IDENTIFYING INFORMATION SYSTEMS
STRATEGIC ACTIONS (ISSA)

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Abstract

This paper is concerned with the methodological steps needed to systematically identify strategic opportunities attainable through the design and utilization of Information Systems (IS) specifically thought for that purpose. The proposed analysis is done at the Strategic Business Unit (SBU) level. The focus of this paper is on how to perform the two main steps of strategy formulation at this level, namely internal scrutiny and environmental scan, with special emphasis on IS.

Based on the strengths of the SBU and corporate IS (both present and forecast), the proposed methodology identifies where they can most effectively contribute to reinforcing or even redefining the SBU's strategy. The concrete result is a series of "Information Systems Strategic Actions" (ISSA) coherent with the corporate goals that have to be undertaken in order to attain a sustainable competitive advantage.

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IDENTIFYING INFORMATION SYSTEMS STRATEGIC ACTIONS (ISSA)

1. Introduction

In the past few years we have witnessed a number of statements and publications about the competitive advantages that companies can obtain by using appropriately their Information Systems (IS), and specifically their computer-based IS. Even though the particular types of competitive advantages that different companies have obtained depend to a great extent on characteristics such as the kind of company it is (service vs. production) and the sector in which it competes, it is clear that we can examine myriad examples of companies that have gained competitive advantages by the strategic use of their Information Systems (see endnotes 5, 6, 8, 9, 10, 11 and 12 for several examples).

Researchers have used known frameworks (such as the framework introduced by Porter[3] known as the "5 forces framework") to analyze the different kinds of strategic advantages attained. The results have shown that sustainable competitive advantages do not come solely from Information Technology innovations or from modifications to the company's Information System but, rather, are the result of the intelligent use of existing technologies and profound interactions between the IS and the different links in the company's value chain.

The aim of this paper is to propose a methodology for generating strategies that allow companies to attain competitive advantages by appropriately using their IS. Although one might think that the conceptual frameworks used in illustrating the examples of companies that have succeeded in the strategic use of their IS could serve this purpose, it is the belief of the current authors that these frameworks are too general for that goal. We will propose instead a *systematic procedure* to identify *Information System Strategic Actions* (ISSA), defined as information systems based broad action programs, intended to exploit the inherent capabilities of the firm, and to position the business towards attaining a sustainable *advantage over its competitors.* The procedure ensures that the actions proposed are coherent with the corporate goals, feasible with the available technologies, and in line with the culture of the company.

Throughout the paper we have chosen to follow the strategy formulation steps described in the next section. All generic strategic management ideas and nomenclature used in this research follow the work of Hax and Majluf, and therefore the multiple references normally appropriate have been omitted throughout the text.

2. Formulation of Businesses Strategies

The central idea of the present paper is that an IS perspective can be adopted throughout the process of strategy formulation in order to identify ISSAs. The strategic planning process is considered a corporate affair, and therefore we will follow the steps needed to ensure a complete and coherent inter-relationship between the ISSAs to be implemented in each business, and the corporate mission and goals.

Table 1

The Formal Corporate Strategic Planning Process
(From "Strategic Management, an Integrative Perspective", by Hax and Majluf, 1984)
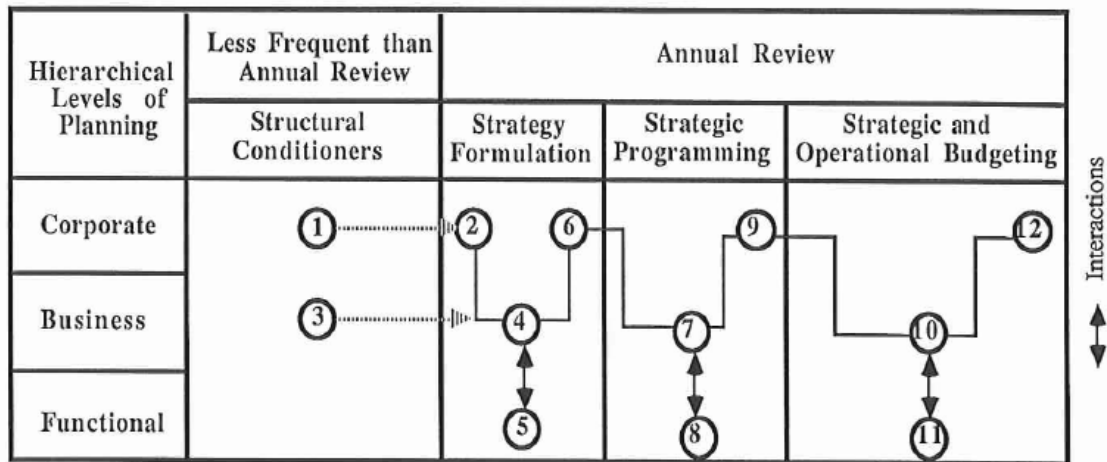
1 The vision of the firm: Corporate philosophy, mission of the firm, and identification of SBUs and their interactions
2 Strategic posture and planning guidelines: Corporate strategic thrusts, corporate performance objectives, and planning challenges.
3 The mission of the business: Business scope, and identification of product-market segments
4 Formulation of business strategy and broad action programs
5 Formulation of functional strategy: Participation in business strategic planning, concurrence or non-concurrence to business strategy proposals, broad action programs
6 Consolidation of business and functional strategies
7 Definition and evaluation of specific action programs at the business level
8 Definition and evaluation of specific action programs at the functional level
9 Resource allocation and definition of performance measurements for management control
10 Budgeting at the business level
11 Budgeting at the functional level
12 Budgeting consolidations, and approval of strategic and operational funds

The main steps of the corporate strategic planning process are represented in Figure 1. Note that from the definition of the *Structural Conditioners* the process follows a "snake" throughout the different levels of the corporation. All levels are involved in the three main stages of the process: strategy formulation, strategic programming, and strategic and operational budgeting. The present paper studies the process only at the formulation stage, though reaching the Business and Functional levels (steps number four and five in Table 1). In generic strategy textbooks the outputs of this process are called broad action programs. As stated earlier, we will call them Information System Strategic Actions. The implementation of these actions in particular programs and their budgeting are the subject of another paper presently being written.

3. The Vision of the Firm

The planning process starts from a statement of the vision of the firm; a rather permanent statement that:

1. Communicates the nature of the organization's existence in terms of corporate purposes, business scope and competitive leadership.

2. Provides the framework that regulates the relationships among the firm and its primary stakeholders.

3. States the broad objectives of the firm's performance. Its primary components are represented in Table 2 and then discussed.

