December 1997

The Role of Information Systems Planning in Hong Kong Business

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Executive Summary
Information systems planning (ISP) has become a key management issue for both practitioners and academic researchers because of the increasingly significant impact of IS on organisations' operations and the need for many organisations to develop a long-term vision that will enable IS to play a more strategic role.

The potential to obtain substantial benefits from IS planning, as well as the problems encountered in the planning process, have made the evaluation of IS planning an important issue for both researchers and practitioners.

This study addresses a variety of issues related to IS planning including analysing the planning practices of organisations, their impacts on organisations, and the effects of some organisational/environmental factors on IS planning practices. A conceptual planning model, which identifies the various components and links of the IS planning system, is used as a framework for evaluation. A field survey of IS planning practices of firms in Hong Kong provides the data for the study.

Major factors considered in the study were:
- planning time horizon
- planning methodologies used
- criteria for evaluation of IS, and
- contribution of IS to organisational performance.

Nearly half of the respondents indicated that their IS planning time horizon is two years or less with an additional 35 percent indicating a three to four year horizon. The short time frame for strategic planning is mainly attributed to the pace of change in technology. The companies that did plan more than four years in advance were focused more on architecture and infrastructure development.

Regarding planning methodologies, 87% of respondents use a commercial IS planning methodology. With several researchers emphasising the importance of tailoring the IS planning process, this result may indicate that many organisations have not reached a level of maturity in IS planning that enables them to be self-reliant in terms of methodology. Critical Success Factors, Goal and Problem Analysis, Information Engineering, and Customer Resource Life-Cycle were the most cited planning methodologies used.

The primary criteria for evaluating IS was clearly user satisfaction (30%) and contribution to business objectives (25%). Two additional factors proving important were system reliability (13%) and timely delivery (8%).

The final factor considered was the contribution of IS to organisational performance. While it is arguably difficult to measure the full impact of IS on organisational performance, our results indicated that internal efficiency of operations was clearly the most cited contribution (33%). Customer satisfaction (16%), contribution to sales revenue (13%) and contribution to business objectives(13%) were the other factors most often cited.

Overall results indicate that most organisations have some form of IS planning, but there is wide variation in the planning practices among organisations. Organisations are particularly slow to commit to a long-term (over four years) plan of any kind. While the results are varied, this study reveals that organisations increasingly need, and are committing to, developing a better defined IS strategy even if they are not quite sure how to go about it.

Introduction
Over the last two decades the rapid evolution and growth in use of information systems (IS) technology has created a challenging environment for IS management. Information systems are increasingly being used to generate strategic advantage for organisations (Clemons and Weber, 1990). Many firms are diversifying and starting new IS-related businesses based on their strengths in IS. Also, firms such as MCI, VISA and American Airlines are forming value-added business partnerships with other firms, based on synergies in information systems (Konsynski and McFarlan, 1990). These opportunities lead to a complex and dynamic environment for the IS function that is significantly affected by both the internal and external business environments.

Strategic IS planning, which includes all planning activities that are directed toward identifying opportunities for using information technology (IT) to support the organisation's strategic business plans and to maintain an effective and efficient IS function, is being extensively used to deal with this complex environment. It has become a subject of considerable importance in IS research, as well as a key management issue for practitioners.

Although IS planning methodologies display face validity, their real validity and effectiveness have been empirically studied to only a limited extent; results have not conclusively demonstrated the efficacy of IS planning (King, 1988). While researchers and consultants have highlighted the necessity to plan and have developed many planning models and methodologies, results from the field are far less encouraging. In a recent study, researchers found that while some firms have had success with the planning process, others have had major problems and some even had to shelve their planning process (Goodhue, Kirsch, Quillard, and Wybo, 1992). Organisations spend significant amounts of resources on IS planning, and therefore are increasingly interested in determining if the benefits are commensurate with the investment. The significant problems with the implementation of IS plans (Martinsons and Revenaugh, 1996) have raised doubts, among some firms, about the quality of the planning process and its efficacy in firms. There is also some evidence that some of the best known and successful strategic information systems were identified and implemented without formal IS planning (Reich and Benbasat, 1990). These factors have raised serious concerns on the utility of IS planning and made evaluation of IS planning an important management issue.

The simplest and most direct method to evaluate planning systems is to determine if it has an impact on an organisation's financial performance. Such an approach, although attractive due to its simplicity, is fraught with problems. IS planning typically tends to provide more intangible than tangible benefits. Also, various other intervening factors influence a firm's performance. Such an analysis, also, does not provide any indication of the possible reasons for the presence or absence of a relationship between IS planning and a firm's performance. Hence, a more comprehensive evaluation of the IS planning systems is required. It is the purpose of this research to apply a *broad-based* evaluation of IS planning in the Hong Kong business community.

IS Planning Background

The concept of strategic planning for information systems has been discussed for more than two decades and various planning models and methodologies have been developed. Zani (1970) provided perhaps the first conceptual foundation by defining it as top-down planning with an emphasis on linking organisational business strategies to IS planning (ISP). McLean and Soden (1977) developed a comprehensive framework for ISP, describing the different stages of planning and the content of the different levels of plans. King (1978) provided a methodology to link the "organisation's strategy set" with the "MIS strategy set". Rockart (1979) developed the "critical success factor" approach to provide better focus for ISP. Henderson and Sifonis (1988) provided a comprehensive top-down model of IS planning. In recent years, however, some researchers have questioned the traditional top-down model and have suggested other models. Most of these model have yet to be adequately tested.

