Strategic Analysis of Technology

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Strategic Analysis of Technology

Abstract
Technology has become a core element of business strategy, and an essential factor of the competitive position of the company, due to the fact that it is one of the pillars of its profitability and growth. The organization around business strategic units as an efficient way of managerial working is being overcome. Now new alternatives are necessary to penetrate in markets, some of them not well known. Prahalad and Hamel (1991) say, after their comparative study of some companies in information technology sector; "the competitiveness of a company flows fits core competences and core products".

Disciplines
Business Administration, Management, and Operations | Strategic Management Policy | Technology and Innovation
1. INTRODUCTION

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This idea, and its possible implications, are the focus of this paper, with the objective of finding a new method of competition, where technology plays an essential role; first, in the determination of the limits to the growth in the company, and second in the determination of the organizational structure, and finally, in the formulation of the business strategy.

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2.- TECHNOLOGY IN THE CORPORATION

There is little agreement as to the exact meaning of technology (McGinn, 1978). A general definition with some measure of acceptance is that technology can be defined as the techniques or processes used to transform labor, knowledge, capital, and raw materials into finished goods or services (Bedeian 1991).

The concept of technology has developed rapidly in the last recent years. In the sixties and seventies technology was considered just like a factor of the environment as important as the economic policy, the legal situation, etc. and especially emphasis was on marketing as a weapon to penetrate into new markets, on the production to reduce costs, and on human resources to manage personnel better and to solve laboral problems. Since the crisis of the seventies, innovation has had a strategic value like motor of economic development.

As a result, the 1980s saw not only a technological revolution which has originated new industrial sectors, but also a production revolution that has modified operations of many of the traditional manufacturing sectors: acquiring new materials, and the design and management of production that have to be applied every day to the mature industries.

Technology is in every value activity of the company and it is important to know if it contributes to competitive advantages and to industry structure.

Following Porter’s analysis (1987), technologies are used throughout the value chain of a firm. The value chain as show in figure 1, the link between the technologies used in the various activities can either assist or hinder the firm’s ability to create value. As a result, it can be seen how a determinant factor of the competitive position of the corporation. The need to integrate the innovation and the management of the technology is an important element in the core functions of the company.

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3.- CORE AND COMPLEMENTARY TECHNOLOGIES

The competitive value of technology, requires a company identify the package technologies used in the organization, and then, determine which are the core and complementary technologies.

Following Prahalad and Hamel (1991), a company's competitiveness flows from its core competences and core products. A core competence is built on collective training of the organization, especially the capacity to coordinate different production techniques and integrate technological developments. Core competences have the following characteristics: provide potential access to a wide variety of markets, give advantages to the product for the client, and to be difficult of copying by competitors.

In order to organize a company around its core competences, a radical change is needed in the business organization. The first step is to identify its core competences. The next step is to project the new strategic architecture\(^3\) of the company, to learn from the company alliances and to develop the internal development.

\(^3\) Following Prahalad and Hamel (1991, pp:60-62) the strategic architecture is like a future road map which identifies the core competences to create and the integrated technologies in those competences.
It is interesting to note, that in a long term, competitive advantage flows from creating, with less cost and faster than competitors, core technologies, competences and attitudes which give place to innovation products. It must not be forgotten that the real origin of this advantage is found in management’s capacity to consolidate technologies and production capabilities in the whole company. This means that the managers must see the company not as a group of independent business, but as an integrated whole which allows exploiting all the technological capability that the company has.

This consideration between core and complementary technologies is going to be the essential variable in the definition, firstly, of the limits of the company, secondly, the business strategy and finally, the organizational structure of the company.

3.1.- Technological position-Limits of the company

A company cannot be considered as a set of independent business with no connection between them. On the contrary, a business must be understood as wholly integrated, where technology belongs to all the functions in the company. Then, technological position will fix a business' limits of growth. That means, that a company that has identified its core competences, has developed those competences, and manages its resources efficiently, and manages to adapt itself to the new competitive environment, will be able to introduce, or create products that its clients need but they have not imagined yet. That means the capability to access new markets which will carry its products.

By contrast, a company that does not have a solid technological position will have a bleak future, due to the fact that it must protect its technological goods, and also spend more money to develop new products, services, etc. that satisfy its clients.

