

Strategic Use of IT in Some European Construction Firms

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ABSTRACT

A study has been carried out in which a number of large construction firms in Europe have been investigated with regard to management thinking in the area of IT. There is a common understanding of the strategic importance of IT, but the means for using the technology strategically are not well developed. Some theoretical frameworks for analysing the firms studied have been developed based on earlier work done by management researchers. The project-oriented nature of construction may make it necessary to modify existing theories. It is believed that although these frameworks cannot be used directly in the strategy-writing process of a contractor, they can help create awareness and explain possible effects of various generic strategies. A number of problems arise in trying to compare strategies or investment patterns between different construction organizations. Some of these problems will be discussed together with some ways of coping with them. Some conclusions about similarities and differences in the management view of IT will be stated from an international perspective.

Key Words

strategic advantage; IT-strategy; corporate strategy; impact of IT, European construction

INTRODUCTION

In most of the world economies the construction industry has suffered from poor productivity and recently also from poor profitability. As in other sectors of the economy, Information Technology (IT) comes in focus when these problems are being discussed. In the USA, investments in IT have increased by 15% annually during a long recent period, a figure much larger than the average annual economic growth. The IT-investments grew by 350% during the 1980's. As a comparison, investments in machinery and buildings decreased its share of GNP by 25% during the same period. The numbers are similar for many of the Western economies. The construction industry has

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invested relatively less, but the pattern is the same (Keen 1991). IT has become the solution to the strategic problem that arises from current economic forces such as globalization, deregulation, political turmoil, etc. IT is an "enabler" in that it makes possible new ways of doing business thus increasing the connectivity in and between dispersed organizations and making the organization more adaptable to new environments.

It is only reasonable to assume that society and the environment will be at least as turbulent during the remainder of the 90's and that the technological development will continue at the same pace as during the past two decades. From a managerial point of view interesting IT developments include:

- development of communication ability through the development and application of standards and through integration of voice, picture, data, and computing capabilities
- an increased availability of databases
- more powerful work stations
- an increased degree of technical integration
- an impact of IT on production and coordination within organizations.

These developments will offer the construction firm a dramatic increase in "connectivity" with new possibilities of inter-organizational relations, improved organizational efficiency, and increased group productivity.

Purpose of the Study

There are many "success stories" told in the business magazines that demonstrate how companies that have made IT investments part of their strategies have gained a competitive advantage over their competitors. American Airlines, American Hospital Supply (AHS) and Citybank managed to get an advantage over Delta, Johnson & Johnson and Bank of America, all of which lacked the competence and capacity to develop similar systems. There have been fewer studies of how construction firms have been linking IT and business strategy. Therefore a preliminary study was undertaken to study how large contractors in Europe deal with IT from a managerial point of view. What are the rationales for making investments in CAD, project management systems, database systems, expert systems, etc? How are the investments being justified from an economic or strategic point of view? How is IT organized in the firm and how is it used to link the firm to other organizations, clients, and suppliers?

The purpose of the study was to investigate the appropriateness of current analytical frameworks that were developed for other industries than the project-oriented construction industry, and to develop new frameworks that better fit the construction firm. It is hoped that it will later be possible to develop a methodology for positioning the construction firm in its competitive

environment and can aid in writing new IT-based strategies.

How Does Strategic Advantage Come About?

Some researchers have investigated successful implementations of strategic IT systems to learn in what sense these systems are strategic. Ward *et al* (1990) has analysed four main types of systems:

- systems that links the firm with its clients or its suppliers and in doing so increases the competitive potential
- systems that improve the organization and control of the business (eg, by integrating internal processes in the firm through the use of executive information systems, EIS)
- systems that provide information based products and services, and
- systems that improve productivity and performance of the firm.

There are a number of characteristics of such systems, one or some of which are inherent in the individual case:

- they are concerned with external rather than with internal relations
- they focus on increased value rather than on cost reduction
- they generate utility for several parties - not only for the firm itself
- they increases the understanding of the customer 's situation
- they are business driven rather than technology driven
- they are implemented in a step-wise fashion
- the information involved is used to develop businesses.

