

## Aligning Internet Capabilities in Small and Medium-sized Enterprises (SMEs): An Exploratory Survey

Rosli Mohamad, Professor Dr. Noor Azizi Ismail  
College of Business  
Universiti Utara Malaysia  
06010 Sintok Kedah Malaysia  
e-mail: roslim@uum.edu.my

**Abstract**—Integrating Internet-based solutions (e-business) potentially enhance firm's efficiency and effectiveness with no exception to Small and Medium-sized Enterprises (SMEs). Nonetheless, such applications promise greater benefits if it is appropriately aligned to support most strategic firm's functions. Despite extensive research on e-business practice amongst this sector, there have been limited works to investigate the extent of Internet alignment across various business functions. Therefore, this study was conducted to explore the issue concerned. A survey was carried out with 54 firms to obtain their perception on the current state of Internet alignment across three major business functions, namely sales-related, procurement-related, and internal operations. The results ascertained that alignment inconsistencies do exist at different business functions. Cluster analysis further revealed two distinct firm profiles based on their alignment pattern. In conclusion, the study suggests that SMEs set different priority over e-business use in support of their firms operation.

**Keywords**—e-business, alignment, SMEs, Malaysia

### I. BACKGROUND OF STUDY

Small and Medium-sized Enterprises (SMEs) have salient role towards economic growth and employability of the nation. As such, deployment of appropriate Information Technology/Information Systems (IT/IS) is one of possible ways to further enhance their productivity and efficiency. Internet emergence in late 1990s substantially transforms business operation. Specifically, an electronic business (e-business) brings new opportunities and challenges to firms of all sizes. It enables firms to make global presence, to improve firm's productivity, to widen market share, and to survive in k-economy. Considering inconsistent definition of e-business, this paper adopts IBM's definition of e-business as "a transformation of key business processes by using an Internet technology" (1). Therefore, this paper refers to e-business and Internet interchangeably throughout this paper.

As a cluster of innovations, e-business is capable to support many aspects of firm operations (2). Nonetheless, not all firms would equally benefit from e-business use (3). Considering resources constraint, SMEs consider e-business primarily to support firms' core business functions (4,5) that correspond well to their strategic objectives (6). This clearly indicates a crucial need to align multi-faceted e-business capabilities with firm strategic objectives. Ability to identify

appropriate e-business solutions would then help firms to optimize value of such investment (7).

IT/IS alignment has received considerable attention among researchers (8). Nevertheless, there have been limited works to explore IT/IS alignment amongst SMEs despite constant calls to examine the issue in this sector (9). Furthermore, earlier works have been focusing on alignment of IT/IS in general (10) or alignment at specific business function (11,12). There are, however, scarce studies to investigate alignment for specific type of IT/IS applications (7). Hence, this preliminary work extends present literature by investigating Internet alignment practice among SMEs.

This study contributes to the literature in several ways. First, the study investigates alignment of specific type of IT/IS. Internet, a type III IT/IS, affects firm operation differently as compared to other IT/IS as it enables effective inter-firm interaction apart of enhancing in-house operations (13). Secondly, in contrast to previous studies (10, 14), this work assessed IT/IS alignment at business process level. The process-oriented approach helps firms to recognize areas heavily supported/not supported by Internet (15,16). Additionally, SMEs relatively lack of IT/IS strategy, which make more difficult to identify different types of their strategy (17). In similar vein, different business functions have varying degree of complexity. This in turn demands for different e-business solutions (18).

This article has five interlinking sections. Next section reviews prior works in e-business and IT/IS alignment. The third section outlines research methodology employed. Discussion of findings and analysis takes place in the fourth section. The paper ends with conclusion, limitations of study, and future direction in this promising area.

