Global Co-Operation in the New Millennium
The 9th European Conference on Information Systems
Bled, Slovenia, June 27-29, 2001

FRAMEWORKS TO SUPPORT E-BUSINESS GROWTH STRATEGY

Adi Prananto

Edith Cowan University, Perth, Western Australia
Tel.: (61 8) 9442 1945, Fax (61 8) 9273 8332
a.prananto@ecu.edu.au

Judy McKay

Edith Cowan University, Perth, Western Australia
Tel.: (61 8) 9273 8318, Fax (61 8) 9273 8332
j.mckay@ecu.edu.au

Peter Marshall

Edith Cowan University, Perth, Western Australia
Tel.:(61 8) 9273 8125, Fax (61 8) 9273 8332
p.marshall@ecu.edu.au

ABSTRACT

It has been almost three decades since Nolan proposed his stages hypothesis. Since then several studies on the stages of growth theory appeared in the academic literature. Despite the criticism it received, the s-tages theory is acknowledged by both the academic community and the professional as one of the most popular models to chart the progression of the IS/IT within an organisation. Although the stages model is claimed to have a descriptive as well as prescriptive nature, little has been written on the transition strategy to a more mature stage. Planning an e-business initiative involves consideration of several important issues. The decisions and considerations regarding these issues or dimensions of e-business should be integrated to form a consistent, coherent and complete strategy for the e-business initiative. Using the stages of growth for e-business (SOGe) framework and the e-business support framework, this paper argued that a balanced, holistic and integrated consideration of these issues will lead to an effective and complete e-business strategy.

Keywords: *Electronic Business, business strategy, stages of growth.*

1. INTRODUCTION

Despite the criticism on the stages theory in Information Systems (see King and Kraemer, 1983; and Benbasat et.al., 1984), the stages of growth model is a popular framework for describing the typical

development patterns of organisational information systems (Benbasat et.al., 1984; Saaksjarvi, 1985; King and Teo, 1997). The authors' recent endeavour on the stages model and e-business found that the stages model is a useful framework to describe an organisation's current position as well as a range of possible position in the future in terms of their e-business maturity (McKay, et.al., 2000a; and McKay, et.al., 2000b). Hence, the stages model is also acknowledged as having partly descriptive and partly prescriptive nature (McKay, et.al., 2000a; and Earl, 2000). However, although the model is claimed to be partly prescriptive, there is little information on on how an organisation should "migrate" to to another stage of maturity and what strategy should be used.

Developing and managing e-business strategies is clearly vital to any successful venture currently implementing e-business. There is a range of issues to think through as an organisation embarks or progress through on its e-business initiatives. It is argued, therefore, that what is required is a more holistic approach to the adoption and implementation of e-business, one that is cognisant of and sensitive to a range of business changes and issues that must be addressed if a range of e-business opportunities is to be successfully embedded in the business activity of an organisation while at the same time trying to mitigate any side-effect that might emerged. The aim of this paper is not to impose on a set of strategy, as the authors believe that organisations are unique and therefore need a tailored strategy based on their unique characteristics and their business needs. Rather, the paper identifies issues need to be considered when organisation embark on creating a strategy for their e-business initiatives.

2. STAGES OF GROWTH MODEL IN INFORMATION SYSTEMS

One of the best known stages of growth model related to organisational information systems is the 'stages of growth model' developed by Nolan (see Nolan, 1973). Nolan's first 'stages of growth model', later extended by Gibson and Nolan (1974) and Nolan (1979), is probably the first to attempt to relate the transition of IT management processes to the maturity of IT. From its inception, the stage hypothesis received a significant amount of attention from both practitioners and members of the academic community (Benbasat et.al., 1984). Since then, four other stages of growth models in IT have been postulated (i.e. Earl in 1993; Bhabuta in 1988; Hirschheim et.al. in 1988; and Galliers & Sutherland in 1991).

