificate/Diploma	5	7.25
Bachelor Degree	43	62.32
Master Degree	20	28.98
PhD	1	1.45

TABLE 4
PROFILE OF ORGANIZATIONS

Variables	Frequency	Percentage
How long ago was ERP system implemented?		
Less than 1 yr	16	23.19
> 1 yr but < 3 yrs	24	34.78
> 3 yrs but < 5 yrs	18	26.09
> 5 yrs	11	15.94
Estimated amount of loss caused by the delay (RM)		
< 0.5 m	27	39.13
> 0.5 m but < 1 m	1	1.45
> 1 m but < 2 m	9	13.04
> 2 m	4	5.80
No delay	28	40.58
Project implementation was delayed		
< 1 month	12	17.39
> 1 month but < 3 months	19	27.54
> 3 months	10	14.49
No delay	28	40.58

Hypotheses Testing

To test the four hypotheses generated, we ran two hierarchical regressions. The results are presented in Tables 5 and 6.

TABLE 5
RESULTS OF HIERARCHICAL REGRESSION ANALYSIS FOR
PREDETERMINED GOALS

	Dependent = Predetermined goals		
	Step 1	Step 2	Step 3
Model variable			
Resistance to change	-0.930**	-0.939**	-0.874**
Moderator			
Change management		0.015	0.053
Interaction terms			
Resistance * change management			-0.094
R ²	0.865	0.865	0.866
Adjusted R ²	0.863	0.861	0.859
F change	0.000	0.792	0.771

** p < 0.01

TABLE 6
RESULTS OF HIERARCHICAL REGRESSION ANALYSIS
FOR USER SATISFACTION

	Dependent = User satisfaction		
	Step 1	Step 2	Step 3
Moderator			
Change management		0.127**	-0.140
Interaction terms			
Resistance * change management			-0.253**
R ₂	0.907	0.918	0.926
Adjusted R ²	0.906	0.916	0.923
F change	0.000	0.004	0.009

** p < 0.01

The results indicate that resistance to change is negatively related to achievement of predetermined goals ($\beta = -0.930$, $p < 0.01$) and to user satisfaction ($\beta = -0.952$, $p < 0.01$). Thus, H₁ and H₂ of the study are fully supported. The interaction term in Step 3 of Table 5 shows that it is not significant as thus H₃ is not supported. The interaction term in Step 3 of Table 6 shows that it is significant as thus H₄ is supported.

To see the impact of moderation we have plotted a graph as shown in Figure 2. The variables were re-categorised into two levels, high and low using a median split before the graph was drawn. The graph shows that the negative relationship

between resistance to change and user satisfaction is lower when the change management initiatives are higher as compared to when the initiatives are lower.

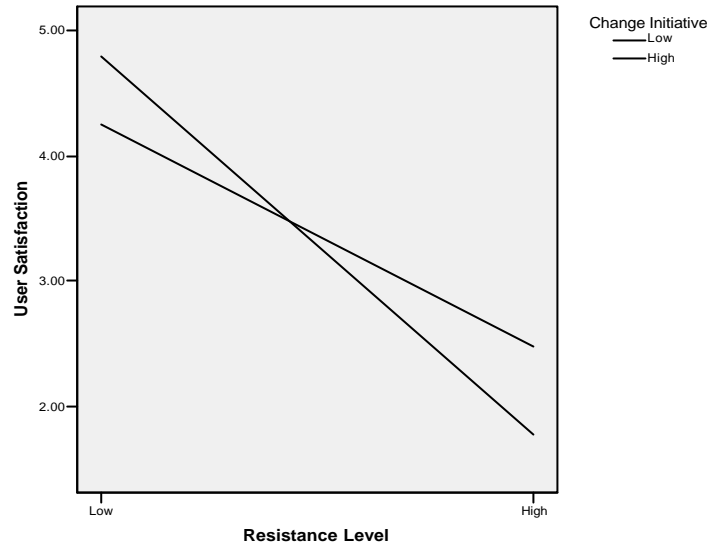


Figure 2. The moderating effect of change management on the resistance to change and user satisfaction relationship

DISCUSSION

In this research, organizational resistance was found to be negatively related to the achievement of predetermined goals. This finding is consistent with the research carried out by Hong and Kim (2002). In order to facilitate a smooth ERP implementation, organizations must be competent in effective change management that involves all the affected personnel's to accept the introduced changes as well as manage any resistance to them.