### II. LITERATURE REVIEW

#### A. IT/IS, E-business, and SMEs

Literature constantly reports slow development of IT/IS usage among SMEs (19, 20). Constraints such as financial resources, unclear IT/IS strategy, and incompetent skills are among major impediments for their progress (21, 22). Since Internet booming, research focus is shifting to investigate Internet impact to the firms. Despite the Internet promising potentials, the said constraints remain as barriers for firms to integrate Internet-based applications across all aspects of their firms operations (2,25,27). As such, firms would have

to consider applications that potentially support their crucial business tasks.

### B. *E-Business from Value Chain Perspective*

Although, there have been different ways of assessing of e-business diffusion within firm, Porter's value chain model (23) is relatively common for studies of IT/IS diffusion in firms. Porter conceptualizes value chain as the activities within a business that are "divided into the technologically and economically distinct activities it performs to do business" (p. 150). To illustrate, (5) shows, different focus of e-business use leads to inconsistent benefits obtained by the firms. Another work by (24) reported that Internet affects primary and secondary functions of business at different degree. Similarly, others viewed e-business predominantly gives higher impact to sales and buying functions (25). Other researchers (26,27) then extended further by proposing extensive e-business taxonomy for SMEs.

Overall, this section shows that earlier works are inconsistent in assessing e-business diffusion into firm functions. Thus, these studies provide basis for authors to specify a framework in examining alignment at business process level.

### C. *Concept of Fit and IT/IS alignment in SMEs*

Concept of fit as proposed by (28) anchors the main hypothesis of contingency theory. In contrast to universalistic theory, the contingency theory surmises (i) 'there is no best way to organize, and (ii) any way of organizing is not effective' (29).

Concept of fit was initially proposed to understand issue in strategic management and organizational behavior (30, 31). Other works then further refine the concept with respect to its conceptualization (32), measurement procedure (33), antecedents to fit (34,11) and possible relationship between fit and firm performance (12,14,37).

Strategic Alignment Model or SAM (31) is among a prominent model to address fit/alignment issue in strategic management. Reference (33) was the first to adapt SAM into IT/IS domain. Their work validated IT/IS alignment construct and confirmed its contingency effect to IS success and firm performance. Since then, similar works have been widely carried out (14, 35).

Even so, earlier researches on IT/IS alignment heavily concentrate on large entities (14, 36). Nevertheless, considerable reduction in IT/IS cost nowadays gives more reasons to extend our understanding of IT/IS alignment issue amongst SMEs (10, 11, 16). Moreover, there have been limited works to employ fit perspective into specific IT/IS application such as e-business (7, 38).

Additionally, SAM noted two aspects of alignment i.e. strategic level alignment and process level alignment (31). To date, many studies mainly have concentrated on strategic level alignment (alignment between business strategy and IT/IS strategy) while there have been limited attempt to investigate IT/IS alignment at business process perspective (16). This is salient effort, as strategy requires interaction of interrelated business activities (15). To fill up the gap, this

study explores e-business alignment at process level perspective.

## III. RESEARCH METHODOLOGY

### A. *Construct Measures*

Based on (26) works, authors shortlisted (with some modifications) 36 Internet-enabled business activities (not disclosed). These functions become a basis for assessing state of e-business alignment. For easier analysis, authors classified the activities into three major aspects namely, in-house, customer-side, supply-side activities.

This study conceptualized e-business alignment as congruence between (i) perceived strategic importance and (ii) the perceived extent of Internet technology support for each business activity identified. The alignment score was determined using parallel approach (33) that has been validated in SMEs setting (10,16). With this in mind, a survey questionnaire requested respondents to assess both aspects using a 5-point scale. As for strategic importance, '1' refers to 'not important at all' and '5' represents 'highly important'. Conversely, for perceived Internet support, score '1' indicated 'not supported at all' while '5' represents 'highly supported'.

Another critical decision on studies of alignment is measurement of fit. Although there are several available alternatives in measuring fit (39), this study employed moderation approach due to its popularity and ability to provide better rationalization of fit (32). Detail measurement procedure is detailed out in finding section.

### B. *Data collection Procedure*

Authors identified respondents conveniently from participants of e-commerce seminar for SMEs that was recently held in Kuala Lumpur. The targeted respondents were firm owners/managers, as they possess clearer perspective about firm use of e-business (40). Besides, they usually hold key responsibilities in firms' decision-making (11).

