

# A FRAMEWORK TOWARDS EFFECTIVE IT STRATEGY FOR MODERN ELECTRIC UTILITIES

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*Summary-- This paper presents the results of a case study and a survey conducted in Swedish utilities concerning utilities IT strategy. The paper highlights the strengths and weaknesses of existing IT strategy and then proposes a framework to enhance the effectiveness of utilities IT strategy. The framework proposed in this paper draws not only upon experiences gained from the case study and the survey, but also incorporates theories and concepts from the school of strategic management, information systems, and organization study.*

**Outline.** This paper is divided into four sections. The second section presents the combined findings from the case study and the survey. The findings, which concern the characteristics (strengths and weaknesses) of existing IT strategy, are linked to some established theories and concepts in the related disciplines. Thereafter, a proposed framework aiming to enhance the effectiveness of utilities IT strategy is presented. The implications of such a framework are also discussed. Finally, some conclusions are drawn and presented in the last section.

## INTRODUCTION

**Background & purpose.** Worldwide, electric utilities are undergoing tremendous changes. Not only deregulation has changed the business environment of the industry, the rapid advancement in information technology (IT) is also about to change the ways utilities use to operate and conduct their businesses. Many published papers have recommended that utilities formulate a long term IT strategy to exploit the full potential of the technology in order to confront the challenges ahead, see for example [1]. However, little has been said about the effectiveness of the strategy. For example, "Is IT strategy an effective tool?" "What is the state-of-the-practice of IT strategy today?" "What are the important considerations of an IT strategy?" "What else could be done to enhance the effectiveness of the strategy?" These are just some of the questions facing many utilities today.

This paper attempts to address these questions by relating to results concluded from a case study and also from a survey done on Swedish electric utilities. On top of this, a framework towards more effective IT strategy is proposed. Central to the framework is a system approach that combines theories and concepts from strategic management, organization theory, and information systems.

**Research methodology.** A combination of qualitative and quantitative methods were used in this research. While the qualitative method (case study in this case) provides an opportunity to gain deeper insights into the relationship between people, the organization, and information technology, the quantitative method (survey in this case) complements it with the ability to generalize the findings to a bigger population. Detailed results of the case study and the survey are documented in [2] and [3].

## CHARACTERISTICS OF EXISTING IT STRATEGY

The characteristics of a strategy can be described from the three perspectives of a strategy, namely the strategy process perspective, the strategy context perspective, and the strategy content perspective [4]. Based on some pre-defined criteria from these three perspectives, the survey shows that only about 32% of the surveyed utilities are satisfied with their existing IT strategy. This section describes some of the characteristics (strengths and weaknesses) of existing IT strategy and relates them to well-established theories and concepts from related disciplines.

### From a strategy process perspective

**IT and people.** *People involvement in the process, communication and understanding of the strategy*, are some of the important elements contributing to the success of a strategy. Many strategies fail during implementation because they fail to involve the critical mass of the organization during the process [5]. More and more organizations are realizing the importance of involving the critical mass of the organization in the strategic process in order to breed more commitment during its implementation. The process should be used as a platform for "consensus building" whereby the majority (if not all) can come to an agreement on certain guiding principles. The common consensus reached is vital for the successful transformation of the strategy during the implementation phase.

Beside this, communication, documentation and made information available concerning the IT strategy purpose, scope, and utilization are some important activities in the IT strategy process. Full communication and better understanding will help ensure that all those affected by the strategy will "buy into" it and that they will have a full awareness of the proposals. This will help to minimize the "resistance to changes" and chances of "one-off"

departmental or local initiatives being undertaken that might undermine the effectiveness of the total strategy.

In the case study, it was observed that the top and middle management levels were quite involved in the process. However, there was a lack of involvement from the line or functional staffs. This observation was subsequently confirmed by the survey results that showed that overall, top management involvement in the IT strategy process was rather high compared with middle management and line and functional staff. This seemed to reflect the conventional thinking that strategy was solely a top management issue. The degree of communication and understanding of the IT strategy purpose, scope, and utilization too was highest for the top management group, followed by the middle management and least for the line and functional staffs. This again was consistent with the observation made in the case study, which showed that there was confusion in the interpretation of the existing IT strategy due to a lack of communication and understanding of the strategy, especially among those who did not participate in the IT strategy process.

