A Critical Inquiry of Strategic Information Systems Planning Analysis Approaches

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ABSTRACT

Strategic Information Systems Planning (SISP) is critical to assist in the effective use of Information Technology in enterprises. One of the vital components within SISP to ensure its success is to perform an all-embracing enterprise analysis to ensure enterprise requirements are well understood and addressed. Existing enterprise situation analysis approaches which are typically used within SISP process are critically examined to identify perceptible shortcomings. This paper discusses the identified shortcomings and outlines focal requirements for an enterprise analysis approach within SISP to cater for present challenges.

Keywords: Strategic Information Systems Planning, Information Systems, Enterprise analysis, Enterprise model.

ABSTRAK

Perancangan Sistem Maklumat Strategik (SISP) adalah kritikal untuk membantu penggunaan Teknologi Maklumat yang berkesan dalam enterprise. Satu daripada komponen penting dalam SISP bagi mempastikan kejayaannya ialah menjalankan analisis enterprise yang menyeluruh bagi mempastikan keperluan enterprise difahami serta dapat ditangani. Pendekatan analisis enterprise sedia ada yang biasa digunakan dalam proses SISP diteliti bagi mengenalpasti kekurangan mereka. Kertas ini membincangkan kekurangan yang dikenalpasti tersebut serta menggariskan keperluan utama pendekatan analisis enterprise bagi menghadapi pelbagai cabaran masa kini.

Katakunci: Perancangan Sistem Maklumat Strategik, Sistem Maklumat, Analisis Enterprise, Model Enterprise

INTRODUCTION

Strategic Information Systems Planning (SISP) has been identified as vital to ensure continuing enterprise success and has been the key concern of IS

managers for the last two decades. In this age of information and knowledge in which Information Systems (IS) has become ubiquitous in enterprise and has grown in its complexity due to the rapidly changing technology, business environment and strategies, SISP has remained no less important. SISP is defined as the process of identifying critical or prioritized IS that can contribute to the effectiveness and efficiency of the enterprise performance. In the practical sense, SISP has been used by enterprises to search for competitive and value-adding opportunities and to develop policies for integrating, controlling and implementing the IT resource (Grover and Segars 2005). SISP can assist enterprise in many areas which includes making sense of its environment, keeping track of new developments, monitoring how IT is being used by competitors, planning for IT infrastructure and establishing appropriate IS and IT applications to support and influence business strategies and objectives (Salmela and Spil 2002). Several success factors to ensure the effectiveness of the SISP process have also been identified. The factors include (1) fits with the organizational environment and planning culture; (2) be realistic with respect to resources available for planning; (3) provides sufficient capabilities to align IS strategy with business strategy; (4) provides sufficient capabilities to conduct necessary analyses; (5) ensures consensus and support for implementation of the decision and plans; and (6) incorporates self assessment and learning of the planning process. While all of these factors are critical, the first four factors imply that the focal need is to analyze and comprehensively understand the enterprise requirements in order to ensure the plan or actions taken will fit with the overall needs of the enterprise. Logically, an accurate understanding of enterprise requirements will lead to the right IS requirements determination and matching IS and IT project identifications. It will surely be a waste of effort and financial resources to plan for huge IS or IT projects that will not benefit or assist enterprise to meet and fulfill its business goals. Effective analysis of the internal and external enterprise operations has also been identified as one of the important dimensions within the measurement of SISP effectiveness (Grover & Segars 2005) apart from the alignment, cooperation and improvement dimensions. Unfortunately, due to a variety of managerial and technical issues encompassing SISP, this challenging task of thoroughly and critically analyzing the enterprise requirements and relating them to the acquisition or developing IS projects has frequently been overlooked.

ESSENTIAL PHASES OF SISP

In order to position the enterprise requirements understanding or enterprise situation analysis component within the SISP process, the following SISP phases is taken from Mentzas (1997) to represent common SISP planning phases. Figure 1 shows the five phases that essentially has to be performed

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in an effective and comprehensive SISP process (Newkirk et. al 2004). The first phase addresses the issue of positioning and establishing the context of the enterprise boundary. It typically covers determining the key planning issues, defining planning objectives, organizing the planning team and obtaining top management commitment. This phase is also crucial in clarifying the enterprise boundary with its participating players and clarifying its main purpose of existence.

The second phase focuses on analyzing and understanding the present enterprise situation and environment. It includes analyzing current business systems, analyzing current enterprise systems and information systems, analyzing current external environment and IS/IT environment, and extracting information of the present understanding of the situation in terms of its requirements. Due to the enterprise complexity, modeling is performed to extract and focus on the key elements of the enterprise. Typical activities in this phase include modeling data, information or processes of the enterprise. This is the focus of the paper since analyzing and understanding enterprise requirements entails that a proper method is used to extract not just any requirements but the core requirements that can ensure enterprise success.