STRATEGIC IMPACT OF IT IN THE CONSTRUCTION INDUSTRY

Frameworks for Analysing the Impact of IT

IT can have different effects on the business which are often hard to identify and assess. Different applications can have different impacts on the business. Because of the difficulties involved in analysing the effects of IT there is a need to define various effects of IT on the firm. General statements such as that "IT should support the generic strategy" (see eg, Parsons) are somewhat vague. Figure 1 describes a framework for describing the different effects of IT on an organization.

There are three types of effects: technical effects, economic effects, and strategic effects. All IT investments involve both economic and technical effects. The negative economic effects that occur in all firms are expenditures on IT. The technical effects occur to a different extent in different firms. Technical effects refers to changes in the time required for an employee, a department or a firm to perform it's task. Other technical effects are eg, quality improvements, added value, and less resource consumption etc. The value of the technical effects varies with the environment in which it occurs. Even if an IT-implementation generates positive technical effects, this does

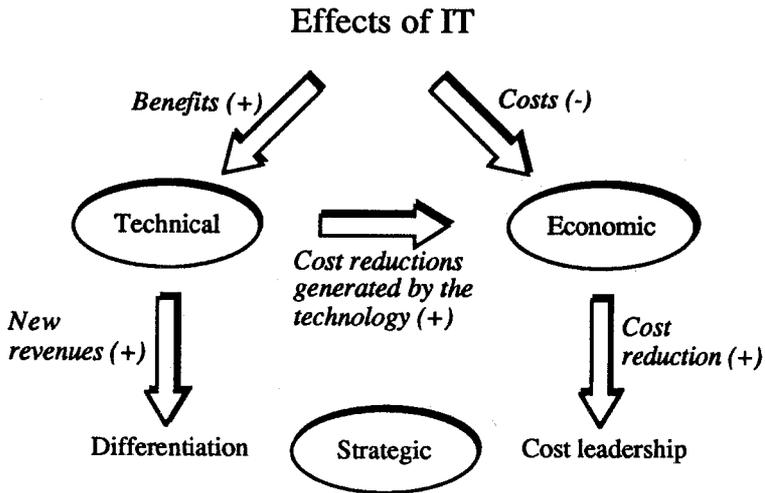


Figure 1. The Different Impacts of IT on the Business

not imply that the implementation is successful. The technical effects must be transformed into strategic effects in some sense in order to make an IT-implementation successful.

Successful implementation depends on the business strategy of the firm. A firm competing through cost leadership (Porter, 1985) should strive for technical effects that can be translated into economic effects such as cost reductions. A firm competing through differentiation seeks IT effects that generates added value to the customer. Cost reductions are important but do not support the generic strategy of the firm. The technical effects of the technology must generate or be transformed into effects that adds the value for the customer in some sense. Cost reductions and efficiency are also important for a firm competing through differentiation but these effects do not support the generic strategy of the firm and do not therefore create any competitive advantage. It may be argued that it is wrong to make a distinction between technical and economic effects since technical effects also have economic effects in terms of revenues to the firm. The reason for the distinction is the fact that the customer does not buy the same product or service. The customer chooses the lower price in cost leadership while he pays for extra value in differentiation.

One issue that arises is whether competitive advantages from IT are sustainable. If IT is going to create enhanced competitiveness and strategic advantage for a firm then it has to create unique benefits to that firm that does not occur in any other firm. Since IT is universally being used today then

no competitive advantage should occur to anybody. Porter (1985) claims that even if technology does not yield competitive advantage to any one firm, it may affect the profit potential in the industry. The firm competes in an environment in which several factors affect the performance. Porter (1985) has identified five competitive forces that determine industry profitability: The entry of new competitors, the threat of substitutes, the bargaining power of the customers, the bargaining power of the suppliers, and the rivalry among the existing competitors. These factors determine industry profitability because they influence the prices, the costs, and the required investments. These factors have to be taken into account when formulating the business strategy. The model in figure 2 can be used to identify how IT can create changes in a firm and within an industry.

