

A STUDY OF SMALL AND MEDIUM ENTERPRISE: ROLE OF INFORMATION TECHNOLOGY INTEGRATION

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Abstract

Integration of information technology (IT) in business processes plays an important role in achieving high performance levels because it adds value to the efforts for such pursuits. These integrated resources provide the right information in real-time and facilitates the use of this information to where it is needed effectively and efficiently.

The present study focuses on whether such benefits through IT integration can be substantiated for SME businesses. The results of the study have revealed that economic factors in the business environment play a major role to influence the need for IT integration in the SME businesses.

Introduction

Small and Medium Enterprise (SME) firms are generally defined as small firms with the flexibility of equipment and human resources (Dijk 1995). In Malaysia, these firms are referred to as Small and Medium Industry (SMI) firms. They are often characterised by strong entrepreneurial leadership (O'Gorman, 1999) and they are generally sub-contractors or suppliers of goods and services to large corporations.

As large corporations generally operate in competitive international markets, SMEs being subsidiaries of these large corporations must also cope with such competitive forces in their business environment. This compliance puts considerable pressure on the SMEs because the management of these firms find themselves limited in the approaches and resources available to them to prepare for fundamental change. Their managers face considerable difficulties in developing and updating their skills in comparison with their counterparts from larger organisations (Winch *et al.*, 1999). These limitations are further compounded with the economy's increasing complexity and uncertainty. SMEs cannot control their environment as compared to large firms because large firms have vast resources and SMEs are limited in their resources to enable them to seek and acquire new technologies and equipment to update their production process and remain competitive in their pursuit to seek profits.

To address these limitations of the SMEs, there is a need for innovative new approaches to SME managerial skills and business processes to maintain their competitive position effectively and efficiently (Winch *et al.*, 1999). One such innovative new approach is

having the infrastructure that can supply the right information in real-time to where and when it is needed (Yusuf *et al.*, 1998). In order to use this information effectively and efficiently, the infrastructure must include the building of business knowledge base, control of business and process activities, and the necessary training for knowledge & skilled workers. Through the use of this knowledge base with the proper skills and competency, the managers would find themselves equipped with the right resources to plan and make decisions that would effectively and efficiently maintain or increase the firms' competitive dynamism and profitability. Management activities will thus be improved through timely internal and external information exchange and control.

In this aspect, SMEs need to consider information technology (IT) integration as an important factor in their pursuits to maintain their competitive position (Mutsaers *et al.*, 1998). This concept of IT integration is defined as the use of computer-based technological hardware, data, and software applications that is shared and accessed for organisational use over a communication network (Wyse *et al.*, 1993). The level of IT integration is defined as the extent to which these computer-based resources are used in reference to the Nolan Stages Theory model. The purpose of such an integration exercise is to strengthen the firm's operational efficiency and effectiveness in responding to customer

needs and competitive pressures (Mutsaers *et al.*, 1998; Julien, 1999).

The role of IT in such organisations is vital because it contributes to the fundamental changes that are needed for production, co-ordination and management towards achieving these goals (Morton, 1991). IT has helped those organisations in pursuit of quality improvements to design goods that are easier to manufacture, improve new product cycle time through cross-functional integration of systems, and use electronic networks to speed up communications internally, with suppliers, and customers. The effects of information technology is to add value to the efforts of the organisation in their pursuit for productivity improvements by providing an efficient means of generating the required information to make the necessary decisions and take appropriate actions (Nolan 1995).

Heathfield (1997) establishes the fact that because of the potential of major opportunities and challenges through IT integration, SMEs that seek out and embrace such new technology quickly are generally successful. These successful SMEs view change as part of a normal pattern of business life and there is a major incentive for IT investment because it can improve efficiency, reduce costs, and help maintain competitiveness.

