

Actual Aspects and Tendencies of International Production

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Abstract

The old approach of producing goods in a country and selling them to another country has lost ground in favour of international production operations. The improvements in technology allowed production of goods to be divided in different phases, which can be made in different countries separately. Lower costs of transport and communications, along with foreign trade liberalization have created economic stimulants for establishing of specific production phases in country. Companies are going nowadays from the unique production unit for the whole world to parallel production, aiming to specialized production on each country, according to the comparative advantage provided by them.

Key words: *international production, manufacturing types, location attractiveness*

The Concept of International Production

Markets globalization brings along more and more “globalized” products resulted from combining inputs from various countries.

The old scheme of producing in one country and selling into another one lost ground in favor of international manufacturing operations. The technological progress allowed for decomposition and desegregation of goods production into several stages performed in different countries. Lower transport and communication costs, as well as liberalization of the foreign trade gave birth to economic incentives that led to location the various production stages in a number of countries. Companies choose for each production stage or component of a good the country that meets the best production conditions, thus allowing companies to capitalize the competitive advantage offered by locating production in different countries, including the differences between labor costs in different locations.

Production management ranks very high among the functional domains of the international enterprise. It is important to note that the economic debates on the theory of choosing the location of a company analysis mainly the location of the production unit. According to the classical practice of choosing the location of the enterprise, priority is given to production, while the remaining functions are only subsequently considered. Another reason for the importance of the production management is that the internationalization of the industrial production is linked to the massive resources employment required, compared to the other functions. Criteria such as products quality, logistics costs, supply prices, salary costs and work schedule, employees participation to company's profits are only few examples of decision-making factors in

company's policy that directly influence the location of the production unit. They are completed by the effects of staff employment, most frequently triggered by the domestic tax policy of the hosting country (an example is the privatizations in the former communist space that provides that the new owner of the factory has to keep the staff sizing for a determined period of time).

Honda Extensively Relocates Its Production Abroad [5]

Honda grounds on the idea that in the years to come, competition on the world automobiles would enhance dramatically leading to a significant dropdown in automobile's sell prices. Meanwhile, Honda has set the objective to increase sales volume between 2002 and 2006 by a 25% up to 3.4 million units.

In this respect, the corporation relocates production in other Asian countries to significantly reduce the production costs. As one of the world leading manufacturers, Honda shall open a new production unit in China from where the cars are exclusively aimed at export. Together with the two Chinese suppliers Guangzhou Autogrop and Dongfeng Motor, it shall start production as of 2005 approximately 50,000 Honda Fit city cars aimed at the markets in Asia and Europe. Honda Accord model produced for the domestic market was highly successful in China.

Beijing authorities push all the foreign producers active in China to direct their production towards exporting. The costs of the local parts producers in China are 30% higher than the prices offered on the world market. Therefore, Honda CEO, Mr. Yoshino stated that their unit of production located here shall use imported parts. Although the customs duties for imports of car parts are still high, they are about to decrease by 2006 by approximately 25% following China joining the World Trade Organization. Even starting with 2004, the Honda's production costs in China should have gone down by 20% compared to those in Japan.

Honda shall not limit its expansion to China. Honda started to produce in Taiwan in 2002 too. The production of car parts and accessories shall be extended to Philippines and Indonesia. Approximately one third of the parts production here shall be built in the cars exported to Europe.

The production capacity of both Honda factories needs to grow by 40%. O large share of the production is aimed at the Eastern part of the USA, whose demand cannot be met only by the production units in Asia. On the USA market, Honda shall increase production by 15% in the next 3 years to approximately 1.4 million vehicles.

The approach of the international production shall analyze whether own production or a form of cooperation abroad is more efficient that purchasing products on the market. The approach of "Production" as a value-adding function focuses on those activities linked to a potential manufacturing reduction in own units that not necessarily implies investing into new production units abrades, as in the case of the production license.

