CHAPTER 3
BI-VARIATE RESEARCH:
EXPLAINING THE STRATEGIC PERFORMANCE
WITH TWO VARIABLES

3.1 INTRODUCTION

In the previous chapter, we observed that the competitive impact of IT was not only dependent on the IT itself. We proposed two options for the further study of the strategic opportunities for organizations, viz. to do research on the strategic impact of new particular organizational or technological variables and to do research on the combination of several organizational and technological variables.

In the previous chapter, it was stated that the first option lacked a promising theoretical basis for further research on the issue of strategic IT. The second option offers a new theoretical point of view. Organizations can be viewed from more than one angle. Obviously, the competitive effects are not explained from only one of those angles. Therefore, it is tempting to combine two of those angles to gain more insight (see also Morgan 1989, p. 13). Per definition, all three variables mentioned above are related to the business functions, so that relations can be expected.

We shall first research the bi-variate relation between IT and competitive strategy on the competitive position, and subsequently the relation between IT and organizational structure and the competitive implications (option 2). The impact of the relation between the competitive strategy and the organizational structure is examined to make the study complete.

3.2. IT AND COMPETITIVE STRATEGY

3.2.1 Introduction

This section deals with the relation between IT and strategy, and its effect on the performance of the organization. We start with an elaborate description of the relation between strategy and IT as used in this research. This relation is based on
the congruence between the various dimensions of the two variables. Subsequently, several empirical studies on this issue are presented. Although there are differences between the operationalizations of the variables, similar features that serve as a basis for further research can be recognized.

3.2.2 Relating IT and competitive strategy: connecting dimensions and configurations

In general, the IS research that deals with strategic IT concentrates on the business strategy level (Chan & Huff 1992, p. 193). Parker et al. state that IT investments must result in improved business performance. For the successful exploitation of IT, one of the main questions is: for which goal has the IT been installed in the organization. To answer this, the IT must be evaluated regarding its possible contribution to the business goals (Parker et al. 1989, p. 19). At present times, there is a broad stream of theoretical research on information systems and their relation to company strategy. And in practice, aligning strategy and IT is a continuing challenge for (IT) management (Broadbent & Weill 1991, p. 293).

This topic of the fit between business strategy and the general goals for IT implicates that a good policy on the use of IT is not possible without a clear business strategy (Holland & Lockett 1992, pp. 135, 141). This linkage has an impact on company performance (Chan & Huff 1992, p. 191), whether it is reactive alignment or proactive impact. The better the fit (congruence) between strategy and IT, the better the expected company performance.

In the various alignment models, this IT-strategy fit is rather conceptual (Chan & Huff 1992, p. 195). Variables are often not translated into measurable indicators. A good example is to be seen in a study concerning 20 UK retailers. Holland & Lockett describe business and IT strategies without operationalizing these constructs (Holland & Lockett 1992, pp. 136-137). The consequence of this conceptual approach is that the assessment of 'fit' is not possible. Therefore, the question remains: what is the nature of the fit between strategy and IT? The answer to this question can be used to assess the effect of fit. Which fits are profitable for the organizations, and which fits are undesirable? To answer this kind of question, strategy and IT must be formally assessed to uncover the links (congruences) between IT and strategy (Chan & Huff 1992, p. 193). Bi-variate researches provide guidelines for the operationalization for the variables. These researches are presented in the next subsection.
The relations between IT and strategy are based on the earlier defined dimensions (see subsections 2.3.2.2 about IT and 2.3.3.2 about strategy). Congruence is explained via rules, which are aligned with certain scores. The scores are determined as follows. Generally two points are awarded if two high logical values are aligned (for instance a high IT efficiency and a high low costs). One point is awarded if two low values are present. Finally there are some penalty rules that deny the relation between certain dimensions and therefore certain types. The application of the rules leads to a final score for the combination of certain IT types and strategic types. The combination between two types is accepted if that combination has at least two points.

The congruence rules that relate IT and competitive strategy are:

Two points if:

- low costs + is aligned with IT efficiency +;
- marketing + is aligned with IT effectiveness +;
- innovation + is aligned with IT innovation +.

One point if:

- low costs - is aligned with IT efficiency -;
- marketing - is aligned with IT effectiveness -;
- innovation - is aligned with IT innovation -.
Penalty rules:

- low costs - can not relate with IT efficiency + (too expensive);
- low costs + can not relate with IT efficiency - (not enough capacity);
- marketing- can not relate with IT effectiveness + (too expensive).
| strategy       | IT                              | unconnected |  | concentrated |  | distributed |  | decentralized |  |
|---------------|---------------------------------|-------------|  |--------------|  |-------------|  |--------------|  |
|               |                                 | eff| | eff| | eff| | eff| | eff| | eff| | in| | in| | in| | in| |
|               |                                 | - |  | + |  | - |  | + |  | - |  | + |  | - |  | - |  | + |  |
| niche marketer| low costs                      | 1 |  | 2 |  | x |  | x |  | 2 |  | 1 |  |  |  |  |  |  |  |
|               | marketing differentiation      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | focus                           |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | innovation                      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | total                           | 4 |  | 0 |  | 0 |  | 1 |  |  |  |  |  |  |  |  |  |  |
| cost leader   | low costs                      | x |  | x |  | 2 |  | 1 |  | 2 |  | x |  | 1 |  |  |  |  |
|               | marketing differentiation      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | focus                           |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | innovation                      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | total                           | 0 |  | 3 |  | 0 |  | 0 |  |  |  |  |  |  |  |  |  |  |
| marketer      | low costs                      | 2 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 |
|               | marketing differentiation      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | focus                           |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | innovation                      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | total                           | 2 |  | 0 |  | 2 |  | 0 |  |  |  |  |  |  |  |  |  |  |
| innovator     | low costs                      | 1 |  | x |  | 1 |  | x |  | 1 |  | 1 |  | 2 |  |  |  |  |
|               | marketing differentiation      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | focus                           |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | innovation                      |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |   |  |
|               | total                           | 0 |  | 0 |  | 0 |  | 4 |  |  |  |  |  |  |  |  |  |  |
### Table 3.1b SCORING THE COMBINATIONS BETWEEN IT TYPES AND STRATEGIC TYPES

<table>
<thead>
<tr>
<th>Strategy</th>
<th>IT Types</th>
<th>Unconnected</th>
<th>Concentrated</th>
<th>Distributed</th>
<th>Decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>effi</td>
<td>effec</td>
<td>in</td>
<td>effi</td>
<td>effec</td>
</tr>
<tr>
<td>niche innovator</td>
<td></td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>low costs marketer</td>
<td></td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

- effi = IT efficiency
- effec = IT effectiveness
- in = IT innovation
The application of the rules is shown in the Tables 3.1a and 3.1b. Relating the IT with the three strategic dimensions, combined with the configurational linkages (see subsections 2.3.2.3 and 2.3.3.3), results in the following eight possible types where the IT and strategic dimensions are supportive.

1. Niche marketers with unconnected IT.  
Niche marketers do not compete via the lowest costs and neither need to process large amounts of data, nor use concentrated or distributed IT for efficiency. They compete via anticipating the needs of their specific niches (focus) and need to be supportive in their marketing (differentiation), administration and simple production processes. This support can be offered effectively by unconnected IT. It would be dangerous (and not necessary) to invest in highly innovative decentralized IT. The resources would be concentrated on specific applications so that the organization would be forced to limit its delivery to one segment only.

2. Cost leaders with concentrated IT.  
The main concern of these organizations is to operate at the lowest costs. The strategic necessity to efficiently process data for controlling production processes and the administrative support fits the regulated information processing of concentrated IT perfectly. These organizations have a low focus and deliver to more market segments. Large investments in IT preclude operating at only one segment: the market capacity would be too small for returns on this investment.

3. Marketers with distributed IT.  
Extra emphasis on the products and their delivery is crucial. All kinds of complex differentiation opportunities, like extra services and quality, determine the position of these organizations in the industry. This differentiation demands elaborate tasks for which standard applications of unconnected IT are not always feasible. Effective special applications are appropriate. These larger organizations (compared with niche marketers: they do not focus heavily) can also use efficient information processing capacity for administrative purposes. Expensive distributed IT aligns with these needs, and can be afforded.

4. Innovators with decentralized IT.  
Innovative opportunities offered by IT are compatible with the behavior of innovators. These opportunities effectively support the workers in these organizations. In no sense do they restrict their innovating efforts. The expensive IT requires a low-focused organization to produce sufficient returns. Efficiency aspects do not
play the most important role regarding the production processes. Customers are willing to pay the price for innovation.