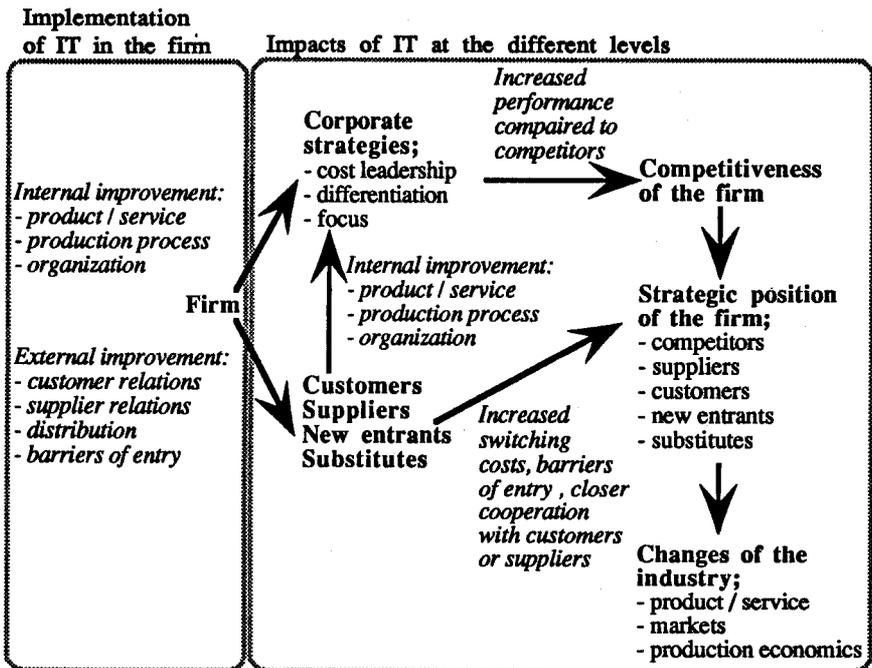


Figure 2. How Different IT Implementations Can Affect a Firm's Strategic Position

IT can be implemented to enable internal and external improvements in the firm. Internal improvements refers to changes in the firm's value chain (Porter, 1985) that improve the performance and competitiveness. Such changes can occur in products, production processes, and organization. IT implementations that support the corporate strategy generate effects that are coherent with one of the generic strategies, cost leadership, differentiation, or focus. Focus addresses market or product niche by either cost leadership or differentiation. External improvements refers to changes that improve the firm's position in its environment in terms of customers, suppliers, new entrants, and substitutes. External improvements can have impact on the performance and competitiveness of the firm. The distinction between internal and external improvements is very important while a firm can achieve the main objective, a strong strategic position, either by being competitive or reducing the impact of the other forces. A firm that is competitive may not achieve a strong strategic position if it is "squeezed" by strong suppliers or customers. A non-competitive firm may, on the other hand, achieve an improved strategic position if it can influence the impact of the external actors such as suppliers, customers etc.

If the firm's strategic position is much improved due to a large increase in the competitiveness, then this will lead to changes at the industry level. If the approach to IT by some firms successfully gives these firms a strategic advantage, then other firms will gradually adapt the approach by the "first mover". This process of strategy adoption will finally result in a change in an entire industry (compare *eg*, the banking industry). If for instance IT generates most benefits in a firm where the characteristics of the firm create more advantages compared with other firms, then this firm will be superior to the other firms which will result in a change and adoption of the other firms to be similar to the "first mover" and achieve the same benefits. The impact of IT can be viewed from different perspectives, either from the industry as a whole or from the different firms within the industry. The impact of IT at the industry level depends on the specific characteristics of that industry. Even if the impact on an industry is modest the firms within that industry should pay attention to IT issues. At the firm level substantial advantages can be gained from proper use of IT. Whether these will occur depends on the special characteristics of the firm. In order to determine what these characteristics are we need frameworks and case studies.

Impact of IT in Some European Construction Firms

To study the impact of IT on the construction industry a number of European construction firms have been researched. Three of these firms are discussed in this paper, one British, one French, and one German. They all represent major European construction operations. The material in the study

was gathered through 4-5 hour interviews with the IT-managers and by studying other relevant documents of these firms. The issues discussed focused on what they considered to be the most important competitive edges of their firms and how IT is being used to enable the firm to achieve its objectives. The real names of the firms have been withheld and the names used are fictitious.