Table 2

The primary components of the Vision of the Firm
(From "Strategic Management, an Integrative Perspective", by Hax and Majluf, 1984)

```
┌─────────────────────────────────────┐
│  THE VISION OF THE FIRM              │
├─────────────────────────────────────┤
│                                      │
│   • Mission of the Firm              │
│                                      │
│   • Identification of SBUs           │
│     and their interactions           │
│     - Shared resources               │
│     - Shared concerns                │
│                                      │
│   • Corporate Philosophy             │
│     - Corporate Policies             │
│     - Cultural Values                │
│                                      │
└─────────────────────────────────────┘
```

1. The Mission of the Firm

The mission of the firm is defined in four dimensions: 1) product scope; 2) market scope; 3) geographical scope, and 4) ways to achieve competitive leadership, sometimes also termed "unique competences." These dimensions might often be quite removed from the peculiarities of each business's IS, but while defining them it is important for the firm to keep in mind the potential of its IS. For example, product scope could be defined as "banking products and services personalized through their information content." In a similar manner, the potential IS impact or support on market scope and unique competences ought to be clearly specified.

If not already explicitly set, the mission of the firm can be specified with the aid of the questionnaire shown in Table 3. Its four dimensions are systematically analyzed, from both the "present" and "future" perspectives. The future aspects of the mission are then prioritized.

Table 3
Determining the Mission of the Firm

MISSION OF THE FIRM	NOW	FUTURE	INITIAL PRIORITY ASSESSMENT		
			-	0	+
PRODUCT SCOPE					
MARKET SCOPE					
GEOGRAPHIC SCOPE					
UNIQUE COMPETENCES					

To help determine future aspects of the scope of the firm, we suggest the use of the following framework, which attempts to systematically analyze how they can be achieved via IS:

1. EXISTING PRODUCTS AND EXISTING MARKETS

   - EXPANSION OF GEOGRAPHICAL COVERAGE (domestic or international). For example, Information Systems could help to coordinate multiple warehouse locations and production points, personalize products making them more suitable for different geographical characteristics, etc.

   - MARKET PENETRATION (increasing market share). Product personalization and/or product enrichment via its information content, and the use of new distribution channels fall in this class of possible actions.

2. EXISTING PRODUCTS AND NEW MARKETS

   - BREADTH OF MARKETS COVERED (expansion of uses and applications). Again, personalization and product differentiation via IS can help in this alternative for growth.

3. NEW PRODUCTS AND EXISTING MARKETS

   - BREADTH OF PRODUCT LINES. Create new products based on information. Personalization of existing products. Bundling of information to existing products. Bundling of different products through their IS treatment.

4. DIVERSIFICATION: NEW PRODUCTS AND NEW MARKETS

- Consider the possibilities of using existing communication networks to develop new distribution channels and markets. It is essential to also evaluate the possibility of working, in this respect, with other companies or industries, even if they appear to be unrelated.

5. VERTICAL INTEGRATION

- FORWARD: GETTING CLOSER TO CUSTOMERS. A few possible alternatives for forward growth include maintaining constant communication with clients, being aware of their inventory levels, making order points available through the IS and offering information on the standing of their orders.

- BACKWARD: GETTING CLOSER TO SUPPLIERS. Maintaining constant communication with suppliers, placing orders directly to their IS, and making timely and accurate forecasts would fall into this category.

Exploring sources of unique competences can be done through the value chain introduced by Porter[4]. Each activity of the value chain and, perhaps more importantly, each interface between activities, can be analyzed in terms of possible uses of Information Systems to gain unique competences. Normally, this will eventually take the form of one of two generic strategies: Cost Advantage and Differentiation (see Porter[3]).

2. Identification of SBUs and their Interaction

For strategic planning purposes, the activities of the firm have to be segmented in terms of Strategic Business Units (SBUs). An SBU, as defined in the planning literature, is an operating unit that sells a distinct set of products or services to an identifiable group of customers in competition with a well-defined set of competitors.

Even if the corporation under analysis already has a defined set of SBUs, it is important to re-evaluate the segmentation of its businesses in the light of IS-based characteristics. Clues for good business segmentation are:

1. COMPETITORS: An SBU should have a simple set of competitors. From an IS perspective one must be aware that companies seemingly in different industries can actively compete (bank ATMs selling insurance at airports, for example).

2. PRICES: All products in an SBU should be affected similarly by price changes. IS-based or -supported products are of special interest for the purposes of this paper.

3. CUSTOMERS: A business unit has a single set of customers. However, it may not be straightforward to identify, at the business level, products sold with great information content or distributed via IS.

4. IS TECHNOLOGY: Changes in generic IS technology should similarly affect all products of a business unit.

5. QUALITY/STYLE: Changes in quality and style should also affect all products in a similar manner.

6. SUBSTITUTABILITY: All products in a business unit should be close substitutes. Also clear substitutes should not exist between different SBUs.

Just as important as the proper definition of the business segments is the analysis of the interrelationships between them. A proper analysis of the interrelationships will undoubtedly enhance the competitive advantage of all business units of the firm.

From an IS perspective, one should analyze the interactions among business units by exploring shared IS resources and shared IS concerns. The proper Identification of shared IS resources will permit added economies of scale and numerous synergies, while being aware of shared IS concerns will allow focusing solutions from a multiple SBU perspective.

Possible lists of shared IS resources and concerns are presented in Tables 4 and 5. The IS resources shown are quite obvious and general. IS managers from each SBU ought to define the extent of their shared IS resources and the importance that the resources have in each SBU.

Table 4
Shared Information systems resources

- Communication Networks:
  - Public
  - Private but available
  - Our own

- Databases:
  - Customers
  - Transactions
  - Suppliers and their products

- Software:
  - ...

Shared concerns are usually more complex to determine than shared resources. In our experience this must be done with extreme care while trying not to overlook any aspect of the SBUs' activities or future operations. It is essential that each business unit has an IS manager who is well versed in both IS technology and the business in question.

Table 5

Shared Information Systems concerns

- Make information available to clients:
  - Of their transactions
  - Of their relevance to our business
  - ...

- Bundling:
  - Of all transactions with our firm
  - Of information from different SBUs into products

- Facilitate client's information flow to us:
  - Joint ordering to different SBUs
  - Joint payment to different SBUs
  - ...

- Facilitate supplier's information flow:
  - Joint ordering of different SBUs
  - Joint payment by different SBUs
  - ...