The survey further showed that there was significant correlation between the level of satisfaction with the strategy process and the degree of understanding of the strategy purpose, scope, and utilization by all the three levels of the organization. It also provided evidence that there is a strong desire to increase the degree of involvement, the communication to and understanding by the middle management group as well as the line and functional staff in the future IT strategy process.

### **From a context perspective**

**IT and business environment.** According to [6], prior to the formulation of a strategy, it is important that the organization performs an "environment scanning" or SWOT (strengths, weaknesses, opportunities, threats) analysis. In the analysis, the top management scans both the external environment for opportunities and threats, and the internal environment for strengths and weaknesses. The external environment has two parts: task (industry) environment that includes those elements that directly affect the organization's major operation, and societal environment that includes the more general forces such as economic, socio-cultural, technological, and political-legal forces. On the other hand, the internal environment includes the structure, culture, and resources of the organization. Environment scanning is often done when formulating the business strategy of a firm. The results from this scanning and the business strategy itself should be used to provide a context to the IT strategy, which in turn will influence the strategy content. Apart from this, the strengths and weaknesses of existing IT systems, competence, etc., in the firm should also be identified.

The case study revealed that the studied utility's IT strategy had not taken much consideration to the "external"

environment, for example, how deregulation in the industry could affect the business activities or processes, and how to exploit the development in IT to arrest some of the threats and to take advantages of the opportunities caused by deregulation. The IT strategy focused primarily on trying to streamline the utility's existing office and administrative IT systems.

In this regard, it is interesting to note that results from the survey showed that only about 37% of existing IT strategies have SWOT analysis as their inputs. There is also a significant difference between utilities with large customer base and utilities with smaller customer base in the degree of consideration taken by their existing IT strategy to the changing business environment. *IT strategy of large utilities paid significantly more consideration to the changing business environment than the smaller utility.*

### **From a content perspective**

**IT and business strategy.** The importance of aligning IT strategy with a firm's business strategy has been cited in many different literatures, see for example [7] and [8]. The alignment, however, requires that the firm's business strategy be clearly defined first. Today, many argue that a successful IT strategy must be an integral part of business strategy and incorporate both a vision for the business and the plans for how to achieve this vision. The objective of an IT strategy is to provide an agreed framework for the development, acquisition, and use of IT in furtherance of agreed business plans and objectives.

In the case study, it was clear that there was a *lack of coupling between the utility's business strategy and its IT strategy*. This was primarily due to the fact that the studied utility had not clearly defined its business strategy at that time, and no business process analysis was carried out. There was a great lack of satisfaction because the IT strategy did not address the various business needs. Incidentally, the results from the survey showed that existing IT strategies addressed the business needs only moderately.

**IT and business processes.** The roles of IT in enhancing business processes have been highlighted in many well-known literatures. See for example [9], [10], [11], and [12]. In [11], evidence is provided that so far most users of IT have not been able to exploit the full potential of the technology despite radical improvements in IT functionality. The improvement in productivity has been only marginal and has not commensurated with the amount of investment made in IT. Thus, an effective IT strategy should provide the basis for such business process reengineering efforts and not merely be a replacement of the traditional manual process. Performing a business process analysis is a pre-requisite in this direction. The need for business process analysis in the process of IT strategy formulation has been highlighted in, for example, [13].

In the case study, it was observed that the IT strategy could hardly contribute to any business process reengineering efforts. It neither made any attempt to identify critical business processes where the potential of IT could be exploited nor recommended the need for a business process analysis. Instead, the strategy focused primarily on choosing technology, e.g., operating systems (Windows 95/NT<sup>1</sup>) and applications for word processing, spreadsheets, scheduling, etc. Results from the survey also provided evidence that existing IT strategies have been more technology focused than process focused. However, the survey also showed strong evidence that future utility's IT strategy is going to be more process focused than technology focused.