Currently, one of the most comprehensive research results in ISP is King's 1988 model shown in figure 1. Informational and resource inputs as well as IS planning goals serve as inputs to the IS Planning System which leads to IS planning outputs, which in turn influences business performance.
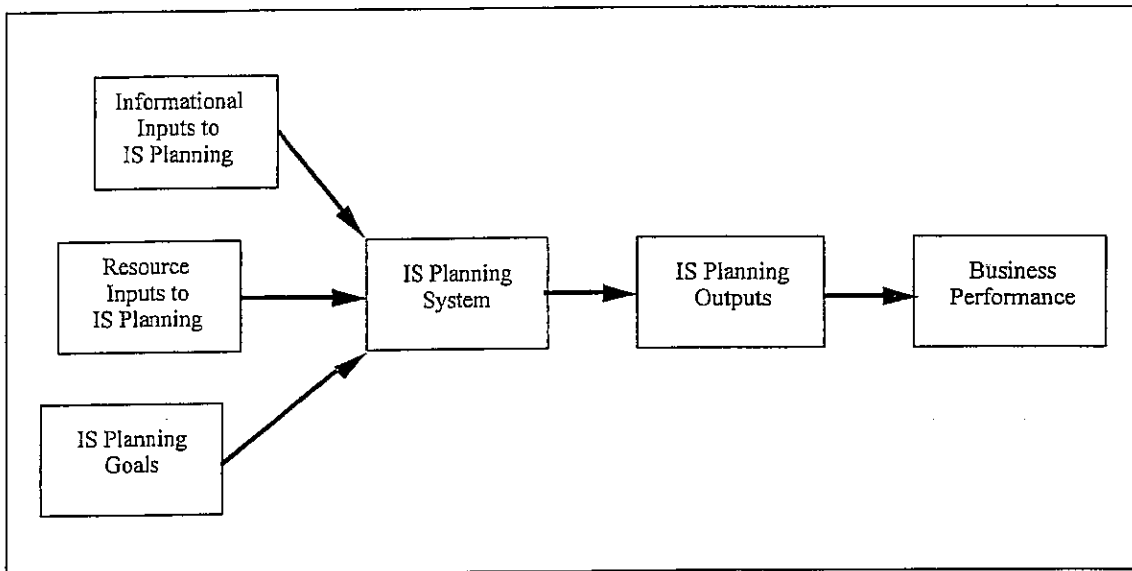

Figure 1. Schematic of model of IS planning in a business (from King, 1988)

King (1988) extended his own model highlighting a number of "evaluation points" shown as various circled capital letters in figure 2. In addition, another element — external standards — has been added to the previous figure. These external standards serve to complement internal standards in the various evaluations that may be made. Assessments made at each of the evaluation points, when viewed as an overall "effectiveness profile", constitute a comprehensive assessment of the IS planning process.
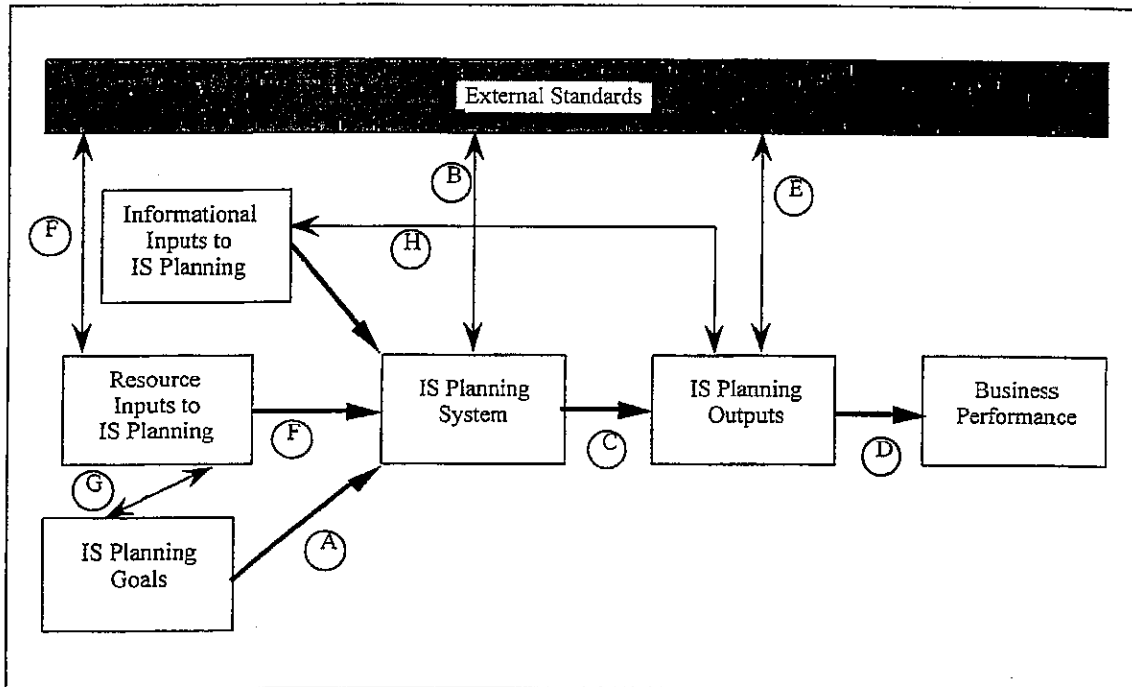
Figure 2. IS planning evaluation framework (from King, 1988)

To investigate IS planning, Premkumar and King (1991) adapted King's previous work to come up with the Information Systems Planning Model (ISPM). It is this model that is applied in the current study.

ISPM is based on input-process-output and is presented in figure 3. The primary inputs to the planning system are the information inputs from business plans and the resources for performing the planning process. The planning system converts these inputs into a set of strategic plans which, when implemented, have impacts on the organisation that are indicated by the "outcome" block in the planning model. A brief description of the various components of the model is provided below.
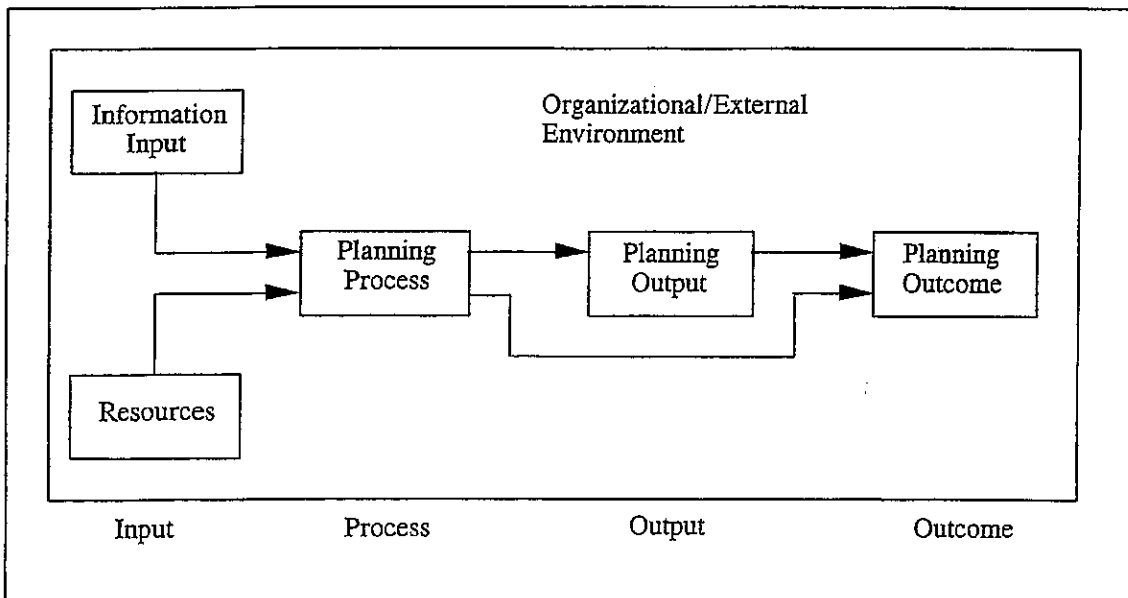