The four types mentioned above are the standard combinations. It would be a simplification to create a hypothesis based on only these combinations. There is enough slack in organizations to realize other combinations.

5. Niche innovators with decentralized IT.
Comparable with the last combination, but differing in the dimension of focus. Obviously these organizations focus on certain market segments with enough potential to pay back the IT investments of the decentralized IT.

6. Low costs marketers with concentrated IT.
These organizations are low costs producers with the possibility to improve the appearance and supply of their products without hindering the smooth execution of the production processes. The main function of the IT is to support the efficiency. Therefore, concentrated IT is appropriate.

7. Low costs marketers with distributed IT.
As 6., but with the difference that the distributed IT supports the differentiation dimensions of the marketer and the efficiency dimensions of the cost leader.

8. Marketers with unconnected IT.
Not all marketers realize complex differentiation. Some concentrate on simple added value in the features of their products and services, and are comparable with niche marketers, operating several market segments at the same time (no focus). Efficiency is not an important competitive consideration. Therefore, effective unconnected IT with its opportunities to support standard functions is appropriate.

It is useful to note that the way the organization wants to differentiate and the use of IT are both linked to the efficient, effective and/or innovative performance of the value chain functions. Besides, various strategies and IT functions can be appropriately linked to each other; the management has choices to make on this issue.

3.2.3 Research on the strategic impact of IT and competitive strategy
Although bi-variate researches provide guidelines for the operationalization of the variables, the different properties of the constructs IT, strategy and competitive advantages of organizations are a main source of ambiguity. This leads to incomparabilities. However, the similarities between the researches are still striking. In all the researches:

- IT is involved with the goals/usage of the automation of the information services;
- the business strategy handles the intended or realized organizational goals;
- the competitive position deals with the relative performance of the organization in comparison with other organizations.

Simon & Grover

Simon & Grover conducted a research in which the linkages of IT with strategic objectives took an important place (Simon & Grover 1993, p. 29). The study investigated the function of certain applications in facilitating the strategic plan of (international) organizations.

For the operationalization of strategy, they used the following strategic dimensions (Miller 1987b):

- complex innovation: the degree to which the firm introduces major new products or services;
- marketing differentiation: the creation of customer loyalty by uniquely meeting a particular need;
- breadth: the scope of the market that the business serves;
- conservative cost control: the extent to which the business achieves a cost leadership position.

IT was not operationalized. Examples were given of applications linked to the various strategic dimensions:

- complex innovation requires information-gathering and the evaluation of systems. These systems improve management decision-making from conceptual design to new marketing concepts with the improved quality of information. IT can play an additional role via CAD/CAM applications;
- using marketing differentiation, customer service and marketing become prime ingredients for the firm's competitive mix. IT can support this by means of inventory management and routing systems and systems offering marketing intelligence;
- as the scope of the business widens, the level of uncertainty will increase. IT can assist management in decreasing newly created uncertainty by
means of detailed sales and product records in database management systems;
- for cost control, it is necessary for the management to closely monitor the organization's operations via information systems and to control costs using inventory and accounting systems. Besides, systems are that standardized operating procedures and formalize policies are needed.

Comments
The difference between this approach and the approach in our study, lies in the linking of concrete application and organizational goals, instead of considering the use of IT at a strategic level. Besides, Simon & Grover see the strategic value of IT particularly in its role as coordinating mechanism of value chain activities (Simon & Grover 1993, p. 30).

Due to the lack of IT operationalization, the link remains rather coincidental. Anecdotal evidence is used to illustrate the linkages between some applications and strategic dimensions. We could imagine applications linked to other dimensions. Nevertheless, the authors claim that, by using this 'fit' concept, IT applications can be most beneficial (Simon & Grover 1993, p. 40). These benefits need to be operationalized. So far, the framework serves as a guide to explore possibilities between strategies and IT.

Ramaswami et al.
In this next study on the impact of IT and strategy, the construct of strategy was also operationalized following the fundamental strategic approach of Porter (Ramaswami et al. 1992, p. 153). They perceived four dimensions:
- service differentiation: emphasizes customer service, service quality and image of the organization;
- marketing differentiation: emphasizes advertising, personal selling and other marketing techniques;
- product differentiation: emphasizes product development and modification;
- cost focus: emphasizes costs efficiencies and competitive pricing.

As in the research of Simon & Grover, the marketing dimension was split into service differentiation and marketing differentiation, and the breadth (focus) dimension was ignored.

They distinguished various information needs concerning the operationalization of IT. Firms need internal and external information for strategy
formulation and implementation. Internal information is, for instance, provided by internal accounting systems delivering data on sales, inventories, costs and so on. External data are provided by marketing intelligence systems, which offer information on customers, competitors, suppliers etcetera, and marketing research systems that support the solving of specific problems (Simon & Grover 1993, p. 152). Both environmental scanning and market research demand complex information processing for which strategic information systems can be used. According to the authors, strategic information systems describe the activities in the collecting, processing and analyzing stages through which this external information needs to pass in order to make strategic marketing decisions. This decision-making process is not directly aimed at getting competitive advantages.

The objective of the study was the assessment of the need for strategic information when using one of the competitive strategies. For instance, a firm using a differentiation strategy may need more strategic information than a firm using a cost strategy. The need for this kind of strategic information (system) governs the IT the organization should use. Knowing the strategy, IT can play a facilitating role for the provision of strategic information. When it is not really necessary, the high costs associated with the labor and the financial resources needed for such IT can damage the competitive position. A firm that meets its strategic information needs and therefore uses the appropriate IT may be in a better position to arrive at a competitive advantage. The fit between strategy and IT is believed to be relevant for the performance of the firm.

The results of their empirical research indicated that organizations using a marketing or service differentiation tend to emphasize the need for strategic information systems (Simon & Grover 1993, p. 157). The other two strategic dimensions did not show any relationship with strategic information systems.

Comments
The research described follows Rackoff et al. in their perception of strategic IT. The focus on IT is that of its usage in the support of the strategic management process. For this they concentrate on external marketing information (Rackoff et al. 1985).

As pointed out before, in our research strategic IT is viewed as being the IT that enhances competitive advantages. The literature shows that strategic effects are not only reached by information systems for supporting strategic management, but also (or even more) by information systems for internal operations efficiency (Galliers 1993; Wilkes 1991, p. 57). For the costs strategy in particular, this 'internal' IT is of essential strategic value. Due to this reason, their operationa-
lization of IT, which focuses on the emphasis of external marketing information (systems), is one-sided.

Another comment on this research concerns the lack of measurement of strategic advantage or (comparative) business performance. The link of the fit with firm performance, which is viewed as relevant for the competitive position of the firm, is not explicitly addressed in their research design. In a footnote however, they report the positive association of strategic information systems with market coverage and penetration. Thus, using a marketing differentiation strategy needs strategic information systems, resulting in a higher market share.

Kühn Pedersen
In a study covering 27 organizations, Kühn Pedersen found 44 examples of information systems that generated competitive advantages. The effect of the fit between IT and strategy is treated in his research (Kühn Pedersen 1990).

As in the researches previous mentioned, he also used the scheme of Porter to identify the business strategies (Porter 1980):

- overall cost leadership;
- differentiation;
- focus.

IT was operationalized in the Information System Strategies (IS strategies). The basis for the classification was the distinction between cost-effectiveness (doing things right: the effective use of resources) and goal-effectiveness (doing the right things: the effective achievement of the business objectives). This distinction was combined with the differentiation between the use of IT for the primary processes and the usage of IT as an output in the realized products and/or services. This combination delivered the following classification (Kühn Pedersen 1990, pp. 196-197):

- administrative support (costs/processes): IT for distributed data and word processing systems;
- information management (costs/products): IT for efficient management of the data resources themselves;
- management support (goals/processes): IT like decision-support systems, expert systems and communication systems (electronic mail, EDI);
- markets and products support (goals/products): IT in electronic payment systems and home banking systems, but also information IT for the reproduction of business statistics, calculations and market data.
The mix of strategy and IT was researched on its impact on the competitive effects of information systems in order to explore the concept of fit (in the research referred to as strategy conformance). The conformance was hypothesized as follows:

- overall cost leadership - administrative support/information management;
- differentiation - management support;
- focus - markets and product support.

In order to measure the strategic advantages of information systems, he separated intended strategic advantages and emerged strategic advantages. The author referred to the information systems as realized strategic information systems if the IS-strategy was formulated according to the business strategy, if strategic conformance (reactive fit) was reached and if the IT delivered the expected advantages. If, however, the advantages were the result of coincidence (Galliers 1993), and the business strategy was adjusted to the IT effects (proactive fit), then the information systems were called emergent strategic information systems (Kühn Pedersen 1990, pp. 195, 201).