In total, out of 150 questionnaires distributed, 68 responses were received. However, only 54 responses were considered valid for further analysis (36%). Majority of the respondents were private limited firms (75%) while the rest either in a partnership or a sole proprietor business. In term of size, there were relative equal distributions (about 30% each) between micro, small, and medium-sized firms. With respect to sector, about 60 percent of the respondents were in service-based sector and another 40% were production-based.

## IV. FINDINGS AND ANALYSIS

This subsection starts with overview of firms' perspective with respect to (i) strategic importance and (ii) the extent of Internet support, for each business activity specified (detail not disclosed). Consistent with earlier works (2), firms generally perceived that Internet strongly supports least complicated activities such as marketing, communication, and information searching. Nevertheless, activities such as communicate financial results, payment to

suppliers/customers, order tracking, and contract negotiation with business partners received relatively lower Internet support. As predicted, as some of these functions are relatively more complicated and require advanced IT infrastructure (41), therefore, they are not widely applicable for most SMEs.

In order to understand alignment at functional level, average scores for the three business functions were calculated. Table 1 summarizes mean score of both aspects – process importance and Internet support. Overall, it clearly indicated that Internet has greater potential to enhance sales activities and procurement-related operation. Meanwhile, firms perceived moderate support for in-house activities (mean = 2.8). Consistent with (4) argument, SMEs primarily consider IT/IS to improve core functions due to resources scarcity.

Visual overview in Table 1 further showed that firms consistently perceived lower Internet support than the strategic importance of all business processes. This clearly signals misalignment between firm’s strategic business needs and e-business capability. Hence, further investigation is noteworthy to investigate the situation from fit perspective.

TABLE 1. STRATEGIC IMPORTANCE AND INTERNET SUPPORT

Function (no of activities)	Strategic importance	Internet support
In-house operation (13)	3.85	2.80
Sales (13)	4.01	3.38
Procurement (10)	3.52	3.17

Based on moderation approach, alignment score for each dimension was determined by multiplying the score of process strategic importance with the score of Internet support for each activity. Based on this measurement approach, the maximum score for each process is '25' (based on 5-point scale) while the lowest score is '1' as higher score represents greater alignment. Alignment score for each process dimension was then computed based on average alignment score of all activities in each dimension.

As Table 2 revealed, e-business capability was moderately aligned with strategic needs of the firms for all processes. Nevertheless, degree of alignment for procurement function was slightly lower than the other functions (11.76). This is somewhat consistent with data presented in Table 2 whereas firms perceived lower strategic importance and lower Internet support for the procurement function. Overall, this finding confirmed that IT/IS is relatively play different roles at various firm operations.

TABLE 2. E-BUSINESS ALIGNMENT

Dimension (no of activities)	Alignment score
In-house (13)	14.3
Sales (13)	14.9
Procurement (10)	11.76

The next attempt was to configure different profile of firms based on their Internet alignment pattern. The cluster analysis is preferable in classifying cases (firms) into several groups based on predefined variables (42). Application of cluster analysis requires several considerations namely; selection of variables to be included, selection of cluster algorithm, and specification of optimum cluster solution (42). The variables considered were e-business alignment score of in-house, sales, and procurement functions. This paper employed hierarchical partitioning strategy (Ward method) with an agglomeration coefficient measure as a basis to determine cluster solution. Table 3 clearly showed that reducing number of clusters from two to one resulted to sharp rise in coefficient value (72%). Therefore, two clusters solution is the most appropriate to be explored further.

TABLE 3. CLUSTER SOLUTION

Proposed cluster solution	Change in agglomeration Coefficient (%)
5	19.24
4	18.74
3	18.71
2	31.09
1	72.15

The next stage is to interpret the cluster outcome. This is possible by exploring characteristics of both clusters. Fig. 1 charts comparative alignment scores across two clusters. ‘Cluster 1’ has 34 firms and remaining 20 firms was classified under the ‘Cluster 2’. A significant T-test result between clusters for the three dimensions further validates the proposed profiles (not disclosed).