Figure 3. Information systems planning model (from Premkumar and King, 1991)

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Planning Components

The primary information inputs to the planning system are represented by the business plans of the organisation and the intended mission of the IS function. The need to integrate IS plans with the business plans of organisations has been stressed by researchers for almost two decades (King, 1988). The business mission, objectives, strategies, and plans of the organisation provided the necessary background information to guide the IS strategic planning process.

An evolving notion in this context is that this information flow need not necessarily be one-way, i.e. business plans providing inputs to IS planning. There are many instances where organisations have evolved business strategies based on a reverse process in which strategic information systems provide the basis for competitive advantage (Hopper, 1989). It is necessary for top management to have a clear perception of the roles of IS in the organisation and articulate the mission of the IS function to IS management to enable them to plan accordingly.

Informational inputs to IS planning come from users, top management, and the IS planning staff. They are collected from the top management and users through a series of interviews in the first phase of the planning process. Thus, these inputs consume the time and energy of both management and staff of planners. Some education and training is also often required to help the participants understand the planning process and the potential of IS technology in their operations to provide useful inputs to IS planning. Thus, human resources are the primary resource input for IS planning.

The planning process, as depicted in Figure 3, is the core component of the planning system that converts the information inputs into a system of plans that provides strategic directions for the IS function. It is the process of analysing, in the context of information systems, the external environment for opportunities and threats, assessing the internal environment for its strengths and weaknesses, forecasting the IS technology trends and their effects on the industry and the organisation, identifying the users' information requirements, developing an information architecture, and finally developing a set of strategic programmes and plans for effectively managing the IS function. The quality of the planning process is reflected in the extent of detailed analysis of these planning dimensions. Many methodologies, such as IBM's Business Systems Planning (BSP) and Martin's Information Engineering (Martin, 1989), have been developed for conducting the planning process. Organisations also use internally developed methodologies for IS planning.

The plan document (output) highlights the strategic choices that evolve from the planning process. The various strategic choice elements are the IS mission, objectives, strategies, goals, resource allocations, information architectures, and strategic programmes. It provides guidelines for subsequent strategic actions that ultimately determine the impact of IS on the organisation.

The "outcome" element in Figure 3 reflects the impact of strategic IS planning. The plan provides the direction for implementation of the various strategic programmes that impact the organisation (Premkumar and King, 1991). A direct link is also shown between the planning process and outcome, since in some organisations even though the plan may have become obsolete, the active participation of users in the planning process can create an awareness of the potential of IS within the organisation to generate momentum, motivation, and a driving force for initiating new and innovative IS applications (Premkumar and King, 1991). These applications can have significant impacts on an organisation in terms of how it conducts its business, as well as in its overall performance.

Ultimately, the performance of any planning system must be reflected in the performance of the department and the organisation. Hence, three measures of outcome, at the planning, functional, and organisational level, are evaluated. They are:

- The fulfilment of objectives of the IS planning (Planning effectiveness)
- Improvement in performance of the IS function (Functional impact)
- Improvement in performance of organisation due to IS (Organisational impact)

Typically planning is initiated to fulfil certain objectives, and the extent of fulfilment of these objectives can be considered as a direct measure of the effectiveness of the planning system. If the objectives are fulfilled, it can be expected to improve the performance of the IS function; this provides a second measure for planning performance. The ultimate impact of IS planning is felt in organisational performance; this is the measure that will be of interest to top management. This measure of the "bottom-line" benefits, although influenced by various other factors, is an important element of the evaluation process. Instead of evaluating the impact based on absolute financial measures, which could be influenced by many other factors, a better approach would be to obtain perceptions of the IS contribution to some of these measures, which could effectively factor out the extraneous influences.

Organisational/Environmental Factors and IS Planning

The overall IS planning system functions within an organisational context. Hence, various characteristics of the organisation and its external environment may significantly impact the planning system. These are shown in Figure 3 as the environment enveloping the IS planning system. The specific organisational variables that are considered in this study are:

- Industry
- Role of IS in the organisation
- Quality of the strategic business planning system

Industry. Industries have varied requirements for information and information technology in their business operations. We can expect industries that are more information intensive to be more dependent on information systems, to have a better quality IS planning process, and to have a greater contribution by IS to the organisation's performance (Premkumar and King, 1991).