The result of the research was that in 6 of the 27 organizations (1/5), realized strategic information systems were present. These information systems produced 15 of the 44 cases of competitive advantage (1/3). The fit was obviously advantageous to competitive advantage. The 29 other cases may result in emergent strategic information systems if these organizations change their business strategy.

Comments
The following conclusions can be drawn:

- the absence of a fit between strategy and IT happens four times more often than the presence of a fit. If there is an absence of fit, then there are only twice as many competitive advantages in comparison with the fit situation. Thus, having a fit is relatively twice as rewarding than lacking a fit;
- 2/3 (29 out of 44) of the competitive effects are not planned and are not based on the business strategy. Up until now, business strategies have not been successfully used as guidelines to reach competitive advantages using IT. Kühn Pedersen gives as a possible reason the formal and abstract nature of business and IT strategies, which prevents the successful usage of the fit concept (Kühn Pedersen 1990, p. 201).

Broadbent & Weill
A comparable research, a case study treating four Australian banks, was conducted by Broadbent & Weill. They carried out their research in the banking industry
because this information-intensive area of financial services was relatively mature in the use of IT (Broadbent & Weill 1991, p. 304). The competitive importance of the fit between business and information strategies was also very clear in this work. Their assumption was that the presence of (more) information-based comparative advantages suggested that there had been a (higher) level of fit (Broadbent & Weill 1991, pp. 294, 296, 297).

Firstly, they identified the level of IT based competitive advantage. Managers were asked to rate their firms' information-based advantages. There was one bank where all the executives stated that they had an above-average position in relation to their competitors. By asking the other banks about the position of the competitors, the good position of this bank was confirmed. The questionnaire continued with questions to diverse managers on areas where the firm had gained some advantage over competitors utilizing IT. This resulted in an average number of information-based comparative advantages. The responses were consistent with the earlier questionnaire. These information-based ratings were also consistent with financial performance indicators. For these reasons, the best bank was assumed to have the best alignment between strategy and IT.

Comparing the banks, some results were:

- compared with the other banks, the successful bank was more focused on its business strategy formation process and used less extensive documentation;
- the successful bank had the highest level of consensus and consistency in its strategic orientation;
- the successful bank had the longest experience in attempting to link business strategies and information systems.

The major factor in a good fit was a flexible and issue-oriented strategy formation process, with concurrent processes taking place at different organizational levels.

Comments
The virtue of their approach is the start of the operationalization and measurement of the strategy and IT issues. The nature of linkage between strategy and IT, however, stays hidden.

Van Engelen
Operationalization of strategy and IT services was present in the research of Van Engelen, which focused on the relation between the (marketing) strategy and the
information systems of product/market combinations and their performance (Van Engelen 1989, p. 3).

This study used systems theory to create a model in which strategy and information systems characteristics were related. Based on the phases of the sales market and the central organization, 7 (marketing sales) strategies were distinguished (Van Engelen 1989, pp. 76-79):

- development strategy
- me too strategy
- niche strategy
- early innovator strategy
- cost-efficiency strategy
- differentiation strategy
- harvesting strategy

These strategies required different (information) relations, viz. formality, bottom-up/top-down, centralization, frequency, degree of automation, importance of content, speed of reaction, usability and private/public relations. These relations exist between various parties, described in the information systems dimension matrix (Van Engelen 1989, p. 102).

The relation between strategy and information systems (characteristics) was studied as follows. Firstly, 300 organizations answered questions that determined their (marketing sales) strategies. For each of the strategies a correlation matrix was created between the information systems dimension matrix and the performance measure. Although diverse measures were considered, the following measure was finally used: the realized profits as a percentage of the intended profits (Van Engelen 1989, p. 120).

In each strategic type significant correlations were found between the measure of success measure and information systems characteristics. The conclusion was: there is a measurable relation between the compatibility of information systems and strategy on the one hand and the performance of the product/market combination on the other (Van Engelen 1989, p. 129).

Comments
The competitive effect of a fit between strategy and information services was supported, although the competitive measure is not equivalent to other measures. Besides, this study was not conducted at a business level but at a product/market level.
3.2.4 Conclusion

Looking at the fit between strategy and IT (or IT related constructs), the following features become apparent:

- the (bi-variate) fit influences the competitive position (comparative performance) of the organization. In all the researches there were attempts (some more detailed than others) to assess the three variables, and to determine the effect of fit on the competitive situation;
- the adjustment between strategy and IT is based on their relevance for the business functions. Strategies concern the linkage of the value chain functions with the organization's position in the industry, while IT is the automation of the information services used for the execution, support and management of these business functions;
- the fit between IT and strategy is the result of mutual influences from strategy to IT (reactive alignment) and vice versa (proactive impact);
- the (IT) management of organizations tries to steer this process of adjustment;
- there is no single best fit between strategy and IT. Strategies can even have appropriate linkages with more than one IT instance (value), and IT instances can relate with more than one strategy.

Relating strategy and IT is obviously common in strategic research, but the competitive results are not consistent, partly due to different measurements. In an adjoining area of IS-research, the relation between an organizational variable and IT has also been studied. The following subsection deals with that research.

3.3 IT AND ORGANIZATIONAL STRUCTURE

3.3.1 Introduction

This section discusses the linkage between IT and the organizational structure, and its effect on the performance. It starts by defining the relation between structure and IT. Subsequently, several empirical studies on this issue will be presented. Although there are differences between the operationalizations of the variables, some similar features can be observed, which are also comparable with the
characteristics of the IT - strategy relationship.

3.3.2 Relating IT and organizational structure: connecting dimensions and configurations

Not only has the IT - strategy linkage received much attention in the field of Information Systems research since the 1970s, the role of the organizational structure has also been viewed as being important. The interest in the relation between IT and organizational structure started in 1958 with the predictions of Leavitt & Whisler. The impact of the IT would result in centralization and in the shrinking importance of middle management (Karake 1992, p. 259).

In the 1970s, many researches were conducted on this IT - centralization relation (see for instance Markus & Robey 1988, pp. 585-586; Schrama 1993, p. 604). Next to the relation between IT and centralization, the relations between IT and other structural dimensions, such as formalization, were also studied (see for instance Carter 1984). The fit concept maintains that the adjustment between IT and the organizational variables is necessary for the organization because it prevents organizational friction (Tavakolian 1989, p. 309). Successful IT functions in organizations which display a fit between IT and structure (Ein-Dor & Segev 1982, p. 66).

The rationale for the relation between IT and structure is based on the major changes that IT causes in the execution of organizational tasks and processes (Karake 1992, p. 259; Keon et al. 1992, p. 25). By definition, the organizational structure deals with these organizational tasks and the coordination between them (Mintzberg 1979, p. 2; Schrama 1993, pp. 604-605). Not only can the execution of the processes change due to IT, the coordination between them may also change, causing an organizational restructuration (Davenport & Short 1990, p. 12). Benjamin & Scott Morton state that IT enables restructuration at several levels: task level, business process level and the organizational level (Benjamin & Scott Morton 1988, p. 94; see also Davis & Olson 1985, p. 354). These IT enabled changes are seen as the key to achieve competitive advantage (see also Hammer 1990). Obviously, there is a tight relation between organizational structure and IT, and this relation is important for the effectiveness of the organization (Schrama 1993, p. 605).

Proponents of the fit concept state that IT reflects the organizational (decision-making) structure (Tavakolian 1989, p. 309). This notion deals with the
information processing function of IT and the information-processing function of
structure. Galbraith approaches the IT - structure relation from this angle: the (lack
of) information-processing capacity of an organization (Galbraith 1973).
Coordination in organizations is possible by means of regulation. Rules cannot
regulate all the necessary coordination. There will be always be exceptions in the
organization of the processes. These exceptions are dealt with by the hierarchy,
for instance by supervisors who make ad hoc decisions. Under stable circum-
stances, the information- processing capacity is sufficient to coordinate organiza-
tional tasks. If the organizational situation is becoming less stable, perhaps
because of environmental changes in the industry, the number of exceptions will
rise, so that the hierarchy is apt to become overloaded. The information-processing
capacity of the organization in this turbulent situation is no longer sufficient, so
that uncertainty concerning the tasks rises.

