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A TRANSACTION-BASED APPROACH TO INFORMATION SYSTEMS STRATEGY FORMULATION

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Abstract

This paper presents some concepts and methods that can be useful for formulating Information Technology and Information Systems (IT/IS) strategy. Achieving IT-based competitive advantage requires more than just aligning IT/IS plans with business strategy: it means designing the IT/IS strategy *in parallel* with business strategy. To achieve this concurrent formulation of strategy, we propose an approach based on two well-known concepts: 1) the so-called «cost drivers» and «differentiation (or uniqueness) drivers», which help to give the analysis the necessary strategic perspective; and 2) the operational concept of «business transaction» and the information elements associated with it. We show how these concepts can be incorporated into the strategic planning process to help link IT/IS strategy and business strategy. We conclude that IT/IS should be involved in strategy formulation from early stages. Finally, we briefly discuss some of the procedural and organizational implications of applying these concepts.

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1. Introduction

The term «Strategic Information Systems» (SIS) has become quite popular in the Information Systems literature in recent years. Many publications (e.g. Business Week 1985, Sunnot 1987, Wiseman 1985) have illustrated the way companies can achieve strategic advantages through the use of their Information Systems (IS).

These examples are interesting because they show that IT/IS can contribute to business strategy. However, they are also somewhat frustrating. Practitioners may want to reproduce such success stories in their own company, but they are not sure how to go about it. The lack of a clear answer generates a feeling of underachievement and skepticism.

A closer look at the famous examples (e.g. American Hospital Supply, McKesson, Merrill Lynch) shows that developing information systems to obtain strategic advantages was either 1) a long process that started almost by chance and evolved slowly (e.g. American Hospital Supply and Hanes DSD, both HBS cases), or 2) was backed by a strong champion in the organization (e.g. Pinsos Galofré, 1989). Few of them seem to have been the result of a purposeful and explicit planning activity aimed at identifying strategic IS opportunities. Consequently, one might conclude that in order to develop strategic IS ideas, all one can do is try to reproduce the environmental conditions that characterized those cases, i.e. foster innovation by relaxing controls, let champions try new ideas, and... hope for the best (see, for example, Cash & Gogan, 1987; Vitale, Ives & Beath 1988).

The authors of this paper believe that it is possible to be somewhat more *proactive*, i.e. to have methodological guidelines for developing strategic IS in a more systematic way. This paper presents an alternative approach based on a simple operational concept: that of the *transaction* and the information associated with it. By looking at transactional information in the light of the *cost and uniqueness drivers* (1) (Porter 1985), it is possible to *augment* the scope of the strategic planning process.

The goal is to let IT/IS play an active role in strategy formulation. By considering the use of transactional information to affect the *cost and uniqueness drivers*, IT/IS can enter the strategic planning process *early on* in the strategy formulation stage. As a result, it becomes possible to identify *focused* strategic applications for IT/IS.

2. Linking IT/IS Strategy and Business Strategy

The number of publications addressing the relationship between business strategy and IT/IS strategy has increased dramatically in recent years. Some authors have even developed taxonomies to classify the different models of the relationship (Wiseman 1988, Earl 1988), while others have conducted tests to compare their effectiveness in generating «strategic» ideas in different business settings (e.g., Bergeron et al, 1991).

Most of these models highlight the strategic potential of IT/IS and, therefore, its potential to contribute to business strategy. The best known examples are based on: 1) the value chain (Porter and Millar, 1985); 2) its micro-activities in marketing and sales (Ives and Learmonth, 1984); 3) the industry competitive forces (McFarlan, 1984); 4) relationships with clients and suppliers (Cash and Konsynski, 1985); 5) the strategic thrusts (Wiseman, 1985); or 6) the organizational structure (Vitale et al 1986). By highlighting the potential impact of IT/IS, all these models focus on Strategy Content.

This paper concentrates on strategy process (as opposed to strategy content). That is, the authors aim to foster *strategic thinking* by incorporating IT/IS concepts and ideas into the strategic planning process. The proposed methodology has three main characteristics: 1) it is *proactive* in the sense that it uses IT/IS to formulate business strategy (it is not just another procedure for aligning IS/IT strategy with business strategy); 2) it includes elements of both operational and strategic planning; and 3) it complements and can be enriched by existing planning models. It does not recommend any specific use of IT/IS to obtain competitive advantage, as previous models do, but introduces some elements that facilitate the process of integrating IT/IS in strategic planning.

The paper presents the basic structure of a strategic planning procedure that incorporates «*strategic actions*» based on IT/IS. The idea of IT/IS-based strategic actions implies the recognition that IT/IS can *influence* business strategy and thus *actively* contribute to shaping the strategy of a firm (Andreu, Ricart & Valor, 1991). For this reason, if we are to allow IT/IS to unfold its *strategic potential*, simply ensuring that IT/IS actions are aligned with a pre-defined business strategy is not enough. The IT/IS viewpoint has to become an active part of the business strategy design process. This is what we mean by *proactive* IT/IS strategy formulation.