Enhanced internationalization of enterprise's activities became critical for the central function of any enterprises, namely production. Enterprise's activities are deemed international from two points of view:

- on one hand, in case of delivering goods across the national borders to reach the client (export-based strategy);
- on the other hand, in case of increasing investment companies make in manufacturing units abroad (abroad investment-based strategy).

Jeans Manufacturing Process [1]

Jeans production of a Swiss company is a good illustration of the stage the production internationalization has reached so far. It is defined as a multi-level multi-national process:

- fabric samples and designs are sent by the Swiss company to the ready-made cloths manufacturer in Philippines;
- cotton comes from India or Kazakhstan and is then shipped for processing to China;
- in China, the cotton is drawing in threads with American equipment;
- the threads are colored indigo in Philippines with dyes supplied from Germany;
- the coating produced in Poland is then shipped to Marseille;
- labels come from France, while the buttons and rivets from Italy;
- all European components are air-shipped from Marseille to Philippines;
- final products are imported in a Slovenian port and sold and put-on in Switzerland.

Production Management, Industrial Policy and National Competitiveness

The wording “national competitiveness” is important for the management of international production for two reasons:

On one hand, relocation the production units abroad is a key word for “national competitiveness” that often becomes subject to various political interferences. This is due to the one-sided approach of production that focuses on the jobs competitiveness. Topics such as marketing competence and infrastructure are not left outside debates, although other key subjects, such salaries, work time, production costs, are the featuring stars.

Besides the microeconomic effects, the analysis needs to cover also the extend of such effects on employment and national wealth, that are critical for the national economic policy. Therefore, production figures are the key focus of the competitiveness debates. Relocating production abroad and direct foreign investment in the country could become key factors of the political success, which most of the times means reelection of the government holding power. To ensure long-term wealth of the nation, state enforces interventionist measures, especially before elections when no employment or standard of living problems should occur whatsoever.

This made “competitiveness” a key word for the industrial policy also because of the example provided by the Japanese economy of the 80s and early 90s. Governments came to attempt to influence relocation of production abroad by subsidies, tax payments facilitation, favorable depreciation methods, especially in case of the large multinational companies. An example of such a policy is provided by the Eastern Germany where the economic system of the new lands was shifted by preserving the so-called “industrial cores”.

The political influence on production management at international level is very obvious in the decision made by VW to acquire SEAT in mid 80s.

This stands for a typical production internationalization decision. Nevertheless, a closer look into the scale of this decision reveals that this was actually a political decision pushed by several groups of interests. The Spanish government, as seller, tried to defend its interests, so did the German and Spanish unions, the Niedersachsen land government and the German Federal government. The figure 1 illustrates the various economic, political and social group’s interest that were considered in making such a decision.