The third phase is the strategy conception phase. This phase includes identifying and evaluating opportunities in terms of possible improvement on existing processes and activities. The phase also includes identifying major IT objectives and identifying high level IT strategies. The fourth phase emphasizes the identification of critical enterprise process and information requirements for IT support. It also includes identifying new business processes, developing desired architecture, identifying and setting priorities for new projects. The fifth phase includes defining the change management approach, defining action plan and defining follow-up and control procedure on the proposed plan.

Focusing on understanding enterprise requirements is actually focusing on the second, third and fourth phases of the mentioned SISP phases. Planning for IS requires enterprise to consider present and potential future requirements and considering several alternatives before selecting the most appropriate way to achieve enterprise objectives. Before going further, let us understand the important terminologies of enterprise situation analysis. The term 'enterprise situation' refers to the global environment, the local industry and the internal enterprise operation (Grunig & Kuhn 2001). The term 'analysis' typically refers to 'separation of a substance into its constituent elements' (American Heritage 1985). However, analysis has two other complementing conceptions associated with it besides the decompositional conception. The second conception is the regressive conception of analysis that refers to the process of working back to first principles and the third analysis dimension is the transformative or interpretive conception. In the transformative dimension, the objects of analysis have to be translated into their correct logical form
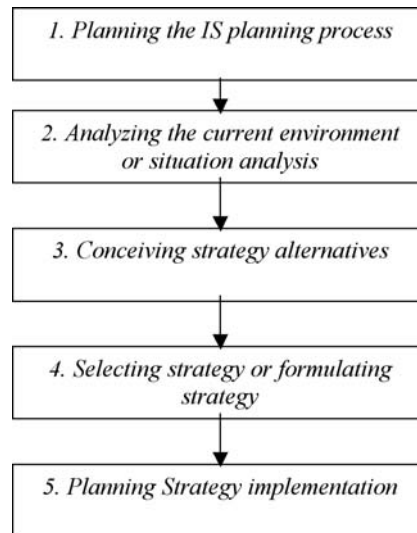
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┌─────────────────────────────────────┐
│  1. Planning the IS planning process │
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│  2. Analyzing the current environment│
│       or situation analysis          │
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                    ▼
┌─────────────────────────────────────┐
│  3. Conceiving strategy alternatives │
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                    ▼
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│  4. Selecting strategy or formulating│
│            strategy                   │
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│  5. Planning Strategy implementation │
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FIGURE 1. SISP Phase (Mentzas 1997)

first before any further analysis activity can take place. Hence, the three conception of analysis is not against each other but should be complementary in order to provide a richer view to the analysis process. With regards to these conceptions, there are three kinds of capability that enterprise situation analysis technique has to possess.

First, is the ability to structure an enterprise situation into manageable entities to enable the analysis process to be performed. Second, is the ability to provide classification or comparison based on certain judgment. Third, is the ability to handle many kinds of information and representation for analysis purposes.

It is understandable that enterprise analysis approaches are highly dependent or influenced by the philosophy employed by the SISP approaches. This does not signify that it is not essential to find out the shortcomings of the current enterprise analysis approaches since it is one important component within SISP process. In the SISP literature, enterprise analysis approaches within SISP are referred as planning frameworks and tools (Earl 1990). Most of these frameworks provide ways for assessment on the impact of IS or assist in looking for Strategic IS opportunities. Three categories of frameworks have been identified by Earl (1990). They are awareness frameworks, positioning frameworks and opportunity frameworks. Awareness frameworks have a tendency to emphasize on increasing an appreciation and understanding of the impact of IS. Usually, these frameworks are general and lack detail to support further IS implementation. Positioning frameworks focus more on the status assessment of organizations based on the use of IT in comparison with

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the evolvement of IT in organizations. Finally, the opportunity frameworks tend to assist enterprise in looking for specific IS opportunities based on analysis of the enterprise's business plans.