The emergence, rapid growth and interest in Internet and e-commerce have seen the parallel development of a number of stages of growth models trying to capture and describe the various phases involved in moving towards greater sophistication with respect to the use and management of IT in the new E-business environment. Amongst these are the E-Commerce Maturity Model (KPMG, 1997), the Commitment-Implementation Matrix Model (Stroud, 1998), the E-Commerce Levels (O'Connor and Galvin, 1998), the E-Business Lifecycle Model (Berryman, 1999), and the Internet Commerce Maturity Model (Poon, 1999b). These models basically assume that organisations pass through increasingly mature stages with respect to the way they use and manage IT to involve themselves in a variety of e-commerce activities. Most of the models cited above recognise 3-4 distinct stages, with organisations moving from no presence on the Web, through a static, informational presence ultimately to full-blown electronic business-to-business and business-to consumer trading wither over the Internet and/or using dedicated IOSs.

All of these models are premised on the idea that organisations pass through notional 'stages' of maturity or sophistication with respect to the way they use and manage IS/IT to support and facilitate business activities, processes and operations. The work by Adizes (1979), Greiner (1972) and Quinn and Cameron (1983) indicates that there is a consistent pattern of development that seems to occur in organisations over time, in which the organisational activities and structures in one stage are not the same as the activities and structures present in another stage. Hence, the authors of the stages theory suggest that changes that occur in organisations follow a predictable pattern that can be characterised by developmental stages (Quinn and Cameron, 1983). These stages are sequential in nature, occur as a hierarchical progression that is not easily reversed, and involve a broad range of organisational activities and structures (Lavoie and Culbert, 1978). The progression through the stages can occur in rapid sequence or they can be very slow in developing (Kimberley, 1979; and Cameron and Whetten, 1981). It is also suggested that there are inherent problems

and issues in each developmental stage that the organisation needs to resolve before successfully advances to a more mature stage (Greiner, 1972).

3. E-BUSINESS PROGRESSION MODEL: THE SOG-E MODEL

One major weakness of the existing stages of growth models emerged when it is applied to assess an organisation's e-busines activity. The IS/IT stages of growth models concentrate solely on the issue of a "traditional" IS/IT, or the "back-office", within an organisation without considering the impact of the Internet technologies in the organisation. This is understandable, as the IS/IT stages of growth models were developed before the burgeoning of the Internet technologies, the emergence of e-commerce and an increasingly interconnected world of e-business. On the other hand, the Internet based stages of growth models focused solely to the Internet or e-commerce side of the organisation, or the "front-office", while paying less or no attention to the more traditional IS/IT.

If the important limitation of the existing model is to be overcome, then a model is required that is able to take into account not only increasing sophistication with respect to traditional IS/IT use in organisations (primarily back office applications and technologies), but which is also able to embrace the various stages of increasing maturity of use and sophistication of the newer, front office systems and technologies that characterise the world of e-commerce. Hence, it seems vital to integrate the two models, and to recognise and acknowledge that arguably, true e-business sophistication will only be apparent when "front office" and "back office" applications and technologies are seamlessly integrated in the pursuit of organisational efficiencies, effectiveness gains, and competitive advantages. Thus, it seems inevitable that stages of growth models be developed to account for the Internet-based IT activity in organisations, alongside traditional notions of IS/IT usage in organisations.

An integrated model of e-business maturity can be achieved through mapping the Internet based stages of growth model onto the IS/IT stages of growth model. The result is called the SOG-e Model (Stages of Growth for E-Business) as illustrated in figure 1.