In the next section we illustrate how IT/IS can be incorporated into the strategic planning process in order to realise its strategic potential. We start by recalling the basic structure of a strategy design process, and then discuss how, with the aid of our transaction-based approach, IT/IS can be included in this process.

3. Pro-active IT/IS strategy formulation

Conceptually, all procedures used to design business strategies start with four basic points: 1) A mission statement that sets the scope of the business; 2) an internal analysis aimed at identifying strengths and weaknesses; 3) an external analysis (environmental scan) to identify opportunities and threats; and 4) a set of corporate guidelines and strategic thrusts to guide the process in the case of a corporation (Hax & Majluf, 1984). The process of formulating a strategy consists of analysing these points in order to identify the best way to pursue the company's mission, using the company's strengths (skills and/or assets) to seize the opportunities and avoid the threats of the environment.

Strategy has to be formulated at all levels: corporate, business unit and functional (Hax & Majluf, 1984), going back and forth in an iterative manner until an internally coherent and integrated set of actions is identified at all levels, one that is also consistent with the corporate mission statement.

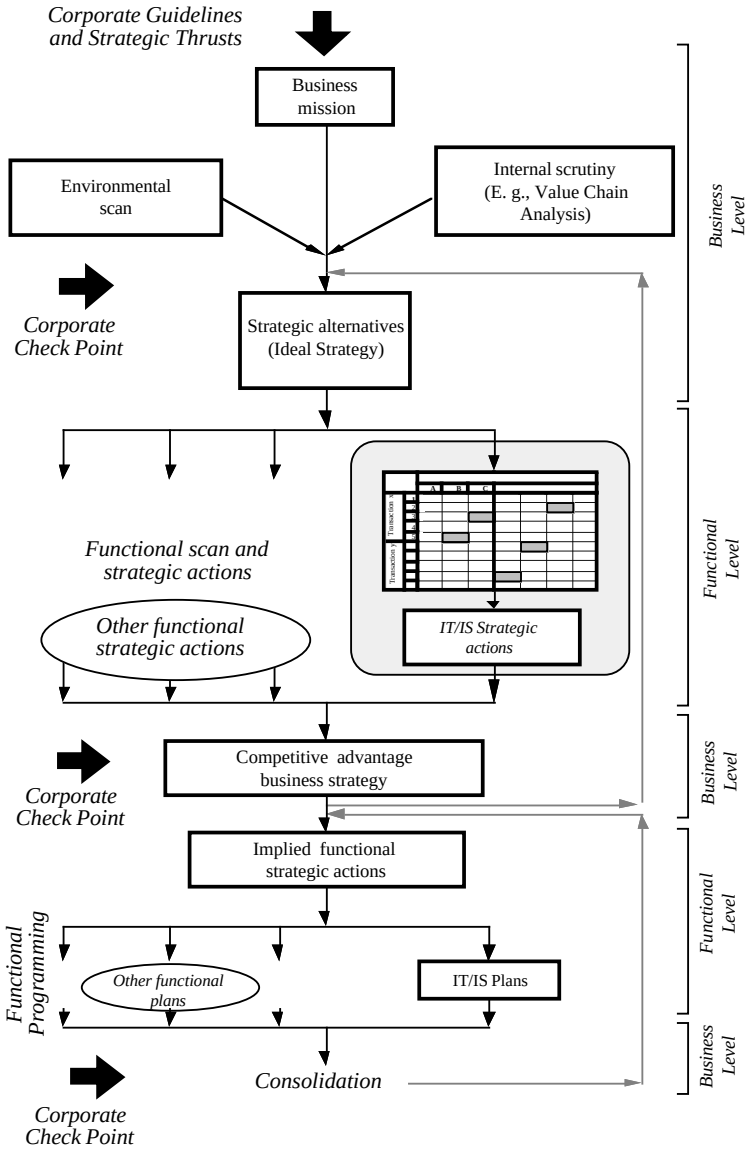
We are interested in the challenge of introducing IT/IS considerations into this process *at a point where such considerations can still influence the business strategy that is being designed.* This permits an interaction between the *IT/IS functional level* and the *business unit level* of the design process, which should enrich the content of the latter. In a more *passive* approach, IT/IS considerations would come into play only later in the process, when all components of the business strategy are already decided upon, so that *only its implications for IT/IS could be taken into account.*

The preceding paragraphs can be better understood with the aid of the diagram in Figure 1. The structure of the strategy design process shows how different activities in the process belong to different levels (functional, business unit, and corporate –shown in the figure through check points) and where the emphasis is placed in each activity.

