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OPERATIONS MANAGEMENT IN INTEGRATED MARKETS: A CONCEPTUAL MODEL

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ABSTRACT

The authors suggest a conceptual model which refers to the operations which can be utilized to identify the most significant opportunities and decisions to obtain competitive advantages in global industries. The model considers the following elements: competitive advantages, performances of the operation system (as sources of competitive advantages) and the four macrophases of the so called operation value chain: design, purchasing, production and distribution. The study of the implications on production strategy deriving from globalization is carried out using three groups of strategic decision categories: organization and management, management systems, technologies. The cross between the three groups of strategic decision categories and the four operation macrophases identifies twelve areas of opportunities and decisions for the realization of global type strategies. The proposed model makes it possible to identify the emergence of three paradigms in global industries regarding performances and behaviour of companies: time and cost compression, agreements and coalitions, transfer.

INTRODUCTION

Twelve countries and over three hundred million consumers are involved in the European Community (EC) market integration, a lot more than in the US market. The economic, monetary, fiscal and commercial integration has already begun and will be completed during the 90's. There are however some obstacles such as language, political and cultural differences as well as problems in transport and distribution. Community coordination is however improving.

The recent developments in Eastern Europe and Germany have clearly accelerated EC market integration [1]. In this perspective it is possible to explain the large increase in alliances and acquisitions between European and American companies. The reduction of trade barriers within the EC market will help to make the consumer needs more uniform, this tendency already exists on a global scale [2].

Thus there is a growing tendency towards a global market in different industries. Among the environmental factors which trigger off the globalization process within the EC process integration there are: rationalization of distribution channels and changes in government policies [3].

Globalization is growing both as far as finished products and components are concerned. The refrigerator market for example, is not yet global as there are still many differences between the needs of families in different countries, while for certain refrigerator parts the market is already of a global type.

In global industries competitive advantages derive in large part from the integration and coordination on an international scale of the various activities of the value chain, while in the so called multidomestic markets the competitive advantages are specific to each country and different local strategies are adopted [4]. In global strategy it is of vital importance to reduce total costs as well as design, production and distribution times. The large distribution in Europe will tend to reward low cost producers [5]. In this sense the EC will also be an appetizing market for American companies that are already used to serving several different markets and to facing high price competition [6], while changes will be required in those European companies which only operate in specific markets and focalize on particular types of performance (e.g. quality).

With reference to manufacturing, advantages can be obtained in a global strategy through: the effective utilization of economies of scale, the concentration of learning in one or a small number of plants, the integration of operations, the coordination or the concentration of activities to support production and product development, the use in general of world class manufacturing policies [7] or the so called stage 4 [8].

The paper presents a conceptual model referred to all the operations which can be utilized to understand and to single out the most important opportunities and decisions in order to obtain competitive advantages in presence of global strategies.

THE CONCEPTUAL MODEL

The proposed model considers: the competitive advantages, the performances of the operation system, as sources of competitive advantages, and the operations articulated in four macrophases: design, purchasing, production and distribution. The four above mentioned macrophases represent what can be defined as the "operation value chain".

For each of the four macrophases the study of the implications deriving from the globalization is tackled utilizing three groups of strategic decision categories: a) organization and management, b) management systems, c) technologies.

For each macrophase of the operation value chain, the model makes it possible to observe the influence of decision categories on the performance of the operation system and on the competitive advantages which the company can obtain as a result.

Figure 1 shows the proposed conceptual model.

i) The Operation Value Chain

The phases which are considered by the model are those which make up the operation value chain: design and development of products, purchasing of raw materials and components, manufacturing of components and assembly of finished products, distribution.

It should be noted that in figure 1 the design phase has been kept separate from other phases. The reason for this is that only in the case of engineer to order firms the design phase is routinely performed as the first operation, followed by purchasing, manufacturing and distribution. In other firms of the make to order, assemble to order and make to stock types, design is an activity which is not synchronous with the other operations which are instead carried out in a cyclical fashion.