Through these IT integrated processes; SMEs usually have a greater ability to produce new products, while large firms tend only to diversify the existing range

of products. In cases where IT integration is done concurrently with modifications in management, gains are increased (Correa, 1994). In addition, firms that use one IT application are more prone to use other applications which suggest that awareness building about IT is cumulative (Klepper, 1995). On the other hand, more and more SMEs are evolving from petty producers towards another stage as subcontractors to large foreign and domestic firms in the electronic and automobile industries (Hodgkinson, 2000). As large parent firms operate in competitive international markets, the subsidiary SMEs too have to comply with such competitive forces in their business environment. These high quality demands by the market are subjecting many SME companies to maintain high production standards, efficient processes, and control systems. These economic forces are exerting the pressure on the SME firms to discard traditional approaches and seek new management concepts and tools in formulating breakthrough strategies that must change their operational paradigm. Among other factors to be taken into consideration, one of the ways to enter this paradigm is through the use of information technology as suggested by Mutsaers *et al.* (1998).

It is also suggested that IT integration may be incorporated into the SME business operations because of the pressure exerted by certain economic forces in the business environment. The question is, can this statement be substantiated and if so, what are the AMET Journal of Management

economic forces and how significant is their influence on IT integration levels in SMEs?

It is seen two aspects of the study on IT integration in SMEs. One aspect of the study is to determine if there is any direct contribution of IT integration towards the improvement of business performance and hence establish the nature of the returns of investments in IT integration. The second aspect of the study is to determine the forces or motivating factors that enforce or encourage the need for IT integration in SMEs. This aspect of the study will establish whether such economic forces exist in SMEs and if so, what kind of forces are these and how much influence they exert to incorporate IT integration. These two aspects of the study form the research objective that can be conceptualised by the following questions.

1. Does IT integration contribute towards high performance in SMEs? In other words, do those SMEs with higher IT integration levels have higher performance levels as compared to those SMEs with lower performance levels?
2. What are the economic factors that have significant effects on the IT integration levels in SMEs?

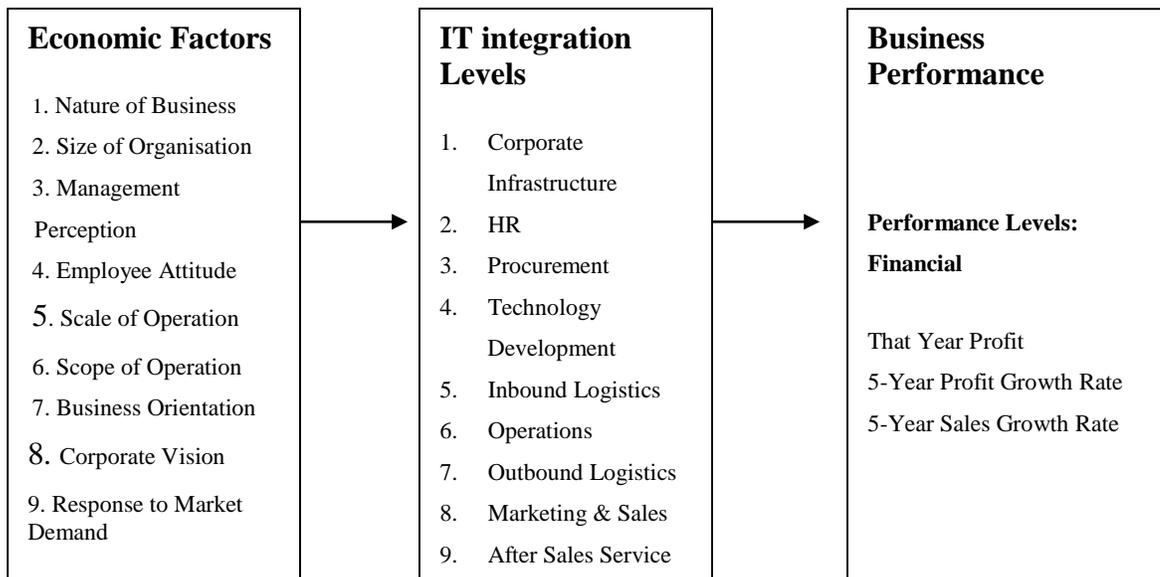
The Framework

The following framework attempts to group the variables identified through the literature review into the three elemental topics

1. **Business Performance Construct:** This construct contains the variables that describe the performance of the SME business.
2. **IT Integration Construct:** This construct contains the variables that describe the IT integration infrastructure in the SME firm.

3. **Economic Factor Construct:** This construct contains the variables that describe the economic forces of SME business environment.