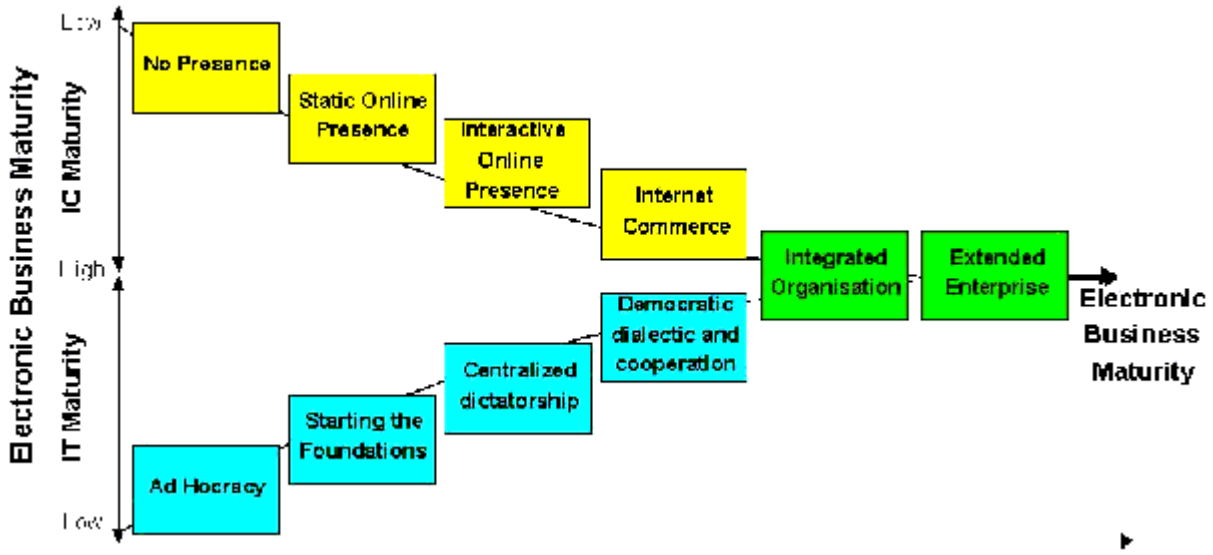

Figure 1: *The SOG-e model*

As with all other stages of growth models, the SOG-e model assumes that the normal progression is from less mature to increasing sophistication over time. Being at a more mature level assumes an accumulation of the knowledge, experience, skills and expertise of all the previous levels. An important new dimension of the SOG-e model however, is to recognise that within the same organisation, there may exist different levels of maturity for the different components of IT use. Thus it is conceivable that an organisation may be at Stages 3 or 4 with respect to its use of traditional IS/IT, but may still be at Stage 2 (for example) with respect

to its maturity in e-commerce. In much the same way, an organisation may have evolved quite quickly to Stage 4 (transacting over the Internet) without having achieved equal maturity with its "back office" IT. To be at Stage 5 or above on the SOG-e model, however, by definition implies at the very least integration of "front" and "back" office applications and technology.

The SOG-e model is useful as a framework to help practitioners understand and describe the current state and position of an organisation with respect to e-business, including an assessment of maturity with respect to e-commerce, in addition to an understanding of the maturity of an organisation's "back office" IS/IT investments. An evaluation of the organisation's progress with respect to a number of "state variables" (the seven Ss) is enabled and supported by the path of maturity, progress and increasing sophistication with e-business that is depicted by the model. The strengths and weaknesses of the current position of all facets of an organisation's IS/IT can be assessed. Further, a clear understanding of the current position, together with the prescriptive picture that the model provides, can guide future planning and strategy formulation with respect to e-business. Thus the model could be viewed as a guide to understanding, diagnosing and evaluating the current position as well as providing insights and guidance on future progression and direction in e-business, including the realisation of future business benefits. A more thorough description of the SOG-e model can be found in McKay, et.al. (2000a) and McKay, et.al. (2000b).

4. ISSUES OF E-BUSINESS STRATEGY

In planning or strategy formulation for e-business there are a number of issues that need to be considered, including the appropriate investment in information systems and technology, the reengineering and redesign of business processes and so on. However, before these issues are reviewed there needs to be a broad strategy formulation effort that decides on what is to be done, the drivers and rationale of this "what", and in very broad organizational terms, how it is to be done.

The strategy formulation will, of course, involve an investigation and analysis of both the external business environment and the resources and competences of the organisation. The resources and competences needed for the e-commerce initiative, of course, need not all be found within the organisation. As with the bricks and mortar or traditional part of the business, market requirements may well be best met by alliance with or outsourcing to business partners (refer to Marshall and McKay, 2000a, for more details on such a strategy formulation approach).

Once the broad thrust of the strategy has been decided, the organisation must then turn to a number of issues to ensure successful adoption and implementation of e-commerce. Marshall and McKay (2000b) identify five major issues to support strategy formulation in e-business, these issues include the following:

- Investment in suitable information systems and technology
- Appropriate reengineering and redesign of business processes
- Effective marketing and customer relationship management
- Efficient and effective acquisition and management of resources and relationships
- The development and management of an efficient and effective logistics or distribution capability

Further, Marshall and McKay (2000b) fuse these issues together into a cohesive and integrative framework. This framework is illustrated in figure 2. There follows a brief review and analysis of each of these issues for the planning of an e-business initiative.