With reference to the primary activities of the value chain [9]: inbound logistics, operations, outbound logistics, marketing-sales and service, and to support activities: procurement, technology development, human resource management, firm infrastructure, we wish to underline the following:

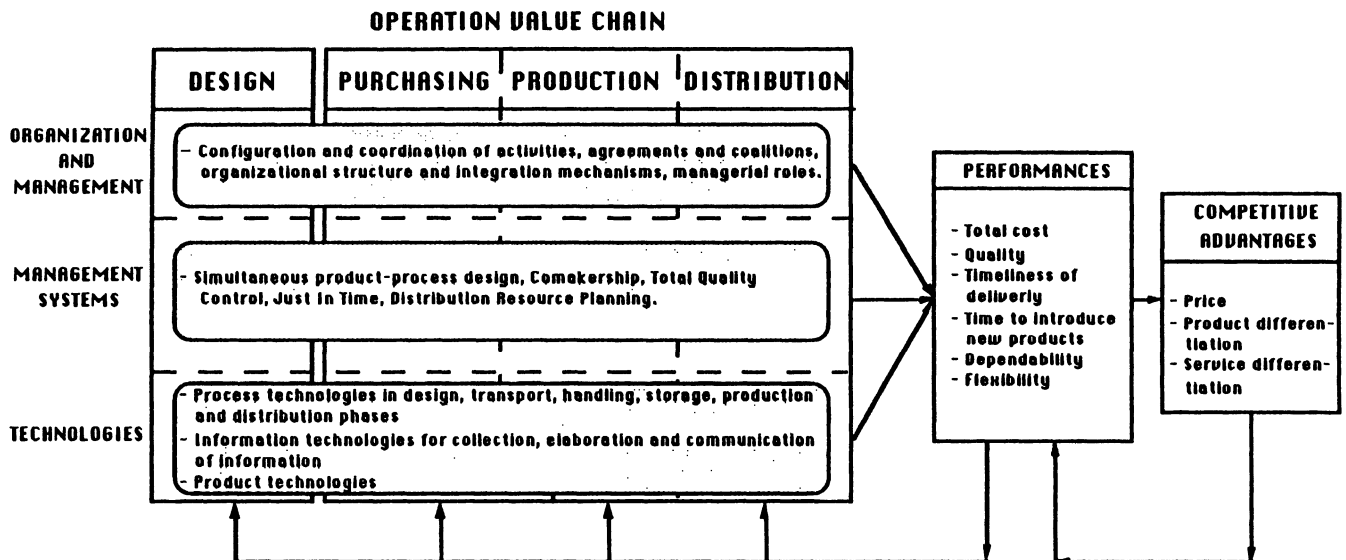


FIGURE 1 Conceptual model

— two primary activities of the value chain that is to say marketing-sales and services have not been taken into consideration in that this model is concerned with "operations"; furthermore when the downstream primary activities of the value chain are of vital importance for the competitive advantages, the international competition strategy tends to be multidomestic; while in those industries in which upstream primary activities and support activities, like technology development, are critical, global competition is more frequent [4];

— the outbound logistics is the same as in our distribution macrophase; the production macrophase also includes the inbound logistics;

— the support activity classified as procurement in Porter's model (purchasing of raw materials, machinery, buildings, etc.) has been restricted to one of the activities which are intended by this term: purchasing of only raw materials and components, that is those codes which are cyclically purchased by the firms; in this case it is correct to consider purchasing as a primary activity, because it plays an effective role in the physical creation of the product [9];

— the design macrophase is also considered a primary activity because it too concurs in the physical creation of the product.

ii) Operation System Performances and Competitive Advantages

As far as operation system performances and competitive advantages are concerned, there are in the literature contributions both by authors who clearly distinguish them and by authors who introduce a single concept called competitive priority.

