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A GENERIC FRAMEWORK FOR DEVELOPING STRATEGIC INFORMATION SYSTEM PLANS: INSIGHTS FROM PAST THREE DECADES

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Abstract

Strategic Information System Planning (SISP) has been a major concern for business and information systems (IS) managers since the 1980s. Past research has proposed several methodologies, processes and models which facilitate development of SISP in organisations. This paper employs a systematic literature review approach and studies 84 papers (which remained after search in nine scientific databases and reviewing more than 2700 papers) in the field to compare the processes proposed in different methodologies. We then synthesized steps in these processes and in several rounds of integration and division, formed a general seven phase framework which covers all activities in the literature. The main elements of the proposed framework are: Initiation, Business Analysis, IT/IS Analysis, Strategy Formulation, Portfolio Planning, Implementation, and Evaluation. The paper concludes with recommendations for both practitioners and researchers.

Keywords: Strategic Information System Planning, Information System Planning, SISP, Development.

1 INTRODUCTION

According to surveys the changes that have been made in the structure of business after the arrival of IT/IS, have made strategic and long-term planning for information systems (IS) and information technology (IT) have been one of the top ten management concerns for decades (Luftman & Ben-Zvi, 2011). These changes entail large investments by businesses. A survey of 260 Fortune 1000 manufacturing firms shows that the average company expends \$9.6 million per annum on IT services, which is estimated to be 15% of the total cost for research and development (R&D) and about 0.3% of total sales (Kleis et al., 2012). It was also estimated that the investment in IS would be over \$450 billion by 2010 (Chen et al., 2010).

The effectiveness of these investments has been one of the primary drivers of strategic planning for IS/IT for years (Earl, 1993; Krell & Matook, 2009). After 1990 new issues like the proliferation of internet-based computing, outsourcing, personal computers and user applications were another reason for the promotion of IS/IT strategic planning (Grover & Segars, 2005).

Since the 1980s, academia has also paid attention to this topic and variety of terms have been used interchangeably for strategic IT/IS planning in the literature: strategic information system planning (SISP), information system planning (ISP), information technology planning (ITP), strategic information management (SIM) planning, information resource planning (IRP) and so on (Amrollahi et al., 2013). Hereafter, we use the term 'strategic information system planning' (SISP) for long-term IT/IS planning.

Development of strategic plans for IT/IS has been an important stream of research and up to now numerous methodologies have been proposed to help organisations in this regard. Moreover several researchers have leveraged tools from strategic management literature and other areas to develop tools and techniques for SISP.

This paper is an attempt to make a general framework for process of SISP development based on previous work. We used systematic literature review approach to investigate different advice on plan development. To this end, we searched nine scientific databases with related phrases in an attempt to answer the following research question:

RQ. Which processes have been introduced for IS/IT strategic planning?

The results of this research may help practitioners to compare different processes of SISP and select or customise them according to the context in which they want to perform the planning. It may also help future research by showing shortcomings in the current body of literature and related gaps.

The remainder of this paper is organised as follows. Section 2 gives an overview of strategic planning for IT/IS. Section 3 describes the methodology used for conducting the literature review. Section 4 illustrates the proposed classification and the results of the study are discussed in Section 5 and provide some recommendations for future research.

2 LITERATURE REVIEW

Academic work on strategic IS planning dates back to the 1980s and 1990s, known as the 'Strategic Information System Era' (Pant & Hsu, 1999). The first research papers on the field usually treat the efficiency of IT/ARE in competitive business environments (Charles Wiseman, 1984; Rackoff et al., 1985; Synnott & Gruber, 1981).

Earl (1989) recommended four research domains for IT/IS planning in organisations: 'Aligning investment in IS with business goals, Exploiting IT for competitive advantage, Directing efficient and effective management of IS resources, Developing technology policies and architectures'. He suggested that the first two areas should deal with strategic information systems planning.

As mentioned earlier, different terms have been used in the literature as regards the purpose of our study. Provided definitions for these terms have also been used interchangeably. Table 1 provides some of the terms and their different definitions in the literature.