While the existing analysis frameworks or enterprise analysis approaches have directly or indirectly contributed to the success of many present organizations, there are still reports on SISP failures. Three main areas have been pointed to have frequently contributed to unsuccessful SISP. The areas include a lack of focus on strategy implementation, a lack of focus on process issues such as getting support from management and users, and a lack of proper methods or ways to perform SISP (Earl 1990). Current dynamic business environment in which there is frequent unpredictable environmental turbulence, emerging kind of enterprises with varying complexity and rapidly changing information and communication technologies entail the research community to further enhance the existing analysis approaches. Moreover, with the present awareness towards flexible and adaptable software systems to support enterprise functioning, it will be an advantage to have an analysis approach that will assist in identifying enterprise requirements that are based on sound theoretical underpinning and not subject to frequent changes by unstable environments (Cline & Girou 2000). This balanced mechanism will surely facilitate the enterprise towards achieving and sustaining its competitiveness within the rapidly changing environment.

CRITICAL INQUIRY OF ENTERPRISE ANALYSIS APPROACHES

Several analysis frameworks or approaches that are typically used within SISP are surveyed and described.
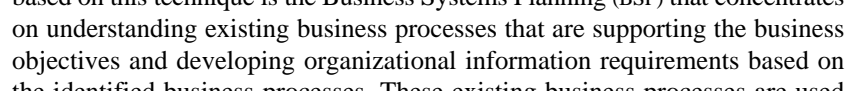
CRITICAL SUCCESS FACTOR (CSF)

CSF is a non-proprietary technique that focuses on aligning the business strategies with the IS strategies. Rockard (1979) describes critical success factor as a few number of areas in any business that if these areas are satisfactory will ensure successful competitive performance for the enterprise. CSF has originally been used to understand the information needs of Chief Executive Officers (CEOs). However, the technique has been expanded and used in the context of strategic planning for IS for clarifying the objectives, control measures and operational activities. Identification of CSF can be done at various levels such as the CSF for industry, organisation, business unit, functional unit and managerial level. There are critics who perceive CSF to be focusing on the internal organisational activities or management control point of view only, it has been a very resourceful technique to enable identification of key information requirements for the business unit or manager.

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In this review, CSF is useful in the second, third and fourth phases. It is useful to determine the present situation as well as what is important for the near future. The CSF technique is basically dependent on enterprise users to specify factors that can contribute to specific objectives. Most of the time, specific scope has to be established, specific users identified and factors are elicited from the users that can contribute to the established objectives. Hence, the technique is not meant for enterprise situation in which there are no well identified users, or no well defined business units and objectives. The factors that have been identified typically consist of high level statements that may relate to a variety of enterprise requirements and they need to be further focused and analysed. In addition, the technique does not directly provide the means to represent and model those identified requirements. In other words, additional mechanism for information and data modeling is needed to ensure that the determined requirement can be adequately viewed and represented.

<div align="center">PROCESS ANALYSIS TECHNIQUE</div>

This technique concentrates on analyzing the enterprise processes since it assumes that processes are the basis for IS support. An earlier methodology based on this technique is the Business Systems Planning (BSP) that concentrates on understanding existing business processes that are supporting the business objectives and developing organizational information requirements based on the identified business processes. These existing business processes are used as the basis for data collection and analysis. Several enhancements to the BSP included the use of the CSF technique to focus on identifying factors that can lead to successful implementation of the processes. Recent methods based on process analysis appears to focus on identifying, evaluating and improving the effectiveness of core processes in support of business objectives (Ward & Peppard 2002). The term processes may include the broad spectrum of activities, procedures, organizational aspects and computer systems. The obvious benefit is the possible identification of core processes that can support the enterprise objectives and the possible change improvement that can be initiated. However, its underlying assumption of the technique is that there already exists a set of acceptable enterprise processes in the enterprise. The technique emphasizes selecting the key processes in order to improve them. Hence, the technique is helpful to contribute to the second phase in which existing processes have to be understood so as to evaluate the current standing of the situation. It is also helpful in the third and fourth phases of SISP in which identification of key and new processes have to be performed for possible improvements on them.
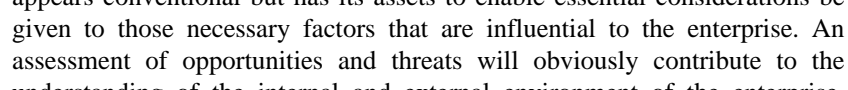
However, the technique does not provide any mechanism to cater for enterprise situations that do not have clear cut processes or a set of standard enterprise processes that would be acceptable to all of the enterprise players.

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Hence, the lacking mechanism of the technique is the high-guiding elements that can provide the means to select a set of standard enterprise processes that would be acceptable to the enterprise players. The technique does not provide link to determine further information requirements to support the identified processes. Having said that, the technique still holds great promises because it already identifies one of the most resourceful element of the enterprise which is the processes in which information requirements can be derived. Moreover, it provides a good base for business process redesign initiatives.