Among the first Schroeder and Lahr [10] propose seven distinct objectives of the operation system: manufacturing cost, quality (conformance) expressed as a cost of quality or in term of customer satisfaction, inventory turnover, customer service, cycle time (the time from receipt of raw materials until the product is in the customer's hands), time to introduce new products, time to change capacity. The same authors propose the following as examples of competitive advantages: unit cost, quality, service, capacity and process technology.

As far as the authors who introduce the concept of competitive priority are concerned, Hayes, Wheelwright and Clark [8] propose five classes of variable: cost, product performance, dependability, flexibility and innovativeness. Ferdows, Miller, Nakane and Vollmann [11] propose four principal competitive dimensions: quality, dependability, cost-efficiency and flexibility. According to Ward, Leong and Snyder [12] there are five competitive priorities: costs, delivery performance (dependability and speed), quality, flexibility (product mix and volume), innovativeness.

In the model which is proposed in this paper the performance which can be obtained from the operation system — considered as sources of competitive advantages — are grouped into the following classes:

- total cost (meaning the unit cost of the product including all costs: design, development, manufacturing, distribution, inventory costs etc.);
- product quality;
- timeliness of delivery;
- time to introduce new products;
- dependability (in product quality, delivery time etc.);
- flexibility (product mix and capacity).

The above mentioned performances coincide in large part with those proposed by Hill [13]: costs both variable and fixed, quality, delivery time and dependability, flexibility in both product specifications and production volumes.

With reference to the general concept of competitive advantages, in the proposed model we define three types of advantages:

- price;
- product differentiation;
- service differentiation.

This definition of competitive advantages derives from the fact that in general consumer choose among several product alternatives which include the connected services on the basis of the price-quality relationship. It is important to underline how, for manufacturing companies, market success is becoming more and more dependent on the ability to offer a balanced mix of products and services. The link between product and service is becoming so tight that it is difficult to distinguish between product and service; in fact some authors are proposing the concept of "service-enhanced product" [14].

iii) Strategic Decision Categories

The strategic decision categories in the manufacturing field are extensively discussed in the literature. Hayes, Wheelwright and Clark [8] identify ten categories divided into structural (capacity, facilities, technology, vertical integration) and infrastructural (production planning and control, quality, organization, workforce, new product development, performance measurement systems). Skinner [15] proposes five strategic decisional categories: structural (plant and equipment) and infrastructural (production planning and control, organization and management, labour and staffing, product design/engineering). Buffa [16] identifies six classes of strategic decisional categories of which three are structural (capacity/location, product/process technology, strategy suppliers vertical integration) and three infrastructural (strategic implications of operating decisions, workforce and job design, position of production systems). Fine and Hax [17] also propose six strategic decision making areas of which three are structural (capacity, facilities, process and technologies) and three infrastructural (product quality, human resources, scope of new products).

In the proposed model three groups of strategic decisional variables are identified: a) organization and management, b) management systems, c) technologies. The categories which are proposed are in many cases the same as those which have already been indicated, but others are introduced with the objective of underlining all the elements and decisions which are significant in obtaining strategies of a global type. Each group of categories can be referred to the operation value chain and represents a framework within which management makes strategic choices which have operative implications and effects on performances.

The first group of strategic decision categories — organization and management — includes elements which can be traced back to the external and internal organizational structure of the company and to the role of management; these are:

- configuration and coordination of the activities; the level of concentration/decentralization of activities in the value chain and the way they are coordinated;
- agreements and coalitions;
- internal organization structures and integration mechanisms;
- managerial roles: the role of the manager in integrating activities to obtain a continuous improvement of the operation system.

The second group of strategic decision categories is represented by management systems, considered both as approaches to process management and as formal techniques and procedures. Of those which interest one or more phases of the operation value chain we list the more important ones: simultaneous product-process design, comakership, total quality control, just in time, distribution resources planning.

The third and final group of strategic decision categories is represented by technologies. These can be divided into the following:

- process technologies of all the phases: design, transport, handling, storage, production and distribution;
- information technologies for collection, elaboration and communication of data and information (information and telematic systems);
- technologies incorporated in the product aimed at improving quality and reducing costs.