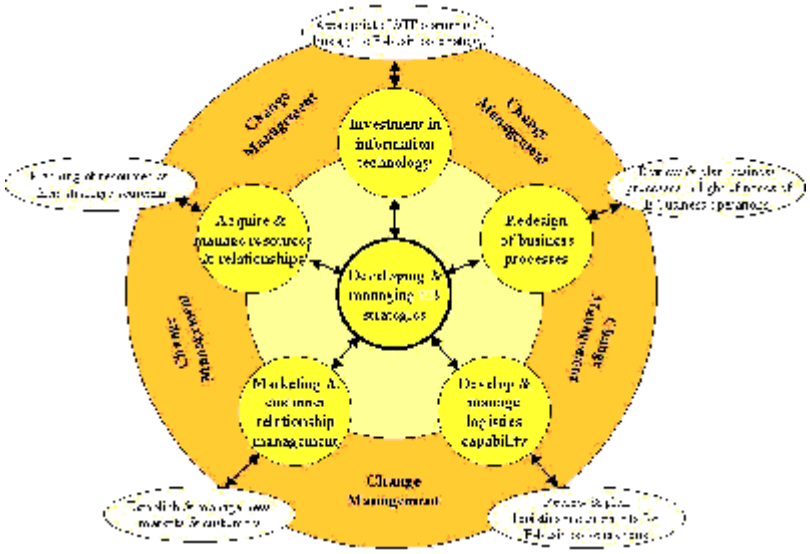

Figure 2: *A framework to support e-business adoption and implementation (adapted from Marshall and McKay, 2000b)*

Investment in Appropriate Information Systems and Technology

The adoption of an e-business capability requires investing in appropriate systems and technology. A careful consideration in IS/IT investment especially needed when organisations moving towards the last 2 stages of maturity of the SOG-e model. Aligning the front-end and the back-end systems and technology is crucial in order to provide a flawless flow of information and guarantee the compatibility of the technology. Planning this investment in information systems and technology requires the strategy formulation or strategic planning exercise referred to above to be followed by information systems planning (IS planning) and information technology planning (IT planning) respectively. The usual relationship between these planning domains is shown in Figure 3.

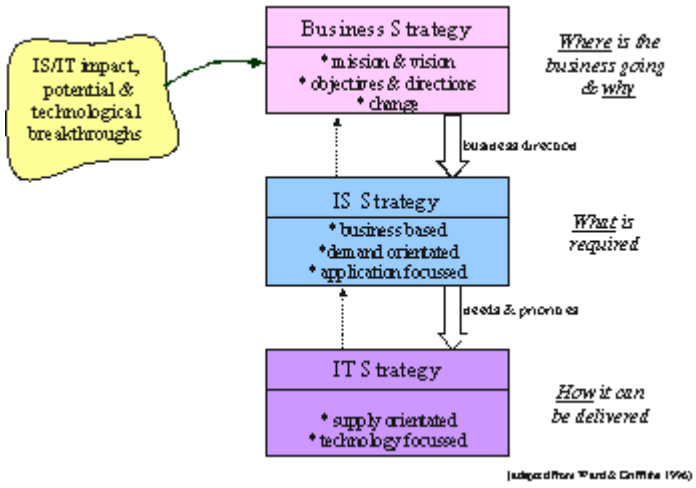

Figure 3: *The relationship between various forms of planning*

This relationship has been described elsewhere (Marshall and McKay 2000a, Ward and Griffiths 1996). However it is noted here that planning for e-business is so central to business planning or strategic planning that the coupling between strategic planning, IS planning and IT planning is likely to be very close. Business issues and issues regarding information systems and technology are much more likely to converge when e-

business is being discussed, than when in years past, systems and technology issues tended to focus on support for the "back office" systems of finance, accounting, manufacturing, and the like.