Following corporate guidelines, the process starts at the business unit level, looking at the classical internal-external analysis in the light of the corporate mission and making a first effort of synthesis to produce what we call an *ideal strategy* (*ideal* because it has to be contrasted with the internal audits at the various functional levels), which then has to be checked for corporate consistency.

Next comes an activity at the functional level, called *Functional Scan and Strategic Actions*. The purpose of this activity is to explicitly consider how the different functional areas (production, marketing, finance, etc.) can *contribute* to the basic, ideal strategy outlined in the previous step. This paper stresses the importance of IT/IS at this stage, *giving it as active a role as any other functional area.* Details of how this can be done are presented below. First, however, it is useful to complete the discussion of Figure 1, just to get an idea of the complete process.

Figure 1. Business strategy design process



Once the functional strategic actions have been identified, they are integrated into a coherent business strategy. The *ideal* strategy may have to be adjusted to accommodate each functional area's contribution, and also any constraints (organizational, knowledge, personnel, skills, etc.). Again, the result has to be checked for corporate consistency.

Having arrived at a more concrete business strategy, *the implications of this strategy for the different functional areas have to be worked out*. In practice, this means all the actions required to support the business strategy in each functional area. From the functional perspective this is a rather *passive* step, as functional considerations are not allowed to influence the structure of the business strategy. Termed *Functional Programming*, this has often been the only stage in the strategy design process where IT/IS aspects have been taken into account. If this is so, the result is a *passive* approach of the kind mentioned earlier.

Finally, consolidating all the *implied functional actions* and checking them again against corporate guidelines produces the details of how the strategy is to be implemented. In a final step, the more specific implementation of projects, budgets and controls will have to be be decided.

4. A transaction-based approach to the formulation of strategic actions

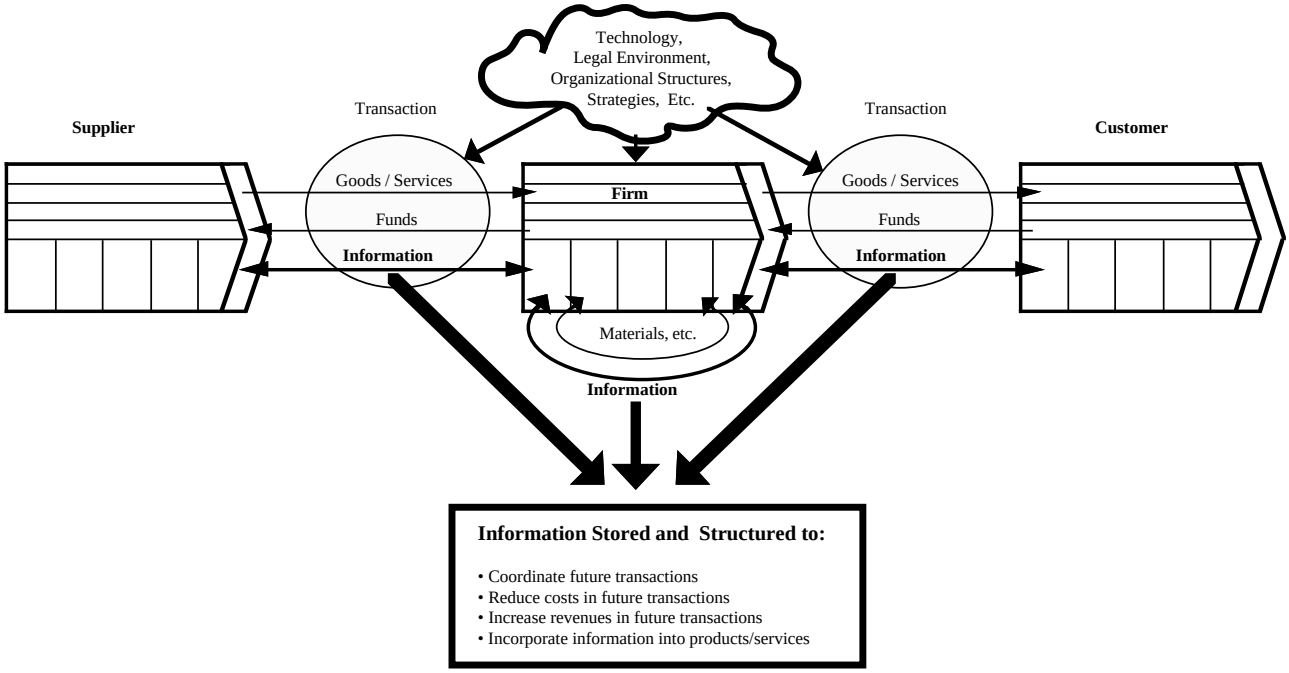
The model proposed by the authors is based on the numerous examples of strategic IS that are to be found in the literature and in real life. Most of these examples involve systems that exploit low-level information, i.e. data gathered during transaction processing. This may seem paradoxical as one tends to associate transaction processing with operational activities of no strategic importance. However, it is a matter not only of how to use transactional information for strategic purposes, but also of deciding what additional information may be worth gathering while transactions take place in order to contribute to SIS.