Case 1, Kingdom Ltd

Kingdom Ltd's main business area is in building and housing, roads, and civil engineering. The main incentive to invest in IT was earlier rationalization but the importance of cost reduction has decreased over the years. The focus has shifted towards quality and quality assurance. The customer requires high quality before low prices. A low price is always important but not at the expense of quality. Kingdom Ltd does not focus on cost leadership, instead the company competes through differentiation by offering products with high quality to the customer. The improvement of the total quality in construction has two aspects. First is the quality improvement of the decision making, *ie*, better and more accurate decisions. Second, increased knowledge about the production process through the accessing and using historical data and experience in the production process leads to higher quality in the production. Quality improvement of the quality in the performance of the firm lies in internal improvement of the entire production process and products and always include some kind of rationalization. It should be observed that cost reduction in itself may lead to higher quality. Kingdom Ltd also emphasises reduced construction times. Also the time to put together a tender is of importance. The average time to produce a tender has been shortened by a factor of 3 with the help of IT. Also, the accuracy in the estimates on which the bid prices are made is higher. There is an awareness in the company of what makes the company competitive and how IT can enhance this competitiveness. Most important is the improvement of information quality; information with high quality rather than information in large quantities. A very important impact of IT in Kingdom Ltd today is in the area of documentation. Extensive documentation is essential for quality assurance and this is not possible without IT. In Kingdom Ltd cases illustrating good as well as poor quality performance are distributed throughout the company. In this way IT facilitates a quality improvement process. Another reason for investing in IT is to make better decision making possible through more timely decisions based on more accurate information to the decision maker. To accomplish this Kingdom Ltd is developing a decision support system. This system will include general construction knowledge as well as specific experience from actual construction projects. The approach chosen by Kingdom Ltd is based on an efficient communication system.

The use of IT on the construction site includes applications for planning, estimating, and project management. Data for project control is continuously gathered on the site. This data is used by the managers on the site but is also transmitted to the management of the business area. Deviations of actual data from planned data are calculated and transmitted to the site. This is done on a daily basis. In very large projects there is a direct communication between the site and the mainframe of the main office. Computers have been used on the construction site since 1979. Personal computers are today used on all construction sites but not all connected to the main office. The client has access to information concerning the project. Through this access he can follow the project on a day to day basis. EDI is currently not used for information exchange with suppliers but there are plans to use it in the future. Kingdom Ltd has formulated its IT strategy in writing. It starts from the goals of the firm. IT is to be used to enable the firm to achieve these goals. A major issue concerning IT is the quality of information provided by the information systems. Investment decisions that concern IT are discussed by an advising committee in which business area managers participate. The manager of the central IT department uses the discussions to produce a suggestion to the advising committee. The final decisions about investments are made by the business area managers. The IT manager provides the technical judgements as well as the judgement of the strategic fit of the investment.

Case 2, Baumeister AG

Baumeister AG is a management contracting firm and acts as a coordinator between the client and the other firms or subcontractors involved in construction projects. The firm does not have any labour force or construction equipment of their own. All the work in production is contracted to specialist contractors. The firm's main competitive edge lies in efficient management of construction projects on a fee basis. According to Baumeister AG, management contracting is more cost efficient for the client while the total cost of the project lies 30% below the traditional way of contracting. The general contractor takes the risk in a project and has to be compensated for that. This form of contracting creates a non cooperative environment between the contractor and the client. Baumeister AG are providing a professional service to the client which is designed to be compatible and consistent or cooperative with the other professionals in the clients organization. Baumeister AG's role as a coordinator in large projects with many firms involved, implies the transfer of large quantities of information. The efficiency of this kind of contracting is dependent on efficient information transfer and processing. The firm has therefore put effort into developing an IT network where Baumeister AG provides a central server to which all suppliers are connected. Baumeister AG's main reasons for investing in IT lies in

improving efficiency, adding more value to the client and reducing costs and ultimately increasing market share and barriers to entry. The firm's objective is to lower the barriers to entry for new suppliers such as: architects, consultants, quantity surveyors, and subcontractors that want to enter the network and perform specific tasks in the projects. There are no barriers to entry, besides the need for adequate IT-resources, to enter the network. Baumeister AG has on average 4 sub-contractors connected in the network and these represent 60% of the total value of the project. This percentage will increase to 80% in the future. The network is not yet fully implemented but it will be so within a couple of years.