By establishing the testable relationships between the variables of the Business Performance construct and the IT Integration construct, the research objective established in question 1 can be analysed and concluded. For this development, the IT Integration construct is the independent variable construct and the Business Performance construct is the dependent variable construct. The following is the resulting framework:



IT Integration and Business Performance: Financial measures

Since IT Integration improves efficiency, reduces costs, and helps maintain competitiveness. (Heathfield, 1997) it implies that profit margins will increase with higher levels of IT

integration. This relationship can be tested with the postulation of the following hypothesis.

H1a: Firms with higher levels of IT integration will have higher

levels of performance measured by current year profit.

other improved performances through IT integration implies that SMEs would naturally experience long term gains in profit and growth. The long-term growth is the result of progressively increasing their output with same asset resources through improved performances. This relationship can be tested with the postulation of the following hypothesis.

H1b: Firms with higher levels of IT integration will have higher levels of performance measured by 5-year trend of profit growth.

Consequently, the test of relationship between IT integration and long-term growth in profit can be tested with the postulation of the following hypothesis.

H1c: Firms with higher levels of IT integration will have higher levels of performance measured by 5-year trend of sales growth.

IT Integration and Business Performance: Non-Financial Measures

In reference to the examples of companies that incorporate IT integrated resources to improve efficiencies in the value chain activities, it implies that AMET Journal of Management

higher IT integration levels will lead to higher efficiency levels in the individual activities of the value chain. This relationship can be tested with the postulation of the following hypotheses for each category of the generic activity.

H1d₁: Firms with higher levels of IT integration in their Corporate Infrastructure - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d₂: Firms with higher levels of IT integration in their Human Resource - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d₃: Firms with higher levels of IT integration in their Technology Development - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d₄: Firms with higher levels of IT integration in their Procurement - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d5: Firms with higher levels of IT integration in their Inbound Logistics - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d6: Firms with higher levels of IT integration in their Operations - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d7: Firms with higher levels of IT integration in their Outbound Logistics - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d8: Firms with higher levels of IT integration in their Marketing & Sales - value chain activity will have higher levels of performance efficiency in that functional activity.

H1d9: Firms with higher levels of IT integration in their After-Sales Service - value chain activity will have higher levels of performance efficiency in that functional activity.

Nature of Business & IT Integration

As suggested in the studies of Porter *et al.* (1985), Glazer (1991), Bhatt (2000), and Davenport *et al.* (1990) the level of technology (nature of business) deployed in the business influences the level of IT integration; the relationship between these two variables can be tested with the postulation of the following hypothesis.

H2: The SMEs that are engaged, as producers of high tech goods and services will have higher levels of IT integration as compared to SMEs engaged in producers of low or matured tech goods.

Size of Organization & IT Integration

Yusuf *et al.* (1998) argue the organisations with a larger number of employees have more problems to contend with and perceive greater benefits from integration of people and functions. It can therefore be said that the size of the firm does have an influence on IT integration initiatives. This relationship can be tested with the postulation of the following hypotheses.

H3: The SMEs having larger number of employees will have higher levels of IT integration.

Scale and Scope of Operations & IT Integration

Yusuf *et al.* (1998) also suggest that factors describing the scope of operations influences on the need of IT integration to manage the complexity and uncertainty of these factors in the business operations. This relationship between the scale of operations & IT integration levels and scope of operations & IT integration levels can be tested with the postulation of the two hypotheses as follows respectively.

H4: The SMEs with a larger scale of operations will have higher levels of IT integration

H5: The SMEs with a larger scope of operations will have higher levels of IT integration

Business Orientation & IT Integration

Bhatt (2000) contends that manufacturing firms have more controls over the processes and activities. Therefore, it is likely that there will be a higher level of IT integration in manufacturing firms as compared to the service-oriented firms. This relationship can be tested with the postulation of the hypothesis as follows.

H6: The SMEs with a manufacturing orientation will have higher levels of IT integration as

compared to SMEs engaged in the service orientation business activities

Corporate Vision & IT Integration

Based on the studies by King (1995) and Carter (1999) that suggest the influence of corporate vision on IT integration levels, the relationship can be tested with the postulation of the hypothesis as follows.

H7: The SMEs that have a clearer vision and mission objectives will have higher levels of IT integration.