Galbraith offers two basic solutions aimed at reducing this uncertainty (see also
Davis & Olson 1985, pp. 341-342):

- reducing the need for information-processing:
  - via decentralization, self-organizing subsystems can be formed. These
        systems do not need overall organizational regulation because of the
decision authority given;
  - via the relaxation of demands (lower profit levels to attain, higher
        budgets to use), the turbulent situation does not make so many demands
on the organization. Some problems will be avoided through the creation
of slack for the organizational departments. The same tasks can use more
time or resources so that the amount of information needed will decrease
(Pennings 1989, p. 15);
- increasing the capacity for information-processing:
  - via the use of computers, the communication and consequently the coor-
dinating possibilities are enlarged. The top-down planning and bottom-
up control in the organization will be enhanced, so that the information
capacity rises to an acceptable level again. IT may enable top managers
to obtain information quickly, reduce their ignorance and support the
making of decisions (Huber 1990, pp. 250-251);
  - the use of horizontal communication opportunities for decision-making,
the information-processing capacity of the organization also rises.

In fact, Galbraith mixes three elements:
- structural changes;
Bi-variate research: explaining the strategic performance with two variables

- information processing changes;
- performance changes.

By relating these three elements, the organization can be balanced. IT and structure are both concerned with the communication in the organization for the coordination of tasks. The fit between them affects the organization's performance. Working in the field of Information Systems, this relationship must be considered (Van den Berg 1988, p. 49).

We use the previously defined descriptions to relate IT and structure (see chapter 1). The types and variables will be linked via their congruence. The congruence rules for IT and organizational structure are:

Two points if:
- formalization + is aligned with IT concentration + (IT has central processing capabilities for standardized data processing. This is appropriate for formalized organizations where standardization is arranged via regulations);
- integration + is aligned with IT integration + (IT lacks a central processing unit: all data processing and control is local, and the IT is connected via integrative devices. This IT enables mutual adjustment which is necessary for the complex and unpredictable work in an adhocracy);
- centralization + is aligned with IT centralization + (for simple tasks, the IT does not require all kinds of specialized applications and connected hardware. This IT fits simple organizations).

One point if:
- training + is aligned with IT concentration + (collective databases, administrative support for professionals);
- formalization - is aligned with IT concentration -;
- integration - is aligned with IT integration 0 (the lack of integration in the organization is backed by a little integration via the IT. More IT integration would require too many resources).

Penalty rules:
- formalization + can not relate with IT concentration - (not enough capacity).
Combining this congruence with the configurational rules (see subsections 2.3.2.3 and 2.3.4.3), the following four standard types, relating IT types and organizational structure types, are produced, along with one mixed type (see Table 3.2).

1. Simple structure with unconnected IT.
In these organizations, the CEO has the decision-making authority. This means that he/she is also involved in the final IT decision-making (centralization). This is possible because of the simple nature of the unconnected IT, consisting mostly of simple effective standard applications with local information processing (concentration). This IT is not needed for lateral communication (integration). The decision-making authority is regulated centrally, using face-to-face contacts and telephone facilities for communication.

2. Machine bureaucracy with concentrated IT.
These formalized organizations are favored by efficient operations. Concentrated IT performs routine and regulated information-processing. Therefore, it needs formalization, but it also reinforces and strengthens the formalized way of doing things (Bots et al. 1990, p. 126). IT is primarily aimed at efficient information-processing via concentrated data-processing at one place. It does not support the effectiveness
### Table 3.2  SCORING THE COMBINATIONS BETWEEN IT TYPES AND STRUCTURAL TYPES

<table>
<thead>
<tr>
<th>structure</th>
<th>IT</th>
<th>unconnected</th>
<th>concentrated</th>
<th>distributed</th>
<th>decentralized</th>
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<td>conc - cent + int -</td>
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<tr>
<td>simple structure</td>
<td>formalization +</td>
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<td></td>
<td>centralization +</td>
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<td>integration -</td>
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<td></td>
<td>training &amp; indoctrination -</td>
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<tr>
<td>total</td>
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<td>machine bureaucracy</td>
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<td>centralization +</td>
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<td>professional bureaucracy</td>
<td>formalization -</td>
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<td>centralization -</td>
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<td>adhocracy</td>
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</table>

conc = IT concentration  cent = IT centralization  int = IT integration
Chapter 3

of tasks in other ways, in order to realize better service or quality. Integration by means of the use of concentrated IT is also not appropriate; all communication flows via the central processor. Several parties are involved in decision-making on IT: the general management, the IT management (as part of the technocracy), IT vendors and the users. The IT centralization is, therefore, not totally implemented.

3. Professional bureaucracy with distributed IT.
In organizations where the workers perform stable but difficult tasks, IT should offer convenience to those involved with operations and decision-making (effectiveness). The choices on IT are to be made by all the relevant parties (general management, IT management, users). This results in average IT centralization. The operators work mainly independently, therefore the IT does not need to offer lateral communicative opportunities (integration). Another consequence of working independently is the possibility of local data processing and control (concentration). Finally, in these organizations there are also major supportive administrative tasks that are supported by the efficient data processing of the central processor.

4. Adhocracy with decentralized IT.
The striking feature of adhocracies and professional bureaucracies is their coordination via lateral and vertical communication. The integrative opportunities of IT support this communication (especially needed when a team is not working at one location) and can even result in more personalized contacts and a hierarchy based on competence (adhocracy elements). The complexity of the tasks is a feature which is also found in professional bureaucracies. This requires effective support. A difference, however, is the unpredictability of the tasks. This has two consequences. Firstly, the users should possess decision-making authority because they are able to assess the relevant requirements for the IT (centralization). Secondly, the IT will support innovative goals. The data-processing and control facilities are situated locally near the users (concentration).

One non-standard configuration can be distinguished.

5. Machine bureaucracy with distributed IT.
Machine bureaucracies can use distributed IT as long as distributed IT offers efficiency opportunities. The advantages of this more effective IT lie in the differentiation opportunities for organizations.
It has been observed that the coordination of the organizational tasks in order to perform the business functions is the basis for the linkage between the IT types and the organizational structure (Galbraith 1973). The question can be posed as to whether the IT should reflect the decision making structure or complement the coordinating needs. Besides, management has choices to make on the adjustment between structure and IT. These are related entities that influence each other (Markus & Robey 1988).

3.3.3 Research on the strategic impact of IT and organizational structure

Research on the relation between IT and structure has a strong conceptual basis. The basis will first be discussed according to the views of three authors. Subsequently, empirical researches conducted by four authors will be presented.

Leifer
The concept of fit has been worked out by Leifer. He states that the importance of fit between IT and organizational design in order to achieve successful IT usage is underestimated (Leifer 1988, p. 63). One reason for the mixed evidence is the different definitions of the variables, just like in the strategy - IT relationship (see also Keon et al. 1992, p. 25; Lee & Leifer 1992, pp. 28-29; Markus & Robey 1988, pp. 585-586; Schrama 1993, p. 604). Leifer proposes operationalizations of the constructs to find natural matches. Our measures are equivalent to the measures in his research.

Comments
The existence and effect of these matches were not empirically tested. Another unsolved issue is the direction of influence (IT ~ structure). Leifer suggested that organizational change is needed to realize the fit between IT and structure. These changes should not be the result of autonomous organizational development, but a consequence of managerial decision-making (Leifer 1988, p. 71). In a later article, Leifer (in cooperation with Lee) stated that the relationship between IT and organizational structure is reciprocal (Lee & Leifer 1992).

Markus & Robey
IT influences the organizational dimensions and, at the same time, the organization affects IT (Lee & Leifer 1992, p. 28). This observation recurs in the study of
Markus & Robey. They connected this issue with the contradicting results of IT impact on organizations. They see the usage of different approaches in the various studies as the fundamental reason for this disorder. These approaches deal with, amongst others, the causal issue of IT and organizational change. They distinguish three approaches (Markus & Robey 1988, pp. 585-589):

- the technological imperative: IT is seen as force from outside the organization that creates certain organizational changes (situational control). It is argued that this is caused by the influence of contingencies (organizational size, the stable or turbulent nature of the environment). Leavitt & Whisler's predictions comply with this perspective. This deterministic approach has, however, not delivered consistent findings on the IT - centralization relation since the 1970s;

- the organizational imperative: organizational change and the presence of IT are caused by choices of organizational members, especially designers of information systems (intended rational). Organizational needs determine information needs, the basis for the IT. IT is the dependent variable, dependent on the organizational situation. Galbraith is a well-known proponent of this opinion (Galbraith 1973). The empirical support for this imperative is limited also;

- emergent perspective: the organizational consequences of IT are the unpredictable results of complex social interactions (emergent). This approach does not explain change via exogenous IT or actors' intentions, but explains change via the dynamic interplay among actors, contingencies and IT. Identical (information) technologies lead to different organizational outcomes in different settings (see for instance: Jaikumar 1986). Meier & Sprague, for instance, conceptualize the match between information systems and organizational design (Meier & Sprague 1991, p. 368). In this framework there is no inherent causal determinism (from IT to structure, or vice versa). The match between IT and structure can be viewed as a two-way dependency, and is seen to contribute to the company's performance. In this emergent perspective, management should facilitate the cooperation between IT and business management in dealing with general management problems.