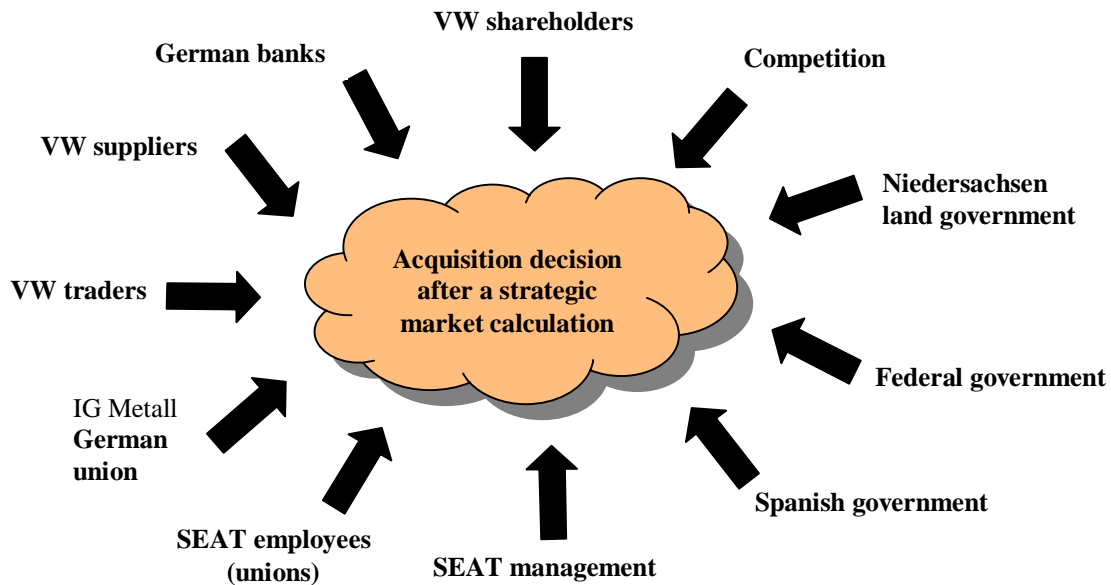


Fig.1. Relevant group interests in making VW/SEAT acquisition decision

Advantages and Disadvantages of Producing Abroad

Key Decisions in International Production Configuration

There are plenty of grounds to support the advantages of approaching the abroad production strategy. Two decision-making /grounding levels are to be distinguished in this respect: In case of a singular location production, it is usually located in company's origin country. In such a situation the company shall deliver on the target markets by export.

If setting-up many production units is decided – or simply said locating production abroad – than issue becomes finding the proper location(s). The arguments in favor of geographical relocation of production need to consider, first of all, the closeness to the target markets and then the costs.

Advantages of Abroad Production

The advantage of abroad production vs. exports grounds mainly on:

- cost reasons or
- trading policy reasons.

They are completed by:

- influences of the state, as well as by
- risks and company's flexibility.

Table 1. Reasons for which car producers relocate production abroad

Relocation grounds	2002
Staff costs 80%
Production in the trading area 30%
Flexibility, delivery capacity 21%
Insufficient production capacity 19%
Focus on core competences 16%
Production coordination costs 8%
Cultural factors 6%
Quality 5%
Production closed to the research and development centers	.. 2%

The empiric study from table 1 shows that cost aspects, especially “Staff” costs, play an important part, nevertheless, issues related to the availability of the production and trading means (such as closeness to the target market), flexibility and delivery capacity are themselves important reasons.

Advantages of the Abroad Production Based on Costs

In case of the approach based on the costs incurred by the abroad production, one should consider those costs related to exports and which the abroad production eliminates or at least reduces. Two types of costs are relevant here:

- potential lower abroad production costs, as well as
- lower transport costs for final products when the production places in the same with the target market

Above all, lower production costs result from the *production means costs differences*. Investors consider here mainly the labor costs in the host country.

Nevertheless, a differentiated approach is required. The high production automation lead to enhanced flexibility that compensates or even exceeds the advantages of the lower costs resulted from implementing production units in countries that provide cheap labor. Thus, the decisions not to relocate or reinvest (return) in the origin countries may become once again viable solutions. Additionally, the singular approach on the overall labor costs is streamlined (even when considering the additional staff costs, leaves of absence etc.) since the labor force cost differences bring along different labor productivity, sometimes due to different qualification levels.

Labor force productivity, normal operation times of the equipments, availability of the productive labor force (measured by number of days worked in one year) are all subject to social legislation and union actions and are other factors that need to be considered. Taking into account all these aspects, *the labor unit (hourly) rates* can be compared. With 0.95 USD/hour, Romania ranked first in 2004 among the Central and East European countries (Hungary 4.37 USD/hour, Slovenia 7.71 USD/hour), this being the key advantage our country has in the fierce battle to attract foreign direct investment from multinational companies, even these focus on

industries that have been long gone in the developed countries, such as light industry (ready-made cloths, footwear etc.).

Labor Force Cost Differences, Cause of Setting-up Production Abroad [9]

More than one million Mexicans work in the approximately 4,000 “Maquiladoras“, production units set-up in Northern Mexico that manufacture parts or components for the assembling units in the USA. In most of the cases, in the first stage, raw materials and materials are brought over from USA to Mexico. The production stages based on intensive use of labor are carried out in those factories, most of them owned by the buyers, while products are delivered back to the US for final assembling.

