CHAPTER 6
DISCUSSION AND IMPLICATOINS

6.0 Introduction

This chapter is to discuss the findings of the research project on the Post ERP Implementation effects in Malaysia. The four main parts in this chapter meant to discuss the findings of the research. The first part is the discussion on research findings. The second and third parts are on the practical implications, the limitation and future research opportunities. The final part of this chapter is the conclusion.

6.1 Research Findings

Most of the past researches have suggested that ERP adoption and implementation appear to have positive outcomes at the organization level. However, the effect of ERP is varying from company to company. We will try to explore some of these reasons of differences in the view of technological and organizational level. Organizational Information Processing (OIPT) theory and IS Sophistication model (derived from Nolan's "Stages of EDP Growth" theory) guides this inquiry. The OIPT theory suggests that interdependence and differentiation both affect the level of benefit that occurs from data and process integration. Our result shows that, among plants that have cleared the implementation hurdle, task efficiency and coordination improvements contributes to explain an amount of $R^2 = 0.481$ of the variance in overall plant

level benefits. Furthermore, there is an adequate amount of the variance in these two predictors (task efficiency R^2 = 0.425 and Coordination and improvements R^2 = 0.345) of overall plant level benefits.

For IS Sophistication, there exist a positive significant impact on both of the intermediate benefits. Indirectly we can see that the IT initiatives implemented by the Malaysian government in promoting the development of human capital and IT infrastructure have been materialized. This result also shows that Malaysian manufacturing firm's IT maturity level is comparable with developed nations.

It is ERP system's inherent nature that provides a common standardize platform for inter and intra company for information sharing.

Our results show that there is no significant positive relationship between interdependent and coordination improvements and task efficiency. To explain this, we note that the level of inter-department or inter-plant interdependence varies among and within organizations. Therefore, the potential for reaping coordination-related benefits from ERP varies as well. Gattiker and Goodhue (2005) suggest that it is not appropriate to expect large coordination-related benefits to accrue automatically from successfully implementing ERP, even though these benefits are highly touted by ERP vendors and in the business press media. One possible explanation is that, at the plant level, the operational consequences of the interdependence between plants have been well understood and addressed by existing practices and communication systems/infrastructure, such as those typical of just-in-time. If that is the case,

ERP systems may not add as much incremental coordination benefit within the production function (Flynn and Flynn 1999; Piszczalski 2000). Our research model is lacking in the sense that we did not measure other such factors (manual process and communication systems/infrastructures).

Differentiation however does not have significant negative effects on the intermediate benefits. This might be due to the high level of ERP customization that has reduce the impact of differentiation towards explaining task efficiency and coordination improvements among the subunits. For example, plant A and plant B have very different business processes. Both plant A and plant B implements the same ERP system. To function effectively, plant A and B must either change their business process to fit the ERP system or customize the ERP system to fit their process needs. If they chose to change their business process to fit the system, Task Efficiency and Coordination Improvements will suffer. On the other hand if the reverse is practiced, they will not feel that being different (differentiation) has any negative impact on being efficient or improves their coordination among sub units. As our result shows that there is a high level of customization among our respondent, thus indirectly, we suggest that customization might moderates the negative impact of differentiation towards task efficiency and improved coordination.

The results indicate that the control variable – Customization has a significant impact on the ERP intermediate benefits. This is also supported by study on

ERP systems conducted by Davenport (1998) where business processes must be changed or the ERP system has to change when there is a misfit between the organization and the packaged software. Customization could potentially bring the ERP in line with the requirements of a nonstandard plant. Customization may, therefore, be an effective strategy for dealing with the unique needs of the extremely different plants discussed in the previous section (Soh et al. 2000; Goodhue, 2005). However, based on the business study conducted by ERP and Business Consultant Kimberling (2010), customization is one of the most controversial topics surrounding ERP software. A majority of the firms have shown their intention of leveraging the off-the-shelf software during their software selection process. However, as project teams get into the details of the software during the implementation cycle, requests to make one or more customizations to the software are inevitable.

In our findings, there is no significant relationship between time elapsed after ERP implementation and the intermediate benefit variables. Our result is different from Goodhue at el., (2005). Thirty-seven percent of our respondent implemented ERP system between two to three years time and twenty-one percent, less than two years. In such short time frame, it might be difficult to measure the long term post implementation effects.