**IT and Structure.** The structure of an organization provides a framework that turns a collection of people and resources into an identifiable form [14]. Discussions of organization structure often include the concepts of levels of management and span of control, which imply differences in responsibility and degrees of authority [15]. Thus, it is also a framework in which people exercise their authorities and influences, and in which decisions are made.

In [14], the impacts of IT on organization structure are further highlighted by seeing an organization structure in two domains, namely the physical and perceptual domains. IT, unlike other general technologies, has far greater impacts on the perceptual domain. By changing the perception of people who make up the organization, the perceived organization structure would be changed. The author argues that the relationship between IT and organization structure are inseparable. This relationship must be considered when introducing IT in organizations.

In the case study, an IT council was formed to coordinate the various IT related activities and projects and to disseminate information throughout the organization. It was also responsible for ensuring the alignment of various IT decisions and activities with the IT strategy. However, the council lacked the authority, and resources, to carry out its tasks. This was primarily due to the absence of an explicit status of the council within the organization structure. The lack of a functioning operational process model further worsened the situation [16]. Despite an attempt to define the roles and responsibilities of various parties involved in IT related activities, the IT council remained largely inoperative.

Results from the survey also showed that existing IT strategies paid only little consideration to the organization structure. However, there was sufficient statistical evidence to show that there is a desire to increase this consideration in future IT strategies.

## A PROPOSED FRAMEWORK

In this section, a framework aimed at enhancing the effectiveness of utilities IT strategy is presented. The proposed framework draws not only from the insights gained from the case study and the survey conducted, but also from concepts and theories from various related disciplines, such as strategic management, organization theories, and information systems. The implications of such a framework are also discussed.

### Towards a business-driven IT strategy

A firm's business strategy and its IT strategy are linked intimately through shared goals, objectives, and processes [15]. It is this interweaving and sharing of goals, objectives, and processes that ensures alignment between the IT and business strategy. Thus, to achieve a business-driven IT strategy, it is imperative that the business strategy be clearly defined first. The business strategy must take into consideration both the external and internal environment of the firm. The team involved in defining the business strategy must be aware of the potential impacts of IT in reshaping the business scope and scale. Figure 1 below shows a high-level strategy process model adapted from the waterfall model commonly used in system development. This iterative model provides the linkages between the environment, business, and IT strategy.

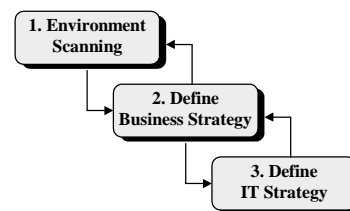


Figure 1. A high-level process model linking business and IT strategy

### A system approach to IT strategy

Figure 2 shows a model that provides a framework towards formulating more effective IT strategy. The model assimilates Leavitt's model of industrial organization [17], concepts from the schools of strategic management, and information system theory.

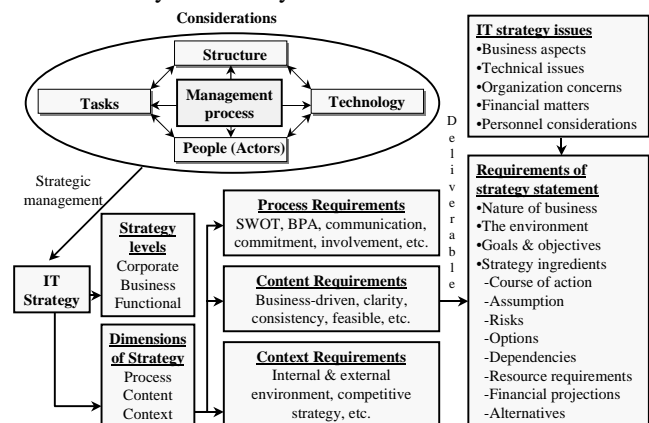


Figure 2. A system approach to IT strategy

<sup>1</sup> Windows 95/NT is registered trademark of Microsoft.