Having identified the required systems and technology functionality for the organisation's e-business undertakings, the e-business planning team must determine whether the organisation is going to utilise, or perhaps develop, its own IS/IT expertise or use another organisation or organisations to provide the expertise. Waiting to provide information systems and technology expertise to organisations adopting and implementing e-business are Internet Service Providers (ISPs) and Application Service Providers (ASPs), as well as the usual IS/IT outsourcing vendors. We note however that there are the issues of Internet based systems for advertising, selling and accepting payments over the Internet, as well as the reengineering and reworking of internal systems so that the "front office" Internet based systems integrate in a coherent way with the more traditional "back office" systems of finance, accounting, manufacturing, distribution and the like. Such consultants need, however, to take a whole-of-business view rather than a limited technical perspective only.

Appropriate Reengineering and Redesign of Business Processes

An e-commerce capability, for example, particularly one involving selling across computer networks and distributing products to customer's homes, will require the design of new business processes. Selling on-line, processing on-line payments and managing inventories for the delivery of on-line sales to customer's homes are examples of these new processes. However, it is also likely that adding an e-commerce capability to an existing business will require reengineering of many existing processes. Of course, the nature and extent of this reengineering effort will depend on some fundamental strategic decisions made by the organisation at the early stage of strategy formulation mentioned above. If the organisation decides to closely integrate physical and virtual operations then extensive reengineering of business processes will likely be needed. If the organisation decides to keep its e-commerce operations very separate, then perhaps, very little reengineering of existing processes will be necessary. As mentioned above, Gulati and Garino (2000) consider some of the strategic options involved in this fundamental decision. There is however, much less discussion in the literature on the operational and business process issues involved in a tightly coupled physical and virtual business operation.

Effective Marketing and Customer Relationship Management

An organisation that is planning an e-commerce capability needs to review its marketing and customer relationship management activities. Consideration of the Internet in terms of marketing, sales and support activities includes considering the potential role of the Internet in expanding and improving market research and market testing, in product/market extension, in market exposure, in prospect generation and contact, in sales channel support, and in post-sale customer support (Stroud 1998). In *market research and testing* one must consider, among other things, the potential of the Internet for gathering feedback from a large and geographically distributed audience of people. In terms of *product and market extension* there is a need to consider the capacity the Internet to change and extend the nature of an organisation's products and markets. Some of this may have been determined in the strategy formulation sessions, but these issues are worth returning to with more focus and more operational detail. Included in product extension possibilities, is the delivery of digital products such as news, software and music over the Internet. The possibilities for mass customisation of the organisation's products also need to be reviewed and thought through when considering product enhancements/extensions (Gilmore and Pine 1997). In terms of increasing *market exposure* there is a need to consider the Internet as a channel for advertising the organisation and its products. In terms of *post-sales customer support* there should be consideration of the Internet in terms of its potential to both serve customers better with post-sales information, and also to help maintain a continuing dialogue with customers or business partners.

Effective and Efficient Acquisition and Management of Resources

An e-business initiative will need additional resources and require the integration and use of a number of capabilities, both human and technological. Those investigating such initiatives need to assess the resource requirements for such an initiative, and then look at how best to acquire and manage such resources. This has already been determined for information systems and technology. However, one now needs to look at the financial, human resources and physical asset implications of the e-business initiative. The requirements for each resource type need to be carefully determined and set out in a feasible and realisable time-phased plan.

It may be found that the best, or perhaps the only way, of building an e-business capability in a reasonable time period is via building and managing alliances with business partners and/or entering into relationships with outsourcing vendors of various types (Grenier and Metes 1995, Impact Programme 1998, Chesborough and Teece 1996). This may be done to obtain specialist consulting services such as strategic planning, IT management, and the like, or it may be done to achieve various functional capabilities such as IT services, warehousing and distribution. Thus the resource requirements, as well as their mode of procurement and management, are planned and costed, thus ensuring the overall e-business strategy is feasible.