Term	Definition	Reference
Information Technology Planning	‘Organizational activities directed toward (1) recognizing organizational opportunities for using information technology, (2) determining the resource requirements to exploit these opportunities, and (3) developing strategies and action plans for realizing these opportunities and for meeting the resource needs’.	(Boynton & Zmud, 1987)
SISP	‘The process of deciding the objectives of organisational computing and identifying potential computer applications which the organisation should implement’.	(Lederer & Mendelow, 1988)
SISP	‘The process by which [an] organization establishes a long-range plan of computer-based applications in order to achieve its goals’.	(Lederer & Sethi, 1991)
Information Systems Planning	‘The broadly-based management activity that provides direction, within an organizational setting for the development and use of information systems’.	(Finnegan & Fahy, 1993)
SISP	‘A systematic methodology that provides a structural guide should be adopted for the process which makes IT a strategic weapon for firm’.	(Tan, 1995)
Information Systems Planning	‘All planning activities that are directed toward identifying opportunities for using IT to support the organization's strategic business plans and to maintain an effective and efficient IS function’.	(Revenaugh & Lu, 1997)
Information Technology Planning	‘Identification of the external factors that would affect and influence strategic directions; consideration of IT trends and emerging technologies; a review and assessment of the current IT environment; and finally identifying the strategies and actions required to implement this vision’.	(Fallshaw, 2000)
SISP	‘Aligning investment in IS with business goals and exploiting IT for competitive advantage’.	(Duhan, 2007)

Table 1. Terms and Definitions in the Literature

3 RESEARCH METHOD

The aim of the current paper is to develop a general framework based on previous research. To this end, we selected the systematic literature review approach. This is described by Kitchenham (2004) as a methodical way to identify, evaluate, and interpret the available empirical studies conducted on a topic, research question, or phenomenon of interest. These steps have been introduced for systematic literature review: (1) identifying resources; (2) study selection; (3) data extraction; (4) data synthesis; and (5) writing-up the study as a report (2004; Kitchenham & Charters, 2007).

To follow these steps we adopted the method used by Ghapanchi & Aurum (2011) and first identified nine scientific data bases and searched with our predefined set of keywords. Our initial search resulted in 2730 research papers. We then started to exclude irrelevant papers when reviewing titles, abstracts and full-text papers. After in-depth study of the papers we categorised them in two groups and extracted relevant data from the papers in each group. For each group of development methods we provide a classification which is presented in the following sections:

3.1 Sources

We searched nine scientific databases: Science Direct, Scopus, IEEE Xplore, ProQuest, ACM Digital Library, Association for Information Systems electronic library, Springer Link, Business Source Premier and Emerald. It should be noted that some journals index their papers in more than one of the above data bases. This meant that we had some redundant papers in our first set. To deal with this issue, we used our reference management software to find and remove duplicate references and then extracted the above statistics. Thirty-four redundant papers were not removed, however, so we excluded them manually.

3.2 Keywords

We searched for the following terms in title, keywords and abstracts depending on the services offered by the relevant search engines:

‘Strategic Information Systems Planning’ OR ‘Strategic Information Systems Plan’ OR ‘Strategic Information System Planning’ OR ‘Strategic Information System Plan’ OR ‘SISP’ OR ‘Information Management Plan’ OR ‘Information Management Planning’ OR ‘Strategic Information Plan’ OR ‘Strategic Information Planning’ OR ‘Information System Plan’ OR ‘Information System Planning’ OR ‘Information Systems Plan’ OR ‘Information Systems Planning’ OR ‘Information Technology Plan’ OR ‘Information Technology Planning’.

3.3 Inclusion / Exclusion Process

The initial search for the above phrases resulted in 2730 papers. We first excluded those papers that were not related to the topic of our research. In this round we excluded papers that used abbreviations such as SISP and search terms such as ‘strategic planning’ for a concept other than strategic planning. After these rounds, the research pool decreased to 467 papers. In the next step, while reviewing abstracts, we excluded papers which were not related to SISP development and excluded those which addressed topics such as alignment and SISP evaluation.