The salary costs in Mexico are much lower than in the USA, while customs duties and taxes on processed products (lohn operations) have been removed – mostly upon NAFTA’s disappearance. Thus, transport costs are kept relatively low, since Maquiladoras are very often located closed to the border.

Maquiladoras manufacture mostly electronic products and home appliances, ready-made clothes and car parts, out of which 80% are (re)exported to the US.

Maquiladoras have been operating in Mexico since 1965, when “Maquiladora“ employment program was initiated. This program provide foreign companies, free of any customs duties, with the possibility of bringing to Mexico, for processing or assembling, components or raw materials, providing the products resulted would be re-exported. Such a condition came to complete NAFTA regulations that did not provide for mandatory re-exporting.

Today, Maquiladoras are subject to sever critics from the social and environmental organizations since their environmental standards are very weak (significantly lower than those observed by the production units in the USA), together with low standards of living and insufficient salaries – according to the modern social standards – provided to those living in the new “working” cities erected around the production units.

With regard to Romania, there are only few that know that many of the component part in German cars (one third of cars imports) are actually produced in Romania, where German investors have already invested over half billion EURO and created 25,000 new jobs.

The *variations of the exchange rates* may influence the decision to oft for abroad production. If exporter’s currency is strengthening, then the price of the goods exported on foreign markets is growing up, which affects its competitiveness. A strong appreciation of the currency of the host country may expose the companies depending on export to certain issues that usually affects to a smaller extend companies that organize production in the country where they also sell.

Likewise, *transport costs* can be significantly reduced by approaching local production, bringing production units, able to meet the market demands, close to customers. In case of consumer goods sensitive to transport costs (such as detergents or cement), the transport costs can reduce pricing margin and producer’s competitiveness to such an extend that export becomes unprofitable and setting-up production abroad a must. Transport safety issues, like in the case of chemicals, which can bring an obvious increase in the cost of transport, are another reason for relocating certain production units abroad. Legal regulations have a similar effect since they can render difficult cross-border transport of certain substances.

Most of the German investors (Continental, INA Schäfler, Lisa Draxlmaier, Siemens VDO Automotive or Thyssen Krupp etc.) invested in the Western part of Romania to combine the advantage of relatively cheap labor with the proximity to Hungary. Practically, a truck loaded with car parts leaving from Timișoara reaches the central warehouses in Germany in less than half of a day from customs clearances. On other hand, to travel from Pitești or Ploiești to

Germany an extra day was needed. Experts state that as of Romania's accession to the EU, meaning once custom clearances for goods shipped to the Common Market is eliminated, the transit time between warehouses in Romania and Germany will be reduced by with an average of 12 hours.

The differences between the production means may lead to some other aspects as well. It's the case of the availability of cheaper raw materials in that country. The environmental regulations or charges levied on implementing technologies influence as well company's decision to set-up production units abroad.

Advantages of the Abroad Production Based on Sale

Direct investment in production companies on foreign markets gives the mother company the possibility to stay in closer contact with its customers. The new relocated production units help, *on site*, establishing new *long-term business relations*. By being present locally, the producer receives very quickly information on the performances /potential of its products on the market, which facilitates prompt reactions. Such a direct contact allows for better understanding the requirements and specifics of the national customers that can be integrated faster and more accurate in the features of the products or services provided. Decentralization means knowing better what customers prefer and is itself one of the main reasons for relocating production capacities according to the principle stating "Production follows sale".

In the innovational competition, internal organization of the company at international level can stand for a source of innovation for buyers. Direct access to "lead markets", as well as the knowledge and information acquired by local marketing enhance company's competitiveness worldwide. Since sale opportunities depend on the location of the production, the production program is always drafted according to the location of the production unit.