3. The Corporate Philosophy

By "corporate philosophy" we understand a general articulation of the relationships between the firm and its primary stakeholders, or of the firm's expected performance given basic corporate policies and values. It will rarely have a direct bearing upon Information Systems strategies, and for this reason no explicit recommendations will be made in this paper with respect to corporate philosophy.
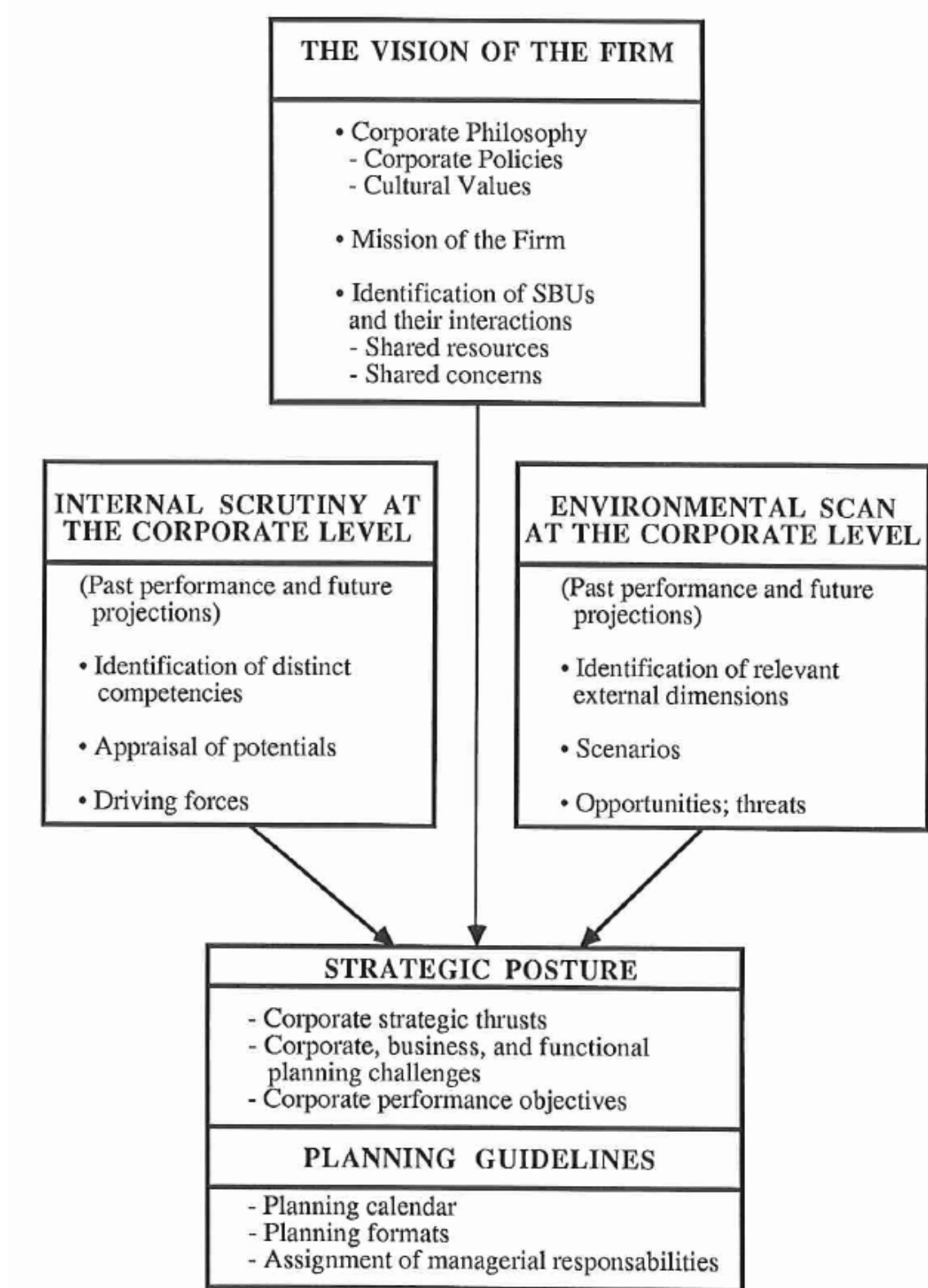
4. Development of the Strategic Posture of the Firm

As presented in Table 6, the strategic posture of the firm is the result of three distinct forces: 1) the vision of the firm, explored in the previous sections; 2) an internal scrutiny at the corporate level, and 3) an environmental scan at the corporate level. Note that in relation to Table 1, our analysis is still at point 2, at the corporate level. The result of these activities will be a set of corporate strategic thrusts, corporate, business and functional planning challenges and corporate performance objectives. We propose conducting these also from the point of view of IS, as described in the following sections.

Table 6

The vision of the firm and its strategic posture
(From "Strategic Management, an integrative Perspective", by Hax and Majluf, 1984)

THE VISION OF THE FIRM

- Corporate Philosophy
  - Corporate Policies
  - Cultural Values

- Mission of the Firm

- Identification of SBUs
  and their interactions
  - Shared resources
  - Shared concerns

INTERNAL SCRUTINY AT THE CORPORATE LEVEL

(Past performance and future projections)

- Identification of distinct competencies

- Appraisal of potentials

- Driving forces

ENVIRONMENTAL SCAN AT THE CORPORATE LEVEL

(Past performance and future projections)

- Identification of relevant external dimensions

- Scenarios

- Opportunities; threats

STRATEGIC POSTURE

- Corporate strategic thrusts
- Corporate, business, and functional planning challenges
- Corporate performance objectives

PLANNING GUIDELINES

- Planning calendar
- Planning formats
- Assignment of managerial responsabilities

1. Environmental Information Systems Scan at Corporate Level

The environmental IS scan at corporate level can be done using a form similar to that shown in Table 7. For each relevant IS-related dimension, the most important characteristics concerning both the past and predictions for the future are documented. An effort must also be made to determine the possible implications of these external factors on opportunities and threats that each dimension offers at the corporate level.

Experience shows that the process of assessing the list of "relevant external dimensions" can greatly benefit from the participation of the corporate IS manager, who should obviously have a good managerial view of the business. In addition, the participation of product managers and market experts can significantly enrich this process.

To conclude the IS environmental scan at the corporate level we recommend performing the exposed analysis under at least two different scenarios, one pessimistic and one optimistic, to facilitate the sensitivity study of the strategic plans and programs to be developed in relation to changes in the corporate scene.