Organisational Culture & IT Integration

The arguments of the research studies by Henry (1994), Busch *et al.* (1991), and Tallon *et al.* (2000) suggest that organisational culture, behaviour, and perception of the employees and management influences IT integration levels. This relationship can be tested with the postulation of the two hypotheses as follows respectively.

H8: The SMEs where employees find computer-based technologies easier to use will have higher levels of IT integration.

H9: The SMEs where the managements have a better perception of computer-based systems will have higher levels of IT integration.

Response to Increased Market Demands & IT Integration

Flexibility to changing market demands is a necessity to improve the competitive position as argued by Gutschke *et al.* (1987) and Mutsaers *et al.* (1998). To attain higher levels of flexibility, there is a need for higher levels of IT integration. This relationship between the flexibility to response in market demands and IT integration levels can be tested with the postulation of the hypothesis as follows.

H10: Firms with higher levels of flexibility for response to market demands will have higher levels of IT integration.

Methodology:

The research instrument used in this study is a survey questionnaire. The questionnaire is divided into 5 sections as described below.

Respondent's Profile: The respondent's profile section of the questionnaire contains 6 measures. These measures are used for acquiring the data for demographic information of the sample

population. The questions set for the questionnaire are essentially generic, straight forward, and self-explanatory in nature. **Company Profile:** The company profile section of the questionnaire contains 15 measures. The first 9 of these measures are used for acquiring the data to generate the demographic information of the companies in sample population. These 9 questions set for the questionnaire are also essentially generic, straight forward, and self-explanatory in nature.

The last six questions in this section describe the measure for six variables of the Economic Factor construct of the theoretical framework. The development of these measures is discussed individually as follows.

Nature of Business: Based on the review of literature, the measure of this variable was developed.

Business Orientation: The measure of this variable is adapted from the study conducted by Bhatt (2000)

Scale and Scope of Operation: The measure for this variable is developed based on the related study conducted by Yusuf *et al.* (1998)

Performance Profile: The performance profile section of the questionnaire contains measures for the 12 twelve variables of the Business Performance construct of the theoretical framework. The first 3 of these measures constitute a group that uses financial ratios as measures of performance. The balance 9 measures constitute another group that uses efficiency levels as measures of

performance. Each of these groups is discussed separately as follows.

Financial Performance: - Based on the recommendations by Chen *et al.* (2001) in their study on using financial factors to investigate productivity; the measures for these three variables were developed.

Non-Financial Performance: - The nine variables describe the performance of the SME business in terms of efficiencies in the value chain activities. Based on the consolidated examples in the article by Walters et al. 2000 and the structured value chain model, the measures for these 9 performance variables were developed. In this configuration, each of the 9 variable components describes the efficiency of one corresponding activity in the value chain. A negatively oriented scenario is suggested for each activity of the Value Chain and the respondents are asked to respond to the extent to which they agree or disagree in regards to the extent to which this scenario applies to the respective value chain activities in their organisation. The interval scale is used to measure the response that determines the level of efficiency.

Information Technology Infrastructure: There are nine variables with regard to IT integration infrastructure of the SMEs. Essentially, each of these variables describe the levels of IT integration in the in the corresponding activities of the SME value chain. For the development of the measure, a generic set of activities is derived from Michael Porter's Value Chain Model. AMET Journal of Management

Each activity is assigned to a variable. The Nolan Stages Theory Model is then used as a guideline to generate the interval scale. The respondents are asked to respond to this scale in accordance to the IT integrated infrastructure suggested in the scale guide that approximately fits their organisation. This response determines the extent to which the individual activity of the Value Chain is IT integrated.

Management Profile: The management profile section of the questionnaire contains measures for the 3 variables of the Economic Factor construct of the theoretical framework identified by organisational culture and corporate vision. These three variables are as follows.

- Employee attitude towards the use if IT integrated resources
- Management's perception on the use of IT integrated resources for performance improvement initiatives
- Vision and mission objectives in the organisation.

The measure of the vision and mission objectives is developed based on the research studies by King (1995) and Carter (1999). The measure for employee attitude is adapted based on the research study conducted by Henry (1994). As for the management's perception, the measure for this variable is adapted from the study conducted by Tallon *et al.* (2000). In all these three variable measures, a negatively oriented scenario is suggested for each measure.