Besides the aspects already mentioned, production relocation can as well be a response to customers or competition's initiative. "*Follow-the-Customer*", equivalent of following the key customers abroad, is widely used in the parts industry. On the other hand, once can notice also "*Follow-the-Competitor*" strategy, as oligopolistic solidarity reaction (tandem-competition like in case of Toyota-Ford, Coca-Cola vs. Pepsi-Cola, ABN-ING or Unilever-Procter&Gamble) whereby a multinational invests in production units abroad, following such an investment that had already been made by a key competitor.

Another sale-related reason for setting-up production units on the national markets could be the fact that the products of the multinationals produced locally raise fewer emotional and patriotic restraints than if imported. Thus the image of the multinational is improved and the hostility of the customers prevented. This usually applies to the multinational players acting on the foodstuff, consumer goods and cars markets.

Influences of the State on the Decision to Produce Abroad

By implementing production units abroad, a company often meets the specific country requirements, as well as drives advantages from location. The constraints imposed to production expansion abroad are usually determined by the commercial barriers local authorities impose to exporters on that market. Thus, local production becomes mandatory, providing that the commercial barriers and local regulations are limitative to trade. In such an instance, companies would decide to produce locally – irrespective of potential higher costs – entirely or in part the quantity of products absorbed by the relevant local market.

Considering the economic policy enforced in various parts of the world, manufacturing in certain regions can gain ground to exporting. This disadvantage is compensated, however, by some countries by levying *higher import customs duties* so that a company that produces locally holds important market advantages vs. competitors that do not produce locally.

Under certain conditions, enterprises may benefit also from state subsidies, providing that production is located in less developed regions, however included in the regional development projects carried out by the relevant countries. Regardless the name given to such regions – special economic zones (China), free, less favored areas or industrial parks (Romania) – these locations are preferred by foreign investors thanks to the facilities offered by authorities as investment incentives, subsidies, discounts exemptions from certain taxes or depreciation methods (e. g. accelerated depreciation).

Flexibility and Risk-Related Arguments in Favor of Abroad Production

Another advantage provided by production decentralization is *operational flexibility*. This flexibility can be perceived as the capacity of a company holding an international production network to react to changes of environment, fluctuations of exchange rate and modifications of the customs duties or variation of the labor cost by taking actions to increase production efficiency, as well as by relocating it abroad. The following tools are used to drive flexibility advantages:

- *arbitrage*, meaning to use market malfunctions in company's advantages, can create advantages for the company by means of supply prices and different costs of the productions means, taxing policy and capital market interest specific to the country towards which investment is directed, as well as by the reaction capacity to the fluctuations of the exchange rate;
- *leverage effects*, representing the opportunity to use company's leading position on the market, can contribute to driving advantages from price differentiation, adopting an aggressive pricing strategy based on insourcing company's activities etc.;
- *risk mitigation effect*, driven by decentralization, can be obtained by increasing the number of locations and by the geographical spreading of the production units according to the Portfolio Theory (in the meaning of diversification) in view of mitigating risks. This takes place by reducing exposure to the country specific disturbances, whenever production is spread over several countries. Besides the political risks, such as strikes, nationalizations or import restrictions by decentralization, the economic risks consisting in variations of the exchange rates are also set-off. In case of similar production levels in different places, the losses incurred in one location can be set-off by the good results of another production unit so that production spreading would result into production-breakdown set-off effects.

Disadvantages of Spreading Production Abroad

On the other hand, the advantages of spreading production bring along a series of disadvantages. Many problems resulted from international spreading of production are comparable to those driven by the dispersion of the production units within the borders of one single country. Certain issues related to expanding production abroad are more critical than in the case of the local production. This is the case of the geographical factors, the divergent customer demands or company's structure (related to the local culture, which play a more critical part in the local production process than in case of the national production strategies. Production units established outside the national borders face problems that are not to be found at national level, such as variations of the exchange rate or the foreign trade policy enforced by a state.

Therefore, the advantages of lower abroad-production costs are cut across by a series of disadvantages deriving from carrying-out international activities. *Economies of scale*, specific to production concentration, are usually given-up. The advantage of the geographically-concentrated production system is mainly driven by the size of the business. The higher the economies of scale, the less significant the relative transport costs and stronger the trend to geographically concentrate production capacities. The extend of the effects of having *one single capacity production worldwide* are basically based on the *regression of the fixed costs*; this usually appear in case of centralizing production, distribution of certain fixed costs (including administrative expenses) over a larger quantity of final products.