Comments
The management of organizations can play an Influencing role by:
- selecting the IT with particular features. The direction of change is from IT to the organization;
Bi-variate research: explaining the strategic performance with two variables

- determining information needs and implementation strategies. The direction of change is from the organizational situation to IT;
- supporting user participation in analysis, design and implementation of IT. The complex interplay leads to unpredictable changes. There is a mutual direction of change between IT and the organization.

Schrama

Schrama emphasized the definition of IT as an important argument for the mixed results (Schrama 1993, p. 604), and combined this with the question of causality. He described the centralization-decentralization debate. The earliest researches found that the use of computers resulted in more centralized organizations. Later, other researches detected the opposite tendency, towards decentralization. Gradually a neutrality thesis developed: not the IT itself, but the usage of IT determined the organizational changes. This view reflects the nature of the technological imperative (technological determinism). It is still seen as an exogenous instrument that causes organizational change. He proposed a definition that focuses on the knowledge and skills for the support of information services. Using this idea of IT, it became evident that the organizational structure (being the tasks, accountabilities and authorities belonging to positions within the organization and the mutual relations between these positions) and IT are both equal aspects of the organization. There is no reason to suggest a one-way relation between IT and structure. The fit between structure and IT, which is the result of a mutual adjustment, was seen as necessary for an effectively-functioning organization (Schrama 1993, p. 605).

Comments

This argument explains the importance of fit and the reciprocal relationship between IT and structure. The basis of his reasoning is viewing both these constructs as parts ('aspects') of the organization. As a consequence of this conceptual debate, the 'fit' is assessed as important for organizational performance. The remaining question is: what is the nature of the fit between structure and IT? To answer this kind of question, structure and IT must be formally assessed.

In the field of the IT - structure relationship, there are some empirical studies that deal with this question. Despite the different measurements, the similarities between the researches are:

- IT is involved in the execution of, and coordination between, processes via the distribution of information;
the structure handles the coordination of tasks in the organization;
the fit between IT and structure is important for successful implementation and usage of IT, and hence for the effective functioning of the organization itself.

Ein-Dor & Segev
Ein-Dor & Segev conducted a well-known empirical study on this issue. They started with the question for successful IT. They found several organizational variables relating to IT success in a literature study. The IT structure was seen as a reflection of the managerial processes in the organization (Ein-Dor & Segev 1982, p. 56). This view suggested an direction of influence from organization to IT (organizational approach).

They operationalized IT and structure to investigate the importance of the relation between IT and structure. For the organizational structure, the level of managerial decision making (centralization level) was chosen, ranging from 'important decisions are made at the top level' to 'strategic decision-making goes down to the lowest level'.

The IT structure was seen as a composition of variables, including:
- centralization of development and implementation efforts concerning IT;
- integration of (for instance) data referring to diverse organizational areas in one database;
- deployment of hardware: ranging from large centralized processing computers (mainframes) to minis and micros;
- the place of the IT manager in the hierarchy.

The main hypothesis was as follows: the IT structure is associated with the organizational structure. The research was conducted amongst successful IT users. Therefore, if the hypothesis could be confirmed, this would mean that a relation between IT structure and organizational structure for successful IT users did exist. The concept of fit is, therefore, appropriate for this research (Ein-Dor & Segev 1982, p. 66).

The hypothesis could be broken down into four concrete sub-hypotheses:
a. there is a positive relation between organizational centralization and IT centralization;
b. there is a positive relation between organizational centralization and IT integration;
c. there is a positive relation between organizational centralization and centralized hardware;
d. there is a positive relation between organizational centralization and the rank of the IT manager.

The sub-hypotheses a, c and d were confirmed. For b, a negative correlation was found.

Comments

Studying the results of this research, a comparison was made with the work of Olson (Olson 1978). In 1978, she found no pattern of relationship between organizational characteristics and information services at all. Later however, with Chervany (Olson & Chervany 1981), some relations were reported, but none between the centralization of organizational structure and hardware. These findings are inconsistent compared with the research of Ein-Dor & Segev; in their view due to different operationalizations (Ein-Dor & Segev 1982, p. 65).

The cause-to-effect direction between IT and structure is also discussed. Ein-Dor & Segev saw the IT as a reflection of managerial processes (thus, finally, the organizational structure), contrary to the idea of Leavitt & Whisler (IT affects organizational structure). They conclude that organizations should be aware of the conjunction between the two constructs, leaving the question of direction unanswered.

Keon et al.

In 1992, Keon et al. performed a study on the same IT - structure relation. However, the performance of the organization received hardly any attention. Only once did they refer to the successful enhancement of organizational objectives by the usage of IT in combination with a structural dimension.

The structure of the organization was assessed by measuring (Keon et al. 1992, pp. 24, 27):

- specialization: the degree to which specialists in various functional areas are present in the unit;
- centralization: the degree to which decisions of various types are made by individuals;
- formalization: the degree to which job descriptions, written policies, organization charts and workflow schedules are used by the employees.
The IT variables included the hardware potential (microcomputers, word processors and terminals) and the sophistication of the IT, ranging from simple data storage and retrieval to forecasting and decision support.

The following results were found:
- a positive relation between both IT measures and specialization;
- a negative relation between sophisticated IT and centralization;
- a positive relation between sophisticated IT and formalization.

Comments
The relations between IT and structure are clear, but the performance implications of the fits are not elaborated.

Schrama
Schrama assigned more consideration to the performance element mentioned above, although he did not measure the organizational performance. He related the organizational (de)centralization with the level of IT (de)centralization (Schrama 1993, pp. 605, 607):
- centralization: distribution of tasks, accountabilities and authorities between the centralized and decentralized level;
- IT (de)centralization: the level of decentralized collecting, mutating and using data.

Both measures showed a clear distribution. Centralized and decentralized forms were present. The relation was measured twice, in 1988 and in 1992. There was a strong relationship between IT and structure on both occasions (Schrama 1993, p. 607).

Comments
This result confirms the opinion regarding the need for consistency between IT and organization in organizations in order to produce effective functioning. Organizations have slack in choosing a certain level of centralization, in structure as well as in IT. To improve their effective functioning, they adjust these variables.

Tavakolian
Tavakolian researched the relation between competitive strategy and IT structure (Tavakolian 1989). He based his strategic distinction on the typology of Miles & Snow. This typology also implicates a structural taxonomy. Therefore, his research
could be viewed as relating organizational centralization with IT centralization.

For the competitive strategy, Miles & Snow distinguished:
- the defender (Miles & Snow 1978, pp. 47-48): following a conservative competitive strategy without much product innovation:
  - centralized decision-making and autocratic management style;
  - structuring activities around business functions (functional organizational form);
  - efficiency driven;
- the prospector (Miles & Snow 1978, pp. 65-67): following an aggressive competitive strategy attempting to pioneer in product/market developments:
  - decentralized decision-making and participating management;
  - structuring its activities around product/market divisions (product form);
  - effectiveness/profit driven;
- the analyzer (Miles & Snow 1978, p. 78-80): following a moderate competitive strategy that makes fewer innovations than prospectors and is less committed to stability than the defenders:
  - balanced decision-making structure;
  - matrix form;
  - driven to the combination of efficiency and effectiveness;
- the reactor (Miles & Snow 1978, p. 93): not following a discrete competitive strategy. Decisions are made at random. This type is excluded from the sample.

The IT activities (development and maintenance, systems operations, systems administration) can be structured with different degrees of centralization: the higher the degree of centralization, the lower the users' responsibilities (Tavakolian 1989, p. 311). So, the linkage investigated relates IT centralization and organizational centralization tendencies.

The following research hypotheses were constructed:
- a. a defender (centralized) is more IT centralized than a prospector (decentralized);
- b. a defender (centralized) is more IT centralized than an analyzer (balanced);
- c. an analyzer (balanced) is more IT centralized than a prospector (decentralized);
These hypotheses were confirmed by the results.

Comments
For the appropriateness of a successful implementation of IT, management should recognize the fit between IT and organization (Tavakolian 1989, pp. 309, 314). This successful IT usage neither operationalized nor measured.