Baumeister AG lowers the barriers to entry for suppliers by making it easier for smaller firms to participate in larger projects that often only are accessible to larger firms with a broader product range. One benefit for the suppliers connected to the network, is that they do not have to provide a broad product range as they must if they are going to compete outside the network. Providing a broad product range implies larger costs to the firm. The network is beneficial for different kinds of suppliers. One benefit for suppliers is that they reduce the necessary product range and let them focus on what they do best which might lead to cost reductions and improved profitability. Another benefit exists for new or small existing firms with a narrow product range that would not be competitive elsewhere. The network might have implications on the supplier structure for Baumeister AG. The number of suppliers are increasing at the same time as the supplier benefits from the opportunity of focusing on core products. These changes may lead to an increase in bargaining power of Baumeister AG. This in connection with cost reductions for the suppliers imply cost reductions for Baumeister AG's clients thus enhancing the competitiveness for Baumeister AG. Another strategic advantage occurs because the network raises barriers to entry for new competitors. Top management in the firm has appointed an IT-manager and has a moderate knowledge about how IT is used to support the business strategy. Top management also participates in investment decisions that concerns IT. Baumeister AG has formulated an IT-strategy in writing that describes how the firm shall use IT to enhance competitiveness.

Case 3, Construct Ltd

Construct Ltd is an international firm with large experience in international construction. As much as 92% of the total production was international in 1981. The international competition has increased rapidly during the last decade and the production has decreased to 65% in 1992. The main international market is in civil engineering: roads, bridges, tunnels, damms, and sewage water treatment plants. The competitors on the international market are primarily Turkish, Egyptian, Korean, and Chinese

firms. The competitive edge of these firms lies in the lower costs of labour. Since the competitors have this advantage Construct Ltd has to define a different strategy to meet the fight. This is especially important since the firm is relatively dependent on the international market. The firm has chosen a "differentiation-focus" strategy concentrating technologically complex projects which require large experience to produce. The firm is therefore focusing on technology, experience, and management by highly qualified personnel. The opinion of Construct Ltd is that the technology level in construction is generally low and that IT is a key technology in enabling differentiation.

Construct Ltd only uses local labour on the construction site but send technical staff abroad, which is very expensive. The size of the staff depends on the project but normally amounts to about 60 persons. The project manager on the site reports to a manager at the main office who is responsible for the specific region. The manager at the main office is only monitoring the project and supports the local manager. Construct Ltd tries to specialize their engineers to have access to the deep knowledge that technologically complex projects require. The technological competence is concentrated to the main office with specialist engineers for roads, tunnels, bridges, dams, etc. The local aspects such as customer relations, relations with the local labour, and other environmental aspects are important. Since the construction sites are often remotely located it is very important that the manager can cope with the problems that occur during a project. Emphasis is given to the support of local managers to ensure a smooth production. This implies large information exchange between the site and the main office. The technical department at the main office supports the sites abroad through a link for communications and data transfer. This solution was used in eg, Saudi Arabia where a design office was located on the site. This office makes the detailed drawings based on the project design transmitted from the main office. The use of IT on the site varies depending on the manager. Young managers usually prefer to have an on-line connection with main office while older managers do not use IT to the same extent. The firm finds it relatively easy to set up information exchange between a site in Europe and the main office, while it is more difficult in countries outside Europe. The information transferred between the site and the main office is technical, financial, and other information related to the planning and coordination of the project. The main office maintains a good overview of the project status and can assist in the planning of resources etc.

The strategy for the national market is different from the international market. Construct Ltd compete through cost leadership where cost reduction and economies of scale in building are the competitive components. Cost reduction comes from time reduction and better utilization of equipment. This requires better planning, coordination, prefabrication, and better use of

existing and new technologies. Good coordination often generates good quality which often leads to cost reductions. The firm finds that IT is important for effective planning and coordination. Construct Ltd believe that IT will be used even more in the future where it will be built into the product to a larger extent than today. The technological choices are very limited in the construction industry according to Construct Ltd. In building construction it is often between traditional production, traditional production and prefabrication, or prefabrication only. The firm argues that IT can have a positive impact on time reductions in all these choices. The impact of IT varies in the different alternatives, but the largest impact occurs in traditional construction since it is more complicated to manage. Traditional construction is most flexible and prefabrication only has the highest productivity. Construct Ltd finds that the most favourable combination is of these two modes of construction. In this way a good combination of flexibility and productivity is obtained.