The term *transaction* refers to the exchange, say between firm and consumer, of goods and services for money. However, beyond the exchange of goods for money, there is also an exchange of information. From the point of view of the firm, this information is assumed to be deposited in a «memory store», i.e. a record of the transaction itself, the conditions of the exchange, and/or data about the consumer (Glazer 1991).

The central idea behind our approach to SIS formulation is to use transactional information to affect *cost and uniqueness drivers* (Porter 1985). *Cost drivers* are the structural determinants of the cost of an activity. Several cost drivers can combine to determine the cost of a given activity. A firm's relative cost position in a value activity depends on its standing vis-a-vis important cost drivers. On the other hand, a firm differentiates itself from its competitors when it provides something unique that is valuable to buyers beyond simply offering a low price. A firm's uniqueness in value activities is determined by a series of *uniqueness drivers*, conceptually analogous to the cost drivers.

The authors' approach involves a systematic analysis of the information available while transactions take place. For each information element, the following question is asked: «Could this information be used at some later stage (possibly in combination with certain IT capabilities that allow quick access or specific processing) to: 1) reduce the costs of the same or other transactions in the future; or 2) increase revenues from the same or other transactions in the future?» (Glazer 1992). The second part of the question refers to the possibility of increasing revenues from the sale of the information available or of some other information derived from it. Figure 2 depicts the situation from a conceptual perspective.

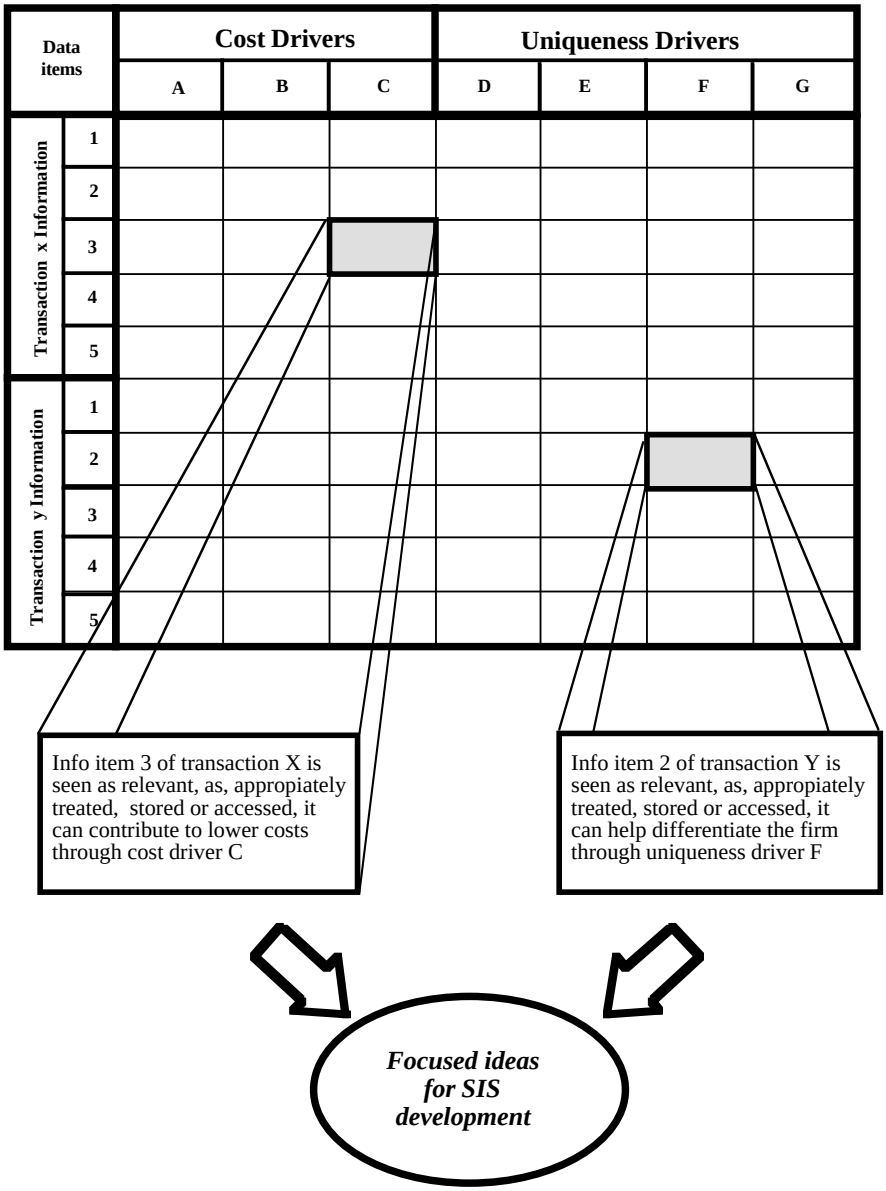
Figure 2



Furthermore, examining transaction information in the light of cost and uniqueness drivers helps to focus the answers to the question posed above, so that they are directly relevant to the strategic positioning of the firm. Thus, the very basic planning procedure proposed here encompasses two complementary points of view. On the one hand, the focus on operational activities results in concrete ideas for action. On the other hand, the use of cost and uniqueness drivers gives the analysis both the strategic perspective and the right emphasis, i.e. relevance for the firm in question. Figure 3 shows how these two complementary perspectives make up the basic model.