Role of IS in the organisation. Researchers have found that IS plays various roles in organisations and that planning priorities, focus, and scope, differ based on the role of IS in the organisation. The "strategic grid" was used in this study to identify the role of IS in an organisation. The "strategic grid" is a 2 x 2 matrix formed by two dimensions --strategic impact of future application, development portfolio on one axis and strategic impact of existing systems on the other, as shown in Figure 4.
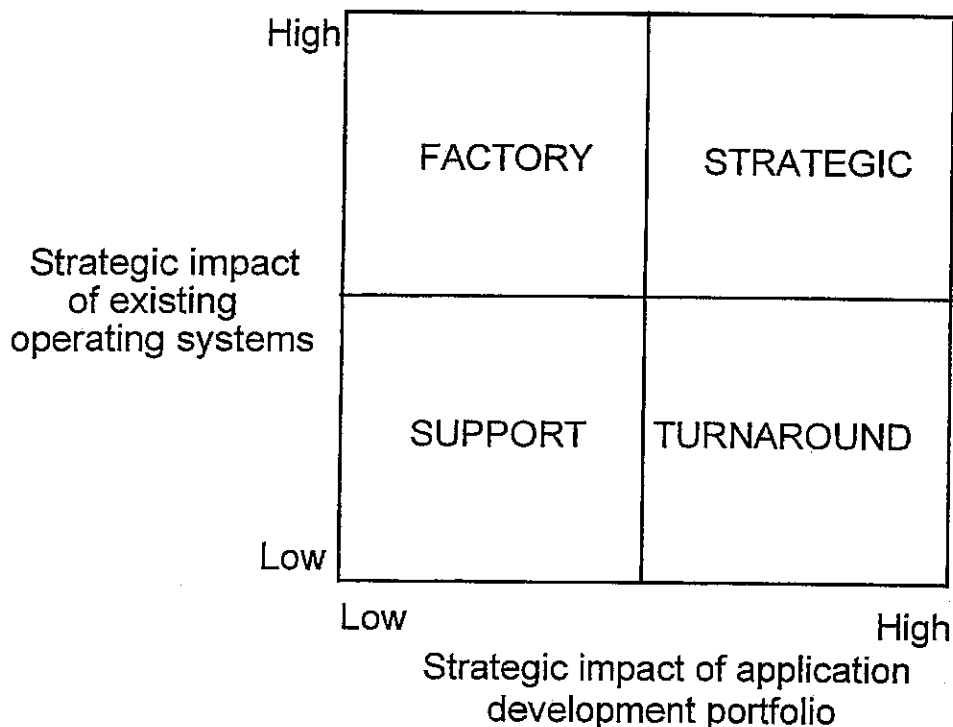

Figure 4. Strategic Grid (from Cash, McFarlan, McKinney, and Vitale, 1988)

Organisations in the "strategic" group are critically dependent on IS for their present operations and have systems under development that are critical for their future operations. Organisations in the "support" group use IS mainly for support services and are not critically dependent on it for either present or future operations. Organisations in the "turnaround" group, although not having a significant impact of IS on their present operations, are developing IS applications that can have a significant impact on their future operations. Organisations in the "factory" group have reached a certain level of saturation with respect to use of IS and are not planning to develop new IS applications that can have an impact on their future operations.

IS planning practices in these four groups vary considerably. Planning for firms in the support generally will be directed toward tactical and operational issues, while for firms in the strategic and turnaround group it will be directed toward strategic issues.

Quality of the strategic business planning system. The strategic business planning system provides long-term strategic directions for the IS function. In some instances the strategic business plan is itself used in the IS planning process for developing the initial business function model. For example, Brancheau and Wetherbe (1987) report that in Pillsbury Foods the strategic business plans were used directly to define the primary business mission and strategies, the major business functions and their critical information needs, all of which form the basis for further analysis in IS planning (Premkumar and King, 1991). This helps to reduce some of the time spent by senior management in defining the strategic vision of the business during IS planning. With increased used of IS as a strategic tool in business plans, we can expect greater impact of the quality of the business planning system on IS planning.

Research Design And Sample
Based on the guidelines provided by Churchill (1979) and the questionnaire items suggested by Premkumar and King (1991), the questionnaire were designed as succinctly as possible with multiple indicator items. All items were measured on a five point scale by indicating the extent of significance of the items to current operations:

5 – Very Great   4 – Great   3 – Some   2 – Little   1 – None

Availability of information inputs (3 items) assessed the availability of information inputs. The adequacy of resources (7 items) assessed the quality and quantity of various resources (top management, user, IS staff, planning methodology, budget) used in IS planning. The quality of planning process was measured using 13 items that evaluate the three major dimensions - analysis of external / internal business, and technology environment. The planning effectiveness was assessed using 7 items.

Performance was measured using objective financial performance measures such as sales revenue, market share, return of investment, etc. and subjective measures that captured the respondent's perception of the contribution of IS to the firm's performance measures. The head of the IS function indicated the extent of IS's contribution to ten major performance measures.

The data was collected using a mailed survey methodology. The questionnaires were sent to 90 companies in Hong Kong randomly selected from major industries. In order to ensure that the responses reflected the organisation's perspective of IS planning and cover the strategic aspects of IS planning, the questionnaires were sent to the senior executives of the IS department, typically the MIS Manager/ IT Manager or the Chief Information Officer. A total of 24 questionnaires were completed and returned for a response rate of 26.67 per cent.

Responses were received from a variety of industries and from organisations varying in size, ranging from small companies, a software house, to very large companies, such as Hongkong Bank and Oracle. The distribution of response with respect to an industry is shown in Figure 5.