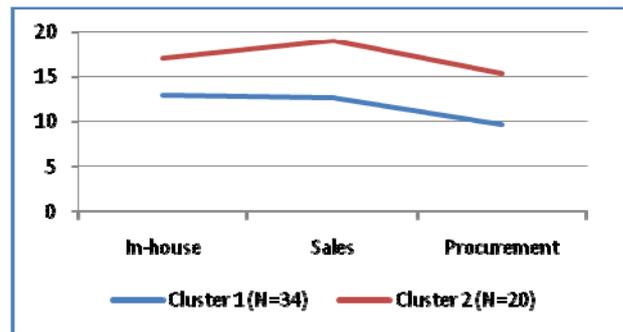


Figure 1. Comparative Alignment Score by Cluster

Fig. 1 clearly portrays that firm in ‘clusters 2’ have relatively higher alignment score across all functions than firms in ‘Cluster 1’. Therefore, ‘Cluster 2’ could be regarded as ‘more aligned’ firms. In contrast, ‘Cluster 1’ which has lower mean score would be interpreted as ‘less aligned’ firm. Concisely, ‘more aligned firms’ perceives Internet

technology provides greater support to almost all aspects of their firms' operation. In contrast, 'less aligned firms' views Internet to play limited roles in facilitating them to execute firm operation.

## V. CONCLUSION, LIMITATIONS, AND RECOMMENDATIONS

Internet evolution brings new landscape for business nowadays. With Internet as a backbone technology, e-business offers vast solutions for firms to choose from. Nevertheless, these solutions do not fit all SMEs in the same way. This study, therefore, reports the current state of aligning Internet capabilities with strategic firm functions. The survey outcome suggests inconsistencies between firms with respect to their e-business capabilities in support of diverse firm's functions.

However, reader should consider the study limitations in interpreting the findings. Firstly, convenient sampling procedure employed potentially creates possible bias as participants of the seminar might have greater awareness about e-business. Nevertheless, this could be justifiable as the study concerns on the extent of Internet usage among firms. Secondly, small sample size and low response rate might not correctly depict actual practice among SMEs at large.

Extending from this work, future studies might consider investigating impact of Internet alignment to performance. This would certainly useful to further contribute to literature of IS/IT domain.