Table 7

Broad assessment of basic information System related external factors

IS-RELATED DIMENSIONS	Past	Future	Oppor-tunities	Threats
• Technological trends: - Hardware - Software - Communications				
• Legal and political issues: - Telecommunication laws and regulations - Aspects of economic policies that could affect the availability and/or development of IS technolgies - Development of public programs and projects (i.e. telecommunication networks) - Any relevant laws and regulations (i.e. bar-code introduction)				
• Social aspects: - Only those considered relevant to help or difficult the realization of plans and programs developed in other dimensions.				
• Information Systems impact in most relevant markets: - Helping to create new products and/or enhance old ones - Helping to access existing markets - Helping to develop new markets				

2. Internal Information System Scrutiny at the Corporate Level

Internal IS scrutiny is concerned with a broad evaluation of the human, hardware, software and any other IS-related corporate asset. The ultimate purpose is to identify the firm's unique competitive strengths and weaknesses. As always, past and future perspectives must be adopted in the analysis. Table 8 shows a possible format to be used for this analysis; it should be noted that, as in all forms proposed in this paper, necessary changes to its structure will be dictated by the peculiarities of each corporation. This same internal strength and weakness analysis will be performed in detail, later on, at the SBU level. The motivation behind the exercise at the corporate level is to avoid overlooking any component of the IS that could affect the definition of the firm's strategic posture, to be developed in the next step of the analysis.

3. Strategic IS Posture

Referring back to Table 6, the firm's Information Systems strategic posture can now be developed through its components: corporate IS strategic thrusts, IS planning challenges and IS performance objectives.

Corporate Information Systems strategic thrusts: Information Systems strategic thrusts are those issues of the IS that must be addressed in the next three to five years to achieve a good competitive position. They should be quite specific and set the basis for constructing a series of Information Systems challenges for each particular SBU. The process of elaborating the strategic thrusts is rather complex and elaborate. As in many aspects of strategic analysis, it is impossible to give hard line recommendations regarding the approach to follow to obtain them. In our experience, the development of the thrusts can be achieved by having the corporate managers who helped elaborate the previous steps independently construct lists that are then discussed at a meeting conducted by a neutral leader (neutral to make sure the discussion does not lose focus). In order to do this, the discussion leader must have solid technical knowledge as well as a profound understanding of the firm's business.

4. Business Strategy and Information Systems Strategic Actions

The complete picture of the process that will ultimately yield Information Systems Strategic Actions (ISSAs) is shown in Table 11. So far we have only explored the top right box: corporate IS strategic thrusts and planning challenges. In the following sections a procedure is introduced for defining the mission of the business and the two remaining analyses - 1) internal information systems scrutiny, and 2) environmental information systems scan - are performed, both of them at the business level.

Table 8

Internal scrutiny at the corporate level

CONCEPTS	Current Position		Future Position	
	Weak 1 2 3 Strong 4 5		Weak 1 2 3 Strong 4 5	
• Hardware				
• Software				
• Data Bases				
• Projects under development . .				
• Communications				
• Human resources in the IS departments.				
• Organizational capacities whithin the IS departments . . .				
• Using IS in:				
- Designing / producing new products.				
- Bundling of products or services.				
- Administrating, following, supporting transactions with clients.				
- distribution channels: logistics				
- Marketing activities support				

Table 9 shows a list of information Systems strategic thrusts that we obtained using the procedure just outlined.

Table 9

List of possible Information Systems strategic thrusts

- To have a set of corporate databases online 24 hours a day.
- To have all delegations connected in real time to the central office.
- Lower the error rate in corporate data processing (e.g., billing errors).
- Increase the number of clients with online connections to our IS.
- Increase the number of different interactions that clients may have with our IS, if necessary, specifying particular areas of concern.
- Increase the number of units of a given type of equipment that perform some specific service to the firm (e.g., automated teller machines).
- Increase the quantity and quality of the information passed on to clients and suppliers.
- Diminish the response time of particular corporate computer applications.
- Develop new IS-based products.
- Increase the level of bundling of products with information content.
- Increase the level of personalization of some products and of their distribution.
- Increase data processing capacity.
- Increase the quality of some databases by adding particular data sets.
- Improve the relationship between the IS department and its users.
- Increase user participation in new IS project definition.
- Make maximum use of available information for marketing uses.

IS planning challenges: Planning challenges can be developed by assigning priorities, for each SBU, to each of the strategic thrusts previously identified. In general, three levels of priority (vital, important and secondary) are sufficient for this kind of analysis. Table 10 shows a questionnaire that can be used to move from strategic thrusts to SBU planning challenges. For every strategic thrust, the priority for each business must be specified where applicable.

IS corporate performance objectives: Each planning challenge has to be met within a certain period of time and measured according to certain parameters. It is therefore necessary to: 1) establish a set of performance measures for each challenge, and 2) assess target values. The same form shown in Figure 10 can serve for this purpose.

1. The Mission of the Business

The mission of the business follows exactly the same characterization as the mission of the firm, except that it is conducted at the SBU level. Table 12 shows a questionnaire developed for the purpose of identifying the aspects of the business mission which can be most affected by IS-related issues (note that it has the already-known dimensions of product scope, market scope, geographical scope and unique competences). Table 13, on the other hand, presents a form designed to help determine product-market segment relationships that can be enhanced (or attained) via IS. Each cell has to be filled with a description of the way(s) in which IS can affect the corresponding relationship.

2. Environmental IS Scan at the Business Level

The environmental IS scan at the business level attempts to measure, from an IS viewpoint, the degree of industry attractiveness in which the business competes. To perform a systematic analysis of the business environment, one can refer to known frameworks (e.g., Porter's 5 competitive forces) and then complete it by trying to develop lists of factors that are relevant to measure overall industry attractiveness. We believe that this exercise, in which each SBU manager must consider the different dimensions of the market in which the business operates, if done properly, has two advantages over plain framework use: it is business specific and it enlightens the manager's vision of the relevant external issues.

Table 10

Statement of IS Strategic Thrusts and IS Planning Challenges

STRATEGIC THRUSTS	BUSINESSES									PERFORMANCE MEASUREMENT
	1	2	3	4	5	6	7	8	9	
• Have a set of corporate data bases on line 24 hours a day.										Time, for each data base and geographic region.
• Have all delegations connected real time to the central office.										Time, for each geographic region.
• Lower the error rate in corporate data processing (i.e. billing errors).										Number of complaints in a given period.
• Increase the number of clients with on-line connections to our IS.										Number of clients per area and period of time.
• Increase the number of different interactions client - our IS.										Number of new clients-IS interactions.
• Increase the number of automated teller machines.										Number of machines installed, per period.
• Increase the quantity and quality of information passed to clients and suppliers.										Quantity of info sent. Number of complaints.
• Diminish the response time of particular corporate computer applications.										Changes in response time.
• Develop new IS-based products.										Number of new products.
• Increase the level of bundling of products with information content.										Number of enhanced products.
• Increase the level of personalization of some products and of their distribution.										Number of enhanced products.
• Increase data processing capacity.										MIPS, Mbytes, etc.
• Increase the quality of some data bases by adding particular data sets.										Number of data sets added.
• Increase the relationship between the IS department and its users.										Measure user satisfaction by periodic questionning.
• Increase user participation in new IS project definition.										Number of users involved in new projects.
• Make maximum use of available information for marketing uses.										Number of new uses.