3.2.- Technological Strategy

The nature of competition forces companies to formulate technological strategies which addresses the types of technological resources the company must invest in to attain competitive advantage.
Once the core competences of the company are identified, decisions must be made about what core and complementary technologies to use, whether to develop those technologies internally, acquire them outside or collaborate with an external unit. To take decisions, many factors play an important role. If it is necessary to react fast, it better buy the technology. However, if it is a core technology, although the cost could be higher, it may be more convenient to establish a strategic alliance, especially for the small and medium enterprises (SMEs).

A) MAKE OR BUY THE TECHNOLOGY

The make or buy decision is critical because the creation of technology is becoming more expensive, and because the distinctive capacity of a company depends mainly on its ability to generate or have unique or special technological knowledge. To invest in own technology could give some important advantages as getting an strategic competitive position, a dependent relationship with the client, the control to access to raw materials, machines, the creation of a distribution channel, and finally, improving the image of the company in a sense of movement and technological effectiveness. However, this technological alternative presents a problem; it is not possible to determinate exactly when and how the planned technological objectives will be reached.

The acquisition of technology has minimal risks, because it is a proven technology with some guarantee of success, although it could be limited and be expensive. However, the company that acquires technology will not have strategic freedom to reach great and broad projects, unless the company possesses or create the capacity to improve acquired technology. When the technology and knowledge are acquired, technology must be improved for the company’s benefit, and allow greater autonomy in design strategies. Big companies usually prefer to create their own technology, because they not only have resources, but also they have specific, large, skilled research and development departments (R&D Departments).

However, when the problem is how to obtain complementary technologies, the criteria are different, sometimes the companies buy them because is cheaper in cost or time. The basic objective
should be to have the ownership of those core technologies that are part of the core products of the company, because they are the source of competitive advantage and the means to minimize costs. Meanwhile, it should acquire complementary technologies because they are not the source of differentiation for a firm’s products.

B) TECHNOLOGICAL COOPERATION

The globalization of the economic activity has increased the need for strategic alliances, groups of companies with the same interests. This organizational innovation is the best way to compete in Europe, where the industry structure is mainly small and medium companies (SMEs). Small and medium companies usually cannot develop necessary innovation, apart from a few high technology companies because of the lack of qualified personnel, economic resources, and scientific equipment. Strategic alliances allow firms to pool resources to get the necessary technology at a low cost.

Higher technology SMEs, with their own research capabilities or with direct collaboration with the Public Centers of Research, secondly, the SMEs suppliers or filials of the big companies that depend on the research of these ones, in other words, it is the big company who push the research and development in the auxiliary enterprises, and finally, the independent SMEs that have not got direct access to the science and need intermediaries to take advantage of the research.

Also, there are continued efforts to establish technical cooperation agreements; joint-ventures, with the objective of forming a new, jointly owned entity to acquire, produce and exploit a new technology. The purpose of the joint-ventures usually is to complement some of the strong points of the company. The contractor parties societies share the collective benefits of technological information and participate in a transferece of technology.

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4 Japanese companies were the first using the innovations in general, and the research and development innovations in particular. Alliances are strategic and organizational networks.
Another form of collaboration, *star up*, in which large firms create SMEs with some of employees from the corporate office. Their objective is to develop technological synergies with productive and commercial value.

On the other hand, the european union programs of technological cooperation help the companies, although the SMEs are not taking much advantage of it, this close relationship between companies can originate projects in which it is possible to incorporate other companies with close activities until conceiving a solid technological network call *filière*. The technological chain is based in the control of the technical progress, the strategy and the structure are organized around the core technological competences and, finally, the generic technologies have multisectorial applications, that allow to develop a model of racional business growth.

There are other methods of cooperation, such as research consortium where the organizations collaborate in a specific program of research and development, sharing costs, results and having access to the industrial goods produced. There are also agreements for technological transfer, participation of a big company in another one, usually of high technology that are joined by research contracts, etc.

### 3.3.- Technology-Organizational Structure

In technologically based business culture, it is essential that the companies have flexible and integrated organizational forms which allow working in groups and have an easy and fast flow of information. That means a non excessive decentralization, to pay attention to the core technological competences which have the competitive advantages.