The Development and Management of an Efficient and Effective Logistics or Distribution Capability

One possible scenario for the e-business initiative is allowing customers to use the new channel of the Internet for the buying of and payment for goods and services. Customers expect physical goods and personal services to be delivered to their homes or businesses. Thus a very important consideration in the e-commerce initiative is the development of an efficient and effective logistics capability. A number of other issues may need attention. Distribution planning may need to be improved if delivery is going to be promised within tighter time windows. The time period over which deliveries are being planned for the e-commerce initiative may be different from that which holds the present. Prices for delivery may be altered for competitive reasons on entering the world of e-commerce. Thus the review, in fact, should range over all distribution and warehousing issues, including the handling and packaging of goods. Any necessary changes in warehousing and distribution will then, hopefully, the anticipated. The logistics capability, especially in organisaitons embark on online trading, is such an important capability that needs careful attention.

5. THE SYNERGY OF THE FRAMEWORKS

Models of maturity may be used for descriptive or prescriptive purposes (Nolan, 1973; Galliers and Sutherland, 1994; McKay, et.al., 2000a; and Earl, 2000). The stages of growth models may be helpful to describe and evaluate an organisation's maturity and sophistication in its use and management of the IT resource, for the purposes of enhanced and shared understanding. The descriptive nature of the SOGe model can be used to outline and describe the organisation's current position in terms of its e-business activities. The need to identify the current stage of maturity is paramount, otherwise subsequent strategic steps and guidelines become impossible to follow (Benbasat, et.al. 1984).

It is also conceivable that the SOGe model can be used somewhat prescriptively in a planning sense, both outlining a possible direction for migrating towards greater sophistication in deployment of IS/IT throughout the enterprise and also helping to strengthen the link between IS/IT investments and initiatives and business objectives.

An important function of the SOGe model is also to consider issues concerning the management and organisation of the IS/IT function as the organisation progresses to greater sophistication in its use of IS/IT. Any given stage of growth is characterised by a subset of problems which are dominant at that point in the firm's history. A prior ability to identify those management practices which may be used to overcome the new issues to be faced as each stage is entered would give managers confidence in their ability to manage orderly stage transitions (Drury, 1983). Marshall and McKay's (2000b) framework plays a significant role in

this process. The framework can provide a comprehensive view on crucial issues that need to be addressed in order to create an effective strategy for the progression of e-business.

Hence, when progressing from one stage to another, it is essential to have an in-depth understanding of where the organisation currently is and the future direction it may take in the future. This can be done by charting the Internet and the IS/IT activities using the SOGe model. Marshall and McKay's framework then can be used to guide the planners to identify and describe any significant problems or challenges associated to the relevant stages and for the transition from one stage to another stage of maturity. By using the two frameworks in tandem, a holistic and integrated view of the systems can be achieved. A holistic and integrated view and understanding is needed in order to assure a successful transition to a more mature stage of e-business. An illustration of the synergy of the two frameworks is provided in figure 4.