Industry	No. of Respondents
Manufacturing	5
Computers	4
Media/Communication	1
Insurance/Finance/Banking	5
Government	1
Building/Construction/ Architecture and Real Estate	2
Hotel/Catering/Entertainment/ Tourism	1
Retail/Wholesale/Trading	3
Information Services	2
Total : 24	
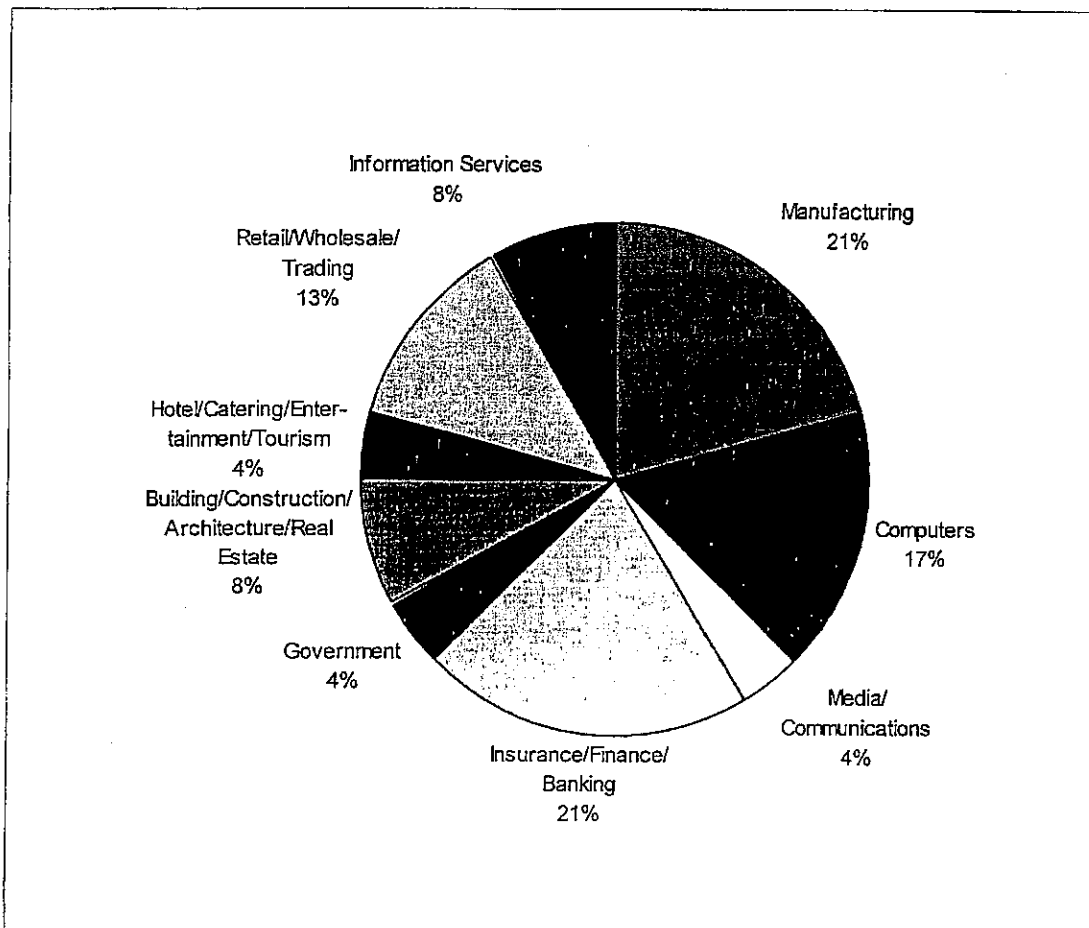
Figure 5. Sample companies by industry category

Results Of The Study

The IS planning characteristics of organisations vary based on a variety factors, including the type of business, the industry in which it operates, the organisational culture and business planning practices, and the role of IS in its business operations. Figure 6 - 9 show the descriptive results of the planning practices of the firms in this study.

Time Horizon of Planning

Figure 6 illustrates the various planning time horizons used by the respondent firms. Forty-five per cent of the respondents have their planning time horizon of 2 and 3 years. According to Sprague and McNurlin (1993), the range of 2-3 years seems to be a reasonable time span to initiate and implement most long-term strategic IS programmes. It is probably in years two and three in the future that the largest improvements can be realised from using a better planning methodology. Although plans for projects in this time frame have been reasonably well developed, they are still open to change because final commitments generally have not yet been made. Project management techniques can have a greater impact on the projects schedule for these years, because the methodologies can be used for the entire projects including the up-front planning.
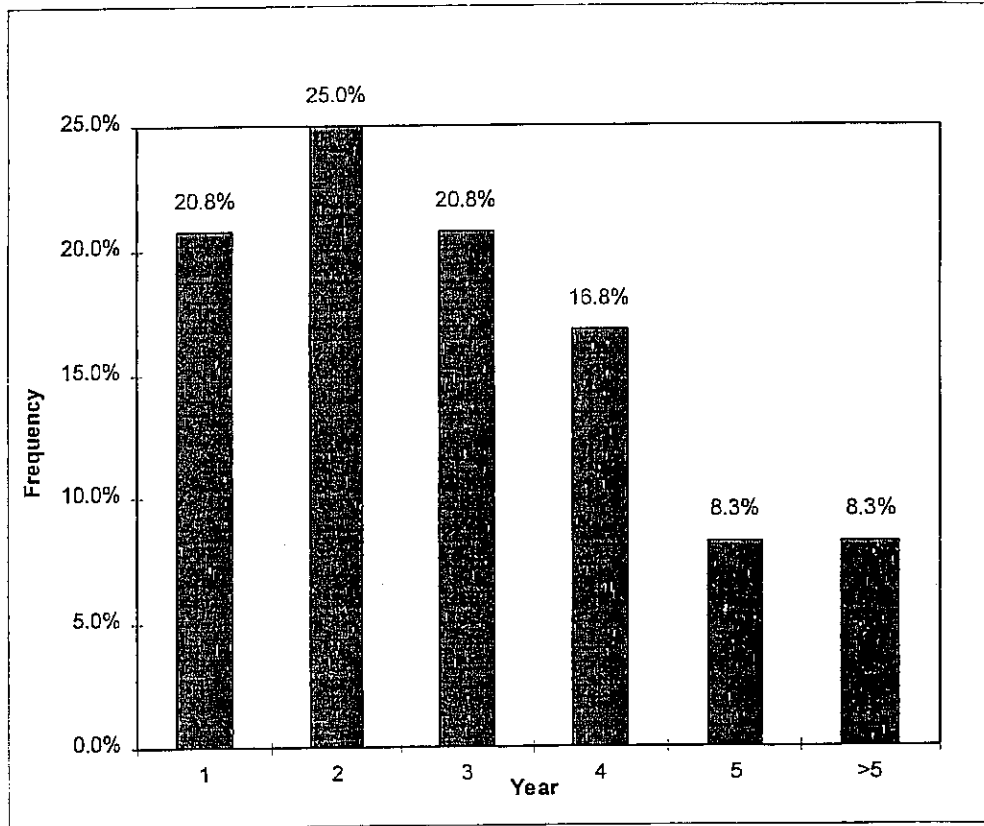

Figure 6. Planning time horizon

For years four and five, companies may not yet have a clear idea of specific projects that will be undertaken. If they are following a long-term strategy, they know generally what they want to be working on, but projects may not have been delineated. However, in years four and five in the future, management has quite a bit of flexibility to plan major projects, if the expertise and facilities will be in place to support the projects. This brings up the point of having an information systems "architecture" and "infrastructure"

A longer time horizon is not preferred because as changes in technology make some varieties of planning beyond 5 years difficult. Yet few are paying attention to the staff capabilities they are likely to need six to ten years ahead, nor planning how to develop those capabilities.