Table 11

Formulation of Business Strategy and Broad Action Programs under a Corporate Planning Process (Adapted from "Strategic Management, an Integrative Perspective", by Hax and Majluf, 1984[2]).
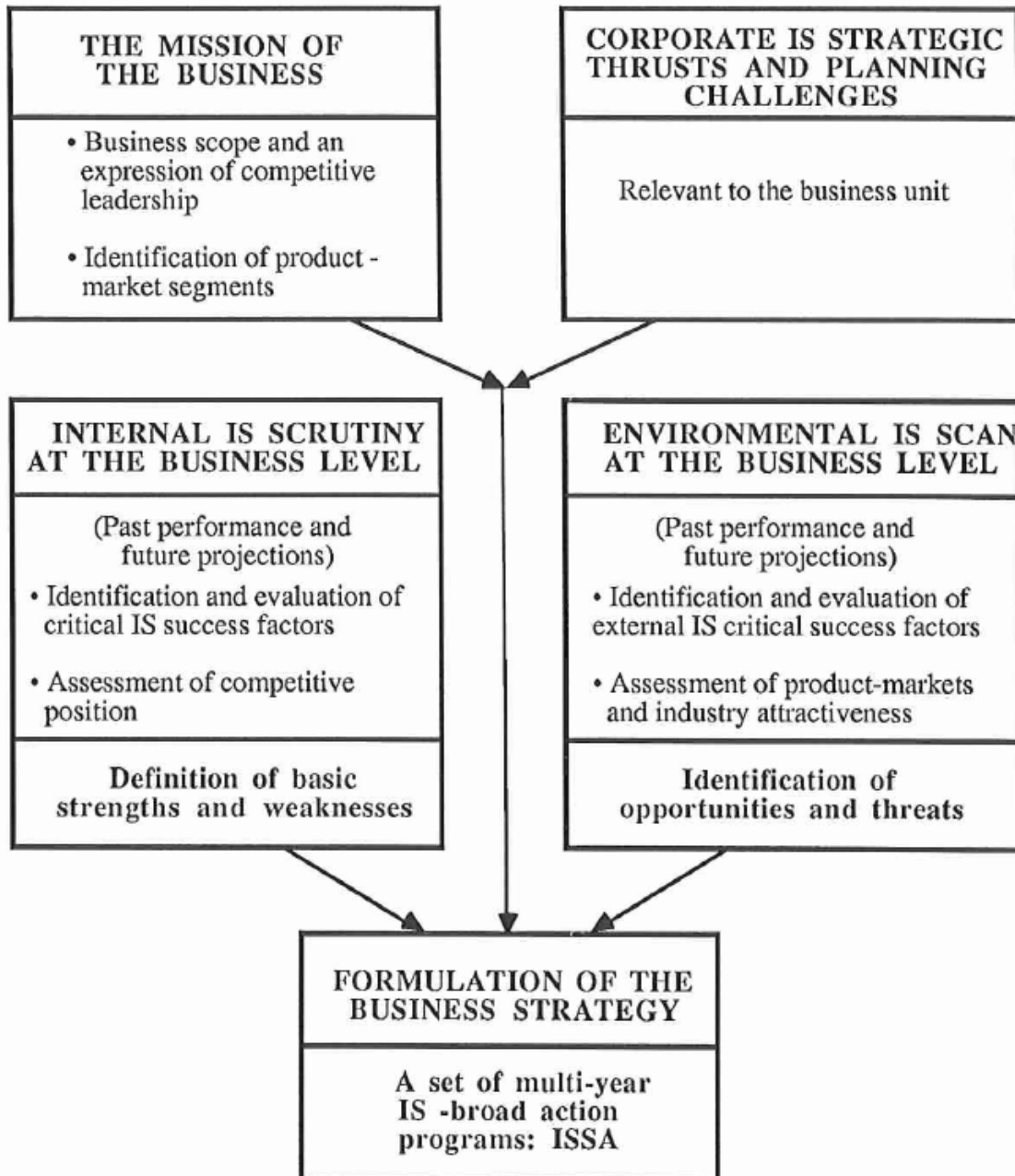
THE MISSION OF THE BUSINESS	CORPORATE IS STRATEGIC THRUSTS AND PLANNING CHALLENGES
• Business scope and an expression of competitive leadership • Identification of product - market segments	Relevant to the business unit

INTERNAL IS SCRUTINY AT THE BUSINESS LEVEL	ENVIRONMENTAL IS SCAN AT THE BUSINESS LEVEL
(Past performance and future projections) • Identification and evaluation of critical IS success factors • Assessment of competitive position	(Past performance and future projections) • Identification and evaluation of external IS critical success factors • Assessment of product-markets and industry attractiveness
Definition of basic strengths and weaknesses	**Identification of opportunities and threats**

FORMULATION OF THE BUSINESS STRATEGY

A set of multi-year IS -broad action programs: ISSA

Table 12
The mission of the business

MISSION OF THE BUSINESS

BUSINESS _____

	NOW	FUTURE
PRODUCT SCOPE		
MARKET SCOPE		
GEOGRAPHICAL SCOPE		
UNIQUE COMPETENCES		

Table 13
Determination of Product-·Market Segments within an SBU
(From "Strategic Management, an Integrative Perspective", by Hax and Majluf, 1984)

DETERMINATION OF PRODUCT-MARKET SEGMENTS

BUSINESS _____

		MARKETS	
		EXISTING	NEW
PRODUCTS	**EXISTING**		
	NEW		

The process can be summarized as follows:

1. Identify the external factors outside the control of the business managers that can impact each SBU Information System.

2. Measure the degree of attractiveness of each factor in relation to the SBU average business base, for current as well as future projections.