The respondents were asked to respond to the extent to which they agree or disagree on the extent to which this scenario applies to their organisation. The interval scale is used to measure the response.

The respondents were the employees of small and medium enterprises with a minimum of two years of experience so as to understand the systems and processes of the organisation.

Data Validity Analysis

Validity for goodness of measure in the survey questionnaire was ensured through a process of qualitative review and judgement. For construct validity, items and scales for the research instrument were selected only after through review of published literature related to the topic of this research study.

For content validity, to ensure that the measures include an adequate representative set of items that tap the concept, three independent close contacts that are successful entrepreneurs with sufficient expertise and experiences in SME businesses were consulted. Through this consultation, the preventability of the measures was also reviewed so as to ensure that these measures could be easily understood by the prospective respondents.

Data Reliability Analysis:

The reliability of a measure indicates the extent to which the measure is consistent

across time and across various items in the instruments. Since each variable in this research study is an independent construct, the most appropriate quantitative reliability analysis method was the test-retest reliability analysis. For this method of reliability analysis, 8 respondents of the survey whose identity was known were requested to respond to the same questionnaire after a lapse of nearly three months. The correlation between the two scores of the eight sets of respondents is illustrated below for the three variable constructs of the research framework. The average correlation of 0.84 suggests a reasonably good reliability of the sample data.

Analysis of the data: Test of Hypothesis H1a, H1b, H1c

The test of hypothesis involves the test of significant effects that the independent variables d1 to d9 have on the dependent variables c1, c2, and c3.

Since all the variables in this analysis use the interval scale, correlation t-tests are performed to test the strength of the relationships between the variable sets c1 & AVGd1d9, c2 & AVGd1d9, and c3 & AVGd1d9. The key findings were:

The t values of all the three variable sets in the correlation tests are less than 1.98 indicating that there is no significant relationship between them. Therefore, the hypothesis H1a, H1b, and H1c cannot be substantiated to conclude that there is significant explanation of

variations between IT integration levels (AVGd1d9) and profitability (c1), growth in sales (c2), or growth in profits (c3).

The regression analysis between the second significantly correlated variable set c6 and d4 was done. The coefficient of d4 with a t value = 2.47 (> 1.98) and the F-ratio of 6.13 (> 3.90) is statistically significant at the 0.01 ($p < 0.05$) and 0.00 ($p < 0.05$) levels respectively. As a result, the hypothesis H1d₄ is also substantiated to conclude that there are 5.56% explained variations (R Square) in the technology development efficiency levels of the value chain (c6) determined by IT integration levels (d4).

The coefficient of d7 with a t value = 2.85 (> 1.98) and the F-ratio of 8.14 (> 3.90) is statistically significant at the 0.01 ($p < 0.05$) levels. Here too the hypothesis H1d₇ is substantiated to conclude that there is 7.26% explained variations (R Square) in the outbound logistics efficiency levels of the value chain (c10) determined by IT integration levels (d7).

The coefficient of d9 with a t value = 2.28 (> 1.98) and the F-ratio of 5.20 (> 3.90) is statistically significant at the 0.02 ($p < 0.05$) levels. Here too the hypothesis H1d₉ is substantiated to conclude that there are 4.76% explained variations (R Square) in the After-Sales Service efficiency levels (c12) determined by IT integration levels (d9).

Test of Hypothesis H2

The F value of 0.26 (< 3.08) indicates that there are no significant differences in the mean levels of IT integration AVGd1d9 for the b10 variable groups. Therefore, hypothesis H2 cannot be substantiated to conclude that there are significant differences in the mean levels of IT integration (AVGd1d9) between the SME business groups categorised by high technology, low technology and matured technology operations.

Test of Hypothesis H3

The correlation tests indicate that there is a significant correlation between the size of the organisation (b11) and IT Integration levels (AVGd1d9) with t-value of 7.03 (> 1.98). Regression test analysis is performed on this variable set to test the significance of variation between them.