A given transaction (say transaction X or transaction Y) produces different information items (5 items in the example shown). These items are data generated and captured when the transaction takes place, and are therefore available in some database. On the other hand, strategic analysis of the firm has previously identified three cost drivers (A, B, C) (examples of these could be: economies of scale, learning effects, capacity utilization) and four uniqueness drivers (D, E, F, G) (for example: product quality, flexibility, delivery time, customer service). Figure 3 shows that the third information item gathered when transaction X takes place can be used to reduce the firm's costs through the cost driver C (e.g. information that is useful for coordinating activities in the manufacturing plant and that can therefore help improve the capacity utilization). The analysis also shows that the second information item in transaction Y can affect uniqueness driver F (e.g. information that could help shorten lead time). Systematically checking transaction data against cost and uniqueness drivers for the major activities of the firm will unveil a map that reflects the strategic value of all transactional information. This map constitutes the basis for SIS; in other words, focused ideas for SIS development emerge when you group some of the relevant information elements in clusters.

Figure 3



A more detailed analysis could be done at the level of each value chain activity. This would be appropriate only if the cost and uniqueness drivers of a particular activity or group of activities differed substantially from those of other activities. If that were the case, we would have several tables like the one shown in Figure 3, one for each value activity set (each one, however, containing all the information items).

The examples in the following section show how some well-known examples of SIS can be understood and conceptualized using the model.

5. Using transaction information for strategic actions: Some examples

In order to show how transaction information can be used to affect cost and uniqueness drivers, this section will discuss examples of companies that have achieved strategic advantages through IT/IS. The value of the following paragraphs is only illustrative, as the analysis is *ex-post.* The purpose is to help the reader to better understand the proposed model.

Supermarkets: Scanner Data

In supermarkets, the use of scanners at checkout points can be justified in retrospect through the following line of reasoning based on the proposed model: If one of the relevant uniqueness drivers is the ability to address different customer segments through specific marketing actions (i.e. micro-segmentation), the importance of *recording all data items relevant for micro-segmentation at sales transaction time* becomes obvious. Therefore, the IS should be designed to record all that information. And more importantly: From the IS perspective it should be possible to *suggest data that may be useful for customer segmentation but that are not included in the initial segmentation dimensions proposed by Marketing and Sales: for example, the transaction time of each sale.* A suggestion such as this is, as we understand it, a *genuine* contribution to strategy formulation coming from the IS/IT ranks. It will still have to be checked whether segmenting customers by purchasing time makes sense or not in the context of the marketing strategy of a specific supermarket (and our proposal is that this should of course be done in the context of the business strategy formulation process), but the important thing is that this alternative not be overlooked during the strategy formulation process.

Thomson Travel: Reservations data

Thomson Travel, a large tour operator in England, exemplifies another use of the proposed model. Thomson developed a communications network that was fully compatible with the English videotex network, which permitted its clients (travel agencies) to access its reservations system through a cheap terminal (a videotex terminal) that could even be rented. If the ability to offer a swift and flexible service is a relevant uniqueness driver for Thomson, then registering reservation data quickly and accurately becomes an important differentiation factor. Thompson found that a good way to accomplish this was to allow the client to enter *reservation data* himself, with the help of IT/IS capabilities.

This decision had significant strategic consequences: Thomson's sales increased very considerably soon after introducing the system. Its competitors retaliated and developed similar systems that were better than Thomson's in terms of their basic facilities and functions (e.g., greater capability of locating alternative hotels in a given city, etc.). Yet travel agencies did not use the newer systems very much. When asked why, a common reply was, «We already know how to operate the Thomson system, which we use with a high proportion of our reservations anyway... It doesn´t pay much to learn how to operate a completely new system...»

Savings Banks: «Family accounts»

Several savings banks in Spain offer what they call «family accounts». These are normal savings accounts *augmented* by an additional service: a periodic report that shows all

transactions sorted by type (deposits from different sources, withdrawals for different reasons such as utility bills, school charges, checks, etc.). This amounts to providing the client with a «profit and loss statement» for the period, which will be more or less complete, depending on whether or not the account owner puts all of his or her transactions through that account. From the point of view of the bank, preparing such reports is relatively easy and can be done at a relatively low cost: the transactions have to be recorded anyway, and sorting them is straightforward as long as the information needed to categorize them is available and a reasonably capable IT infrastructure is in place.