Moreover, planning for less than 2 years becomes useless because most long-term IS programmes take longer than this to develop from a concept to an implementable system. Generally, plans for the coming years are well along and have already been sold to management. The projects are already either under way or will soon start. Commitments have been made on resources, time schedules, costs, and benefits. It is almost too late to make significant changes to the plans without substantial embarrassment. However, some projects can be terminated suddenly, as occurs, for instance, when a steering committee sees that a major project is getting into deeper and deeper trouble, and kills it. In

general, there is not much flexibility in initiating major new projects in the next year, or even in reorienting projects already under way. What can be done in this short time might be to install all improved projects management system; it may help reduce problems in schedules, costs, and performance for the remainder of the projects. In addition, small pilot projects can also be initiated to explore technologies that appear to be promising for the future.

IS Planning Methodology

Figure 7 shows the popular formalised IS planning methodologies in terms of their relative proportion of organisations using each methodology. As shown in Figure 7, only 12.5 per cent of the respondents use an in-house developed methodology, while the rest use a commercial IS planning methodology. The result shows that a high use of well-known commercially-available methodologies. According to Premkumar and King (1991), organisations must tailor their IS planning process to meet the special characteristics of their organisations and the packaged methodologies may not provide sufficient flexibility. The tendency to use commercially-available methodology may indicate that many organisations have not reached a level of maturity in IS planning that enables them to be self reliant in terms of their methodology.
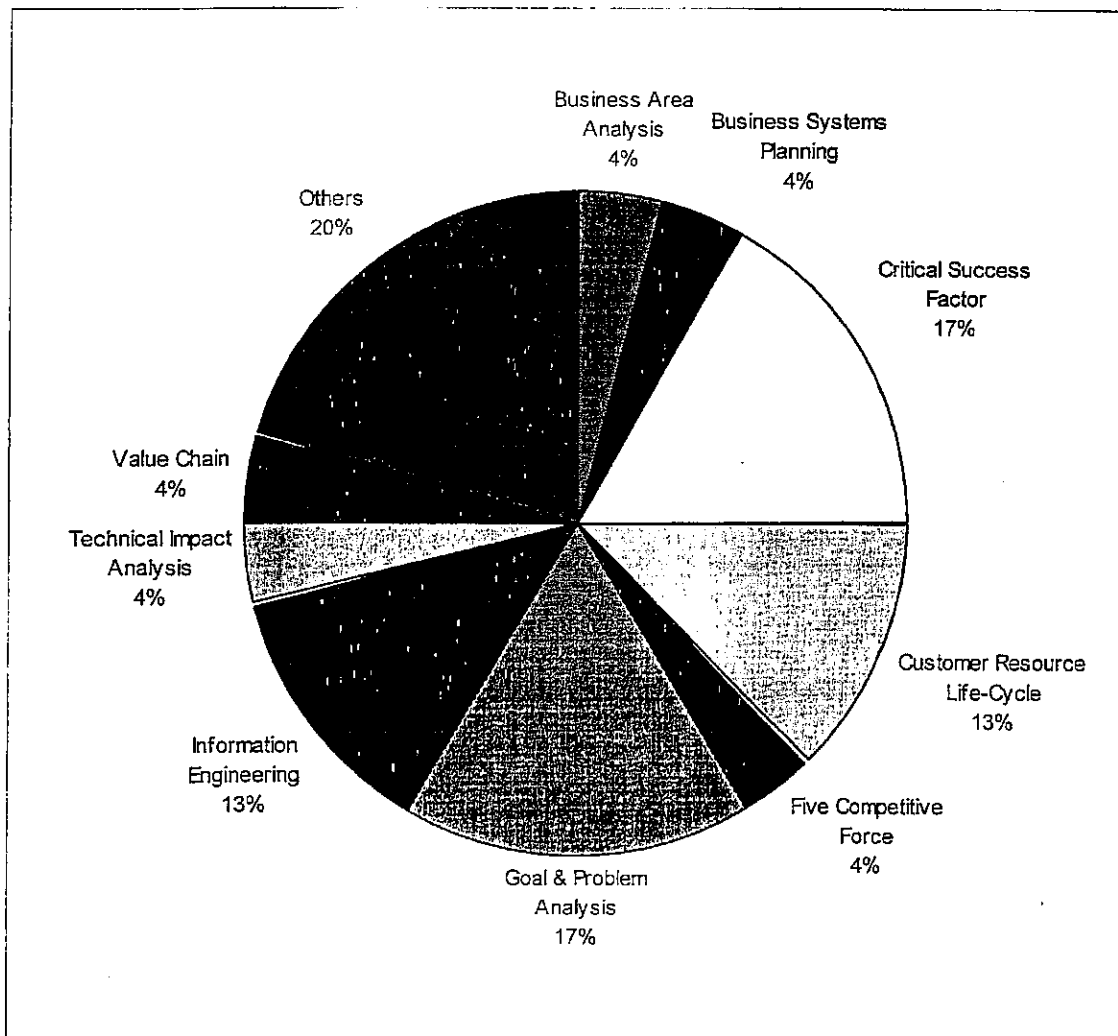

Figure 7. Planning methodologies used

Another factor that was evident was that in many firms the IS planning process was still a centralised process. However, as the organisation reaches a level of maturity in IS planning, then the IS planning process will be diffused throughout the organisation.