Regression t-Tests for Linearity between AVGd1d9 and b11 were done. The coefficient of b11 with a t value = 7.03 (> 1.98) and the F-ratio of 49.37 (> 3.90) is statistically significant at the 0.00 ($p < 0.05$) level. Therefore, the hypothesis H3 is substantiated to conclude that there are 32.19% explained variations (R Square) in the IT integration levels determined by the size of the SME (b11).

Test of Hypothesis H4 and H5

The t value of 0.74 for the correlation test between the variable set AVGd1d9 & b15 indicates that no correlation exists between this variable set. As a result, the

hypothesis H5 cannot be substantiated to conclude that there is significant explanation for variation in the IT integration levels (AVGd1d9) determined by the scope of operations (b15) in the SME businesses.

Regression t-Test for Linearity between AVGd1d9 & b14 were done. The t-values of 2.43 (> 1.98) for the correlation test between the variable set AVGd1d9 & b14 indicates that significant correlation exists between this variable set. Regression test analysis is performed on the correlated variable set AVGd1d9 & c16 to test the significance of variation between these two variables.

The coefficient of b14 with a t value = 2.43 (> 1.98) and the F-ratio of 5.88 (> 3.90) is statistically significant at the 0.02 ($p < 0.05$) levels. Therefore, hypothesis H4 is substantiated to conclude that there are 5.36% explained variations (R Square) in the IT integration levels (AVGd1d9) determined by the scale of SME business operations (b14).

Test of Hypothesis H6

The $t_{Stat} = 2.49$ (> 1.98) is statistically significant at the 0.01 ($p < 0.05$) levels to indicate that there are significant differences in the variable b13 groups. The mean of IT integration level (AVGd1d9) is higher in the manufacturing group category. Therefore, the hypothesis H6 is substantiated to conclude that SMEs with a manufacturing business orientation have significantly higher levels of IT integrated processes in their AMET Journal of Management

organisation as compared to the SMEs involved in the service orientation.

Test of Hypothesis H7

Regression test analysis is performed on this variable set AVGd1d9 and e3 to test the significance of variation between these two variables. Regression t-Test for Linearity between AVGd1d9 & e3 showed the coefficient of e3 with a t value = 3.52 (> 1.98) and the F-ratio of 12.39 (> 3.90) is statistically significant at the 0.001 ($p < 0.05$) levels. Therefore, hypothesis H7 is substantiated to conclude that there are 10.65% explained variations (R Square) in the IT integration levels (AVGd1d9) determined by the nature of the long-term SME vision and mission objectives.

Test of Hypothesis H8 and H9

The t value of 5.92 (> 1.98) indicates that there is a significant correlation between the variable set AVGd1d9 & e1 and the t value of 7.67 (> 1.98) indicates that there is also a significant correlation between the variable set AVGd1d9 & e2.

Regression t-Test for Linearity between AVGd1d9 & e1 shows that the coefficient of e1 with a t value = 5.92 (> 1.98) and the F-ratio of 35.08 (> 3.90) is statistically significant at the 0.00 ($p < 0.05$) levels. Therefore, hypothesis H8 is substantiated to conclude that there are 25.23% explained variations (R Square) in the IT integration levels (AVGd1d9) determined by the nature employee

attitudes (e1) towards the use of computer-based resources in SMEs.

The Regression t-Test for Linearity between AVGd1d9 & e2 exhibits that the coefficient of e2 with a t value = 7.67 (> 1.98) and the F-ratio of 58.87 (> 3.90) is statistically significant at the 0.00 ($p < 0.05$) levels. Therefore, hypothesis H9 is also substantiated to conclude that there are 35.53% explained variations (R Square) in the IT integration levels (AVGd1d9) determined by the perception of SME management (e1) towards the use of computer based resources as a means to improve productivity.

Test of Hypothesis H10

ANOVA F-Test Statistics was undertaken to detect differences in b12 groups. The F value of 0.25 (< 3.08) indicates that there is no significant difference in the mean levels of IT integration (AVGd1d9) in the b12 variable groups. Therefore, the hypothesis H10 cannot be substantiated to conclude that there are significant differences in the mean levels of IT integration (AVGd1d9) among the SME groups categorised in accordance to their response to the increased market demand (b12).

