

## **Chapter 4: Information Systems as Strategic Weapons**

### ***4.1. A Priori Assumptions***

The crucial role of IT in changing the way the economy works is clear for all of us (Parsons, 1983). In some industries IT is even capable of changing the nature of products and services or their production processes (e.g. in publishing or in the media). In other industries product life cycles change (e.g. entertainment electronics, financial investment services), or the economies of scale are rewritten (e.g. vehicle industry, clothes industry). IT multiplies the number of markets accessible, while at the same time allows for fulfilling specific customer needs (e.g. in Internet commerce). Creates a new foundation for inter-firm co-operation (e.g. when using electronic data interchange), and speeds up sales processes (e.g. one-day delivery services).

According to the advocates of the strategic weapon perspective, these unprecedented effects of IT do not necessarily leave the relative competitive position of economic actors unchanged. In their view the attentive use of information systems can result in competitive advantages, which might be sustained on the long run as well, but at least it can be renewed through continuous innovation.

### ***4.2. Literature Review***

It was in the mid 1980's that the term Strategic Information Systems (SIS), which stands very close to the strategic weapon metaphor, first surfaced in the literature. The first attempt to define the notion and give a detailed discussion about the topic can be linked to Wiseman (1988). Wiseman defined SIS as the use of IT in order to support or change a company's competitive strategy.

The research of strategic information systems began with case studies prepared mainly at American universities. Placing the label ‘strategic’ on applications was done in a rather intuitive way, but in most cases the precondition was the system’s strong orientation towards customers or suppliers, and the increase of sales and market share as a result of the application. Among the famous (often quoted) cases are American Airlines’ ‘Sabre’, AHSC/Baxter’s ‘ASAP’, Digital’s ‘XCON’ and McKesson’s ‘Econoscan’.

SIS literature draws a large part of its models from general management literature, within it especially the works of Porter (value-chain, competitive forces of industries, competitive strategies etc.). Among its own contribution *the strategic grid model* of Cash, McFarlan and McKenney’s is one which stood the test of time (see Figure 9).

The Strategic Impact of the IS  
Development Portfolio

		LOW	HIGH
The Strategic Impact of the Existing IS Portfolio	LOW	support	turnaround
	HIGH	production	strategic

Figure 7: *The strategic grid model (Cash – McFarlan – McKenney, 1992)*

The strategic grid model analyses the applicability of IT as a strategic weapon on the industry level. The model classifies the industries according to their present and medium-range affectedness by the strategic impact of IT applications.

In the case of industries of the ‘support’ segment IT plays a supplementary, secondary function. It is important that there is no change expected in this situation in the foreseeable future. Because of its secondary role, IT requires low or medium expenditures and only occasional attention on the part of senior management. An example is the cement industry where companies typically use only simple data processing systems.

The ‘factory’ segment contains industries where IT plays a key role in conducting everyday activities, but crucial IT applications are built out for the long run, and therefore

there is no specific need for development. An example is the modern steel industry, where planning and execution of operations are computerised.

Industries in the 'turnaround' segment are in a unique situation: they are just going through the IT revolution. E.g. currently many retail chains are implementing computerised systems with their suppliers and apply automated fill-up systems.

If the role of IT in an industry had been crucial in the past and it is expected to remain crucial in the future it is justifiable to speak about a 'strategic' situation. Probably one of the best examples is the sphere of financial services, where computers, teller machines, point-of sale systems have been commonplace for a long time now, but newer and newer applications (home-banking, Internet transactions etc.) keep putting novel challenges before market players.

SIS can turn up in any of the segments with the exception of 'support' industries. While in the 'factory' segment IT serves as entry barrier defending the players within the industry, in the remaining two segments IT poses a great challenge to the companies within the industry as well.

The *information intensity matrix* (Porter – Millar, 1985), presented in Figure 5, serves similar purposes. This categorises industries according to the information content of their products or services, and the information intensity of the value chain producing these products and services.