6.2 Theoretical Implications

This research explores the possibility to consolidate two prevailing theoretical model postulated by Goodhue (2005) and Raymond and Pare (1992). Goodhue's model is based on OIPT with interdependence and differentiation as its dimension and customization and time elapsed as its control variables. As for Raymond and Pare (1992), IS sophistication is the predominant investigated independent variable. This research incorporates the two models to be analyzed. By taking it one step further, we attempt to run two other models, which are the control models (control variables only) and theoretical model (theoretical variables only). These integrated models are tested to evaluate the true impact and to provide additional explanatory power of the theoretical variables for a more cohesive understanding of ERP phenomena. From our analysis, the customization as control factor is crucial in moderating companies that has highly differentiated subunits. In other words, customization moderates the differentiation variable. These findings is significant as it indicates that both theoretical and control variables accounted for substantial proportion of variance explained and it provides better explanatory power in the area of ERP success and benefits from the post implementation perspective.

6.3   Practical Implications

From a practical standpoint, this study provides several implications for ERP system vendors, mediating institutions and ERP adopters. Our results shows that the effect of competitive strategy on IS sophistication is significant. Furthermore, firms differ in their emphasis on the dimensions of IS Sophistication depending on their own strategic orientation. In responding to a strategic necessity, a wide range of organizational capabilities may be feasible or required. Although firms within every industry may choose different competitive strategies and have different IT capabilities from their competitors, each competitive strategy must be aligned with appropriate IT capabilities.

This study finds that for manufacturing firms, particular attention must be paid to the firm's IT capabilities and utilization. These capabilities must be pursued for a given competitive strategy. It provides guidelines to senior managers on how they should allocate their time and energy in their firms to make their IT more responsive to their firm's success. For instance, the executives in firms pursuing a firm competitiveness strategy should concentrate more on IT integration be it internally with the other proprietary systems but also the external system integration with their customers and suppliers. Internally, the firm must work toward improving IT organization variables by making the responsibility and authority for IT direction, development, and operation clear and explicit. In addition, they should build confidence among IT executives that IT proposals are properly appraised and should continuously monitor the IT function based on

clear performance criteria, goals, and responsibilities. This implies that they should work toward in improving top management understanding of planning processes that link information strategy to business needs; providing IT development resources; creating an environment for introduction of or experimentation with the information technologies.

Another important implication arising from our results is that, our model explains much of the plant-to-plant variation in ERP impacts among plants that have implemented ERP successfully. At the beginning of this paper, we suggested that the executive will also want to understand why ERP results vary from company to company. Contrary to our expectation in hypotheses 2, the direct impact of interdependence on ERP intermediate benefits (Task Efficiency and Coordination Improvements) is found to be small. To explain this unexpected result, we suggest that this might be due to an existing business practices and communication systems that facilitate the communication and coordination among subunits. Thus, the coordination benefits of ERP system among subunits may not reflect a significant improvement (Flynn and Flynn 1999; Piszczalski 2000). However, we should not dismiss the fact that ERP might improve the task efficiency and coordination between subunits.

Our findings for differentiation show that differentiation has no significant negative impact on ERP intermediate benefits (Task Efficiency and Coordination Improvements). This is contrary to the study of Gattiker and Goodhue (2005).

This phenomenon can be explained in the context of ERP Customization. As our result shows that there is a high level of customization among our respondent, thus, indirectly, we suggest that customization might moderates the negative impact of differentiation towards task efficiency and improved coordination. Certainly we cannot dismiss the fact that differentiation can create operational difficulties for a subunit that differs from its peers in its products and manufacturing processes. We would suggest that IS implementers should not dismiss out of hand managers who claim the ERP system does not fit their existing operational process.

The result indicates that customization moderates the effect of differentiation, and yet we do find that customization by itself has a significant impact (as a main effect). This is important since exhortations against customization are plentiful in industry and academia (Pereira 1999). However, we have to take into consideration that we do not investigate whether this benefit of customization outweighs the initial and ongoing IT costs related to programming, potential future upgrade difficulties, and other risks. According to Business Consultant Kimberling (2010), there are three main reasons for the controversy around customization. First, customization might increase the complexity and risk of an implementation and at the same time may expose to the potential of more difficult and complex software upgrade. Second, software vendors had spent significant efforts and resource in R&D development and incorporating the industry best practices in the system. Customization in some ways might undermine the best

practices built into the software. Finally, uncontrolled customization is often a symptom of bigger problems, including a solution's mismatch with a company's requirements or a lack of project controls during implementation. Thus, firm should strike a reasonable balance between standardization and customization.