3. Determine the IS-related opportunities and threats associated with each SBU.

The different factors to be considered can be grouped into five families: procurement, market-related, competitive, technological, and economic and social. Table 14 presents a partial list of the factors to be considered. The first three families come directly from Porter's framework of the five competitive forces[3], while the others are, in a sense, more IS-based. Factor identification is a creative process in which both IS managers and production and marketing managers should participate actively, after having been made aware of the previous analysis undertaken at the corporate level. The kind of issues raised in this factor identification process have to do, for example, with identifying ways in which one could change the relationships with clients, via IS, in order to raise their switching costs, or with identifying market needs that can be satisfied via IS (in this respect it should be recalled that often the clients themselves are

those who have the good ideas[13], so that an explicit effort to gather this information may be justified). In our experience, in a specific setting these issues tend to flow rather naturally.

In carrying out the analysis of the environment, and specifically of the competitors, one should not lose sight of the fact that innovations and great advantages are often obtained not with the use of the latest technology but with the clever use of basic systems. For example, American Hospital Supply[5] captured 40% of the hospital supplies market by installing an order terminal in hospital warehouses. Its leading competitor, Johnson & Johnson, could not follow suit because, being highly segmented into more than 40 companies, it could not consolidate all its information systems in order to provide this same service[6].

Table 14
External factors and assessment of the degree of attractiveness

EXTERNAL FACTOR	CURRENT SITUATION	FUTURE SITUATION
• Procurement: -Procurement market intelligence not publicly available -Possibility of a JIT procurement-inventory system available from suppliers • Market-related: -Product differentation based on IS -Market needs not currently covered but potentially covered via IS (new possible products) -Evolution in pararel markets (p.e. other countries) -Posible impact of IS in the price of products/services -Captive markets via IS -New markets attainable via IS •Competitive: -IS-related barriers to entry -IS-related barriers to exit -Vertical integration based on IS (forward and backward) -IS-related sustitive products -Bundling based on IS -IS capacity utilization rate (hard, soft, personal, applications, ...) -Efficiency increases based on IS (processes, functions, administration, cost) -possible improvements in logistic and administration •Technological: -Hardware, Software, communications -Techniques for design and development -Advanced techniques relevants to the SBU IS (p.e. expert systems) •Economic and social: -Salary level of IS personnel -Availability of expert personnel -Regulations and IS related legislation -Public funds availability for IS activities -Demographic and sociological changes -Adaptability to international markets		

3. Internal IS Scrutiny at the Business Level

In this part of the analysis we try to understand the strengths and weaknesses of the IS in each SBU. The analysis is best done comparing the IS with that of the most important competitor. The steps to be followed are the following:

1. Determine the IS critical success factors (IS-CSF) in each SBU.

2. Find the most important competitors in IS matters. The competitors may be different for each IS-CSF.

3. Assess the relative position of the SBU in each IS-CSF.

4. Summarize the IS-related strengths and weaknesses of each SBU.

In the following paragraphs we present some suggestions on how to approach these steps:

1) - Identifying critical factors in Information Systems: The identification of critical success factors for each IS has to be done by the managers of each SBU. Even though the list of IS-CSF will be different for each particular business, it is possible to suggest families of factors that have to be explored, not barring the possibility that other factors may have been overlooked. There are two kinds of factors: 1) technological in nature, like hardware, database management software, etc., and 2) derived from the relationship between the business and its Information System. Table 15 presents a series of families that can be useful in determining the IS-CSF.

Table 15
Examples of families of Information Systems Critical Success Factors

---

(1) Technological:
- Hardware: Computers, terminals, communication networks.
- Support and development software:
    - Programming languages.
    - Operating systems.
    - Data-base management systems.
- Software development technology used.

(2) Application software:
- Design: its quality and easiness of maintenance.
- Technical efficiency of the resources used
    (CPU, networks, data-bases).
- Match between software and real needs:
    - Software designed for the particular application.
    - User satisfaction.
    - Number of unsatisfied needs, by user type.

(3) Human resources:
- Quality and productivity of available human resources,
    by type (operators, technical staff, programmers,
    analysts, designers, managers).
- Number of people available, for each type.
- Degree of employee satisfaction and their retribution scale.

(4) Organizational:
- Quality of the IS department organization, as a function
    of the SBU needs.
- Degree of user participation in project development.
- Quality of the retribution/promotion system.
- Existence of organizational support to technical innovations.
- Quality of the planning/budgeting system,
    as a function of SBU needs.

(5) Others:
- Budget, per functional areas.
- Degree of high-level management commitment to
    help develop IS to its fullest.

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2) - Locating the most relevant competitors: Clues for their identification are:

- They are aggressive in the use of new technologies.

- They are innovators in the use of IS in their products.

- They innovate in the use of IS in their relationships with third parties.

- They attract good IS professional staff.

- They are known for the high degree of efficiency and/or effectiveness of their IS.

- They are leaders in the allocation of funds to IS.

In general, any business that has a leading position in any of the above dimensions has to be considered as a potential leading competitor in IS.

3) - Assessing the relative position of the SBU in each IS-CSF: By comparing the firm with the companies identified in the previous section, one can determine its position versus the relevant competition. The comparison has to be carried out for each IS-CSF. This is easily done with the help of a grid as shown in Table 16 where, for convenience, the names of the IS-CSFs shown in Table 15 have been shortened.

As can be seen in Table16, we suggest the analysis to be carried out twice; once to assess the present position and the second time to try to project a realistic favorable future position.

4) - Summarize the IS-related strengths and weaknesses of each SBU: At this point the information concerning the weak and strong points in each SBU can be summarized. A table similar to Table 17 can be useful for this purpose.

Table 16
Strong and weak points versus competitors

Table 17

Summary of strong points versus competitors for each SBU.
A similar table can be constructed for weak points

STRONG POINTS

IS-CSF (from Fig. 14)	NOW			FUTURE		
	Low	Medium	High	Low	Medium	High
	✓				✓	
		✓		✓		
		✓			✓	
			✓			✓
		✓			✓	
	✓				✓	
		✓				✓

The internal IS scrutiny at the business level just performed is not an activity to be carried out only once, since an important component of the analysis depends on our competitors, and they may change. Internal scrutiny should be performed routinely, but with more depth when IS decisions are about to be made. Note that the suggested continuous evaluation has some organizational implications, as someone must be made responsible for updating the information concerning competitors' IS.