The crossing of the three groups of strategic decision categories with the four macrophases of the operation value chain makes it possible to identify twelve areas which represent the implications in terms of opportunities and decisions for the realization of a global strategy.

IMPLICATIONS OF GLOBALIZATION

Table 1 — which derives from the conceptual model of figure 1 — shows some of decisions that must be taken and some of the significant activities that are necessary in order to realize strategies of a global type.

The table is self-explanatory. It should be noted that for each group of decision categories there are some decisions/activities which are common to all four macrophases of the operation value chain. The limited space available to us for the presentation of this paper does not allow us to comment on each of the points contained in the table. We shall limit ourselves to some general considerations on the groups of the strategic decision categories which have been indicated.

i) Organization and Management

The configuration and the coordination of activities lead to competitive advantages. Among the factors which favour the concentration of activities there are [4]: - economies of scale, - management of the learning curve, - the specific advantages of each country, - advantages which derive from the common localization of inter-related activities such as product development and production. On the other hand factors which can encourage decentralization are: - an easier access to know-how, - better adaptability to local demand, - tariff and customs barriers, - risk of political changes. With reference to the operation value chain the most favourable configuration of each macrophase can differ from the others. With regard to product design and development — both of which are strongly linked to R&S activities — decentralization of the development centres can facilitate access to know-how and its development, as it favours the flow of information, contacts in border areas, and induces contacts with leaders in the field [18]. The choice of suppliers on international markets makes it possible to reduce costs and improve the quality of acquired materials. Finally as far as production is concerned, the generation of economies of scale can be realized either through the concentration of all production activities or through the construction of a number of plants according to the logic of specialization. Production in decentralized plants can favour the attainment of various objectives: low cost, learning economies, the establishment of a company on foreign markets, the introduction of new products, technical leadership [19].

The coordination of decentralized units is fundamental in obtaining competitive advantages. These advantages derive more from how the company firm manages the various activities than from where these are located. As is shown in Table 1, coordination among development centres allows an exchange and increase in know-how, while coordination in the purchasing of materials makes it possible to obtain economies of scale and create the base for long term agreements with suppliers. The transfer of experience can be considered as a form of coordination. The ability to capitalize and transfer experience among the various units represents an important advantage for global companies in their competition with national firms. As can be seen in Table 1 the transfer of management and technological experience is often recurrent. Three types of transfer classes can be recognized [20]: transfer of plants and resources, of knowledge and ability, of tasks and responsibilities; the transfer of just one of the above mentioned classes is ineffective.