In the context of the model described above, the process of launching such a «family account» as a new product can be conceptualized as follows: *Personalizing products* is one of the uniqueness drivers underlying the bank's strategy. The relevant transaction data are all the usual items recorded along with account transactions, *plus the additional item «transaction type»* (as this is the basis on which the personalized report is prepared). The bank that was first to identify the need to record «transaction type» information for the purpose of preparing the personalized reports developed a competitive advantage vis a vis other banks whose operations were not yet ready to gather and process that kind of information.

6. Incorporating IS/IT-based strategic actions in strategy formulation

As stated in the introduction, this paper describes an approach that can be used to give IT/IS content to the *«Functional Scan and Strategic Actions»* phase of the strategy formulation process. In order to explicitly develop IT/IS-based strategic actions, the authors propose to use the intermediate results of previous analyses and to cross-fertilize them with transaction information in order to uncover IT/IS-based strategic potential. Because of the procedure employed, the strategic potential identified will be *focused,* in the sense that it will be consistent with the strategy being formulated.

As shown in Figure 3, if the basic components of the *ideal* strategy (i.e. the relevant cost and uniqueness drivers, as determined by the internal scrutiny and environmental scan carried out in the first, business-unit level step of the strategy design process) are explicitly taken into account, the resulting IT/IS strategic actions will be consistent with them *by design.*

The step in which strategic actions are devised consists of systematically applying the model, using the cost and uniqueness drivers as exemplified in the preceding section.

Clearly, the ideas generated by means of this procedure will be strategically focused, as they are the product of an explicit consideration of the results of the strategic analysis process, which is precisely the process that determines what makes sense and what doesn't from a strategic point of view. However, as with many other ideas generated in a formal strategy formulation process, it may not be possible to implement all of them at once. It is in the subsequent synthesis step that the most appropriate ones will have to be selected.

In summary, the procedure described in the following section helps to achieve the objective of *raising IT/IS considerations to the same level as those of other functional areas in the strategy formulation process.*

7. Using the model: A simplified example

In this section we illustrate how the model can be used to generate IT/IS-based ideas with strategic potential. To do this we shall apply the model to a specific situation, which we have chosen for two reasons: 1) it involves a well-known industry, so the reader will readily appreciate the relevant issues, and 2) there is published information about it. Although the resulting setting is not completely real (due to the fact that we do not have *all* the information), we find it realistic enough.

The situation is the one presented in the OTISLINE case (HBS case 9-186-304), which describes how OTIS Elevator streamlined its maintenance operations by using OTISLINE. This centralized, real-time system was designed to receive all service and maintenance requests from North American clients and to send service operatives to the pertinent sites. It thus also serves as the basis for scheduling these activities. Although the system was designed with the service and maintenance activities in mind, it turns out that much of the information it handles is also relevant for OTIS Elevator's other business activities, namely selling and manufacturing high quality, reliable elevators.

Service activities and transaction information

OTISLINE is a centralized customer service system used to dispatch service mechanics, in response to callbacks, 24 hours a day. OTISLINE is based on an integrated database that contains the customer master file (customer name, building location, contract information) and other information used to monitor and control the service business, such as route information and service price estimating data. In addition, the OTISLINE application records all maintenance activity for elevators under a service contract.

Customers access OTISLINE by calling a toll-free number that connects them to the customer service center. Incoming calls are distributed either to the next available dispatcher or are placed on a queue if all dispatchers are busy. The dispatcher then pages a service mechanic to request service on the out-of-order elevator. If the service mechanic assigned to the route is unable to take a call, the dispatcher pages either an alternate service mechanic or the service supervisor. For each callback, service mechanics call OTISLINE, describe the situation when they arrive at the building, and report the steps taken to repair the elevator. Table 1 summarizes the activities involved and the data generated by each transaction.

Table 1

Basic Transaction	*Activity*	*Transaction Data*
Service Request	Customer calls OTISLINE	Time when call comes in
	Call is placed on queue	
	Dispatcher answers	Time when call is answered
		Dispatcher identification
		Elevator identification *
		Service request log number
		Time when call ends
Dispatching	Dispatcher pages available mechanic	
	Dispatcher assigns mechanic	Mechanic identification
		Service request log number
		Time when mechanic dispatched
Servicing	Mechanic arrives at building	
	Mechanic repairs elevator	
	Mechanic calls dispatcher (callback report)	Time of call
		Dispatcher identification
		Service Request Log number
		Time of arrival at building
		Description of situation
		Work performed
		Components replaced
		Time repair was completed
		Time when call ends

* Installed Base file: building identification number, elevator type (**), building name, telephone number, address, city, state.