5. IS-Related Broad Action Programs: ISSAs

The last step in the analysis proposed in this paper is that leading to the definition of information system strategic actions. The actions proposed, emerging from the systematic data gathering and processing done in the previous sections, ought to be coherent with the corporation's strategic positioning. Making use of the strong points of the SBUs' Information Systems will provide a sustainable competitive advantage. As the concrete example discussed in section 6 below will show, the identification of ISSAs often flows rather naturally as a consequence of the analysis conducted so far. In summary, ISSAs should:

1. Be coherent with the strategic thrusts of the corporation.

2. Neutralize threats posed by the environment.

3. Make use of opportunities of the environment.

4. Capitalize on the strengths of the IS in each SBU.

5. Correct the SBU's IS weaknesses.

6. Suggest a methodology for IS resource allocation in each SBU.

Though the functional managers may have been strongly involved in the development of the ISSAs, there may still be some inconsistencies to resolve. The functional requirements arising from the totality of the businesses might lead to disagreements between business and functional managers. This could in turn, lead to the functional managers to dissent, which would need resolution by direct discussion and, if necessary, by corporate-level intervention. It is therefore very important to assure the functional managers' agreement with the ISSAs selected in the previous steps.

Since all the ISSAs usually involve the participation of the IS department, having its manager on-board is particularly desired. It is very important that all the requirements associated with the IS department are analyzed together so that the overall package is a feasible task.

At this point in the analysis, the information relative to each SBU, together with the possible conflicts from functional managers, can be consolidated in an attempt to assess the corporate IS strengths and weaknesses. This information is needed in order to exploit, at the corporate level, those IS-CSFs which are consistently strong and take the necessary steps to strengthen those which are consistently weak. The information can be condensed in a table as shown in Table 18, in which each cell contains the point value of the corresponding IS-CSF and SBU of Table15. This consolidation exercise is important, as corporations, and therefore each SBU, can gain substantial advantages from cross-businesses information systems.

Table 18

Corporate strong and weak IS-CSFs

INFORMATION SYSTEMS CRITICAL SUCCESS FACTORS	NOW SBU						FUTURE SBU					
	1	2	3	4	5	6	1	2	3	4	5	6
(1) Technological: • Hardware: • Support software: • Software development technology used.												
(2) Application software: • Design • Technical efficiency. • Match between software and real needs.												
(3) Human resources: • Quality/productivity of human resources. • Number of people available, for each type. • Degree of employee satisfaction.												
(4) Organizational: • Quality of the IS department organization. • Degree of user participation. • Quality of the retribution/promotion system. • Existence of organiz. supp. technical inn. • Quality of the planning/budgeting system.												
(5) Others: • Budget, per functional areas. • High-level management commitment to IS.												

6. An Illustration of the Methodology

In this section we present an illustration of how to apply the methodology proposed in this paper. As with any such illustration, it is only a short and partial presentation of the whole process. Nevertheless, the example highlights some additional considerations and shows the power of the methodology.

The selected environment is an insurance company that we will call Catalonian Insurance Company (CIC). CIC is a regional insurance company with a very good market penetration in Catalonia, a region of Spain. It has a well-known brand and a reputation of efficiency and fairness.

CIC offers a wide range of insurance products across two different SBUs. One offers insurance products to industries and companies, but the business unit of interest to us offers different products to individuals (we'll call this SBU "Personal Insurance"). CIC does not have any other product line except insurance.

One important characteristic of CIC is their effort to modernize over the last two years. As a result, the company is recognized as having a cost advantage in its computerized back-office operations.

For the sake of brevity, the analysis at the corporate level is not presented here. The starting point of our example will be at the business level (see Table 11). However, since part of the inputs in the process are the IS corporate strategic thrusts and the results of the analysis at the corporate level, these are summarized below.

As a result of the corporate analysis, the following IS corporate strategic thrusts have been identified:

1. Try to increase the utilization of computerized IS in front-office operations. The corresponding performance measure proposed is the percentage of IS-supported front-office operations. All business units are involved.

2. Try to increase the utilization of back-office-generated transaction information for marketing intelligence purposes. The corresponding performance measure will be the number of marketing reports obtained via IS. Again all business units are involved.

3. Offer insurance coverage to individuals as broad as that of the competition. Clearly, this strategic thrust affects only the Personal Insurance SBU. Its performance will be measured by the time required to achieve the proposed objective.

The next step in the strategy formulation is the determination of the business mission. Table 19 presents a summary of this mission for the SBU object of our analysis. As one can see in the Table, the proposals are to enhance the product scope by including travel insurance and to enlarge geographical scope from the regional to the national level.

The concept "others" in product scope includes any special insurance of a risk not considered in the indicated product families.

Table 19
The mission of the business for CIC

MISSION OF THE BUSINESS

BUSINESS   Insurance to individuals

	NOW	FUTURE
PRODUCT SCOPE Different families of products offered to individuals	Life Car Medical Home Others	Same plus Travel
MARKET SCOPE It is possible to segment markets by income, wealth, etc. but this is not relevant for this presentation.	Individuals as opposed to businesses	
GEOGRAPHICAL SCOPE Proposed geographical expansion	Catalonia	Spain
UNIQUE COMPETENCES	1. customized products 2. extremely well known trade name	1., 2., 3. full individual coverage

Following an environmental IS scan at the business level, a partial list of the external factors thought to be relevant from an IS perspective can be obtained:

1. Existence of telecommunication networks connected to teller machines: Bank ATMs and Airline Automatic Ticketing Machines.

    Currently, this network is widely covers Catalonia and other Spanish regions, and is soon expected to cover all of Spain.

2. There is a clear trend towards increased use of the technology described in point 1.

3. There is an increasing awareness among Spaniards of the value of life, which is reflected in the insurance business, particularly in life insurance.

4. Some major credit card companies automatically give travel insurance when using their cards to buy travel tickets.

5. Some financial institutions are beginning to sell insurance products, especially when packaged with pension funds.

6. Standardized products are the norm in the sector, but there is a very large increase in the number of customized insurance policies issued by CIC. Customization remains a slow manual process in the few competitors offering such possibilities.

Some explanations of this list are in order. First, note that not all points are IS-related. However, since these factors can potentially affect the IS-related business strategy determination, they should be included. This again shows that IS strategy is not at all separate from general competitive strategy.

A second point is that the list presented above contains factors of very different natures. The first factor is of technological nature; technology is usually very relevant in IS strategy formulation. Factors 2 and 3 are social in nature; they represent changes in people's behavior. The last three factors are of a competitive nature.

After the more relevant factors have been determined, it is time to perform the internal IS-scrutiny at the business level. Recall that the methodology presented consists of selecting IS-Critical Success Factors and evaluating them in relation to the more relevant competitors. A partial list of the results of this analysis Is presented in Table 20. The table shows that the business unit is strong in back-office operations in several manners: cost of operations, Data Base design, and familiarity to computerized IS procedures. However, the SBU is weak in the level of familiarity of front-office personal to IS procedures.