## REFERENCES

- [1] M. Meckel, D. Walters, A. Greenwood, and P. Baugh, "A taxonomy of e-business adoption and strategies in small and medium sized enterprises," *Strategic Change*, vol. 13, no. 5, pp. 259 - , 2004.
- [2] H. Wilson, E. Daniel, and I. A. Davies, "The diffusion of e-commerce in UK SMEs," *Journal of Marketing Management*, vol. 24, no. 5/6, pp. 489 - 516, 2008.
- [3] D. L. Lester and T. T. Tran, "Information Technology Capabilities: Suggestions for SME Growth," *Journal of Behavioral & Applied Management*, vol. 10, no. 1, pp. 72-88., 2008.
- [4] P. Bharati and A. Chaudhury, "Studying the Current Status of Technology Adoption," *Communications of the ACM*, vol. 49, no. 10, pp. 88 - 93, 2006.
- [5] F. Wu, V. Mahajan, and S. Balasubramanian, "Wu, F., Mahajan, V. and Balasubramanian, S. (2003). An analysis of e-business adoption and its impact on business performance," *Journal of the Academy of Marketing Science*, vol. 31, no. 4, pp. 425 - 447, 2003.
- [6] E. Boulianne, "A contingency framework for effective information systems design and e-business applications," *International Journal Information Technology and Management*, vol. 8, no. 1, pp. 50 - 68, 2009.
- [7] L. Raymond and F. Bergeron, "Enabling the business strategy of SMEs through e-business capabilities: A strategic alignment perspective," *Industrial Management & Data Systems*, vol. 108, no. 5, pp. 577 - 595, 2008.
- [8] Y. E. Chan and B. H. Reich, "State of the art IT alignment: what have we learned?," *Journal of Information Technology*, vol. 22, p. 297-315, 2007.
- [9] A.J.G. Silvius, W. Benny, and S. Jakobus, "Business and IT alignment answers and remaining questions ," in *Pacific Conference on Information Systems (PACIS)*, 2009, <http://aisel.aisnet.org/pacis2009/44>.
- [10] P. B. Cragg, M. King, and H. Hussin, "IT alignment and firm performance in small manufacturing firms," *Journal of Strategic Information Systems*, vol. 11, p. 109-132, 2002.
- [11] N. A. Ismail and M. King, "Factors Influencing the Alignment of accounting information systems in small and medium sized Malaysian manufacturing firms," *Journal of Information Systems and Small Business*, vol. 1, no. 1 - 2, pp. 1 - 20, 2007.
- [12] Val. A. Hooper, Sid. L. Huff, and Peter, C. Thirkell, "The impact of IS-Marketing alignment on marketing performance and business performance," *The Database for Advances in Information Systems*, vol. 41, no. 1, pp. 36 - 55, 2010.
- [13] E. B. Swanson, "Information systems innovation among organization," *Management Science*, vol. 40, no. 9, pp. 1069 - 1092, 1994.
- [14] [Y. E. Chan, R. Sabherwal, and J. B. Tatcher, "Antecedents and outcomes of strategic IS alignment: An empirical investigation," *IEEE Transactions on Engineering Management*, vol. 53, no. 1, pp. 27-47, 2006.
- [15] P. P. Tallon, "A process-oriented perspective on the alignment of information technology and business strategy," *Journal of Management Information Systems*, vol. 24, no. 3, pp. 227-268, 2007.
- [16] P. B. Cragg, M. Tagliavini, and A. Mills, "Evaluating the alignment of IT with business processes in SMEs," in *18th Australasian Conference on Information Systems*, Toowoomba, Australia, 2007, 5 - 7 December.
- [17] E. Lefebvre and L. Lefebvre, "Firm innovativeness and CEO characteristics in small manufacturing firms," *Journal of Engineering and Technology Management*, vol. 9, pp. 243-277, 1992.
- [18] N. Melville and R. Ramirez, "Information technology innovation diffusion: an information requirements paradigm," *Information Systems Journal*, vol. 18, no. 3, pp. 247-273, 2008.
- [19] P. B. Cragg and M. King, "Small-firm computing: Motivators and inhibitors," *MIS Quarterly*, vol. 17, no. 1, pp. 47-60, 1993.
- [20] J. Y. L. Thong and C. S. Yap, "CEO characteristics, organizational characteristics and information technology adoption in small businesses," *Omega*, vol. 23, no. 4, pp. 429-442, 1995.
- [21] W. H. DeLone, "Determinants of success for computer usage in small business," *MIS Quarterly*, vol. 12, no. 1, pp. 51 - 61, 1988.
- [22] G. Premkumar, "A meta-analysis of research on information technology implementation in small business," *Journal of Organizational Computing and Electronic Commerce*, vol. 13, no. 2, pp. 91 - 121, 2003.
- [23] M. E. Porter and V. E. Miller, "How information gives you competitive advantage," *Harvard Business Review*, vol. 63, no. 4, pp. 149 - 174, 1985.
- [24] C. E. Koh, T. K. Nam, V. R. Prybutok, and S. Lee, "A value chain perspectives of Internet practices, e-readiness, and organizational performance: A comparison of US and South Korean firms," *Industrial Management & Data Systems*, vol. 107, no. 4, pp. 519 - 536, 2007.
- [25] K. Zhu, K. L. Kraemer, and S. Xu, "The process of innovation assimilation by firms in different countries: A technology diffusion perspectives on e-business," *Management Science*, vol. 52, no. 10, pp. 1557 - 1576, 2006.
- [26] L. A. Lefebvre, É. E. Lefebvre, Elia, and H. Boeck, "Exploring B-to-B e-commerce adoption trajectories in manufacturing SMEs," *Technovation*, vol. 25, pp. 1443 - 1456, 2005.
- [27] S. R. Magal, P. Kosalge, and N. M. Levenburg, "Towards a stage model for e-business adoption among SMEs: Preliminary results for manufacturing and service firms," in *Paper presented at the Fourteenth America's Conference on Information Systems*, Toronto, Canada, 2008.
- [28] T. Burns and G. M. Stalker, *The management of innovation*. New York, USA: Oxford University Press, 1961.
- [29] J. R. Galbraith, "Organization design: An information processing view," *Interfaces*, vol. 43, pp. 28 - 36, 1974.