Discussion:

Hypotheses H1a, H1b, and H1c, were found to be not significant and therefore could not substantiate that higher IT integration levels contribute to higher

performance levels measured in terms of financial gains of profit and growth. The argument by Heathfield (1997) that the incentive for investment in IT integration results in the improvement in efficiency, cost reductions, and help maintain competitiveness does not necessarily imply that SMEs will make gains in profit margins as postulated in hypothesis H1a. The consolidated findings of Gunasekaran *et al.* (1996), Klepper (1995), Correa, (1994) and Sohal *et al.* (2001) that suggest long-term cumulative trends towards improved efficiencies, reduced costs, and other improved performance through IT integration does not necessarily imply that these favourable trends will lead to long-term growth in profit and sales as postulated in hypotheses H1b and H1c. There are other economic factors to be considered concurrently with such investments if increase in profit and growth is the main criteria for incentive in such IT integration investment schemes.

Of the 9 postulated hypotheses (H1d₁ to H1d₉) that SMEs with higher levels of IT integration in their individual value chain activities will have higher levels of performance efficiency in that respective functional activity, 4 hypotheses were supported to substantiate that there are improved efficiencies in the Procurement Activities (H1d₃), Technology Development Activities (H1d₄), Outbound Logistics (H1d₇) and After-Sales Support (H1d₉). These findings were quite consistent with the examples of companies illustrated by Walters *et al.* (2000).

Hypothesis H2 was found to be not significant and therefore could not substantiate those SMEs that are engaged as producers of high tech goods and services will have higher levels of IT integrated processes in their organisational activities as compared to SMEs engaged in producers of low or matured tech goods. The argument by Bhatt (2000) that higher the information intensity requirement will lead to higher levels of IT integration was also not substantiated in his study on the effects of information systems integration on business process improvement. Therefore, the findings of both the studies are consistent.

Hypothesis H3 was found to be significant and therefore substantiates that SMEs with larger number of employees will have higher levels of IT integration. This finding is also consistent with the outcome of the study by Yusuf *et al.* (1998). In their study on enterprise-wide integration of MRPII, the findings imply that those organisations with a larger number of employees have more problems to contend with and therefore should perceive greater benefits from integration of people and functions.

The hypotheses H4 and H5 are discussed together since their derivations are the result of consolidated category of factors in the study by Yusuf *et al.* (1998). Hypothesis H4 was found to be significant and therefore substantiates that SMEs with a larger scale of operations will have higher levels of IT

integration. This finding is supported by Yusuf *et al.* However, hypothesis H5 was not substantiated and conflicts with the findings of Yusuf *et al.* Their findings have been based on large-scale UK manufacturing firms whereas the findings of this study are based on firms that are small or medium scale. Based on this argument, it can be contented that SMEs may not really be with a scope of operations as large as the firms examined by Yusuf *et al.* to influence IT integration levels of SMEs. However, to be certain, further exploratory studies may have to be conducted where the demarcation between scale of operations and scope of operations is quantitatively clear and absolute.

Hypothesis H6 was found to be significant and therefore substantiates that SMEs with a manufacturing business orientation have higher levels of IT integration as compared to SMEs engaged in the service business orientation. Bhatt (2000) supports this finding. His study also reveals that the moderating effect of network integration on process improvement initiatives and customer focus is more significant in manufacturing oriented companies than service-oriented companies.

Hypothesis H7 was found to be significant and therefore substantiates that SMEs with a clearer vision and mission objectives will have higher levels of IT integration. This implies that successful organisations are those that have a clear and agreed strategic vision and a relatively clear and agreed means of progressing towards this vision

because a clear mission statement is essential for effectively establishing objectives and formulating strategies. However, there are no empirical studies to support this finding but a theoretical assessment by King (1995) in his article on creating 'strategic capabilities architecture' suggests that using the available hardware and software technology to establish an IT integrated infrastructure needs careful thought. Information systems and the underlying information architecture of an organisation should be based on this strategic vision. Unless this vision exists and is shared by the key players within the organisation, the information systems cannot be effectively planned, prioritised, designed or built. In another similar theoretical assessment by Carter (1999) in his article on information architecture, argues that the vision itself is a fusion of thought on the preferred directions, the current and proposed position within the marketplace, and the identified capabilities of the organisation. The desired sustainable competitive advantage arises from an integration of supportive strategies and the synergy of the organisation's various capabilities. The finding in this study through a formal research process supports these theoretical deductions of the published literature.