Finally we read the remaining papers in full text to form the final set of papers which are the subject of our analysis. The main criterion for selecting relevant papers was their focus on processes and approaches to facilitate SISP development. For this reason we excluded case studies and those papers which lacked specific guidelines on the development of SISP while reviewing the papers in full text. The resultant references on which we made our analysis were all references on SISP development which contained either a process for SISP development or an approach to facilitate SISP development. Finally, we removed duplicates and then in another round referred to the full texts to formulate the final list of 84 papers. Table 2 illustrate the process of inclusion / exclusion.

Round	Number of Papers Excluded	Number of Papers Remaining
Initial list of papers	NA	2730
Exclusion based on title	1522	1208
Exclusion based on abstract	741	467
Removal of duplicate papers	34	433
Exclusion based on full text	349	84
Final List	-	84

Table 2. *Different Stages of Inclusion / Exclusion and Number of Papers in Each Round*

As mentioned above, in all rounds of exclusion we tried to include papers in our final set which directly presented methods, tools or guidelines for the development of IS strategic plans.

3.4 Data Analysis

After we finalised the list of the relevant papers, we performed in-depth analysis on the content of those papers and developed a seven-phase general framework which covered most of the development activities in different processes. To do this we extracted main finding of the papers and tried to synthesize them in different stages which is explained in depth in upcoming sections.

4 RESULTS

The final set of 84 papers is the basis of the results described in upcoming sections. These papers provide a set of steps (or formal methodology) for SISP. After identification of the final set of papers in this category, we made an in-depth analysis of the text and identified the steps defined in each process. The process we followed was based on the thematic technique for analysis of qualitative data (Ghapanchi et al., 2013).

During the review of different phases in the literature, we defined several sets of phases and then, by adopting them with activities in different papers, we merged some phases, divided others into different phases or renamed them. After several iterations, we finally arrived at our final set of phases which covers activities in all processes. Table 3 shows some of the titles we devised in several iterations for SISP phases and Figure 1 illustrates the final activities in our framework.

Iteration	Proposed Phases
1st iteration	Current Status → Planning → Desired Status
2nd iteration	Pre-planning → Organisational Analysis → Strategy Planning and Implementation
3rd iteration	Pre-planning → Analysis → Planning → Implementation
4th iteration	Pre-planning → Business Analysis → Technology Analysis → IS Analysis → Business Strategic Analysis → IS Strategic Analysis → Implementation → Evaluation
5th iteration	Initiation → Business Analysis → Technology Analysis → IS Analysis → Strategy Development → Implementation → Evaluation
Final Phases	Initiation → Business Analysis → IT/IS Analysis → Strategy Formulation → Portfolio Planning → Implementation → Evaluation

Table 3. Different Iterations of Thematic Analysis

Many processes do not provide any suggestions for activities or mention activities which are related to different phases. Peffers & Tuunanen (2005), for example, mentioned a general activity named ‘data collection’ but did not differentiate data on business and IT/IS so we related the activity to both business and IT/IS analysis activities in our framework.

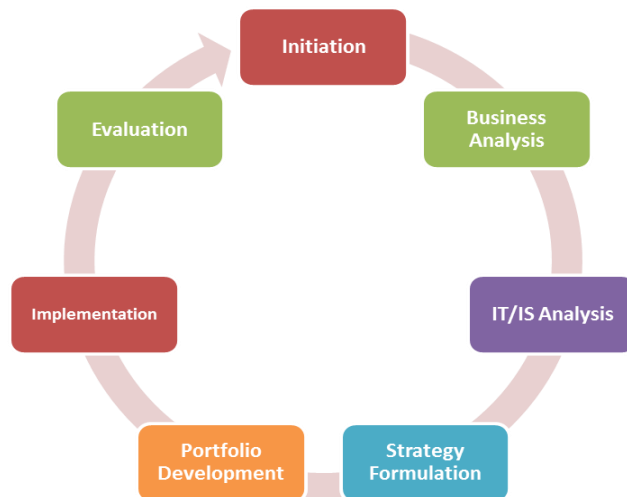


Figure 1. Seven Phases of General Framework for SISP Processes

a. **Initiation:** This phase covers activities which are needed before commencement of actual development activities or any prerequisites before actual development. It may include development of the planning team in the organisation (Kehoe et al., 1993) or introduce the aims of the planning project and contain initial information about the organisation provided by external consultancy team members (Lee & Gough, 1993; Morton, 2006).