IT is used on all construction sites. Personal computers are used on small construction sites and IBM-Hayes 400 with a PC-network are used on the larger sites. The rapid development of the PC's capacity leads to an increase in the use of PC's all over the firm. Today EDI is not used for communication and information exchange between the suppliers of materials and Construct Ltd. No supplier is connected yet but EDI is currently beginning to appear in the construction industry. Construct Ltd tries to implement EDI but it is not evident that it will be a panacea and the experience shows that there are some problems to be solved when implementing EDI. The difficulties depend on the size of the firm where large firms are easier to cooperate with than smaller firms. Exchange of digital information is made by sending computer discs by mail but the firm estimates that most suppliers will be able to use EDI in 5 years. The ministry of economics demand that the finance division of Construct Ltd use EDI applications to the transfer of economic data to the ministry. Another example where EDI has been imposed on the firm is in some large projects in which the clients demand that all the firms involved should use the same CAD-system to enable data transfer of drawings. The client sets up a central server to which all the construction firms involved in the project are connected. All communication passes through the server and all transferred documents and drawings are stored in a common project database. The client server is common in large projects in which many firms perform minor tasks and in which the client is an experienced manager of large construction projects. Construct Ltd believe that this will be a more common mode of operation also for smaller projects in the future. Technical issues are taken very seriously and are often discussed in top management of Construct Ltd. The manager of the technical department always participates in these

discussions. The technical department at Construct Ltd consists of five departments: civil works, building department, computer department, construction methods department, and mechanical department. There are 70 engineers employed in the technical department and 4 engineers are employed in the computer department.

DISCUSSIONS

There are difficulties involved when the impacts of IT on a firm or an industry is going to be determined. Some factors that increase these difficulties are:

- time lag from implementation until the benefits arise
- revolutionary / evolutionary performance improvement due to IT
- other factors that enhance / reduce the performance of the firm.

The time from when investments are made to the time until benefits occur may be different in different industries and in different firms. This makes a comparison across industries and firms difficult. In some earlier success stories major impacts have appeared almost immediately. However the improvement process caused by IT can be revolutionary as well as evolutionary. There is a danger in evaluating the benefits of IT by comparing industries and firms with an evolutionary process of performance improvement with the well known success stories. Although the impact in an evolutionary process may appear less dramatic the final outcome in terms of strategic position may be just as important as in revolutionary IT applications. Such a comparison might lead to the conclusion that IT can not have any effects on the business performance even though IT might have an evolutionary performance improvement on the firm on a longer term. The third factor that makes evaluation of IT difficult is that there are many forces that can enhance or reduce the performance of the firm. It may be internal changes within the firm with no connection to IT or it might be changes in the firm's environment. It is difficult to isolate and measure the impacts of IT on the business performance and make quantitative evaluations. In the following, the three cases are analysed using the frameworks developed above (figure 1 and 2).

Kingdom Ltd

Kingdom Ltd competes through differentiation by offering products and services with high quality. Issues concerning IT are discussed frequently in top management. IT is being used to enable higher quality in the firm's production and does therefore support the corporate strategy. Figure 3 illustrates how IT is used to support the business strategy of Kingdom Ltd. A new application for Decision Support Systems (DSS) has been developed in order to support decision makers with information.