3.3.4 Conclusion

Looking at the IT - organizational structure fit, the features below become clear:

- this (bi-variate) fit is seen as important for successful IT usage and thus for effectively functioning organizations;
- the adjustment between structure and IT is based on their relevance to the business functions and information-processing capacity;
- the realization of the fit is researched from different angles: IT determines structure, structure influences the value of IT, or there is a process of mutual adjustment;
- regardless of these approaches, the (IT) management is in the middle of this process due to the coordination of business functions;
- organizations have slack so that they can choose for certain structures and IT (Ein-Dor & Segev 1982; Schrama 1991). There is no single best fit.

The existence of the relation between IT and structure is obvious, but the measures, and therefore the relations, are not always defined equally. This hampers comparison. Besides, the precise effect on the competitive position is not clearly empirically investigated.

3.4 COMPETITIVE STRATEGY AND ORGANIZATIONAL STRUCTURE

3.4.1 Introduction

In the preceding sections, we made clear that IT must logically fit with the competitive strategy and the organizational structure to enable effective usage. Therefore,
it is challenging to explore the relation between the competitive strategy and the organizational structure as well.

The structure of this section is as follows. Firstly, a theoretical basis is developed on the linkage between strategy and structure. Then various empirical studies on this issue are discussed. Although there are differences between the operationalizations of the variables, some similar features are found, especially in comparison with the characteristics of the IT - strategy and IT - structure relationships.

3.4.2 Relating competitive strategy and organizational structure: connecting dimensions and configurations

The strategic ideas of Porter pay much attention to the realization of the business functions (Porter 1985). Generic strategies are determined by means of a thorough study of the industry and the value chain business functions. Porter devotes less attention to the coordination of the tasks that perform these business functions. This coordination determines the organizational structure (Mintzberg 1979, p. 2). Different strategies need different administrative requirements and therefore different decision-making organizational structures (White 1986, p. 218).

Researchers other than Porter pay more attention to the relation of the competitive strategy with the organizational structure. Caves (1980), for instance, gives a broad review of studies on the relation between strategy and structure. In this review, the study of Chandler (structure follows strategy) occupies a prominent place. He uses the paradigm of (market) structure – conduct – performance. The environmental forces determine the choice for the appropriate strategy (Caves 1980, p. 74). The strategy prescribes the conduct of the firm. The company's performance benefits if the strategy is well-tuned to the (market) structure (based on the work of Rumelt: Caves 1980, p. 77). Caves concludes that:

- correct strategic choices, based on (market) opportunities, improve economic performance;
- organizational structure should be correct, given the strategy chosen.

It is important to note that, in the view stated above, the strategy prescribes the structure. According to Pennings, this vision is based on a mechanistic perspective of the organization, as if it were an instrument (Pennings 1985). Scholars in the field of organizational behavior consider this mechanistic view as unrealistic, and state that the organizational context is not only the result of strategic choices, it
is also a factor that causes strategic choices. Bower views the structure as the context within which decisions are made so that the structure motivates or impedes strategic activities (Fredericson 1986, p. 281). It is clear that the organizational structure is more or less the solid reflection of decision-making processes that influence strategic decision-making, according to the work of Simon, March and Cyert (Boersma 1989, p. 37; Miles & Snow 1978, p. 8; Perrow 1986, p. 124). Hall & Saias hypothesize that the structure may (partly) predetermine strategy because (Hall & Saias 1980, pp. 151, 153):

- the structure influences the process of strategic planning;
- structural features may act like filters for information-processing and condition the perception of (strategic) matters;
- structure determines organizational behavior, and therefore strategic problem-solving, via the structure of communication (channels) and power.

Fredericson demonstrates the influence of three structural dimensions on the strategic decision-making (Fredericson 1986, pp. 282, 285-290). Some hypothetic examples are given below:

- centralization leads to delaying the start of the strategic decision-making process. In addition it increases the possibility that strategic decision-making will be a proactive, opportunity-seeking process;
- formalization increases the likelihood of a reactive strategic process. The comprehensiveness of strategic decision-making will also be enlarged by a higher formalization.

These arguments indicate the role of structure in developing a particular way of strategic decision-making.

Concluding:

- on the one hand, studies suggest that structure follows strategy (Chandler 1962; Donaldson 1986, 1987);
- on the other hand, there are studies that demonstrate the opposite (Fredericson 1986; Hall & Saias 1980).

Just like Miles and Snow, Miller (1986) chooses for a third perspective, where "ties unite strategy and structure; that given a particular strategy there are only a limited number of suitable structures and vice versa" (Miles and Snow 1978, p. 8; Miller, 1986, p. 234; see also Hall & Saias 1980, p. 161). The structure influences the flow of information and human interaction, thereby channelling human interaction and
Bi-variate research: explaining the strategic performance with two variables

collaboration, specifying coordination and allocating power and responsibilities in the organization. These elements do, of course, influence the determining of strategy. There is also a reverse direction of influence. The nature of strategic decision-making needs and motivates certain structural devices. For example, elaborate analysis and formal planning need expert staff and specialists. These demands can lead to more specialization and technocratism. In the terms applied by Miles & Snow, there is complementary adaptation of strategy and structure, and properly aligned, this will enhance organizational performance (Miller 1987a, pp. 7-8; 1987b, p. 70; 1988, pp. 281, 283, 286).

To describe the mutual relation between strategy and structure, we use the earlier-defined measurements. In the subsections dealing with strategy and structure (2.3.3.2 and 2.3.4.2), the dimensions and types for the future measurement of the variables have already been defined. These types and variables will be linked, based on congruence rules.

The congruence rules for competitive strategy and organizational structure are (see also Figure 3.3: Congruence scheme for strategy and structure):

Two points if:

- **low costs + is aligned with formalization +** (low costs requires a continuous production process for efficiency. This requires regularity, and regulated work is favored by formalization that results in standardized behavior);
- **innovation + is aligned with integration +** (the complex and unpredictable innovation requires independent, skilled workers operating together);
- **marketing + without low costs + is aligned with:**
  - centralization + and formalization - (marketing differentiation can also mean that value is offered via more simple operations. Non-formalized control is feasible to direct these operations);
- **marketing + with focus 0 is aligned with:**
  - training + and integration - (marketing can require very stable but complex tasks (quality work) so that skilled (training) independent tasks are needed).
Based on the strategic and structural types (see subsections 2.3.3.3 and 2.3.4.3), seven configurations can be created in which the strategic and structural variables are related as follows (the Tables 3.3a and 3.3b; see also Miller 1986, pp. 241-248; Romme et al. 1990, pp. 52-55):

1. Niche marketers with simple structure.
In these organizations, one person (the entrepreneur) can oversee the total situation. This is possible because of the focus on a certain market segment where the organization tries to differentiate. The executive can directly supervise the workers who perform simple tasks to realize the primary process (no innovative capacity). Training or mutual adjustment are not necessary for the coordination; all the decision-making power is centralized. Also formalization is not needed for coordination: standardization would hinder the required flexibility in the competitive market.

2. Cost leaders with machine bureaucracy.
Low costs producers need efficient production processes to compete well. The standardization needed for this requirement is prompted by a regular, stable primary process without interruptions. Via formalization the required tasks are prescribed, resulting in centralization. The large, regular and rather specialized output is sold to a stable and large market. The predictable tasks should not be renewed too often (innovations result in interruptions). These not-too-complex tasks are standardized, and therefore do not require much mutual coordination or
specific training (comparable with defenders: Miles & Snow 1978, pp. 47-48).
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<td></td>
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<td></td>
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<tr>
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<tr>
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<tr>
<td>Low Costs</td>
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<tr>
<td>Marketing Diff</td>
<td>+</td>
<td></td>
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<tr>
<td>Focus</td>
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<tr>
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<tr>
<td>Innovator</td>
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<tr>
<td>Low Costs</td>
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<td>Marketing Diff</td>
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<td>Focus</td>
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<tr>
<td>Innovation</td>
<td>+</td>
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<tr>
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Table 3.3b  SCORING THE COMBINATIONS BETWEEN STRATEGIC TYPES AND STRUCTURAL TYPES

<table>
<thead>
<tr>
<th>strategy</th>
<th>structure</th>
<th>simple structure</th>
<th>machine bureauc.</th>
<th>professional bureauc.</th>
<th>adhocracy</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>frm</td>
<td>cen</td>
<td>int</td>
<td>tr</td>
</tr>
<tr>
<td>niche innovator</td>
<td></td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>total</td>
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<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>low cost marketer</td>
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<td>+</td>
<td>+</td>
<td>-</td>
<td>2</td>
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<tr>
<td></td>
<td>total</td>
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<td>2</td>
<td>0</td>
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</tbody>
</table>

bureauc. = bureaucracy
frm = formalization
cen = centralization
int = integration
tr = training & indoctrination
3. Marketers with professional bureaucracy.
Stable primary processes can also consist of complex tasks. Training is then an appropriate means of coordination, because the complexity is learned and the process is still standardized. This dependence on the skills of the workers results in decentralization. These skills are especially needed when the quality of the performance of the tasks is crucial: differentiation is the important factor. Innovative new activities that require much mutual coordination are undesirable. The organization delivers specific services and products to specific customers: the lowest costs are not the most important competitive aim. This does not automatically mean that they focus on one group only; this would result in vulnerability.