Some of the other activities which are suggested in different papers for this phase are: gaining commitment (Li & Chen, 2001), definition of scope (Lederer & Gardiner, 1992; Peffers & Tuunanen, 2005) and direction (Choi & Bae, 2009; Choi et al., 2010) of strategic plans and so on.

b. **Business Analysis:** Study of business processes, requirements, strategies or structure of market and analysis of competitive advantages is an important part of SISP development. Any activity which deals with study of organisational or business processes and strategies belongs to this phase.

Examples of activities in this category are: business and strategy analysis (Y. G. Kim et al., 2003; Surmsuk & Thanawastien, 2007; Tan, 1995) or assessment of competencies (Lederer & Gardiner, 1992). Many researchers, however, have not differentiated between business and IT/IS competencies or organisational aspects and merge this phase with next one.

c. **IT/IS Analysis:** As indicated in many processes, the next phase of IS plan development is the analysis or study of current IT and IS in organisations, their drawbacks and their ability to meet current or future challenges in the organisation.

This may include activities like: introduction to IS (Gwo-Guang & Gough, 1993), identification of IT opportunities (Lederer & Gardiner, 1992; Min et al., 1999), IS analysis and modelling (Cho & Cho, 2005) and so on.

It is also important to note that in many works activities like data collection (Peffers & Tuunanen, 2005), analysing competencies (Choi et al., 2010) and external environment assessment (Bulchand & Rodríguez, 2003) are mentioned which could be relevant to both business and IT/IS analysis phases.

d. **Strategy Formulation:** All activities which relate directly to the development of the plan are included in this phase. Strategic tools and techniques usually help organisations to formulate their strategy in this phase. The expected output is a plan which describes the desired status of the organisation in terms of vision, mission, competencies, critical success factors, etc.

Different processes use different terms for this phase. Some of these terms are: strategic IT planning (Tan, 1995), strategy formation (Karababas & Cather, 1994; Min et al., 1999), suggesting extract important enablers (Choi & Bae, 2009) and so on.

e. Portfolio Development: Activities in this phase are related to selecting information systems and planning for change from the status quo to the desired status according to the strategic plan. According to the literature, the following activities could be part of this phase: obtaining application portfolio (Surmsuk & Thanawastien, 2007), information systems selection (Karababas & Cather, 1994), identifying business/application processes and developing an application profile (Li & Chen, 2001), project definition and planning (Y.-G. Kim et al., 2003; Lederer & Gardiner, 1992) and identification of alternative systems and selection of preferred system (Mehrez et al., 1993).

We found seven processes that omitted this phase, however. They either stopped at strategy formulation without any advice for implementation or went directly from strategy formulation to the next step, 'Implementation'.

f. Implementation: As mentioned above, most of the processes stop at strategy formulation, but many others have advice on implementation of the strategy. Implementation of the strategic IS plan may occur in different forms. Organisations usually develop the planned portfolio of their programmes either in-house or by outsourcing. However some of them have limited the implementation phase to document the result for further actions (Min et al., 1999) or conducting workshops (Peffer & Tuunanen, 2005).

The terms used are: implementation (Bulchand & Rodríguez, 2003; Joseph & George, 2007; Morton, 2006; Reponen, 1993), developing requested information system (Joseph & George, 2007; Li & Chen, 2001) and so on.

g. Evaluation: Many processes present their guide as an iterative or evolutionary process which at the end of each iteration provides feedback for the next. This evaluation may take the form of feedback from stakeholders (Joseph & George, 2007), or changes in business (Reponen, 1993) or advice to the planners to develop measurements to evaluate the effect of strategic planning (Peffer & Tuunanen, 2005). In our final pool we found five processes which entailed evaluation, feedback or comments.