SWOT ANALYSIS

SWOT is a checklist acronym for Strengths, Weaknesses, Opportunities and Threats. It is a useful technique to identify the strength and weaknesses of enterprises and examining their potential opportunities and threats. Using SWOT is helpful to focus into areas where the enterprise is strong and has greatest opportunities. The technique provides a fast way to model a situation by asking a set of important questions such as: What are the main business of the enterprise? What are the enterprise's strengths? What are the enterprise's alternatives ? What are the weaknesses of the enterprise?

The technique is just like any other such as PLEETS (Robson 1994) that appears conventional but has its assets to enable essential considerations be given to those necessary factors that are influential to the enterprise. An assessment of opportunities and threats will obviously contribute to the understanding of the internal and external environment of the enterprise. Simultaneously, it also facilitates the process of identifying potential strategies to be implemented for the enterprise's future. On one hand, the technique is simple and straight-forward enough to be used by analysts at any given time regardless of the enterprise's size and structure. On the other, the technique is too naive to be used on its own without comprehensive and reliable understanding of the information sources and the context in which the information input is taken. The technique does not mention specifically the way to identify the reliable sources of information that can answer those identified questions. For SISP phases, SWOT technique is beneficial to be used within the second, third and fourth phases. However, it lacks the mechanism to provide structure to an enterprise situation because there is no delineated way to provide scope or guidance and there is no standard output that can be extracted and represented as a result of using the technique.
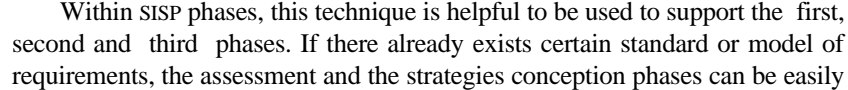
NORMATIVE ANALYSIS

Normative analysis technique focuses on a set of basic classes of object systems that are found to exist in many determined enterprise situations (Davis 1982). These basic set of classes are perceived as the norm and should be used as the prescription or normative set of requirements. Each analysis

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of a situation will tailor or customise the normative set of requirements to meet the need of the analysed situation resulting in more specific requirements being derived. Many existing methods which utilised this technique use a variety of elements to be the normative set of driving elements to derive more specific information requirements. One of the methods is the Business Information Analysis and Integration Technique (BIAIT) that focus on the element of 'order' and provides a set of seven questions to elicit the requirements based on the 'order' concept.

The obvious benefit of the technique is the provision of structure to the information requirements determination process and guidance to the analysts in performing their task. Hence, this structure and guidance is highly needed in complex enterprise situation in which there exists multiplicity of available users that can provide varying versions or views of requirements. However, the source of deriving the set of generic or basic classes of object systems to be the normative set of the approach is highly critical. The potential source of the generic set of objects for certain kinds of enterprise situation may be derived from examining many such situations and deriving the similarity among them. Another potential source is to derive the generic set of requirements from certain organisational theory or model that is believed may provide the obvious benefit to the whole situation.

Within SISP phases, this technique is helpful to be used to support the first, second and third phases. If there already exists certain standard or model of requirements, the assessment and the strategies conception phases can be easily performed because the standard can basically guide the elicitation of the enterprise's requirements. The technique has to be complimented with certain mechanisms to support the modelling and representing of enterprise requirements and relate them to their corresponding information requirements.
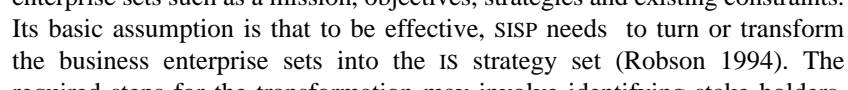
ENDS-MEANS ANALYSIS

This technique is based on systems theory. It emphasizes the identification of reliable enterprise managers that can specify their information requirements, the outputs and the measures of efficiency and effectiveness of key enterprise processes. Its main purpose is to identify information requirements of the enterprise. In simple terms, the technique requires that the enterprise identifies the goals (ends) of each business area and later define its inputs and processes. The inputs and the processes represent the means of the technique. The stages involve in the technique are as follows:
1. Specify ends
2. Specify means
3. Specify efficiency measures
4. Specify effectiveness measures

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The enterprise needs has to also define the efficiency measure which is the utilization of resources as compared to the output produced and the effectiveness measure which is the appropriateness of the outputs to support the next process within the whole enterprise processes. This technique is ultimately focused on the ends or objectives set by the enterprises. It has the inherent capability to enhance, revise or redefine enterprise or business processes in order to achieve the enterprise objectives. It can be applied by individual analysts as well as by teams. For the SISP phases, the technique can contribute to the second, third and fourth phases. However, the technique seems to assume that there are well defined business objectives or well defined enterprise users that can provide reliable sources of inputs to the technique. Hence, the technique lacks the mechanism to provide structure to the enterprise situation and there is no mechanism to specifically model and represent the derived requirements of the analysis. It is not directly able to derive information requirements for the enterprise.