The organizational structures must facilitate changes inside and outside the company. The company must rapidly innovate and integrate a new technology when it comes from out of the company. The adaptation capacity also requires an optimal grade of simplicity of the organizational structures

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5 The *filière* is a group of integrated phases that are divided into different segments, that can culminate in the raw materials or in the services of the product.
which will change due to the dynamic environment. The companies are obliged to concentrate their efforts to get the best technological level for their strategy and organizational structure.

4.- STRATEGIC VALUE OF TECHNOLOGY

The evaluation and selection of technological strategy can be made from two perspectives. The first is a strategic view in terms of products-markets; in which innovation is the result of the exhaustive knowledge and the long experience that the companies have of their traditional business. The second comes from controlling the generic technologies which determine the specific technological competences required for the product-market lines the firm has selected to pursue.

The difference between these perspectives is in the role of technology. In the first, technology is at the end of the strategic process, to adapt some specific products to some markets, exploiting some opportunities or adapting to a new reality. In the second perspective, technology is the driver of the strategic process. It is riskier because the investment is large and the results are unpredictable. However, once a firm establishes control of a core technology, usually, the economic value of its technology is much higher (Figure 2).

![Figure 2](image)

STRATEGIC FOCUS OF PRODUCTS-MARKETS

<table>
<thead>
<tr>
<th>Objectives Definition</th>
<th>Formulation of the Global Strategy</th>
<th>Core Competences</th>
<th>Technological Innovation</th>
<th>Products Markets</th>
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STRATEGIC FOCUS OF THE TECHNOLOGICAL COMPETENCES

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<tr>
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Although firms usually prefer the second perspective because it allows control of technological variables, the two perspectives do not have to be mutually exclusive, but can be complementary in a global strategy. Technology would be the starting point in the strategic process, to create technology-based cooperative networks like agreements and strategic alliances.

In the background of these perspectives, there is a central debate in management theory: the relation strategy and structure. Some authors like Ansoff, Chandler, etc. think strategy determines organization needs that must originate new structures, on the other hand others like Mussche, Lawrence, Lorsch, etc. claim structure the determinant element of the strategy. Then we must say that some companies define their strategic objectives depending on their structure, and others, by contrast, that adapt their structure to the strategy based in the market evolution.

The strategic analysis of the technology requires the identification of the criteria firms use to define their research and development objectives. This definition will depend on the resources of the company and also of its goals. Some companies formulate technological objectives based on the available internal resources, while other companies give priority to potential markets.

Following the Prahalad and Hamel thesis, the strategic focus of the technological competences is a better means of strategy formulation than the products-markets focus. Without the ability to dominate the generic technologies and create as many strategic alliances as necessary, to acquire techniques and competences at a low cost, a firm never attains a competitive advantage no matter how attractive the industry.

5.- CONCLUSIONS

At the present time, a successful firm must not only manage its commercial, financial and human resources, but also manage technological innovation. It is a critical requirement for sustained competitiveness because dominating a technology is often a firm’s main competitive weapon.
An enterprise that has identified its core competences, has invested to sustain them, and has a management that efficiently manages its resources, will be able to create new markets with technically innovative products, as well as compete in the global markets. To get so, it is necessary to design integrated and flexible organizational structures that push from inside the innovation, and at the same time, to know how to adapt new technologies.

The company must also develop a technological strategy, determining which technologies to acquire using patents or licenses, which are going to be developed internally, which will be acquired through technological cooperation programs such as strategic alliances, or to acquire firms that possess the necessary new technical knowledge to develop our activity.

As Prahalad and Hamel note, technological strategy must be established before the formulation of the business global strategy. In doing so, firms will produce differentiated products and services, which are innovative technically and capable of satisfying changing market need. Developing a technology-based competence is especially important in this era of globalization and limits to growth.

6.- ACKNOWLEDGEMENTS

I would like to thank the collaboration in this article of Alberto PEREZ GORDO, instructor at the University of Valladolid, Spain, and E. James FLYNN, associate professor in the Department of Management, College of Business, Iowa State University, for the valuable comments and suggestions.

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7. REFERENCES