Hypothesis H8 was found to be significant and therefore substantiates that those SMEs where employees find computer-based technologies easier to use will have higher levels of IT integration. There are also no empirical studies to support this finding. However, AMET Journal of Management

the study by Henry (1994) on 'Resistance to Computer-based Technology in the Workplace' only reveals the causes and solutions of employee attitudes towards such technology but does not reveal if such negative attitudes will contribute to lower IT integration levels. However, both these studies are complementary to imply that if employees are negatively oriented towards IT integrated resources, the opportunities to incorporate IT integration will be very low. The way to go around it is to provide the proper education and training to the employees to impart the proper awareness and skills that would change this negative perception.

Hypothesis H9 was found to be significant and therefore substantiates that SMEs where the managements have a better perception of computer-based systems will have higher levels of IT integration. The finding of this hypothesis is supported by Tallon *et al.* (2000). They conclude that when there is positive management perception on the potential of IT integration, there are clear goals for such investment. This creates a positive impact on firm's performance at multiple points along the value chain through IT integration.

Hypothesis H10 was found to be not significant and therefore does not substantiate that SMEs with higher levels of flexibility for response to market demands will have higher levels of IT integration. There are also no empirical studies to support this finding but however, the article by Mutsaers *et*

al. (1998) on 'The evolution of information technology' only reveals a theoretical deduction that is not supported by this research study. This study implies that high levels of flexibility in SMEs to address market demands do not influence IT integration levels.

From these discussions, the two research objectives are concluded. The first research objective that questions the significance of IT integration on performance levels can be concluded as being relative to the type of performance category that is being sought. From the findings of this study, IT integration does not significantly contribute to performances that are categorised in terms of financial gains. However, IT integration does contribute to improvements of performances that are categorised in terms of non-financial gains and that too in certain specific areas of the value chain activities. The second research objective can be concluded to suggest that economic factors driven by the business environment play a major role that motivates the SMEs to seek and invest in IT integrated infrastructures in order to sustain or improve their competitive position. This phenomenon also logically explains why non-financial performances are improved through IT integration. In the next section, the implications of these findings are discussed.

Implications of the study:

Essentially, this study has established that the economic factors of the business environment play a major role in determining the levels of IT integration in SMEs. These findings imply that because the complexities of the SME businesses are increasing as they evolve from petty producers towards another stage as subcontractors to large foreign and domestic firms as suggested by Hodgkinson (2000), there is a need for formal structured management systems such as the TQM that emphasise the importance and needs for IT integration to address these business complexities in an organised, efficient, and effective way.

Limitations of the study:

In this study, the economic factors influencing IT integration levels in SME businesses were determined through an open rigorous discussion in the literature survey. However, the study does not ensure whether all possible economic factors that could influence IT integration have been taken into consideration for the analysis. In this sense, the outcome of this study is only an appreciation of how significantly some economic factors play a role in influencing the IT integration levels in SME firms. A more appropriate and useful approach for the study of IT integration in SMEs is from the perspective of established economic principles of structured management system such as the TQM. By this

approach, the findings of the study can be contained for at least one major application. This limitation was realised in the course of the research process.

Future Research Direction:

The limitations of this study in the previous section suggest new areas of interest for future research directions. One of these areas is the study of IT integration from the perspective of a structured management system such as the TQM. Structured management systems are becoming more and more important for future SME businesses as they evolve into more complex businesses. The training needs for SMEs to adopt these structured management systems have been proposed by Hamzah *et al.* (1994) in their study on "TQM training for SMEs in Malaysia". Moreover, the needs for the appropriate IT integrated infrastructure to facilitate such structured management systems such as those proposed by Dewhurst *et al.* (1999) is only theoretically deduced. Therefore, this area still needs to be researched more aggressively in order to provide optimum cost effective solutions for high business performance through structured management systems and IT integration especially for Malaysian SMEs. Other areas of research directions include the study of IT integration for new business opportunities as suggested by La Rovere (1996). Such businesses include the provision of on-line services, Internet business, e-commerce transaction, software applications development, electronic publishing and

multimedia, etc., where IT integration is the major asset investment to operate the business .

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