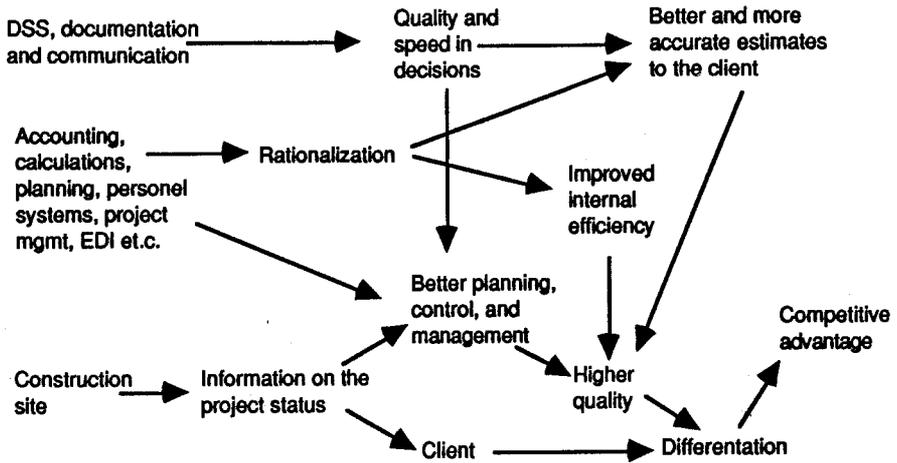


Figure 3. IT Support to the Strategy of Kingdom Ltd

The technical effects of this system lies in providing correct, timely, and useful information to the decision maker. These effects enable the decision maker to improve the quality of the decisions which then improves the quality of the firm's performance. The technical effects are transferred into strategic effects since the firm's strategy is differentiation through high quality. Documentation is a very important factor in improving the quality of the firm's performance. The documentation of knowledge and experience is transferred into strategic effects since "bad cases" are communicated throughout the organization. IT is also used for information transfer between the construction site and the main office. Data on project status is compared to plans in terms of progress, quality and resources. Discrepancies are then reported back to the manager at the construction site. The technical effects of this application are to exchange project information and detect discrepancies. This technical effect has economic consequences since better control and management can generate cost reductions. It also results in strategic effects since better control generates higher quality in production. The project control system works with industry quality standards, quality standards set by the firm, quality standards set by the client, and actual quality status of the project. The system also enables the client to follow the project on a daily basis which add extra value to the client and thus gives the firm a strategic advantage. Rationalisation is the chief technical effect of administrative applications. The consequence of this effect is mainly cost reduction. Therefore these applications primarily do not support the firm's differentiation strategy. The effects can be beneficial as long as the

rationalization do not have a negative impact on the firm's ability to differentiate its products and services. High quality of the performance of the firm always include rationalization. The technical effects of these applications are therefore transferred into strategic effects for Kingdom Ltd since they improve the quality of the firm's performance. The economic effects embedded in rationalization is not transferred to the customer. In summary Kingdom Ltd uses IT to improve the internal operation which supports their differentiation strategy which in turn determines the strategic position of the firm, figure 4.

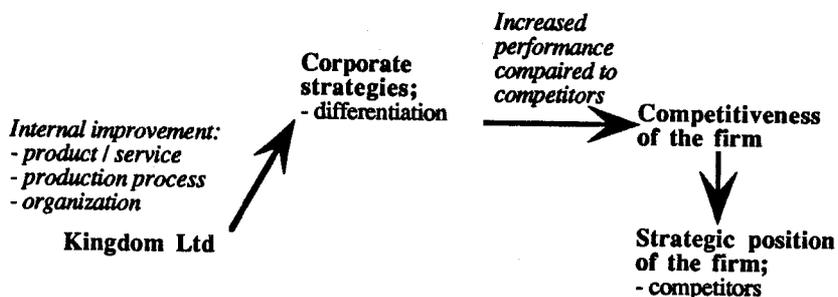


Figure 4. The Implementation and Impact of IT on Kingdom Ltd's Strategic Position

Baumeister AG

Baumeister AG competes through cost leadership by offering a service, project management, to the client. The firm has an extensive network of suppliers that perform specific tasks in projects. One of the most important aspects of the performance is the existence of a supplier network and efficient information transfer and processing. The technical issues concerning efficient information transfer and processing have a high priority at the top management level. Baumeister AG has a clear focus on how to use IT to support the corporate strategy. IT has been used to set up a network among the firms involved in projects where Baumeister AG manages a central server to which all parties are connected. The technical effect consist mainly of efficient information processing and transfer of large volumes of information within the network. This technical effect is transferred into economic effects while the network enhances the efficiency of management contracting. The economic effect, *ie* better cost efficiency, is in turn translated into strategic effects since the firm competes through cost leadership. The IT based network generates improved connections to the suppliers. These improved relations

imply reduction of the bargaining power of the suppliers which in turn leads to a strategic effect for Baumeister AG. Another external improvement of the firm is the fact that the network raises barriers to entry. The external improvement of the network also generates internal improvements for Baumeister AG since more efficient information exchange and processing enhances the productivity. The productivity increase leads into strategic effects since it supports the competitive strategy. Thus, the IT based network of Baumeister AG positively affect the strategic position since it reduces the competitive forces of the suppliers, new entrants and competitors, figure 5.