- [30] L. Donaldson, *The contingency theory of organization*. California: Sage Publications, 2001.
- [31] J.C. Henderson and N. Venkatraman, "Understanding strategic alignment," *Business Quarterly*, vol. 55, no. 3, pp. 72 - 78, 1991.
- [32] J. C. Henderson and N. Venkatraman, "Strategic alignment: Leveraging information technology for transforming organizations," *IBM Systems Journal*, vol. 32, no. 1, pp. 4 - 16, 1993.
- [33] Y. E. Chan, S. L. Huff, D. W. Barclay, and D. G. Copeland, "Business strategic orientation, information systems strategic orientation, and strategic alignment," *Information Systems Research*, vol. 8, no. 2, pp. 125 - 150, 1997.
- [34] H. Hussin, M. King, and P. B. Cragg, "IT alignment in small firms," *European Journal of Information Systems*, vol. 11, no. 2, pp. 108 - 127, 2002.
- [35] F. Bergeron, L. Raymond, and S. Rivard, "Fit in strategic information technology management research: an empirical comparison of perspectives," *Omega*, vol. 29, no. 2, pp. 125-142, 2001.
- [36] R. Sabherwal and Y. E. Chan, "Alignment between business and is strategies: A study of prospectors, analyzers, and defenders," *Information Systems Research*, vol. 12, no. 1, pp. 11 - 33, 2001.
- [37] P. B. Cragg, M. King, and H. Hussin "IT alignment and firm performance in small manufacturing firms" . *Journal of Strategic Information Systems*, vol. 11, pp. 109 - 132, 2002.
- [38] T. S. H. Teo and Y. Pian, "A contingency perspective on Internet adoption and competitive advantage," *European Journal of Information Systems*, vol. 12, pp. 78 -92, 2003.
- [39] N. Venkatraman, "The concept of fit in strategy research: Toward verbal and statistical correspondence," *Academy of Management Review*, vol. 14, no. 3, pp. 423 - 444, 1989.
- [40] A. Molla and R. Heeks, "Exploring e-commerce benefits for businesses in a developing country," *Information Society*, vol. 23, no. 2, pp. 95-108, 2007.
- [41] M. Tagliavini, A. Ravarini, and A. Antonelli, "An evaluation model for electronic commerce activities within SMEs," *Information Technology & Management*, vol. 2, no. 2, pp. 211 - 230, 2001.
- [42] [42] Joseph, F. Hair, William, C. Black, Barry, J. Babin, and Rolph, E. Anderson, *Multivariate data analysis*. New Jersey, USA: Pearson Prentice Hall, 2010.
- [43] S. Poon, "Future of small business e-commerce," in *Electronic commerce concepts, methodologies, tools and applications* , Ann Becker, Ed.: Information Science Reference, 2008, vol. IV, pp. 1466 - 1473.
- [44] A. H. Van de Ven and R. Drazin, "The concept of fit in contingency theory," *Organizational Behavior*, vol. 7, pp. 333 - 365, 1985.
- [45] A. H. Van de Ven, "Alternative forms of fit in contingency theory," *Administrative Science Quarterly*, vol. 30, no. 4, pp. 514 - 539, 1985.