** Elevator Type file: elevator type, specifications, list of components

Company strategy, uniqueness drivers and cost drivers

OTIS Elevator pursues a differentiation strategy. It specializes in elevators for large, complex buildings and sells quality, service and its ability to customize elevators. Its products sell for a premium price. OTIS has a large and highly regarded service organization. Some elevators have microprocessor-based control systems (these are replacing older electro-mechanical control systems). Reliability is more important than cost for OTIS Elevator's target customers. In summary, the major elements in its differentiation strategy are: 1) product quality (reliable elevators), 2) superior service (responsiveness), and 3) customization (ability to adapt to client specifications). What follows is a brief analysis of the main uniqueness drivers.

Product quality means safer elevators and thus reliable designs. The main uniqueness drivers affecting product quality are: quality of materials, features of the elevator control system, the reliability of the components, and the ability to measure reliability as the basis for product re-design.

In the elevator service market, superior service implies quick response to service requests (i.e. getting a dispatcher on the phone quickly, dispatching a service mechanic

quickly, and identifying and fixing the problem quickly), the ability to guarantee service level contracts (eg. hospitals or buildings with one elevator only), and the avoidance of recurrent failures through repair quality and OTIS's commitment to re-design the elevator (in order to prevent the same problem from happening in the future). Thus, the uniqueness drivers affecting service level are: dispatcher availability, effectiveness of service mechanics, quick diagnosis capabilities, modular design (so that faulty components and sub-assemblies can be quickly replaced), skill level of service mechanics, ability to control dispatcher and service mechanic performance (feedback information to facilitate learning).

The third element of OTIS's differentiation strategy (customization) implies being able to adapt to customer specifications. In the case of large and complex buildings this involves working closely with the architect, the developer and the customer, and having a highly skilled and experienced engineering team. The uniqueness drivers, therefore, are: quality of engineering, and the ability of the salesforce to work closely with architects.

Finally, although OTIS does not pursue a cost leadership strategy, we will look at cost drivers. Cost drivers are always present in a firm's activities, and particularly in the activities that contribute to differentiation. In other words, differentiation is costly. The cost of differentiation reflects the cost drivers of the value activities on which uniqueness is based (Porter 1985, page 128). OTIS pays more than its competitors for the higher quality materials and reliable components it purchases, and also for sustaining a strong engineering team, a skilled salesforce (capable of working closely with architects) and a highly regarded service organization.

With regard to service, the main costs are those associated with acquiring, deploying and managing (service) resources. The cost drivers, therefore, are: the skill level of the service mechanics, the pattern of capacity utilization of the mechanics (i.e. both the way they are deployed or assigned to field offices, and the way they are dispatched in response to service requests), the productivity of the service mechanics, the pattern of capacity utilization of the dispatchers (i.e. the way they are organized), the productivity of the dispatchers, and failure rates (if elevators break down more often, OTIS will need more service mechanics).

Mapping transaction data and cost/uniqueness drivers

Having identified the main uniqueness drivers and cost drivers, we now turn our attention to the process of mapping transaction data against these drivers in order to discover ideas for strategic applications. For the sake of simplicity, we will restrict our analysis to the more important cost/uniqueness drivers. Figure 4 illustrates the mapping process.

Figure 4

		Uniqueness Drivers				Cost drivers	
		Product Quality		Service Level		(Cost of service)	
	Transaction Data	**Reliability**	**(Re-)Design**	**Availability**	**Dispatching Effectiveness**	**Capacity utilization**	**Productivity**
Service request	Time when call comes in			X			
	Time when call is answered			X	X		X
	Dispatcher identification			X	X		X
	Elevator identification	X	X				
	Service request log number	X	X				
	Time when call ends						X
Dispatching	Mechanic identification					X	
	Service request log number					X	
	Time mechanic is dispatched				X	X	X
Servicing	Service Request Log number	X	X				X
	Time of arrival at building				X		X
	Description of situation		X				
	Work performed		X				X
	Components replaced	X					
	Time repair was completed					X	X

The task now is to analyze how the information items available (the data gathered in the course of the transactions carried out by OTISLINE) contribute to each driver (the columns in the above table):

1. The «components replaced» data can be traced to specific installations (through the service request log number), thus providing reliability information by elevator model and building type.

2. Similarly, the «problem description» and «work performed» data can be linked to specific elevators, thus providing information for re-designing elevator models if the frequency of problems makes this necessary.

3. The time a customer call is put on hold indicates how long (on average) it takes for each dispatcher to become available.

4. The time between the moment a call is answered and the time a service mechanic is dispatched and arrives at the building indicates the effectiveness of the resource allocation process (dispatching).

5. The collected information on all the service mechanics dispatched and the percentage of their time spent servicing elevators is an indicator of service capacity utilization.

6. The information on the time each dispatcher spends on the phone answering service requests is an indication of their productivity. Similarly, the time spent repairing elevators as well as the kind of work performed are indicators of the productivity of service mechanics.