In addition, we should acknowledge the possibility that our questionnaire did not measure customization for the benefit of the individual plant (as we intended), but rather measured customization directed at making the ERP fit better with the organization as a whole.

Our finding on the ERP benefits improve with time is not significant. This is contrary with the results from Hitt et al. (2002) and Gattiker and Goodhue (2005) about ERP benefits after implementation. However, those researchers also found that after implementation some performance indicators seemed to drop back toward previous levels. Hitt et al. (2002) are quite cautious about this particular finding due to their few "after implementation" data points. We also noted that around 58% of our respondent implemented ERP system less than 3 years. In such short time frame, it might be difficult to measure the long term post implementation effects.

ERP-enabled interplant coordination improvements lead to local level overall ERP benefits. As expected, Task Efficiency does predict overall ERP benefits as strongly as do Coordination Improvements. (as the standardized regression

coefficients in Figure 5.2 indicate). One possible explanation is that improving coordination among subunits is an often-cited motivation for implementing ERP. However, we suspect that coordination-related benefits are more important for other types of relationships—for example, between plants and sales or between engineering and purchasing.

6.4 Limitations and Future Research

We acknowledge the limitations of our study. More specifically, our study examines varying levels of IS Sophistication, Interdependence and Differentiation among plants with ERP systems. We did not attempt to measure different in terms of cultural environments factors. Testing a model that captures different levels of cultural environmental factors is an important item for future research.

Since this study was conducted in Malaysia, specifically for manufacturing plants at Klang-Valley, the study recognizes that relying on a single informant can limit the scope of response to the survey instrument and lead to common method bias. It may limit the generalizibility of our results to those organizations in similar institutional context in Malaysia. Therefore, we must be cautioned when generalizing these findings to organizations operating in different institutional and cultural environment. However, to counteract this we reduced this potential source of bias by identifying the most appropriate key informant by making telephone contact with few respondents' company. Nonetheless, a research design incorporating multiple informants could add further insights to our findings. In spite of this limitation, we believe that the more studies of cross-industry and wider national coverage are conducted, the better informed we will be concerning the applicability of OIPT and IS Sophistication theories under different institutional, economic and cultural conditions.

This study focuses at the local (plant) level. As we mentioned earlier, our analysis does not include global costs and benefits, such as the ability to quickly answer corporate-wide questions involving multiple plants. Additionally, the plant level is not an appropriate level of analysis for capturing IT costs such programming and maintenance costs. However, given the arguments of Barua et al. and others discussed in our introduction, we believe that the tradeoffs entailed in a local focus enable us to make worthwhile contributions.

The measure of Interdependence that we adopted is lacking in the sense that we did not include the other factors such as the existing business practices and communication systems or infrastructures. These factors might affect the level of coordination benefit within the production function. As for the measure of customization that we adopted has consider the role of this variable generally. We noted that by including measures that distinguished between different customization strategies would have increased our understanding of customization and may have increased the likelihood of detecting a stronger statistical effect of customization. We also recognize that ERP packages may have more built-in flexibility and capabilities than the companies represented in our data are using. However, our goal was to understand ERP as enacted by businesses.

Finally, we identify the ERP systems as a class and assuming that the similarities among this class of systems are more important than the differences. However, it

would be important and interesting to examine and focus on differences among different ERP systems in the market.

6.5 Conclusion

This research enhances our understanding of how IS Sophistication, Interdependence and differentiation in the organization could contextualize and shape organizational adoption of ERP systems. This research focuses on subunit analysis to provide a better understanding of the interaction among inter and intra company. The results also provide us a better view on the degree of assimilation of the ERP systems in the organization by taking a post implementation perspective. The research is carried out in Malaysia as a proxy for evaluating ERP implementation in developing nation. In addition, this research explores the possibility to consolidate two prevailing theoretical model postulated by Goodhue (2005) and Raymond and Pare (1992). The results add to the emerging literature of the relationship between effects of IT sophistication in an organizational framework. In our result of our analysis of data from 131 manufacturing plants, there is evidence that supports the notion that interdependence and IS sophistication is associated with increased plant level benefits from ERP. Our data also points out the importance of a moderating effect of the control variable customization, towards differentiation. In addition, our analysis supports our overall hypothesis of this interaction and highlights the practical implications for managers in service organizations.