Besides the industrial and corporate SIS opportunities, another key topic in publications is the sustainability of competitive advantages achieved by strategic systems.

Literature first advertised SIS as sources of *sustainable competitive advantages* (see e.g. Clemons, 1986; King – Grover – Hufnagel, 1989). Later it became accepted that IT is not capable of maintaining sustainable competitive advantages – primarily because it can be copied or can be obtained relatively cheaply (Scott Morton, 1991). In connection with this, some authors (e.g. Brady et. al., 1992) started to use the term *contestable competitive*

*advantage*, referring to the view that companies can not afford to ignore those short-term advantages, which they can enjoy against their competition by innovations based on IT.

These debates have led to a more sophisticated approach concerning competitive advantages stemming from SIS.

Rotemberg and Saloner (1991) analysed SIS-based competitive advantages along two dimensions. The *dependence* dimension measures how much the industry players should be in connection with each other. The other dimension – *exploitation* – arises from the uniqueness of computer systems (IT products), the differentiation effect connected to it, and from the various entry/exit barriers etc. According to the authors, sustainable competitive advantage can exist only if both dimensions show high values. This happens to appear most perfectly in the case of airline reservation systems.

The high dependence values of reservation systems can be explained by the following:

- the systems physically link the players;
- no airline can allow itself to be left out of any of the big systems;
- players share marketing information that is generated by the system (reservations broken down into agencies, the market reaction to price changes etc.).

The high exploitation value, on the other side, comes from the following characteristics:

- agency contracts are exclusive;
- a new terminal costs between 5.000 and 20.000 dollars;
- the use of new systems should be learned;
- the development of an alternative system costs around 100 million dollars and requires 6 to 24 months of enter.

Kettinger et. al. (1994) links sustainability of competitive advantages with environmental factors, internal organisational conditions, and with strategic actions initiated by the organisation.

In terms of the *environment* the legal and economic administration has probably the greatest impact, on the one hand, because it can conserve competitive advantages through

patterns and trademarks, on the other hand, because of the anti-monopolistic measures, by which it can also destroy advantages. In the case of IT, there are examples only of the latter role (e.g. reservation systems), which means that solely by external tools competitive advantages cannot be sustained.

In terms of *internal conditions* the size, structure and learning/innovation potential can have the most influence on maintaining IT-related competitive advantage.

The role of organisational size is underpinned by the fact that e.g. some process automation systems can be financed and operated economically only after a given size (output volume) had been reached.

Other systems, even if affordable, can have a strategic impact only if they are extended to the whole organisation. This is why heavily decentralised structures that respect local autonomy to the maximum extent are incapable of keeping the pace with competitors' strategic systems. According to some expert this has impeded Johnson & Johnson to come up in time with a similar system as Baxter's ASAP (Clemons – Row, 1991).

The learning and innovative potential of organisations becomes crucial if we accept that through IT the organisation can only gain contestable competitive advantages, however the emergence of these can be made permanent by newer and newer innovations. This thought leads us to the application of the *core competence* concept (Prahalad – Hamel, 1990) to strategic systems. Some authors argue that IT applications that are based on existing organisational competences, and which record, distribute and develop these competences, represent incontestable sources of competitive advantages (Ciborra, 1994; Andreu – Ciborra, 1996).

Among the *strategic actions* aimed at maintaining competitive advantage 'first hit' and 'generating switching costs' should be mentioned. The two are strongly connected and can usually be applied in the case of inter-organisational systems. By being the first to develop an application a company can create entry barriers in front of its competitors and can get access to the most profitable resources (e.g. suppliers, customers). If regarding

these involved partners the costs of switching to alternative systems can also be built up, then theoretically competitive advantage can be maintained.

Practice, however, shows that companies executing the 'first hit' often end up in competitive disadvantage because the rest of the players face a much lower level of risk in terms of system development, in addition they can develop more advanced solutions compared to 'first hitters'. The rise in efficiency can be so high that the followers might be willing to bear a part or even the whole of switching costs of players who joined the original system.