Table 20

Summary of Internal IS scrutiny for insurance to individuals (SBU of CIC)

	STRONG POINTS					
	NOW			FUTURE		
	Low	Medium	High	Low	Medium	High
Computarized back-office operations			✓			✓
Quality of back-officeD.B. design			✓			✓
Degree of IS training in back-office personel			✓			✓
Degree of IS training in front-office personel	✓				✓	

Referring back to Table 11, we now have all the elements needed to formulate specific ISSAs for the SBU object of this analysis. This is a creative process which has to integrate all the elements presented above. The mission of the business and the IS-corporate strategic thrusts are the basic guidelines of the analysis. This analysis also must be able to integrate the relevant external factors and competitive strengths to place the firm in a position of competitive advantage.

Our experience has indicated that it is sometimes important to lower the analysis to the product (or product family) level. For each product, one can use a matrix as presented in Table 21. It has two dimensions: the rows represent all points of contact between the firm and the customer of the product, following the scheme described by Ives and Learmoth[7]; the columns represent either the basic strengths and weaknesses or the external factors identified in the preceding steps.

The matrix is used by filling each cell with the degree of IS impact on the corresponding activity, from low to moderate to high. The result is a description that highlights how the product can be supported by IS to reach a competitive advantage in one or several of the client contact activities arising from the contracting or delivery of the product or service.

Table 21

Product audit and relation to IS

	Establish requirements	Specify	Select a product	Order	Authorize and pay for	Acquire	Test and accept	Integrate into and manage inventory	Monitor use and behavior	Upgrade if needed	Maintain	Transfer or dispose	Account for
Financial institutions getting into insurance													
Travel insurance ass., to credit cards													
Inc. customizd products	x	x	x										
Inc. life conciousness	x												
Inc. use ATM networks	x	x	x	x	x	x							
Front-office IS training	x	x	x	x	x	x							
Back-office IS training							x	x		x	x	x	x
Quality of DB design							x	x		x	x	x	
Efficient back-office operations							x	x	x	x	x	x	x

PRODUCT: _____ ; Form _____ ; Folder _____ ; Date __/__/__ ; Author _____

Several considerations are important.

a) The rows in the Table 21 matrix, corresponding to the activities of contact with clients, are useful for a service company and could also be useful in other sectors but, depending on the particular industry, a somewhat different list of activities would be relevant.

b) The interpretation of the cells is somewhat different depending on the concept used to define the columns. When the concept used is a strength or weakness related to IS, the cell indicates the actual impact of this internal factor in the corresponding activity, but for comparison one could also use the potential or future impact. This is the case for the four first columns in Table 21. Since the effect of the first three columns is the same for all products in the SBU, two possible strategic actions are easily derived. In the example, given the clear superiority in computerized back-office operations, it makes sense to consider the advantage in cost and the ability to compete in prices for the standardized products. Secondly, strength in back-office operations, specifically in DB design, allows CIC to consider the possibility of using this information for marketing intelligence purposes. By analyzing the degree of coverage and historical records of each client, one can determine what kind of marketing and sales action can be taken to introduce other products to the client.

c) Another family of concepts that may be used to define columns is the external factors. Again, the impact of each factor on the corresponding row activities should be considered: some factors will have a positive impact and will therefore present an opportunity. The ability to exploit the opportunity will depend on one's strengths. Other factors will constitute a threat, and similarly the ability to cope with them will depend on one's strengths and weaknesses.

d) In fact, trying to conceptualize the analysis with matrices as in Table 21 is often difficult, because of the various concept families needed to be taken into account. In spite of the fact that each factor (internal or external) corresponds to a column, the interrelations among them must also be considered when analyzing each product.

e) Sometimes it can be useful to use a version of Table 21 with different concepts in the column side. For instance, there are generic uses of IS to support activities such as customization (to personalize), bundling (with other products, clients, operations, etc.), new products, product enhancement, increased efficiency of operations, etc. In such cases, each cell can be used to indicate the corresponding impact of the action on each activity, bearing in mind the firm's capabilities and the probable evolution of the external factors.

The result of such an integrative effort should be a set of Information System Strategic Actions. For the case in study, the following ISSAs could easily be derived:

1. Orient the sales force effort by using marketing intelligence from the back-office transaction DB.

2. Introduce a travel insurance policy to be acquired through the existing teller machine networks. Initiate contacts with banks and airlines to study this possibility.

3. Design microcomputer programs to support the customization of insurance policies. It will be necessary to train the front-office personnel.

In our opinion, this example points clearly out the possibilities of the proposed methodology. In general, the ISSAs identified using this methodology often represent a well-organized and coherent set of actions that make a lot of sense given the strategic orientation of the firm analyzed.

Furthermore, although the ISSAs identified are sometimes not completely original (in the sense that not all of them represent novel strategic opportunities), it is almost always the case that, after the analysis proposed in this paper, management sees them as a much better structured set than before.

In addition, the analysis proposed often generates, as an important by-product, an increased awareness, on the part of the managers involved, of the strategic possibilities of the IS in their organization. In summary, it is the belief of the current authors that the proposed methodology can be very useful for the firms interested in the subject.

7. What Lies Ahead

Referring back to Table 1, the methodology described has systematically covered steps 1 to 6 of the Formal Corporate Strategic Planning Process from an IS perspective. With this methodology, a firm can identify a set of Information System Strategic Actions, but now it is necessary to implement them so that the firm can actually gain a sustainable competitive advantage. The implementation of these actions, in particular programs and their budgeting, is the subject of another forthcoming paper.

An important aspect, different from the normal strategic planning process, is the contribution of the IS department to implementation, as well as its relation to the other functional and business units in the firm. As a consequence, the completion of both the strategic programming and the strategic and operational budgeting parts of the planning process (see Table 1) is not sufficient; it is also imperative to take care of both the possible organizational changes affecting the IS department and its relation to the rest of the corporation, and the cultural changes and possible IS-related training necessary for the implementation of the selected ISSAs. The integration of IS considerations in the business strategy is a new concept to many organizations, and a new way of doing business might be necessary. All this will have to be confronted to transform ISSAs into implemented actions to provide the firm with sustainable competitive advantage.

The following is a sample of issues that will probably arise in the programming phase of the process:

1. Selection of the necessary IS changes both in technology and in its conceptual structure derived from the strategic use reflected in the selected ISSAs.
2. The scheduled introduction of such changes.
3. Horizontal IS-configuration from the horizontal strategy of the corporation.
4. Project selection and evaluation with appropriate resource allocation and control systems.
5. Configuration of the computer infrastructure and IS technology in general for the short and medium term.

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