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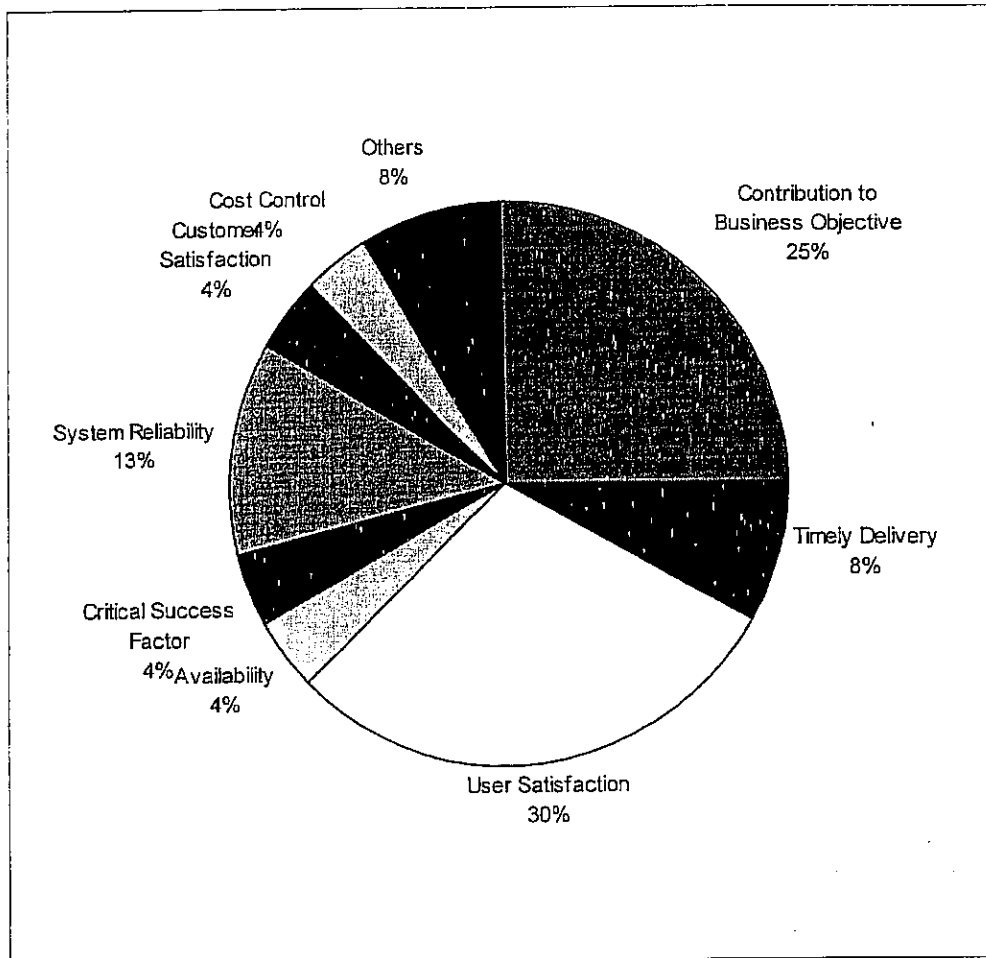**Criteria for Evaluation of the IS Function**

Figure 8. Critereia for evaluation of IS

Figure 8 lists the various criteria used for evaluating the IS function. "User Satisfaction" is the primary criterion for evaluation. Since the primary objective of IS function is to support the user in the performance of his tasks, "user satisfaction" is used as the primary indicator of the performance of the IS function. "Contribution to Business Objective" is also used as an indicator of the performance of the IS function, in line with the concept that IS should contribute to the business objectives. "System Reliability" is an important criterion for firms where computers are critical to their daily operations, such as banking and financial organisations. Another criterion, "timely delivery", may reflect users' concern with the huge backlog that has long been characteristic of IS department. "Cost control" is in line with the traditional budgetary control system in organisations. Other criteria used are, customer satisfaction and availability.

Most of the criteria seem to evaluate the operational aspects of the organisation. It is important to consider other aspects of evaluation that reflect the new role of IS in the organisation, by considering the contribution of IS to various organisational performance measures such as sales revenue, market share, etc. It may initially be difficult to measure the contribution of IS to these organisational performance measures, but unless such evaluations are undertaken, it may be difficult to convince top management of the strategic potential of IS. Such an evaluation helps top management understand the bottom line benefits from IS and will facilitate top management involvement and commitment to IS planning.

Contribution of IS to Business Performance

Figure 9 illustrates the contribution of IS to the business performance. The highest contribution of IS is toward improving the internal efficiency of operations, which is the traditional role of automating the clerical operations and improving office productivity. However, IS planning is also being increasingly used in certain non-traditional roles for improving operations. For example, IS planning is used in an organisation for process redesign of some of its operation activities.
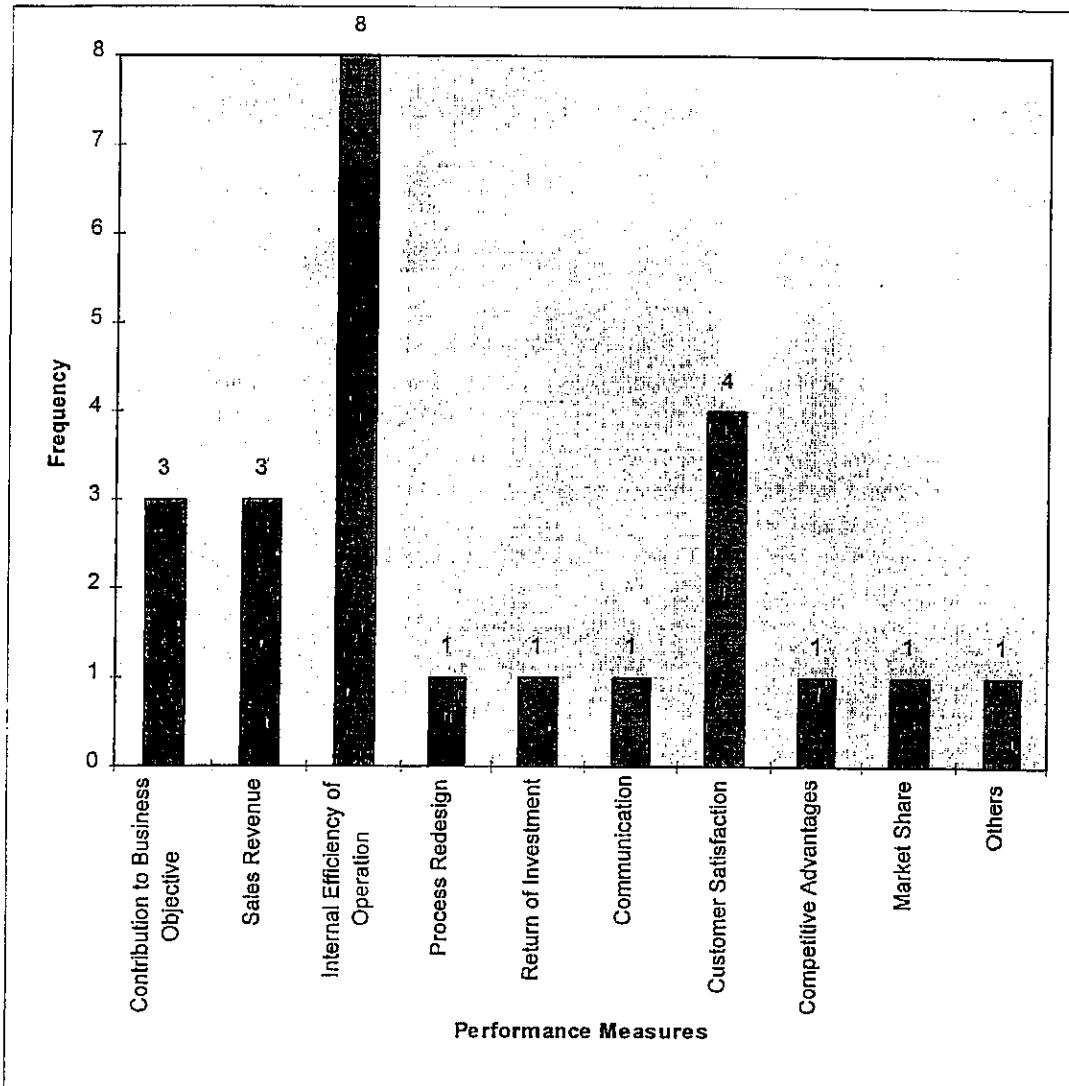