### ***4.3. Related System Categories***

SIS does not have a preferred technology. Theoretically every system can be strategic perhaps with the exception of the very conservative planning and controlling systems. By looking at the SIS literature, especially the published case studies, the very high ratio of inter-organisational systems (IOS) is what hits our eyes.

The Author has made a longer overview on the special capabilities of IOS in supporting competitive strategies and attacking competitive forces in another publication (Antal-Mokos et. al., 1997). Here, only a short summary is presented.

There have been several attempts in literature to define IOS (Cash, 1985; Konsynski – McFarlan, 1990). Below, the study starts out from a definition that is perhaps longer than the usual, however it defines the criteria of IOS most accurately.

IOS is an IT system that provides communication between two or more organisations that are independent from each other legally and also from the managerial aspect. The development of the system, its maintenance, the provision for the communication network can be the responsibility of one of the partners, or both of them, but a third and independent party (usually an IT service provider) is often involved too (Suomi, 1992).

The communication of the parties is electronic, no disintegrated physical medium is used (e.g. floppy disk). Communication can take place:

- between the independent computer systems of the parties in the form of standardised data interchange (*Electronic Data Interchange*, EDI), which is a computer-computer link;
- by feeding and taking data from a computer system (human-computer link) that is typically created by one party and accessible to the other players as well (e.g. by a remote terminal);
- by the interaction of colleagues and work-groups of various organisations (human-human link) on a common platform (e.g. Internet).

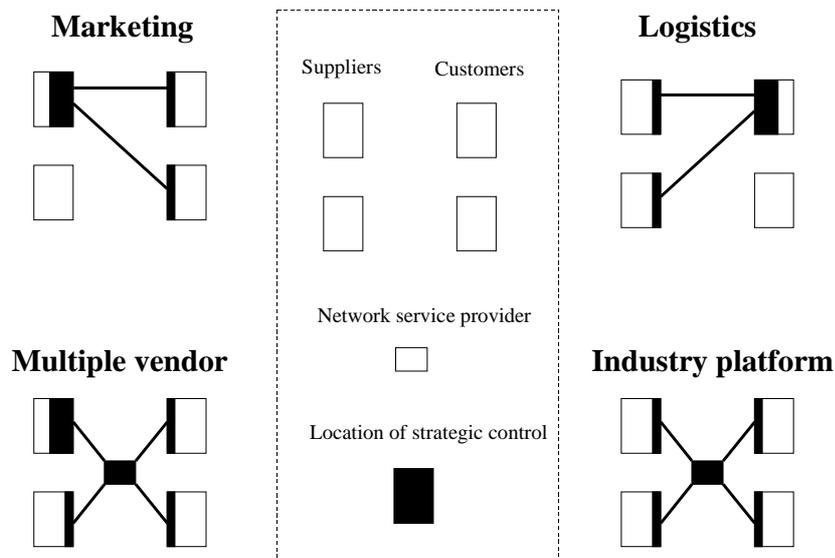


Figure 8: The types of inter-organisational systems (based on Konsynski – Warbelow, in: Cash – McFarlan – McKenney – Applegate, 1992)

Konsynski and Warbelow's model (see Figure 10) classifies IOS according to the number of parties and location of strategic control over these applications. Based on this classification the following categories emerge:

### ***Marketing System***

The owner of such a system intends to increase the efficiency of its sales and production planning by granting its important customers an opportunity to order through computer. This is perhaps the most frequent type of IOS, which is used mainly by producers of consumer goods as well as wholesalers. McKesson, interested in the pharmaceutical, beverage and domestic products business, belongs to this group, for example.

### ***Logistics System***

Logistics systems primarily support the procurement operations of buyers, and they are based on *just-in-time* philosophy. Such systems have been implemented between assembly plants of large car manufacturers (e.g. General Motors) and their suppliers.