	DESIGN	PURCHASING	PRODUCTION	DISTRIBUTION
ORGANIZATION & MANAGEMENT	<ul style="list-style-type: none"> - Choice of location of development centres in leading environments - Coordination among development centres for the exchange and increase in know-how - Agreements between producers and/or suppliers in the development of new products and in the improvement of already existing ones <ul style="list-style-type: none"> - Task force and committees as permanent organizational structures to favour multidimensional approach - Informal relations as a means of coping with the enormous information needs - Managerial roles as a means of integration (management internationalization) - Evaluation and reward systems which favour the attitude to integration and to a continuous improvement 	<ul style="list-style-type: none"> - Choice of suppliers on international markets - Coordination in the purchase of common materials - Agreements with suppliers on the global scale and in the long term 	<ul style="list-style-type: none"> - Choice of plant relocation to obtain an integrated manufacturing system - Agreements among producers to obtain economies of scale and access to know how - Agreements between producers and/or suppliers of technologies in the improvement of the process 	<ul style="list-style-type: none"> - Choice of companies providing distribution and/or information services - Agreements for distribution on new markets - Agreements with producers and/or distributors on the global scale to serve the same markets and to reduce distribution costs
MANAGEMENT SYSTEMS	<ul style="list-style-type: none"> - Product-process standardization policies on a global scale - Overlapping approach between different centres in the development of products - Simultaneous product-process design in collaboration with production units - Integrated and/or centralized management of product and documentation changes <ul style="list-style-type: none"> - New methods of cost accounting and new performance measurement systems to understand and to control total cost and other performances including response time 	<ul style="list-style-type: none"> - Comakership policies with transfer of the highest standards to all suppliers - Transfer of managerial innovation developed in managing plants, in plant-supplier relations and from other suppliers 	<ul style="list-style-type: none"> - World Class Manufacturing, Total Quality Control, and Just In Time policies - Transfer of management systems and skills - Aggregated planning of plants according to global needs of the distribution system 	<ul style="list-style-type: none"> - Order and stock management policies on a global scale through Distribution Requirement Planning techniques - Storage and transport systems management on a global scale
TECHNOLOGIES	<ul style="list-style-type: none"> - Assisted design technologies for product-process standardization - Technologies for simultaneous design - Transfer of product technological innovations among plants <ul style="list-style-type: none"> - Information technologies for collection, elaboration, and communication of data and information among operation units to allow integration within and among the different phases of the operative value chain 	<ul style="list-style-type: none"> - Transfer towards suppliers of innovations in technical processes developed in company plants or by other suppliers - International transfer of technological innovations incorporated in raw materials and/or components 	<ul style="list-style-type: none"> - Automatic production techniques to exploit economies of scale - Learning of new technological processes concentrated in pilot plants - Transfer of technological innovation from plant to plant 	<ul style="list-style-type: none"> - Storage and handling technologies - Transfer of technological innovations among distribution systems

Table 1 Decisions and activities related to strategies of a global type

Agreements and coalitions with other producers or with other companies which are upstream or downstream on the operation value chain have the objective of creating economies of scale and learning economies, allowing access to know-how, reducing risks and modifying the competitive environment [21]. A higher degree of vertical integration involves fewer risks when it is realized through agreements and coalitions than when it is obtained through acquisitions or the utilization of internal resources. Through

coalitions a company is repositioned more quickly than through internal development. The time which is necessary to create the minimum threshold of experience within a firm is greater than the time which is required if a coalition is formed; this can occur in the case of rapid technological innovation as in the computer field. Examples of agreements and coalitions are given in the top four quadrants of the table.

As far as aspects of internal organization are concerned, successful global competitors must have an organization capable of managing multidimensional problems. In this sense it becomes important to create a structure which is complementary to the line structure, with task forces and committees, which represent a permanent and non transitory supplementary decision making body [20]. Even informal relations become fundamental when dealing with firms that operate on a global scale. The formal systems alone are not able to satisfy the enormous information needs which are necessary to coordinate such complex configuration.

The roles and tasks of management also change noticeably in these contexts. As several different cultural backgrounds are present within the company at any one time, management cannot assume that all values are common. Often the shared understanding of the role of management becomes an instrument of integration which is more powerful than formal structures and systems. The manager therefore becomes a vehicle of integration. Internationalization and cosmopolitanism are the new characteristics which are required of this person. The task of the top manager is not that of submitting the activities of a national organization to a central control, but rather that of co-opting abilities and obtaining the involvement of the national organizations; paradoxically, attention shifts from a control of the strategic content to the management of the organizational process. Evaluation and reward systems must favour the free exchange of information and commitments to global objectives over the above local interests, to obtain an attitude to integration and thus favour a climate of continuous improvement.

As can be deduced from Table 1 the peculiar characteristics of the internal organization and of the role of management present some notable similarities in the various phases of the operation value chain.

ii) Management Systems

The adoption in several cases of unified functioning and service standards in applying managing methodologies can be of great value in reducing general coordination costs.

As far as the design and development macrophase is concerned, it is important to underline how policies of product standardisation make it possible to increase, equal to total production volume, the unit volumes of codes (raw materials and components) and thus favours the consolidation of comakership [22]. Often standardisation takes place within a wider framework of redefinition of the product which requires its transformation from local to global, that is its redesigning in order to meet the needs of a world market. The identification of a segment of the global market, the redefinition of the product and the consolidation of the sources of supply have been indicated as strategic factors which together with the already mentioned environmental factors can trigger off the globalization of an industry [3].