Resistance was also negatively related to user satisfaction. This again is consistent with the research carried out by Hong and Kim (2002). When resistance is high it means that the users are not very happy with the changes imposed on them. This in turn will lead to lower satisfaction. This indicates that managing the change effectively by acknowledging resistance as natural and expected, giving importance to employees concern, having regular and open communication, get everyone's participation, and promote skills and development are some of the ways to lower the organizational resistance. Employees aren't really resisting the change, but rather they may be resisting the loss of the status, loss of pay, or loss of comfort. In summary, organizational resistance is an

important factor that Malaysian manufacturing organizations should look into. Caution should be exercised while managing end users in order to increase user satisfaction and acceptance of ERP system. Thus, this could lead to higher ERP implementation success rate.

Change management initiatives were found to be positively related to user satisfaction. These points to the importance of change initiatives in gaining support from the users. Kim et al. (2005) highlighted the challenge involved in any particular change, when they asserted that change management "requires major effort usually beyond capabilities of the implementation teams". Change management initiatives did not moderate the relationship between resistance and predetermined goals but it moderated the relationship between resistance and user satisfaction. This goes to show that when there is resistance, the change management initiatives will help in reducing the negative impact.

Implications of the Study

Organizational resistance is a factor that has to be taken into consideration in manufacturing organizations whenever a change is implemented. Specifically, lowering the resistance will increase the user acceptance. This research has shown that the management has to pay more attention to end users (people) issues as proposed by Holsapple et al. (2005) – ERP is technologically complex and due to that, human issues are not emphasized. Behavioral scientists in the past have also proposed that people do not resist technical change as much as the accompanying results of social change. In this study, those respondents who are resistant may not be actively involved in the planning stage of the change or, (1) the nature of the change is not clearly explained by the organization, (2) the objective and reasons for the change is not made clear to the people affected by the change, and (3) weak establishment of relationships between the supervisors and subordinates. All the said reasons could be due to the dominance of the Malaysian culture of collectivism that has shaped the workplace of the manufacturing sector into becoming more relationship-oriented rather than task-oriented (Abdullah, 1994; Hofstede, 1991).

This study's findings may help in increasing the implementation success statistics in manufacturing organizations. Caution should be exercised while managing change and organizations must be competent in effective change management that involves all the affected personnel. Organizations embarking on this journey have to first invest time in educating the employees about the benefits of the system and constantly emphasize that the potential benefits ultimately received from using the new system. One way is to get the employees to be involved during the planning and implementation stages which will help them to be identified with the project and thus reduce resistance.

Limitations

There are a couple of limitations in this study. First, the sample size is small due to the low response rate and time constraint. Obtaining more robust results would require a sample size of several hundred companies. Thus, this limits the generalization of the research results to the whole population of manufacturing companies in Malaysia. Second, in this research, only one questionnaire was solicited from each company, thus the person who filled up the questionnaire may not be representative of all users within the company especially on the portion related to user satisfaction. Although we have argued that resistance to change is difficult to discern from culture, we would also accept the fact that cultural background of respondents may also have an influence and may have affected the findings. Next is the very limited number or almost none of similar research carried out in Malaysia, which can be used as a benchmark or covered as literature review. Lastly, perceived project metrics were used in defining implementation success, leaving out factual aspect of implementation success outcome in this research; this was due to the difficulty in securing the factual data from the participating companies.

CONCLUSION

This research has shown that the human factor, that is, operators/users of the technology's refusal to wholly adopt the technology, and to fully utilize the potentials of the technology are important issues in implementation of changes in manufacturing companies in Malaysia. To overcome this problem, the management has to embark on a structured program to educate the users about the potential benefits of the new system. This may in many ways reduce the probable resistance that could arise and enhance the likelihood of a successful implementation.

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