Leavitt [17] views industrial organization as complex systems with at least four interacting variables, namely, task/process variables, structural variables, technological variables, and human variables. Leavitt contends that the interaction of these forces is mutually dependent: as one changes, so do the others in response. The result is that it is difficult to achieve any significant degree of change without tackling each of the factors in parallel. Leavitt's model provides a powerful *system view* of the interacting forces within an organization. Since its introduction, this model has been used or enhanced by, for example [18] and [19]. In [18], another important element, the *management process* is added to Leavitt's model. Management process is seen as part of the "glue that holds organizations together." It includes, for example, strategic planning, budgeting, statutory reporting, conducting staff appraisals and doing corporate public relations [12].

Most of the shortcomings of existing IT strategies revealed in the previous section can be linked to the various elements of the organization first postulated by Leavitt; these shortcomings reflect the failure to take into sufficient consideration the various organizational elements.

The survey revealed that existing IT strategy paid substantially higher consideration to technology than other elements. However, there is strong evidence that future IT strategy will pay higher consideration to processes, people, and structure, while consideration to technology will remain relatively at the same level. This is a good indication as technology changes very rapidly whereas other elements are more stable. IT strategy should be more process-oriented than technology-oriented, thus providing a strategy for a longer time horizon. It is the author's strong belief that only when all these interdependent elements are given the proper consideration, will IT strategies become effective. These considerations should be reflected in the content of the strategy document.

IT strategy may exist in different levels of the organization, for example, the corporate level, business level, and the functional level. It is important that this is made clear to avoid confusion, as the objective, scope, and depth of the strategy may vary. This was one of the problems that were observed in the case study conducted. Defining the level of the strategy also provides a context to the strategy beside the firm's business strategy.

The process in which the strategy is formulated can have serious implications on the success of the strategy [20]. The process should be used as a platform to build consensus, support, commitment, and also the momentum needed towards successful implementation. Besides involving the critical mass of the organization and having good communication to disseminate information, the process should also be preceded by a business process analysis. The importance of such analysis in the process of IT strategy formulation has been highlighted in, for example, [13].

Besides relating to the business of a firm, the objectives of such an analysis are also to:

- Identify the critical business processes vital for the firm's survival.
- Differentiate customer-focused, value-added processes from other processes.
- Identify the weaknesses of existing processes and potential for improvement.

The deliverable of the strategy process is the strategy content. The content of the strategy should reflect the consideration given to the various organizational elements as depicted in the model and be communicated and understood by people directly or indirectly impacted by it. This is one of the factors that is shown by the survey to have significant correlation with the satisfaction level of the strategy. The strategy content should contain at least the following [15]:

*Nature of the business.* A description of "What business are we concerned with? What are the boundaries of the business?"

*The environment.* A description of what is known and assumed about the relevant and significant factors and trends surrounding the firm that could impact or influence the firm's current and future business operation. The following should be addressed: "What is the IT environment today and what might it be in the future? What are the current capabilities and what can they be in the future? What are the strengths and weaknesses of current IT systems? What are the key technologies that might have significant impact on achieving or reshaping the firm's goals?"

*Goals and objectives.* In line with the firm's business strategy, goals and objectives of the IT strategy must be stated in clear and concrete terms. What IT capabilities are we trying to achieve, and what long term objectives are we going to set for the organization? For example, if the business strategy requires more value-added services to be provided to the customers to retain their loyalty, what IT systems and infrastructure are needed to achieve this and by when?

*Strategy ingredients.* This includes the course of action necessary to achieve the objectives of the strategy. For example, if a goal of the IT organization is to improve the capabilities of its people, will it accomplish this through hiring, training, retraining, or a combination of these? If a new infrastructure is needed to support some strategic IT systems, will it be leased or built? Along with these alternatives, major *assumptions and risks* associated with them should be made clear. For example, what is the risk if the infrastructure needed to support the strategic systems is not own by the firm itself? It is also important to state the *dependency* of one strategy on another. If the strategy is to provide more value-added services to customers, what

about the marketing strategy? What is required to know the customer preference better in order to deliver what is actually wanted? Finally, the strategy must identify *resources* required to carry out the actions, and it must present financial projections of the benefit and cost of implementing the strategy. In evaluating different alternatives and allocating resources that often involve unquantifiable variables, a method prescribed by [21], which employs an analytic hierarchy process may be used. A description of the method is beyond the scope of this paper.