4. Innovators with adhocracy.
Some organizations compete by means of a constant renewal of products and services; they want to deliver the quality reflecting the state-of-the-art. An issue like low costs efficiency, and differentiation aspects such as advertisements or extra services, are of no interest to their customers. This innovative motivation results in unpredictable processes and products which are mostly highly complex; standardization is not possible (thereby eliminating formalization and training-coordinating mechanisms). Management cannot control the content of this work alone; it decentralizes the decision-making power to the teams of experts. The mutual adjustments between, and within, these teams coordinate the tasks of the primary process. The focus of these organizations is not tight; one market segment does not always have enough innovative absorption potential (comparable prospectors: Miles & Snow 1978, pp. 65-67).

Three mixed forms are also suggested.

5. Niche innovators with adhocracy.
The only difference with the ‘innovators with adhocracy’ is the absorption potential of a certain market segment. If this potential is large enough, then the focus of the organization should be high.

6. Low costs marketers with machine bureaucracy.
The difference with the cost leader / machine bureaucracy is that the efforts towards differentiation do not hinder the efficiency of the production process.

7. Marketers with simple structure.
Niche marketers can grow out of their only niche by delivering to more market segments (focus). They still differentiate by adding value to the products (quality, convenience of use, better service), not only for specific customers but also with the aim of reaching more types of customers. Maybe they are even capable of developing a limited amount of innovations if this does not tax the simple structure.

The execution of the business functions of the primary process is an important aspect behind the linkage between the variables. Besides, the variables are mutually supportive and develop in time; it is impossible to indicate causality (Miller 1988, p. 286).

3.4.3 Research on the strategic impact of competitive strategy and organizational structure

In this subsection, a conceptual study conducted by Miller is presented, followed by several empirical works.

Miller suggests a research direction to really relate strategy and structure. He proposes to look at strategy and structure from a multidimensional angle (Miller 1986, p. 234). Venkatraman backs this idea, saying that studying strategy from a one-dimensional point of view unjustly simplifies the construct of strategy (Venkatraman 1989b). As strategic dimensions Miller recognizes the Porter-based dimensions of (Miller 1986, pp. 238-239):

- differentiation (innovation and/or marketing): aims to create a product that is perceived as uniquely attractive;
- focus: gives special attention to a specific type of customer;
- cost leadership: strives to produce goods cheaper than the competitors do;
- asset parsimony: emphasizes the low amount of assets per unit output.

These dimensions refer to the content approach of strategy, meaning the intentions and the outcome of the strategy, and not the strategic decision-making process (see for instance Fredericson 1986). As a proponent of the configuration approach, Miller suggests the use of creating strategic types of supporting elements from these dimensions, based on the rules of thumb (see subsection 2.3.3.3 and appendix A.3 about strategic types) (Miller 1986, p. 236):
1. niche marketers: high focus - high differentiation - high asset parsimony - low cost leadership;
2. innovators: low focus - high (innovation-) differentiation - high asset parsimony - low cost leadership;
3. marketers: low focus - high (marketing) differentiation - high asset parsimony - low cost leadership;
4. cost leaders: low focus - low differentiation - low asset parsimony - high cost leadership;
5. conglomerates: low focus.

Miller admits the weakly-described character of the coherence of the strategic elements. Nevertheless, he crosses them with the structural types of Mintzberg, and reaches 8 strategy - structure fits. Romme et al. gave some empirical basis for the strategic - structural types based on a variance (content) approach (Mohr 1982). They found the following fits (Romme et al. 1990, pp. 52-58):
- niche marketers and simple structure;
- cost leaders and machine bureaucracy;
- (innovative) differentiation and adhocracy.

These fits should be more effective than others because of the balance between the strategic and structural elements (Miller 1986, p. 248). The relations between all these elements are broadly described, making clear that there is no one-way direction between strategy and structure; the message is that they should be mutually balanced each other. To achieve this, the management has to make choices. Although there are many constraints on managerial choices, like the present organizational structure, the current product-market combinations, and the demands of the industry, the management is not forced to respond to the strategic, or structural, imperative.

In the remainder of this subsection, empirical studies on the topic of strategy - structure subject are discussed.

Egelhoff
Studies that back the importance of the strategy - structure relation started with Egelhoff. He operationalized and measured strategy and structure to study the effect of fit. He based his research on the information-processing model (Galbraith 1973). Different elements of strategy require different information-processing in the organization. Structure is the organizational variable that offers a certain information-processing capacity. There is a good strategy - structure fit if the
information-processing requirements demanded by the strategy are satisfied by the information-processing capacity of the structure (Egelhoff 1982, p. 436). Based on this information-processing approach, strategy and structure were both operationalized and linked (Egelhoff 1982, p. 437).

The study was specifically aimed at multinational firms. The information-processing relation between the parent firm and the foreign subsidiaries was the central issue. Based on this relation, the structure was operationalized. This resulted in (Egelhoff 1982, pp. 438-441):

- worldwide functional divisions;
- international divisions;
- geographical regions;
- worldwide product divisions.

This characterization of structure was very different from commonly-used structural features like formalization or centralization. This was due to the multinational focus of this study.

The strategy was measured via eight elements of international strategies conducted by firms:

- product diversity;
- product modification differences;
- product change;
- size of foreign operations;
- size of foreign manufacturing;
- number of foreign subsidiaries;
- extent of ownership;
- extent of acquisitions.

Product diversity refers to the commonly-used dimension of differentiation. Product modifications and product changes resemble the dimension of innovation. The other elements are strongly related to the global aspect of multinational companies.

The author hypothesized diverse fit relationships for successful organizations (there is no comparison with unsuccessful organizations). Most of these relationships were supported (Egelhoff 1982, p. 449). He recognized that 20 good fits for organizations were possible.

Comments
Although this research supports the relevance of fit, some comments can be made.
Firstly, the research was aimed at MNCs, and was not indicative of common strategy and structure measurements. Secondly, although information-processing was linked to managerial decision-making, the role of management in reaching a fit was not highlighted. Thirdly, Egelhoff assumed a deterministic one-way direction. The strategy was a constraint for the appropriate structure. Finally, the success of organizations was not measured. He selected a sample of so-called "successful organizations”.

Ettlie et al.
The relation between strategy and structure is also studied in the field of innovation. Ettlie et al. hypothesized two kinds of innovations: a radical innovation especially aimed at process innovation, and a more incremental process adoption. One of these innovations would emerge as being dependent on the fit between strategy and structure (Ettlie et al. 1984, pp. 682, 684).

Structure was operationalized, partly based on the Aston studies (see Inkson et al. 1970). Three dimensions were examined:
- complexity;
- formalization;
- centralization.

The concentration of technical specialists was added to these dimensions of structure.

Strategy was typified as follows:
- technology policy: a preemptive, long-term strategy for technological innovation;
- market-dominated growth strategy;
- diversification.

Success was not measured. The dependent variable was the nature of the innovation.

The results showed that the technological strategy and technical concentration predict radical innovation. The effect of the fits between the other strategies and structures is less clear. Notwithstanding, the author claimed that incremental innovation appears to be dependent on market-oriented strategies and traditional arrangements (Ettlie et al. 1984, pp. 693-694).

Comments
Although this research originates from another field of study, the concept of fit was
still recognized. The conceptual model very clearly stated the deterministic one-way direction of strategy to structure. Technological policies led to concentration of technical specialists; growth strategies and strategies of diversification were implemented via traditional complex, formalized and decentralized structural arrangements (Ettlie et al. 1984, pp. 684, 685).

White

In 1986, another strategy - structure research did measure all three relevant variables, namely strategy, structure and performance (White 1986). White noted that there were few researches on the fit between business strategy and internal organization. Therefore, his aim was to show how differences in performance associate with differences in generic strategies combined with organizational differences (White 1986, pp. 217-218).