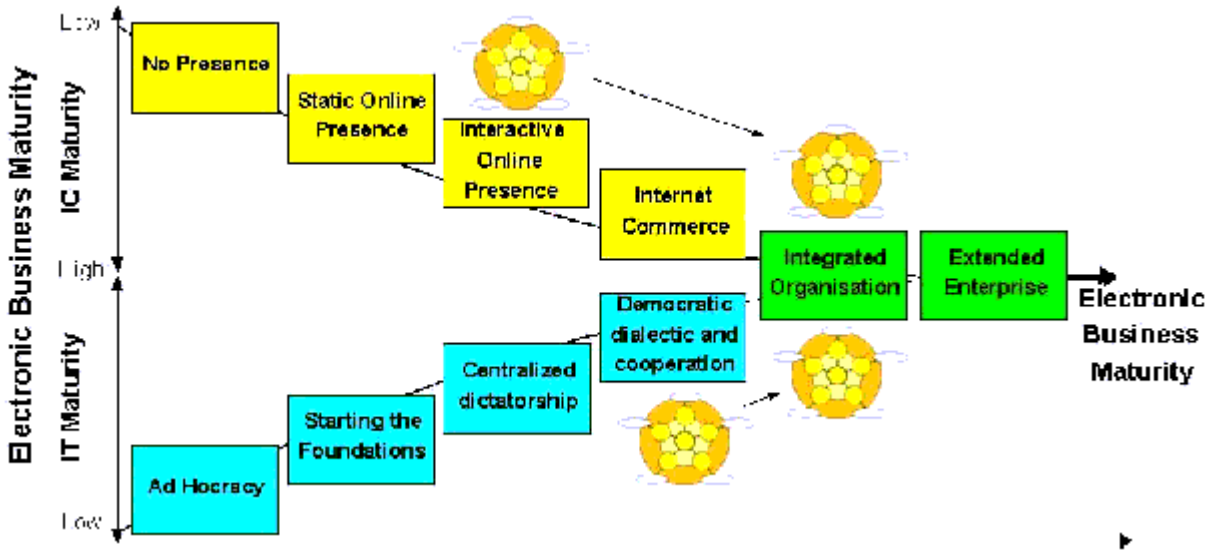

Figure 4: *Illustration of the synergy between the SOG-e and the 5 issues.*

It is also important to realise that problems arise during this exercise need to be addressed and resolved properly. At a more extreme view, organisations that do not successfully resolve their problems are expected, in general, will not be able to advance in stage, or consequently not to grow as fast as organisations that do resolve their problems (Greiner, 1972). However, we concur that eventhough the organisation has not resolved these problems, there are possibilities that organisations may still advanced to the designated stage. The organisations in this criterion need to be aware of possible "disharmony" that might stem from the unresolved issues.

Once the particular concerns highlighted by the frameworks have been individually considered, it is suggested that the overall strategy is reviewed in the light of the learning that has occurred. It may be that the original strategy formulation will be found to be still suitable as it stands. On the other hand some alterations and enhancements to the strategy may be necessary. The strategy formulation, informed via some of the detailed and operational considerations from the deliberations guided by the frameworks, should position the organisation well for embarking on its e-business initiatives.

6. CONCLUSION

The stages of growth model is capable to provide a clear description and understanding of an organisation's current position as well as its possible alternatives in which the organisation can evolve to in the future with regards to its e-business initiatives. However, in progressing through the stages, there are issues need to be considered to ensure a smooth transition and mitigate potential problems that might arise during and/or after the transition. The understanding of the organisation's current position and future direction as well as these issues are needed in creating a feasible 'evolution' e-business strategy. Using the 2 frameworks described in

this paper in tandem, a holistic and balance view can be achieved. Hence, an organisation is able to devise an effective and complete e-business strategy when progressing through to a more mature level of e-business activities, rather than a fragmentary strategy that is myopically focused on just one or two dimensions.

The SOGe framework proposed in this paper has been tested in a medium public sector organisation, and has been proven very useful to incite discussion during planning session among senior management. Further research is currently underway to validate and fine tune the model.

REFERENCES

Adizes, I. (1979). Organisational passages: Diagnosing and treating life cycle problems in organisations. Organizational Dynamics, vol. 8, no. 1, pp. 3-24.

Benbasat, I., Dexter, A.S., Drury, D.H., Goldstein, R.C. (1984). A critique of the stage hypothesis: Theory and empirical evidence. Communications of the ACM, vol. 27, no. 5, pp. 476-485.

Berryman, E. (1999). Getting on with the Business of E-business. PriceWaterhouseCoopers, USA.

Bhabuta, L. (1988). Sustaining Productivity and Competitiveness by Marshalling IT. In Information Technology Management for Productivity and Strategic Advantage, Proceedings of the IFIP TC8 Open Conference, Singapore.

Cameron, K.S. and Whetten, D.A. (1981). Perceptions of organization effectiveness across organizaitonal life cycles. Administrative Science Quarterly, vol. 26, p. 525-544.

Chesborough, H.W. and Teece, D.J. (1996) When is virtual virtuous? Harvard Business Review, 74(1), pp65-73.

Drury, D.H. (1983). An empirical assessment of the stages of DP growth. MIS Quarterly, vol. 7, no. 2, pp. 59-70.

Earl, M.J. (1983). Emerging Trends in Managing New Information Technologies. In The Management Implications of New Information Technology, N. Peircy, (ed.), Oxford Centre for Management Studies, London.

Earl, M.J. (2000). Evolving the e-business. Business Strategy Review, vol. 11, no. 2, pp. 33-38.