While it is impossible to demonstrate conclusively that a particular strategy is optimal or even to guarantee that it will work, some broad criteria to test it for critical flaws are given below [22]:

- *Consistency*. The strategy must not present mutually inconsistent goals and policies.
- *Consonance*. The strategy must represent an adaptive response to the external environment and to the critical changes occurring within it.
- *Advantage*. The strategy must provide for the creation and/or maintenance of a competitive advantage in the selected area of activity.
- *Feasibility*. The strategy must neither overtax available resources nor create unsolvable subproblems.

Formulating the IT strategy is only the first step in a *total strategy process* as shown in Figure 3 below. In short, it is suffice to say that the total strategy process is an iterative one. The strategy must be transformed into a series of programs or plans for implementation through a process known as strategic planning [15]. These programs need to be coordinated, followed-up, and assessed. For an IT strategy to remain effective, it has to be a "living" document [13], i.e., continuously reviewed, updated, and properly maintained through a process known as strategy maintenance [15].

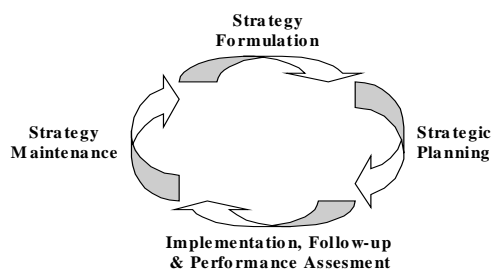


Figure 3. Total strategy process

### Implications of the system approach

There are several implications if this system approach is taken. First, IT strategy will be more complex due to its encompassing feature. It becomes the nucleus drawing together corporate, business, and human resource strategy. Thus, IT strategy must become a central management issue in view of its growing strategic imperative, and it must not

be treated in isolation. As IT strategy becomes more and more integrated with business strategy, the boundary between the two becomes blurred.

Second, practitioners or consultants need to increase their knowledge, skills, and competence substantially in dealing with this complexity. It is no longer enough for them to only excel in one specific area such as technology; they must be able to foresee, anticipate, and manage other organizational forces as well. Results from the survey show that only about 58% of the IT strategy formulated used the service of consultant, and *there is insufficient evidence to suggest that the consultant's involvement would necessarily increase the satisfaction level* of utilities towards their IT strategy. This appears to reinforce the new requirement on consultants. On the other hand, when utilities hire consultant services, the scope of works must not restraint consultants to only look into the technology aspect.

### CONCLUSIONS

Both the case study and the survey conducted provided evidence that electric utilities are far from being satisfied today with their existing IT strategy. There is evidence that existing IT strategies focus considerably on technology aspects but less on other organizational elements that are vital in achieving a firm's ultimate objectives. Weaknesses highlighted in this paper demonstrate the importance of considering other vital elements such as tasks/processes, people, and structure as postulated by Leavitt [17]. From the survey, there appears to be a realization of the existing weaknesses. There is a strong desire among utilities for future IT strategies to be more balanced, i.e., more consideration will be given to other organizational elements beside technology.

Besides adopting a system approach based on the organization model first put forward by Leavitt [17], the approach towards IT strategy presented in this paper also provides a framework for the alignment between IT and business strategy, and some requirements for an effective IT strategy. The requirements draw not only from the insights gained from the case study and the survey conducted, but also from concepts and theories from various related disciplines, such as strategic management, organization theories, and information systems.

The system approach called for in this paper has several implications. It not only makes future IT strategy more complex by having to relate to other organizational elements, it also requires that future IT strategy becomes a central issue of the management due to its impacts on the organization as a whole. If a consultant is hired to aid in the formulation of the strategy, the scope of works should not be restricted to only the technological aspect for the strategy to be effective. Furthermore, practitioners and consultants must increase their knowledge, skills, and competence in dealing with this increase in complexity.

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