BUSINESS STRATEGY ANALYSIS

This analysis approach enable enterprise to derive the essential based on the business strategies. Basically, the technique relies heavily on the business enterprise sets such as a mission, objectives, strategies and existing constraints. Its basic assumption is that to be effective, SISP needs to turn or transform the business enterprise sets into the IS strategy set (Robson 1994). The required steps for the transformation may involve identifying stake holders, identifying influential groups within the enterprise, identifying goals and identifying purposes as well as their strategies to achieve the identified goals. The technique focuses on the possible opportunities which manifested in the business strategies that can lead to IS strategies. It has its advantageous in terms of focusing on aligning the business strategies with the IS strategies. Its focus appears narrow and mainly concentrates on the business enterprise sets which may not portray the real requirements of the whole enterprise or only reflect the understanding of a few persons in the enterprise. Nonetheless, several well-known methodologies such as Business System Planning and Information Engineering make use of the business enterprise sets as their source of information requirements.

It can be used to identify desired or potential processes to be supported by technologies. On one hand, the business strategy sets do provide a rich source of information requirements, it may also has potential biasness since the derived enterprise sets might come from only certain selected users. The technique is more suitable for a structured situation with identified users. It does not specifically cater for a situation that may involve multiplicity of players in which the users are uncertain about their exact responsibilities and requirements. The technique seems to offer the multiple level analysis from a

variety of enterprise groups in the enterprise but the possible integration of the analysis or the potential understanding of the whole enterprise is not well articulated or defined. The technique also lacks the mechanism to represent and model the determined enterprise requirements from the performed analysis.

VALUE CHAIN ANALYSIS

Value chain analysis is one of the techniques that concentrate on looking for the opportunities that can be exploited or supported by IT. Obviously, the technique can be categorised into opportunities framework. Other similar approaches include Porter's five factor framework and Linkage Analysis Planning (Primozic & Leben 1991). Porter (1980) was one of the pioneers to introduce the concept of a value chain. A value chain refers to the sequential set of activities which consists of primary and secondary activities. Primary activities are those that contribute to enable products or services to be one step closer to the customer while the secondary activities are those that support the primary activities. By modelling the activities in a value chain and analysing the links between them, the organisation has the chance to identify IS opportunities to enhance the activities. Porter refers to opportunities to enhance the primary activities as opportunities to increase the competitive effectiveness of the organisation. Opportunities to enhance the supporting activities are referred to as opportunities to increase the efficiency of the organisation. Porter (1980) further extended the concept of value chain to the concept of value system. A value system of an industry can be formed by modelling all the businesses in the entire industry. In this way, an organisation is able to identify the potential IS opportunities and the importance of IS in connecting suppliers, customers and competitors in the wider context.

Even though value chain analysis is helpful in identifying key value adding processes, value chain analysis has been criticised as too abstract in its identification of potential IS applications. Essentially, it does not provide any guidelines or means for further data and information determination and modeling. However, value chain analysis focus on the area that is critical to look for opportunities to apply IT. For the SISP phases, the technique can contribute to the second phase of understanding the current situation and the third phase of identifying opportunities to apply IT. It is perceived as one of the important tool for the present organisation to scan for IT opportunities. As a generic tool or opportunity framework as Earl (1989) categorizes it, value chain analysis technique needs to be used with other complimenting techniques to serve within a more solid planning methodology.

PORTER'S FIVE FORCES MODEL

Porter (1980) identified five big forces that exist in the dynamic world in which organizations need to face. The model is called Porter's Five Forces

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Model and has been widely used in strategic business planning as well as in planning for IS. The five recognized forces are as follows:
1. Rivalry between competitors
2. Threat of new entrants
3. Threat of substitute products or services
4. The power of buyers
5. The power of suppliers

Several contributing factors are identified with each force to characterise them. The model can be used to identify IS opportunities or business opportunities that can help to influence the significant forces. Examples include identifying IS opportunities to close the threats of new entrants or to change the bargaining power of potential buyers.