### ***Multiple Vendor System***

It is an advanced version of the 'marketing system' as buyer demands are met by the offer of several industry players. The developer of the system, however, often keeps enjoying special privileges (at least, being to contact point of customers). Baxter's ASAP Express and the first reservation systems are examples of this category.

### ***Industry Platform System***

The system is developed with the common intention of industry players. The 'buyers' and 'sellers' joining the system enjoy the same rights, although there might be some discrimination against smaller organisations and newcomers. Among others, the clearing system of banks and brokerage firms fall into this category.

The marketing and logistics type of systems are often called *electronic hierarchies* because relations are clearly defined within them. Multiple vendor and industry platform type of systems, on the other hand, are referred to as *electronic markets*.

#### ***4.4. System Development and Implementation***

According to the SIS literature the development of strategic information systems has two critical conditions:

- a formal IT strategy should be elaborated in harmony with the corporate or business unit strategy,
- based on the IT strategy SIS concepts should be developed systematically by using a standard methodology.

Related to these conditions a great number of publications surfaced in the late 1980's and the first part of the 1990's on the following topics:

- IT strategy (Galliers, 1987, 1988a; Earl 1987, 1988, 1989);
- their adjustment to corporate and business strategies (Bakos – Treacy, 1986; Goldsmith, 1991; Baets, 1992; Powell, 1993; Atkins, 1994);
- experience with SIS methodology (Galliers, 1988b, 1991; Lederer – Sethi, 1988; Bergeron – Buteau – Raymond, 1991; Premkumar – King, 1991; Ruohonen, 1991; Earl, 1993).

As the first two topics are only distantly related to the development of strategic systems, only the third one is discussed below.

First of all, it can be asserted that the SIS planning methodologies collected by the above-mentioned authors are rather miscellaneous. A part of them fits well to strategic systems, but because of their simplicity they hardly can be called methodologies. Besides the already mentioned strategic grid model, the information intensity matrix and the Porter's models these include:

- the customer resource life cycle model of (Ives and Learmonth, 1984);

- the strategic thrusts matrix which operates with Porter's categories (Rackoff – Wiseman – Ullrich, 1985);
- the critical value activity model created from the key success factor method and Porter's value chain (Chu, 1995).

The other part of the methodologies 'deserves their name' – at least looking at their complexity. It appears however, that these methodologies adopted the SIS view only later and partly, and keep emphasising the execution of a standard system development project.

These include:

- the *Business System Planning* method of IBM (Lederer – Sethi, 1988);
- the *Method/1* of Andersen Consulting (Lederer – Gardiner, 1992);
- the *Information Engineering* approach (Martin, 1982).

#### ***4.5. The Information System Organisation***

The strategic weapon perspective prescribes paradox criteria for the place of the IT function within organisations. It requires those who are responsible for IT systems to be close to operations (the place where strategic opportunities may arise) and to senior management (the place where strategy is formulated), at the same time.

More and more organisations are trying to match this paradox criteria by duplicating the IT department in a special way. This takes shape in the assignment of a CIO (or the creation of a small, centralised unit) with the tasks of strategic planning, standardising, and exercising control; while at the same time system development, maintenance and operation activities are either decentralised<sup>1</sup> or put in a separate unit. Of course, the planning and implementation of organisation-wide applications as well as expansion of successful local system to the whole organisation would require further centralised tasks and responsibilities.

---

<sup>1</sup> This is practically equal with Earl's (1989) federal solution.

The outsourcing of IT is generally not recommended from the strategic perspective, although more and more service providers start offering ‘strategic partnerships’ to their potential customers (Drótos, 1995). Outsourcing should be approached with great caution by those companies that fall into the ‘turnaround’ and ‘strategic’ segment of the strategic grid model, though selective *outsourcing* remains a possibility to these companies as well.

#### **4.6. Strength and Barriers**

The strategic weapon metaphor means a break with the traditional concept on the organisational role of IT, which is the support of administrative and control activities and best represented by the IT pyramid. The advocates of the perspective, applying a sensitive and intuitive approach, have justifiably drawn the attention of senior management to that IT questions should be discussed among the highest level objectives of the organisation.