Figure 9. IS contribution to organizational performance

Customer satisfaction is the second highest contribution, which reflects the increased use of information technology, particular in the service sector, to get greater access to customers and to provide better services through more timely and relevant information for customers. Information systems can be used to increase access for customers by installing computer terminals in users' premises, and then providing services such as ordering, inquiring the status of orders, verifying accounting information, checking availability of products, etc. These enhanced services usually improve customer satisfaction and bring them closer to the company.

The contribution of IS to the five objective performance measures – process redesign, return of investment, market share, communication, and competitive advantages – were the lowest, possibly because of the difficulty of linking the improvement in these performance measures to use of specific IS applications. Also, these measures are influenced by a variety of other organisational factors, and they further increase the difficulty in identifying the contribution of IS to these measures. However, concerned efforts need to be taken to identify IS contribution to these measures because these provide senior management with clear indications of the bottom line benefits from information systems.

Difficulties, problems, and obstacles encountered in carrying IS planning
Feedback from the respondents indicated that there were a number of problems encountered in carrying out IS planning. The problems encountered are as follows:-

- Lack of top management support and involvement
- Lack of resources, such as budget, time, and staff
- Lack of experienced skilful staff.

IS planning requires extensive resources, but the availability of resources has been found to be a major problem in organisations. However, various software tools are used to improve the efficiency in resource utilisation by providing better methods for collection and analysis of information.

The implementation of IS plans is also a major problem. Plans are shelved because of a lack of proper implementation plans and migration strategies, lack of resources, the enormity of the changes to existing systems, user and system development groups' resistance to change, and the existing backlog. Hence, proper review and feedback mechanisms and good implementation strategies are considered vital for the success of the overall planning system.

Moreover, the involvement of user and management can help to erase the resistance to change. Assigning skilful staff to delineate an IS plan and manage the implementation can improve the quality of IS planning.

Summary And Conclusion
IS planning has become a key issue for both practitioners and academic researchers because of the increasingly significant impact of IS on firms' business operations and the need for many to develop a long-term vision that will enable IS to play a more strategic role. This study used a field survey to study the planning practices of organisations, its impact on the organisation, and the impact of organisational factors on IS planning practices.

The results of the study indicates that the strategic IS planning has come of age and most firms are involved in some form of strategic IS planning. Although most firms seem to favour using many commercial methodologies, some firms seem to favour using an in-house methodology. It indicates the need for refinement of the planning methodologies to suit the organisational context.

The impact of IS on some of the organisational performance measures such as ROI, market share, and sales revenue should provide the IS manager with sufficient evidence to impress top manager of the bottom-line benefits of IS technology, and thus influence them to allocate sufficient resources to the IS function. Therefore, concerned efforts need to be taken to identify IS contribution to these measures.

In fact, it is important for the IS manger to evaluate the impact of information systems on some of the performance measures to highlight the fact that IS is no longer primarily a support function providing cost reduction/productivity improvement from automation, but can also influence the business operations and strategies of the organisation, and thereby impact other performance measures.

Although such an evaluation exercise may initially be difficult, it is very important to collect sufficient data for such evaluations, especially when major investments are made in IS. The criteria for evaluation of the IS function have also to be modified to reflect the new role of IS in the organisation and create greater awareness and accountability in deployment and use of IS among both users and IS personnel.

The results also highlight the need to allocate adequate resources for planning to maintain a high quality planning process and successful implementation of its recommendations. Many organisations consider planning as a resource drain that affects their daily operations. Hence in times of crises and resource "crunch" in IS, the first activity to be affected is IS planning, since its effects on the function and the organisation are not immediately felt. However, there could be serious long-term implications of a cut-back on IS planning resources.

Moreover, various integration mechanisms, such as participation of IS manager in strategic business planning, close interaction of business planners with IS planners, participation of top management and users in IS planning, and a steering committee that sets direction for the IS function, can be instituted to ensure close integration of business and IS planning. These mechanisms help to broaden the business perspective of the IS manager and also create an awareness among top management, users, and business planners of the strategic potential of IS technology. The innovative use of IS to develop business partnerships has opened up new areas of business opportunities where close interaction between the two planning systems becomes essential to forge successful alliances.

The IS evaluation approach that is adopted here is particularly valuable as a diagnostic tool, since it permits the direct identification of potential IS planning weakness as well as the identification of elements of the planning system that are particularly productive or useful. As such it can form the basis for a comprehensive assessment of IS planning that can guide resource allocations as well as remedial programmes.

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