The five forces model is a useful generic model to facilitate organisations to assess its current situation, the opportunities and the threats from its environment. The model may help the organisations to identify the potential IS applications that can aid them in implementing their business strategies. Similar to the value chain analysis, this model acts as a generic template which identifies five important components that make up the competitive market or environment for organisations. For the SISP phases, the technique can contribute to the third and fourth phases. Apparently, planning for IS requires the organisation to not only focuse on the internal needs but also to address these five influential forces in the environment in order to stay competitive. However, this model is very generic and do not provide detailed guidance on identifying, representing and specifying further requirements for the enterprise. The technique is useful to be used as one of the tools within a more comprehensive methodology.

SEVERAL SHORTCOMINGS

The enterprise situation analysis frameworks or approaches that have been reviewed in this paper have the objective of understanding the enterprise requirements in order to become the basis for identifying IS requirements. Yet, there are many variations that can be observed of the analyzed approaches. The techniques differ in terms of source of input for determining the enterprise requirements, its coverage of analyzing present enterprise requirement or future/desired enterprise requirement and its output analysis whether in determining potential IS requirements or data and information requirements. Even though there are classification or recommendation on the potential usage of the reviewed approaches within SISP process, this paper intends to analyze all of them based on the main objective of analyzing and identifying enterprise requirements. Hence, a few shortcomings that have been identified are summarized as follows:

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1. A lack of mechanism to address and structure complex enterprise situations. Most of the techniques assume that the enterprise situation has appropriate organizational structure and clear links and job assignments between and amongst the enterprise or business units. Many of the techniques assume that users and top management are clear about their directions and are available to provide clear business requirements. This is not always the case since top management may consist of several individuals who may have different viewpoints and directions and they may not have the ability to make obvious their business requirements. Moreover, there are now emerging a kind of enterprise situation that is formed from various heterogeneous enterprise units that may have various dynamic relationships amongst each other. They are formed with specific missions but their operational activities have to be coordinated and controlled among the non-uniform units. This kind of enterprise situation is referred to as complex and uncertain (Mumford 1996). This survey has hardly found any specific analysis technique that is equipped to address such a situation.

2. A lack of mechanism to clearly link the enterprise requirements to IS requirements and information/data requirements, and develop enterprise information model. Very few approaches support linking the enterprise requirements to IS and information requirements for the enterprise. Apparently, information determination and modeling within SISP is crucial to ensure that the highly required information to support strategic management activities can be directly provided by the developed IS applications. It will be useful if critical enterprise processes are captured since these processes can be reengineered for improved performance and critical information requirements to support them can be derived. With the current IT capability and advancement, there is also an obvious need to provide an enterprise information model that can represent wider choices of data and information requirements of the enterprise. The type of applications developed for the present enterprises include transactional system, management information system, expert system and knowledge management system. Hence, an enterprise information model developed within SISP should serve to provide an integrated view of the information resources of the organization that not only cover data requirements but also information and knowledge as well. The development of a more comprehensive enterprise information model is suggested so as to serve as a guide or enterprise memory to the enterprise IS development. The model will be more useful if it can provide a decent representation that can serve both the business and technical people. To be precised, the model should serve to link the identified organizational needs to the business and IS analysis needs.

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3. A lack of sound theoretical basis. Many of the surveyed analysis techniques are not based on any sound theoretical basis to provide an overall understanding of the enterprise requirements. Many of the techniques are fully dependent on the enterprise users for requirements. While the users are one possible sources of requirements, there are possibilities that the users may not have a comprehensive understanding of the enterprise requirements or may be bias towards their own interest. There is obviously a need to have a guiding principle or theory to ensure that the whole wellbeing of the enterprise is taken care of. One of the ways to address this issue is to utilize certain organisational theories or models that can assist in this process.

4. Most of the reviewed enterprise analysis approaches do not provide ways to specify detail outputs that can be usable for further business and systems analysis process. Hevner & Studnicki (2000) pointed out that there is a vast specification gap between the recommended IS solutions in the IS plan and the detail requirements to implement the desired IS. A study performed by Goodhue(1992) also found that the system recommendation of IS projects in the IS plan are highly ambiguous. Certain ways have to be provided to bridge this specification gap. One of the means is to equip enterprise analysis approaches within SISP with the capability to capture information requirements which are usable for IS implementation process. This can be through extracting specific enterprise requirements in useful forms and relating them to specific IS projects. Based on each project, detail information requirements can be extracted and represented.