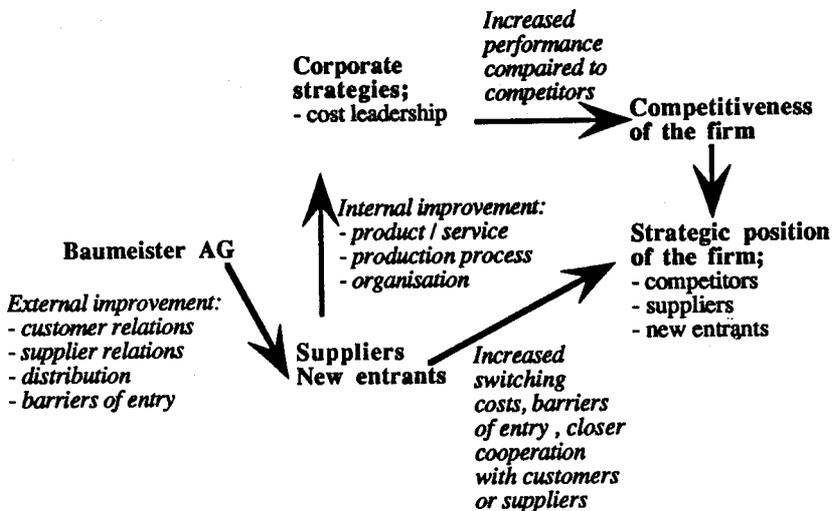


Figure 5. The Implementation and Impact of IT on Baumeister AG's Strategic Position

Construct Ltd

Construct Ltd has separate strategies for the international and the national market. The international strategy is to focus on large complex projects that require extensive experience and knowledge in technical issues and management, thus a differentiation-focus strategy. Technical issues are considered important top management who always involve the manager of the technical department in discussions on these issues. The firm is aware of its competitive components and of how IT can be utilized to support the corporate strategy. To handle remote, complex project an efficient information processing and transfer system is required. The technical department of the main office provides site managers with technical information. IT is used to

transfer drawings produced in the main office to the construction site where the more detailed drawings are made. The technical effect of IT in this case consist of efficient data processing and data transfer long distances. This technical effect is translated into strategic effects since IT can be used to distribute the specialized competence in the main office to the sites. This further enables the firm to manage difficult projects and differentiate its products and services. The firm competes on the national market through cost leadership and the main focus therefore is on economies of scale and in cost reduction. This strategy leads to technical effects in terms of improvements in evaluations, planning, and coordination of the construction projects. This in turn leads to higher quality and reduction of the project duration. These technical effects are translated into economic effects since they imply a better utilization of equipment and a more cost efficient production. IT supports the corporate strategy, cost leadership, since cost reductions improve the competitiveness. The main implementations of IT are internal. EDI will soon be implemented for data transfer to and from suppliers.

Some clients have made moves which have resulted in losses in bargaining power towards these clients. Such clients are experienced in managing large projects themselves. They use a server to which all firms are connected. Using a server enables the client to split the project into smaller tasks which are performed by different firms. The client increases it's bargaining power. Smaller and less complex tasks makes it easier for the client to compare bids of different suppliers. The way IT is supporting the corporate strategy in Construct Ltd is described in figure 6.

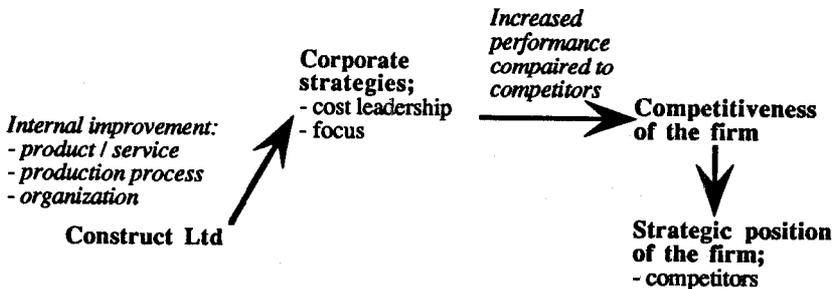


Figure 6. The Implementation and Impact of IT on Construct Ltd's Strategic Position

CONCLUSIONS

A construction firm can improve its competitive position by adapting one of three generic strategies, cost leadership, differentiation, and focus. However it is obvious that each of these strategies leads to strategic effects in many ways. IT can be applied in two different ways to support these generic strategies: to improve internal operations or to improve external relationships. The generic model developed in this paper can be used as a framework for analysing different ways to use IT to improve the strategic position.

In two of the above cases an IT based network is the main cause of a redistribution of power and thus changes the competitive position of the contractor, either favourably or unfavourably depending on the ownership. It is obvious that new information technology such as product models, communication networks etc will change the industry structure.

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