Finally, we map activities in the literature with our proposed seven phases. This mapping is performed in different ways: sometimes one activity is assigned to one phase only, sometimes a number of different activities are assigned to one phase. There were cases in which one activity was related to different phases (see Figure 1). For example Lederer & Gardiner (1992) prescribe 'Scope Definition and Organization' for the initiation phase, 'Business and Competitive Assessment and Present Status Assessment' for the business analysis phase, 'Information Technology Opportunities for IT/IS analysis, Information Technology Strategies, Organization Plan, Technology Plan and Information Action Plan' for the strategy formulation phase and 'Project Definition and Planning' for the portfolio planning phase. Reponen's research (1993) is another example which refers to finding 'Practical Problems and Theory' for analysis of both business and IT/IS but two different activities ('multiple method approach' and 'information management strategy') for the strategy formulation phase.

Figure 2 illustrates the frequency of citation for each phase in the literature. Business analysis is the most relevant activity in the methods described. IT/IS analysis and strategy formulation activities are also found in almost all processes, but implementation and evaluation phase activities are usually missing from processes.

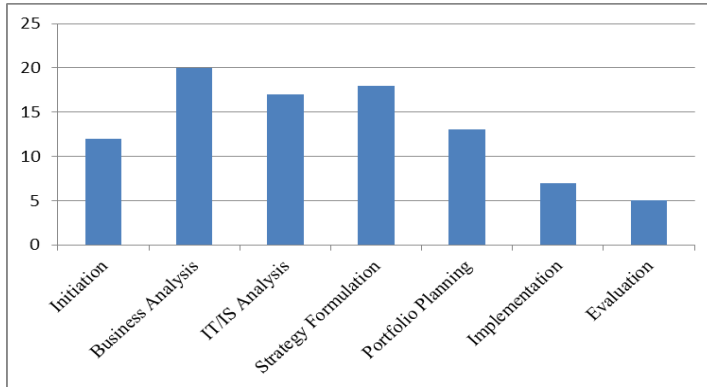


Figure 2. Number of Citations for each Phase

5 DISCUSSION

This paper presents a comprehensive and systematic review on processes and tools of SISP development. We provide a seven-phase framework in our paper which covers most of current formal methodologies in literature. We mentioned these phases in our review: initiation, business analysis, IT/IS analysis, strategy formulation, portfolio planning, implementation and evaluation. Our study shows that although analysis and strategy formulation have been the subject of most processes, few have paid attention to implementation and evaluation phases. The great attention paid to business analysis in the processes may show a systematic linkage with SISP and business planning procedure which has previously been questioned in the literature (Earl, 1993).

This research may also add another perspective for comparing five SISP approaches (Earl, 1993). The new perspective is the focus of five presented approaches on one of the presented phases. Table 4 shows different SISP approaches and their focus phase in our general framework. We considered ‘emphasis, basis, ends and metaphors of each approach’ to map those approaches with our framework.

SISP approach proposed by (Earl, 1993)	Business-led	Method-driven	Administrative	Technological	Organisational
Emphasis	Business	Technique	Resource	Model	Learning
Basis	Business plans	Best method	Procedure	Rigour	Partnership
Ends	Plan	Strategy	Portfolio	Architecture	Themes
Metaphor	It’s common sense	It’s good for you	Survival of the fittest	We nearly aborted it	Thinking IS all the time
Focus phase	Business analysis	Strategy formulation	Strategy formulation and portfolio Planning	Portfolio planning and implementation	All phases

Table 4. Mapping of Results with Earl’s Classification of SISP Approaches

5.1 Implications for Practice

As indicated in previous research, a large gap exists between the practice of SISP and what has been presented in academic research (Teubner, 2007; Vitale et al., 1986). The reason for this gap may be the complex and confusing literature with a huge amount of research which prevents practitioners from identifying their actual needs when they refer to academia.