Results

The use of OTISLINE transaction information can affect many business functions, including information services, customer services, service mechanic dispatching and control, service marketing and engineering. In addition, OTISLINE can be used to support applications that enhance the productivity of elevator service mechanics. The table below summarizes some of the information (reports) that can be obtained on the basis of the preceding analysis:

Table 2

Reports / statistics	***Business objective / driver***
Response time - by office - by dispatcher - by mechanic	Superior service/Effective dispatching
Number of callbacks - by customer - by elevator type - by office	Superior service/Design
Component reliability - by elevator type - by customer (building type)	Product Quality/Design/Engineering
Service mechanics productivity - calls by mechanic - time to repair	Efficiency/Capacity utilization
Service mechanics performance - time to repair - repair quality	Superior service/Effectiveness/Skill level
Dispatcher productivity - service request calls - callback reports	Efficiency/Capacity utilization

All these reports provide management with information not just for controlling operations, but also for planning capacity, allocating resources and deciding what action to take to correct specific problems in critical areas. For example, the system can produce reports of response-time statistics by mechanic, by dispatcher, by office, by elevator type and

by building type. Detailed knowledge of this information allows OTIS management to take corrective actions in the short and medium term in an area (service responsiveness) that is key to its differentiation strategy.

Moreover, the system can produce reports showing the amount of time each dispatcher is available to accept calls during the shift, thus enabling OTIS to measure dispatcher performance. The system can also provide statistics on how long customers have to wait before they are attended to by a dispatcher.

By accumulating repair data over a period of time, the system can provide reliability reports that identify chronically malfunctioning components and other recurring problems. This information can be used by management to allocate resources to locations with recurring problems, and by Engineering to spot trends that indicate elevator design problems.

In summary, we have illustrated our approach with OTISLINE, a well-known example that is readily understandable. It should be noted, however, that with OTISLINE we have made an «ex-post» analysis. Some of the information reports suggested by our analysis are being provided routinely by OTISLINE to OTIS management. Obviously, the aim is not to reproduce existing information systems but to use our approach to identify new application opportunities. We believe this approach can be applied «ex-ante» to business organizations that, like OTIS Elevator, collect (or may collect) transaction data on a routine basis as part of their operations.

6. A few procedural comments and organizational implications

We have introduced a systematic procedure to structure the process of identifying strategic IT/IS application opportunities. We want to emphasize the concepts and guidelines, rather than the actual way of using them. However, from a procedural viewpoint, it is interesting to note the following:

- The results obtained can vary significantly, depending on the degree of abstraction employed in describing the different transactions. It is difficult to give a general-purpose guideline regarding the «ideal» degree of abstraction. From a practical standpoint, therefore, the advice is to be prepared to adjust the degree of abstraction after a few attempts.

- The ideas generated in the process may not be new in the firm. People in the organization may remember someone in the past having talked about the same or similar ideas. Few of these ideas may have been implemented or even considered (unless sponsored by somebody with power in the organization). The proposed procedure has the advantage of generating the ideas at the right time and in the right place –that is, during the strategy design process.

- Not all of the ideas generated will be independent. Some may be complementary, some even contradictory or incompatible (from a technological as well as from a business point of view). This should not be disturbing, however. During the next phase of the strategy design process the final choice can be made to obtain a coherent set.

- It should be kept in mind that implementing the ideas generated as a result of the procedure described here *can actually change the cost and uniqueness drivers of the firm.* This is not surprising, considering that this is exactly what is meant by having strategic impact. Consequently, any subsequent use of the procedural guidelines proposed in this paper has to include a fresh effort to identify the relevant (possibly new) cost and uniqueness drivers.

- Are all organizations equally prepared to undertake such a process? Clearly not. Some experience of *passive* IS strategic planning is advisable before undertaking *active* planning. This is basically for reasons of *organizational learning*, on the part of both line management and IS management. The larger the organization, the more such learning is likely to be necessary. Furthermore, the procedure described here is probably less demanding on the organization than the one based on the ITSGA concept (Andreu, Ricart & Valor, 1991). For this reason, the procedure outlined in this paper can be a reasonable first step towards active IT/IS strategic planning.

7. Conclusion

Obtaining IT/IS-based strategic advantages implies *active* IT/IS strategy formulation. This, in turn, means enriching the strategy design process with IT/IS components aimed at identifying IT/IS-based actions with strategic potential. This paper has presented a transaction-based approach which can be effectively used to give IT/IS *content* to the strategy formulation process. The basics of a procedure designed to do this have been presented, along with some comments to facilitate its application from both the procedural and organizational standpoints. □

(1) *Cost drivers* are the structural determinants of the cost of an activity. *Uniqueness drivers* are the determinants of the uniqueness of an activity that contributes to the differentiation of the firm.

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