Based on the discussion, this research foresee the urgency to equip enterprise analysis approaches for the purpose of supporting SISP with the following five crucial features:

1. A mechanism to determine enterprise and information requirements of an uncertain or complex organizational situation that do not have well defined users or enterprise strategies.
2. An ability to bridge the link of the enterprise requirements to the specific IS requirements.
3. An ability to bridge the IS plan to the IS project implementation by providing more detail IS plan.
4. A conceptual modeling capability in developing an enterprise information model that covers wider requirements not just data requirements.
5. Have a sound theoretical basis to provide more stable requirements.

Table 1 shows the analysis that was made on the reviewed enterprise situation analysis approaches based on the identified features. It shows that most of the reviewed techniques have not provided a mechanism to address

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TABLE 1. Analysed features for the Enterprise Analysis Approaches

Feature Technique	Address Complex enterprise situation	Support multiple level analysis	Support Information/ data modeling	Have sound theoretical basis	Determine Existing Enterprise Requirements	Determine Future /potential requirements
Critical Success Factor	None	*	None	None	**	**
SWOT Analysis	None	none	None	None	**	**
Process Analysis	None	*	None	None	**	*
Normative analysis	**	*	None	None	**	*
End-means analysis	None	*	None	***	**	**
Business Strategy analysis	None	none	None	None	*	**
Value Chain Analysis	None	none	None	None	*	***
Porter Five Forces	None	none	None	None	*	***

***	-	High emphasis		**	-	Medium emphasis
*	-	Low emphasis		none	-	No emphasis

complex enterprise situation, have not provided a modeling capability for information requirements and have not used any solid theoretical basis. Other features highlighted include the ability to provide multiple level analysis and the ability to determine present and future requirements.

FOCAL REQUIREMENTS FOR AN ENHANCED APPROACH

In view of the analyzed enterprise situation approaches and the present enterprise challenges, the following requirements are further elaborated to provide the direction for the enhancement of enterprise analysis approaches within SISP process.

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Requirement 1: a comprehensive view of enterprise requirements capturing core enterprise requirements and linking to its information requirements

As observed from existing enterprise models, the categorization of data and information in an enterprise into its respective categories are difficult due to its changing and dynamic nature. One way of looking at this is that data and information are resources that can be used and reused in an enterprise. Their existence is very much dependent on their use and production. The information components for the enterprise may not be very useful if they are represented by themselves. Typically, information requirements are derived from the enterprise. elements such as its people, processes and activities, enterprise objectives and goals (Davis 1982). Traditional approaches to information requirements group information requirement according to its enterprise structure such as department, business units or strategic business units. The focus is more on understanding each individual enterprise units' requirements and is internally oriented towards satisfying them. While it may be convenient, it may not be the best way for the present enterprise situation that has to respond to a rapidly changing global environment. It is more beneficial to perceive business units and departments as only enterprise tools formed to fulfill enterprise requirements. They can be opened and closed as and when the enterprise needs to. As such, the present focus should not only be towards understanding information requirements of each individual unit but should focus more on the whole effectiveness and needs of the enterprise.

This may mean that there is a necessity to not only understand information requirements for the operation of each enterprise unit but also to cover the information needs that support the whole managerial activities of the enterprise such as the planning and controlling activities. These will form the core requirements and will facilitate the enterprise to function not just in the operational level but also the managerial level. Subsequently, this research suggests looking beyond business operations or processes and individual business units in order to derive information requirements for the present enterprise. There is a requirement to have a whole view as well as various level views of enterprise information requirements and to develop the ability for the enterprise to balance between the internal orientation and external orientation as well as the present and the close future requirements. In summary, it is vital to provide the ability to determine enterprise requirements, link them to information requirements and the ability to model those requirements systematically in order to increase human comprehension towards facilitating formulation of new strategies for the enterprise.
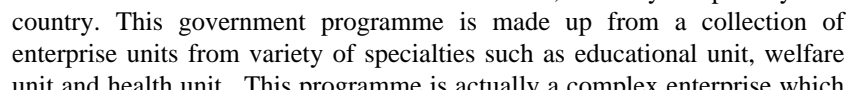
Requirement 2: Cover wider scope of data/information requirements

The information model should take an embracing view to conceptualise the data, information and knowledge requirements of an enterprise. As seen from the above discussion, such a view cannot concentrate on data alone since

there are a variety of information types, shapes and forms available in the enterprise. The view should at least cover data, information and knowledge as well as the flexibility to have different structure and form for the representation. It is important to stress that at the enterprise level, information exists in a variety of forms from the most abstract such as ideas and thoughts to the most solid such as data elements that are conveniently represented in a database. Hence, a useful enterprise information model needs to consider various critical informational aspects such as the information types or categories, the information source, the information status, the aggregation level as well as their forms.