Nevertheless the SIS literature representing the strategic weapon metaphor can be criticised on a number of points:

- Most of the authors based their arguments on one concept of strategy (that of Porter), which, in addition, is heavily criticised by many. Although there have been attempts to develop alternative strategy models (e.g. Chan – Huff, 1992), the proportion of these in the mainstream SIS literature is not significant.
- The authors were not able to operationalise the central concept of the approach, ‘strategic information systems’. The strategic information system criteria<sup>2</sup> formulated

---

<sup>2</sup> King and Sabherwal (1992) have selected the following key characteristics to identify strategic information systems:

- *the capabilities of the system*: information storing, information processing, and/or information transmission;
- *the level of supported strategy*: internal strategy (building an effective process and organisational structure), competitive strategy (business unit level goals), and/or business portfolio strategy (decision about business units);
- *competitive factors targeted by the system*: customers, suppliers, competitors, new entrants, and/or substitute products;
- *type of competitive advantage created*: differentiation, cost leadership, innovation, growth, and/or alliance.

mostly for survey research are rather questionable, in addition respondents had a rather high degree of freedom how to interpret them.

- The definition problems were worsened by measurement difficulties. The sales and market share increases caused by the system were impossible to identify exactly, even in the most well documented cases, because the effect of other influencing factors on the result were impossible to separate (see e.g. the case of Baxter).
- The disclosure of the strategic effects was also hindered by the cross-sectional character of the examinations. Longitudinal examinations were seldom (e.g. Segars – Grover – Kettinger, 1994), and the subsequent analysis of famous SIS case studies regarding market share or profitability did not prove the concept of sustainable competitive advantage (Kettinger et. al., 1994).
- Empirical research suggests that e.g. the main motivation behind the development of inter-organisational systems is not to obtain advantages against the competition, but to follow industry trends (Reekers – Smithson, 1994). Based on this it is more reasonable to speak about IT-based *competitive necessity* instead of competitive advantage (Benjamin et. al., 1990). Others, meanwhile, have drawn the attention to the fact that taking competition for granted has to be revised too; in many cases (e.g. in the case of industry platform systems) it is more adequate to speak about *co-operation* (Konsynski – McFarlan, 1990).
- Literature had not given a clear definition of IT system types that can be treated as potential SIS. The authors have rather formulated excluding criteria, but there has been no consensus on this topic either (e.g. can we speak about strategic EIS or not). The analysis of strategic outcomes often seemed to be more important than the fact what the systems are really used for.

---

According to this, researchers have defined strategic information systems as ones that possess at least two system capabilities, support at least two strategic levels, target at least two competitive factors, and result in at least two types of competitive advantage.

- This latter statement also raises the possibility of technological determination. The starting point of the SIS planning process (which would lead to strategic advantage) was usually not the creation of a better business model (which could receive IT support), but the system itself (Earl, 1992).
- Remaining with planning: contrary to the recommendations of the dominant SIS literature a large part of the ‘famous’ SIS was not created along formal methodology, not to the initiation of the IT department or senior management, and not as an original development (Galliers, 1993a). Although the advocates of the SIS perspective soon realised this, the recommendation of formal methodologies has lost little of its impetus.

The failure to exactly define strategic information systems and the problems with the rational-instrumental approach have led many researchers to announce a return to the case study method. These authors recommend an anthropological type, information-rich description of the topic, instead of concept building and the statistical proving of hypotheses (Wiseman, 1994; Ciborra, 1994).

On the other hand, systems that have strategic impact nowadays are being studied in the frame of process and knowledge management. These approaches make the role of IT clearer as well as give up the concept of technological determination by describing the task of IT as that of serving a new business model.

This might also project the future role of the strategic perspective. In the Author’s opinion, after the turn of the millennium the strategic weapon metaphor is much more a ‘meta-metaphor’, to which several other perspectives belong, built on various business models and technologies, but all aiming at the increase of competitiveness.