The idea at the basis of his study was that the structure is relevant for the successful implementation of strategy. Therefore the strategy guides the structural choices. Although Porter recognized the need of supporting organizational arrangements, the possible choices were not explored in the literature (see also Porter 1980, p. 35). The reason for this deterministic approach lies in the strategic demands for the business functions like internal operations, distribution, R&D and so on (White 1986, pp. 221, 222, 224). For their successful execution, management has to coordinate these functions. This coordination entails a certain amount of uncertainty. The greater the uncertainty experienced using a certain strategy, the greater the certainty the structure has to provide. The role of the managerial choices is unclear, probably because of the deterministic approach used. This means that the choices should be clear when using a certain strategy.

Strategy was measured according to Porter’s ideas. In the past, there had been a lack of non-situation-specific strategies at the level of business units. Through the development of generic strategies, linkages could be made between the goals and the coordination of business units. White limited his strategic operationalization to the basic distinction between low costs and differentiation strategies. Because he wanted to link equivalent constructs, he measured outcomes (and not intentions), viz. the current organizational structure and the realized competitive strategy. He combined costs and differentiation outcomes into 4 types (White 1986, p. 226):

- pure costs;
- pure differentiation;
- both costs and differentiation;
neither costs nor differentiation.

Strangely enough, the organizational structure did not deal with the usual internal organization of the business units, but with the broader organizational context. Three organizational requirements were chosen to cope with the strategic demands (White 1986, pp. 222-224):

- autonomy: organizations deal with uncertainty by means of decentralization, resulting in autonomous units;
- frequent reviews: reporting to the hierarchy is necessary, but can demand too much information processing capacity, ultimately causing more uncertainty;
- coordination: the differentiation and integration of business functions can differ dramatically, varying from direct functional line responsibility via shared responsibility to no line responsibility at all.

The performance was measured using sales growth and ROI figures, taking 4-year averages (White 1986, p. 227).

Overall, the results confirmed the positive effect on performance of the associations between strategy and structure (White 1986, pp. 228-229):

- low autonomy (more control for corporate office in business decisions) corresponds to higher ROI only with low costs strategy;
- shared responsibilities fit with low costs strategy (effect on ROI) or with differentiation strategies (effect on sales growth).

Comments
The concept of fit is supported, although the measures for the organizational structure deviate from the usual measures.

Miller
In a follow-up to his previous study (1986), Miller conducted an empirical research for which structural dimensions were linked to features of strategy-making in 1987. For organizational structure, the following frequently-used dimensions were measured (Miller 1987a, p. 8):

- formalization;
- centralization;
- complexity;
- integration.
These dimensions express the content of the structure. However, this content of structure was linked to the process characteristics of the strategy (compare for instance Fredericson 1986). The way the organization deals with the strategy was studied, and not the content of the strategy itself. This was evident in the following dimensions (Miller 1987a, pp. 9-10):

- rationality: how carefully and systematically do scanning and analysis take place?
- interaction: how much bargaining and consensus-building is involved with decision-making?
- assertiveness: what is the level of risk-taking and action (rather than reaction) with respect to the environment?

Miller developed two kinds of hypotheses. The first kind dealt with the relations between the dimensions of strategy and structure (Miller 1987a, pp. 11-13):

- integration is positively associated with rational, interactive and assertive strategy-making;
- formalization is positively associated with rational and interactive strategy-making and negatively associated with assertiveness;
- centralization is negatively associated with rationality and interaction, but positively associated with assertiveness;
- complexity is positively associated with rationality and negatively associated with assertiveness.

It is clear that different characteristics of structure prosper form the same features of strategy. There is no tight 1:1 relationship.

The second group of hypotheses linked the fit to performance implications. The most relevant one was (Miller 1987a, pp. 13-14):

- the predicted association of structure with rationality and interaction will be stronger in successful firms than in unsuccessful firms.

Overall, there was substantial support for many of the hypotheses. The findings showed significant associations between structure and strategy-making. In general, the relationships were the highest among good performers (Miller 1987a, pp. 26-27).

Comments

The concept of fit was supported again, although it was the process of strategy that was studied, and not the content.
In the same year (1987), Miller produced a second study in which strategy and structure were again correlated (Miller 1987b). The aim of the study was to relate strategic dimensions to those of structure. There were, however, a few deviations from his earlier studies (Miller 1986; 1987a).

In the first place the contents of strategy (thus not its process characteristics as in 1987a) were used (Miller 1987b, pp. 55, 56). The strategic dimensions were:

- (complex) innovation;
- marketing differentiation;
- breath (reversed focus);
- conservative control (low costs).

Secondly, these strategic dimensions were linked to rather uncommon structural dimensions:

- uncertainty reduction: the structural mechanism to deal with the unpredictability of the organization for more informed and orderly administration (for instance: scanning and analyzing the environment, developing a hierarchy and implementing formal procedures);
- differentiation;
- integration.

The structural content variables, like formalization and centralization, which were previously proposed and used as a basis for structural configurations (see Miller 1986; 1987a) were ignored. Besides, performance was not measured in this study.

Comments

The deviations make it hard to compare the studies. The main result of this 1987b study was the finding of strong correlations between strategic and structural dimensions. This conclusion supports the notion of fit, although not related to the performance of organizations.

Miller

In 1988, strategic and structural content variables, comparable with the variables in our research, were linked. Realized strategies influence actual organizational tasks, and therefore the focus is also on the emergent (actual) structure, rather than on the intentional, formal structure (Miller 1988, p. 293). The linkage between strategy and structure was also investigated with respect to its effect on performance. Miller recognized that previous organizational research had neglected
strategy because it had been viewed as a necessary response to the environment, as in the structure-conduct-performance paradigm. Subsequently, Child had elucidated the possibility and importance of strategic choice (Child 1972). Accordingly, this strategy was considered to be a relevant fit variable in Miller's research. The message for the management is that it can and should pay attention to creating good fits between strategy and structure (Miller 1988, p. 302). The shape of these fits is, again, an object of Miller's study.

Four strategic dimensions were distinguished:
- innovation;
- marketing differentiation;
- cost leadership;
- strategic breadth (inverted focus).

These dimensions were associated with the following structural features, namely the use of:
- liaison devices (integration);
- delegation (inverted centralization);
- technocrats (indicative for specialization);
- formal controls (indicative for formalization).

Performance was measured via averages of ROI, growth in net income and a subjective assessment of the chief executive officer (CEO) of the profitability of the firm compared with its competitors. On the basis of these figures, the sample was divided into successful and unsuccessful organizations.

The following hypotheses were developed:
1. innovation has a positive association with liaison devices, technocrats and delegation.
   Result: mostly confirmed (delegation does not relate to any strategy);
2. marketing has no association with liaison devices, technocrats and delegation.
   Result: mostly confirmed (except for a low-order correlation between marketing and liaison devices);
3. cost leadership has a negative association with liaison devices, technocrats and delegation, and a positive association with formal controls.
   Result: partly confirmed (the relation is as expected, but only the links with liaison devices and formal controls are significantly);
4. strategic breadth has a positive association with all four structural dimensions.
   Result: not confirmed (the relations are as expected, but only liaison devices relate significant);
5. the three positive associations (1, 3 and 4) will be stronger for high performers than for low performers.
   Result: Only a few of the relations between strategy and structure were more significant in the successful than in the unsuccessful organizations.

Comments
The conclusion of this subsection is that several strategy - structure fits exist. However, their effect on the performance is not consistent.

3.4.4 Conclusion

Looking at the fit between strategy and structure, the features listed below become clear:

- this (bi-variate) fit is important for successful organizations, although the precise effect on the dependent variables is not always investigated empirically in the same way;
- the adjustment between strategy and structure is based on their relevance to the business functions;
- the realization of the fit was earlier researched from different causality angles, but now there is agreement on the mutual adjustment of strategy and structure;
- regardless of these approaches, the management is at the middle of these processes because of the coordination of business functions;
- organizations have slack enabling to choose for certain strategies and structures and IT. There is no single best fit.

3.5 CONCLUSION ON BI-VARIATE RESEARCH

Bi-variate studies offer promising competitive results in comparison with the univariate research, but they have two drawbacks:
Bi-variate research: explaining the strategic performance with two variables

- the results of the researches are not clearly matching;
- the competitive results are not very strong, in contrast to the results from the well-known case studies.

An important reason for these drawbacks, besides the standard operationalization issues, could be the neglect of the third central variable (viz. organizational structure is missing in research relating IT and competitive strategy). Despite these drawbacks, the insights obtained from the bi-variate studies are a basis for further use of the variables in this research, because of the congruences between them and other similar characteristics.