Requirement 3 : Mechanism to address complex enterprise situation

In addition to the first two requirements, there is a need to provide a mechanism to handle or provide structure to an unstructured enterprise situation or a situation that may consist of several independent and differing units. There are increasing number of present enterprise which is made up of variety of individuals from various enterprise units. The enterprise is created with specific purpose or objective but they are not physically in one form. An example is numerous government programmes which are formed to address certain national issues such as tourism, calamity or poverty in a country. This government programme is made up from a collection of enterprise units from variety of specialties such as educational unit, welfare unit and health unit. This programme is actually a complex enterprise which requires administration, planning and coordination to be able to achieve its objectives. It may not have well-articulated enterprise strategies or its participants are not very well-versed with the enterprise requirements. In other words, the participating units may not be clear of the enterprise processes required to be performed. Hence, identifying their core requirements and identifying IS requirements to support their processes are difficult tasks. The participants may realize that they have specific objectives to achieve, but due to their various backgrounds, they may have different strategies to achieve those objectives. Hence, there is a necessity to provide an alternative way to determine enterprise requirements in which the requirements should not merely by asking users or by extracting from the existing enterprise strategies or processes. Other underlying or significant elements should be used as the basis for identifying enterprise requirements to ensure this kind of enterprise may be able to function and survive successfully in this rapidly changing environments.

Requirement 4: Provide high level goal

This is another subtle capability that is perceived to be critical for the present enterprises. Planning for IS not only requires understanding the present requirements of the enterprise but also to look for future or

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potential requirements. However, the effort required towards focusing for the future is difficult and unpredictable. One of the means to tackle this uncertainty is to provide a high level goal to the enterprise that will ensure the future is taken care of as well. In this context, viability or sustainability is an appropriate goal that is highly needed for present enterprises. Hence, developing an enterprise information model that specifically keeps the information required to support the viability of the enterprise is obviously an advantage. One way or another, the model will facilitate the process of identifying IS applications that not merely supports the present requirements of the enterprise but also identifies IS applications that will support the activities needed to sustain the enterprise for the future.

Requirement 5: Support object-oriented paradigm

It is apparent that there is an immediate need to bridge the gap that exists between the IS planning process with subsequent IS development projects to ensure successful implementation of IS projects in enterprises. One of the means to close the gap is to have a similar paradigm that is used in the planning process till the development of IS projects. In this context, object-oriented paradigm is useful because its concepts are applicable both in the enterprise modeling domain as well as in the IS development domain. It is plausible to suggest the use of object-oriented concepts in the development of an enterprise information model within the SISP process so that subsequent IS project developments can continue to use similar concepts and any existing semantic gap can be significantly reduced.

Obviously, these are only five shortcomings and limitations that have been discussed based on the limited number of analysis approaches that have been reviewed. It is important to realize that there are a variety of enterprise forms and purpose of existence which have to perform SISP. More so, there are a variety of changing environments that each enterprise has to cope with during the course of its existence. Hence, it is quite difficult to develop one specific approach that can cover the whole limitations that have been highlighted. It surely would be magnificent to develop an approach that is based on solid theoretical foundation, have the ability to extract critical and stable enterprise requirements for the present and future undertaking, have the ability to document the extracted requirements, be able to derive specific IS projects and also provide detail guidance on IS projects implementation. Having said that, the gist of the issue is not merely on the development of a new approach but more so on the realisation that SISP success is so much dependent on the use of effective enterprise analysis approach. This requires the researchers and practitioners to always look for ways to improve and advance the existing enterprise analysis approaches to face current challenges. Even though there are other relevant research issues that have been focused in the area of SISP, very few research really concentrate on the improvement of enterprise analysis

approaches. However, many present research in the area of IS are going towards developing approaches to translate enterprise or business models directly into software development models such as Object-Oriented Software Engineering (OOSE) (Jacobson et al. 1992), Semantic Object Modelling Approach (SOMA) (Graham 1995), and Object-Oriented Role Analysis Modelling (OOram) (Reenskaug et al. 1996). This is one of the positive advancement within IS research since it intends to bridge the semantic gap of enterprise requirements and software system requirements.

SUMMARY

This paper has presented a critical inquiry of eight well known enterprise analysis approaches typically used within SISP. It has described and analyzed the approaches based on several identified features which are perceived as important for the present enterprises to face current unpredictable environment. It has also highlighted and discussed several of their shortcomings. Even though there are many emerging approaches in the literature, this paper has selected the more established and well-known analysis approaches. Finally, the paper presented five general requirements suggested to be incorporated for the future development or improvement of enterprise analysis approaches to meet SISP objectives.

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