Galliers, R.D. and Sutherland, A.R. (1994). Information Systems Management and Strategy Formulation: Applying and Extending the 'Stages of Growth' Concept. In Strategic Information Management: Challenges and Strategies in Managing Information Systems, R.D. Galliers and B. S. H. Baker (eds.), Butterworth-Heinemann Ltd., Oxford, pp. 91-117.

Gilmore, J. H. and Pine B. J. (1997) The Four Faces of Mass Customization. Harvard Business Review, Boston, 75(1), pp 91-101.

Greiner, L. (1972). Evolution and revolution as organizations grow. Harvard Business Review, vol. 50, no. 4, pp. 37-46.

Grenier, R. & Metes, G. (1995), Going Virtual: Moving Your Organization into the 21st Century, Prentice Hall, New Jersey.

Gulati, R. and Garino, J. (2000) Get the Right Mix of Bricks and Clicks., Harvard Business Review, 78(3), pp107-114.

Hirschheim, R., Earl, M., Feeny, D., and Lockett, M. (1988). An Exploration into the Management of the Information Systems Function: Key Issues and an Evolutionary Model. In Information Technology Management for Productivity and Strategic Advantage. Proceedings of the IFIP TC8 Open Conference, Singapore, 1988.

Impact Programme (1998), Exploiting the Wired-Up World: Best Practice in Managing Virtual Organisations. [On line] Available at http://www.achieve.ch

Kimberley, J.R. (1979). Issues in the creation of organizations: Initiation, innovation, and institutionalization. Academy Management Journal, vol. 22, pp. 437-457.

King, J.L. and Kraemer, K.L. (1983). Evolution and organizational information systems: An assessment of Nolan's stage model. Communications of the ACM, 27(5), pp. 466-475.

King, W.R. and Teo, T.S.H. (1997). Integration between business planning and information systems planning: Validating a stage hypothesis. Decision Sciences, 28(2), pp. 279-308.

KPMG (1997) Electronic Commerce Research Report 1997. London, UK: KPMG.

Lavoie, D. and Culbert, S.A. (1978). Stages in organization and development. Human Relations, vol. 31, pp. 417-438.

Marshall, P. and McKay, J. (2000a) Rethinking Information Systems Planning in Strategic Business Networks. Proceedings of the Americas Conference on Information Systems, Long Beach, California, 13-15 August, 2000.

Marshall, P. and McKay, J. (2000b). A framework to support the adoption and implementation of electronic commerce in SMEs. Paper to be published at Working for E-Business (WEB) Conference, Edith Cowan University, December 2000.

McKay, J., Marshall, P., and Prananto, A. (2000a). Stages of maturity for e-business: The SOG-e model. Conference Proceedings of the 4th Pacific Asia Conference on Information Systems, Hong Kong University of Science and Technology, Hong Kong.

McKay, J., Prananto, A., and Marshall, P. (2000b). E-Business maturity: The SOG-e model. Paper to be published at Australasia Conference on Information Systems (ACIS) 2000, Brisbane, Australia.

Nolan, R.L. (1973). Managing the Computer Resource: A Stage Hypothesis. Communications of the ACM (16:7), pp. 399-406.

Nolan, R.L. (1979). Managing the Crisis in Data Processing. Harvard Business Review, Mar-Apr, pp. 115-126.

O'Connor, J. and Galvin, E. (1998). Creating Value through E-commerce. Financial Times, Pitman Publishing, London.

Poon, S. (1999) "Small business and Internet Commerce: What are the lessons learned?" in F. Sudweeks and C. T. Romm, Eds. Doing Business on the Internet: Opportunities and Pitfalls. London, UK: Springer, pp. 113-124.

Quinn, R.E. and Cameron, K. (1983). Organizational life cycles and shifting criteria of effectiveness: Some preliminary evidence. Management Science, vol. 29, no. 1, pp. 33-51.

Saaksjarvi, M. (1985). End-user participation and the evolution of organizational information systems: An empirical assessment of Nolan's stage model. Communications of the ACM, 29, pp. 181-189.

Stroud, D. (1998) Internet Strategies: A Corporate Guide to Exploiting the Internet. London: Macmillan Press Ltd..