As far as the production macrophase is concerned, an aggregate planning of plants, according to the global requirements of the distribution system, can be an advantage: because it becomes possible to shift production from one plant to another, to improve the development of plants and to optimize fluctuation in the rate of change [19].

Recent methodologies for cost accounting and for performance measurement, including response time, are important in all the macrophases (see in Table 1).

iii) Technologies

One of the main competitive advantages derives from the transfer of advanced innovations in process technologies, information technology, product, raw material and components technologies. The similarities of products and processes within the company favour the transfer of technological improvements. High tech firms, in which intangible assets are fundamental, are favoured in this process as transfer costs are very low [19].

As far as design is concerned, CAD technologies not only make it possible to implement product standardisation policies, but when used together with telematic technologies, they also make it possible to design the product together with the suppliers.

New automation technologies make it possible to obtain economies of scale utilizing learning processes.

In the distribution context the regulation of control over communication technologies, together with deregulation in transport, favours to the creation of alliances [23].

Modern information and telematic systems allow greater integration among phases of the operation value chain, and make decentralised units efficient [24].

This aspect is shown in Table 1 for all the phases of the operation value chain.

CONCLUSIONS

In many industries there is a clear tendency towards globalization. It is believed that this phenomenon will grow as it is favoured by the progressive reduction in barriers between countries and differences between consumers. Market globalization on the other hand also depends on the behaviour of companies. For example, Japanese producers have given a significant impulse in this direction redefining products on a world basis. To obtain competitive advantages in global industries, all producers, including those in other countries, must be taken into account. Market integration both in Europe and in the world means that choices in design, purchasing, assignment of production and distribution tasks, must all be assumed and coordinated on a global scale to gain competitive advantages. In the model that has been presented we have tried to underline the most significant opportunities and decisions in the realization of strategies of a global type with reference to operations. Compared to domestic or traditional internationalization strategies, three paradigms in global strategies seem to emerge as far as company performances and behaviour are concerned: a) cost and time compression, b) agreements and coalitions, c) transfer.

a) Cost and time compression. The reduction in costs in the whole operation chain and the compression of time make it possible to gain competitive advantages in price, product innovation and service. The cost and time compression which can be obtained adopting a global strategy is greater than that which can be obtained adopting a domestic one. Indeed in global strategies it is possible to take better advantage of the purchasing, production and distribution economies of scale by working on large manufacturing

volumes which are made possible through the presence on a large number of markets. It is also possible to configurate and coordinate the company structure on an international base utilizing the many differences (e.g. in cost and in access to know-how) among the various countries. In the previous paragraph some specific decisions on organization were discussed. Factors which play an important part in compressing time are: company organization, management as a strategic resource in integrating activities along the value chain, the use of management systems which help to make the operation flow "lean", and the use of information technologies [25].

b) Agreements and coalitions. Agreements and coalitions are much more important in the case of globalization than in the case of other strategies. They are utilized for several reasons: to reduce innovation and know-how acquisition times, to reduce risks linked to research and entry into new markets and to create better economies of scale. In the previous table we underline numerous cases in which agreements and coalitions in various phases of the operation value chain play an important role in obtaining sources of competitive advantage.

c) Transfer. This is another fundamental paradigm in global strategy and its utilization is an important source of advantage. As was seen in the previous paragraph, the transfer must be identified in all phases of the operation chain. The transfer of know-how, experience/learning in production, managerial skills and invisible assets [26] are fundamental elements for competitive advantage and are more easily obtainable by firms operating with global strategies.

In conclusion, the proposed model can be useful in identifying the decisions to be taken, the actions to be carried out in order to make the changes required by global strategy. The change is great, as the challenge is significant for many European firms which are or will soon be competing in global market.

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