This framework provides a strategic planner with a good guide for comparing and selecting an appropriate process. Different planners, depending on the context of their organisation and their time and budget limitations, can select a process which best fits their goals. Planners who have already selected a process can also better understand the shortcomings of their current method and can perform alternative activities to handle those shortcomings. The framework may also help consultant companies to select, develop or modify their processes.

The processes introduced in this paper are diverse in detail (from two to seven activities) and type (different outputs, iterative vs. single use, etc.) and for this reason a variety of practitioners (including CEOs, CIOs, consultants, IT/IS personnel, etc.) in different organisations (including SMEs, IT/IS consultancies, and other industries) may benefit from this framework.

Studies also show that mandatory government regulations have been one of the major drivers of IS investments in many countries. Such investment has been less likely, however, to bring competitive advantage for companies (Krell & Matook, 2009). This shows the important role of government and policy-makers in IS/IT strategic planning and current research may also help these people to better understand available methods and select the best method for planning advancement policies.

Most research on other aspects of SISP is based on older methods that could be an indicator of infrequent use and this review may help practitioners to access a wider range of especially new methods which are less practised but could be beneficial to their work.

The proposed framework itself can be used as a general process for SISP which however lacks specific guidance on detailed activities in each phase but by considering appropriate activities from literature in each phase it may result in a proper and comprehensive method of SISP.

5.2 Implications for Research

In spite of the attention paid to SISP development by academia, few comprehensive reviews of current methodologies and related processes could be found in the literature. The paper attempted to fill this gap and provide a comprehensive review of current methods and tools in the literature. This review of processes and tools for SISP development could benefit future research in several ways. Our classifications may help new researchers to identify a gap in the literature and focus on aspects of SISP development which have been studied less in previous work. We found five important gaps.

First, as depicted in Figure 6, implementation and evaluation phases have been ignored in many processes and authors cease recommendations after formulation of strategy. We believe, however, that a comprehensive research may provide guidelines about implementation of strategy and more importantly enable organisations to evaluate the strategic planning process and use corrective actions for future implementation of processes. For this reason we believe that this shortage should be recognised as a gap in the literature and future research should pay more attention to such activities when they propose a process.

Second, we observed less research after 2010 compared with 2000-10 and even 1990-2000. The reason for this may relate to concepts that have been introduced to industry on those days (e.g. electronic business, dot-com bubble, IT out-sourcing, service-oriented architecture (SOA), Web 2.0, and social web). It should be noted that the advancement in IT has never decreased and new technologies are still in train that influence IS/IT strategic planning. The arrival of technologies and challenges like cloud computing, crowd-sourcing, privacy and ethics, etc. may force organisations to face new challenges for which they need new strategies and new methods of planning.

A third gap is related to the research context. Most come from the European context and little research have been conducted in South America, Africa, the Middle East and Asia. For this reason, context-based research may assist future research in SISP development. Even more than different countries, the context of different industries should also be considered in future research. Finally, we recommend

future researchers to conduct surveys on actual practices for different phases of formal SISP processes and study their popularity among planners, effectiveness, fit in different contexts, etc.

6 CONCLUSION

In the current paper we used a systematic literature review approach to provide classification of formal processes for development of long-term plans for IS/IT (in this research: SISP). We started with searching nine scientific databases and 2730 papers. After several stages of inclusion and exclusion, we arrived to our final set of 84 papers. By synthesizing steps in this final set of papers, this study provides a seven-step general framework for formal processes which could be mentioned as a new and general framework which reflect findings of previous research and processes. The result has been further discussed and several implications for practice and research identified.

7 LIMITATIONS

The nature of this paper obviously means that its results are affected by the limitations to which its references were subject. Although we attempted to search all important scientific data bases in the field, because of the popularity of the subject and the huge number of papers we may have missed some which were not indexed on those data bases. It is possible that we missed industrial processes which were not introduced through academic papers. Moreover, previous research (especially older papers which were published before concurrence on current terminology) may use other terms that prevented their inclusion in our pool and our research (like any other review paper) is limited to the keywords which we used as our search query.

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