The modification of the relations between the production factors corresponding to abroad production has as correspondent another minimal combination of the production costs, which, in most of the cases, means to adapt the manufacturing procedure that incurs new costs deriving from adaptation of the production technology.

Electrolux Concentrates Production [6]

Electrolux, one of the leading home appliances producers, pursues a more flexible and efficient production structure by a significant cut-down in the number of production units. By focusing on research and development, as well as on the support functions, the concern would save annually EURO 63 million.

In Germany, Electrolux shall focus innovation and production activities in Bayern, the origin region of its subsidiary AEG Home Appliances. Thus, the Rothenburg unit would be turned into the European cooking machines center for the medium and high market tier. The location in Bayern is thus about to become the leading cooking machines assembly factory within Electrolux multinational.

Vacuum cleaners production is still based in Germany, however, about to be relocated to Hungary, while the refrigerators and freezers production facility in Kassel would be closed. Home appliances that do not require cutting-edge technology, such as refrigeration machines, can no longer be manufactured in a country with such expensive labor like Germany.

Beside the scale effects, production's relation with other company specific functions, as well as with their geographical concentration may also ground production concentration decision. Above all, the possibility of supply from one place and making direct and consistent decisions is favored, while giving up cross-border technology transfer (thus saving the related expenses). In case of relocating production, the know-how transfer would also lead to additional expenses, such as costs with surveillance and coordination by the mother company of the activities carried-out by the decentralized production units. Empiric observation of the activity of the multinationals has shown that a high degree of concentration of research and development may also influence production concentration, usually in the origin country.

In certain cases, the social and cultural and image effects are to be considered. Among the social and cultural features we can list the associations of the product features with a certain country of origin. When such associations exist ("made in...", "Grünes Punkt"), there is a need to concentrate production in the base country and to increase research of the foreign markets in view of expanding export activity. This is a typical situation for luxury products (watches produced in Switzerland, diesel car manufactured in Germany etc.). The so-called *Country-of-Origin-Effects* are lost in case of abroad production. To the same extend, the "citizenship" of an internationally active enterprise may bring along image benefits in the countries in which it operates polycentrically (multinational company) or where it produces only certain segments of the value chain (transnational company).

These obstacles imposed to relocating production units are completed by a series of disadvantages linked rather to the relocation process, than to the abroad production (see table 2).

Table 2. Obstacles imposed to relocating production by a German corporation

Mental and social obstacles	Economic and organization obstacles
<ul style="list-style-type: none"> ○ Solidarity with the current situation ○ Protests from employees and officials ○ The need to lay-off staff ○ Good relations with customers, suppliers and national authorities ○ The tradition of German location ○ Losses incurred by German economy following relocation ○ Relocating production as a reflection of the lack of loyalty towards the country 	<ul style="list-style-type: none"> ○ High relocation costs ○ Negative ratio between returns and investment ○ Low staff availability to work abroad ○ Low production and delivery flexibility ○ Inferior quality of the products resulted ○ Deficiencies in planning the relocation time ○ Inadequate size of the company ○ Loss of respect towards authorities ○ High transport costs in providing for the domestic market ○ Insufficient capital resources ○ Loss of the “ Made in Germany“ advantage

Types of Manufacturing in the International Production

Overview of the Key Types of Manufacturing in the International Production

The systematic approach of the international production system gives birth to various basic structure types of a company's production. Therefore, an enterprise may choose, as illustrated below, between 5 different production structures (“Types of manufacturing”). They mainly distinguish whether the production is concentrated in one country or spread over many countries. The second dimension tries to distinguish the degree of production fragmentation, opting either for centralizing production or for dividing certain links of the value chain or production levels among the existing locations (figure 2).

In case of concentrating production in only one country, we can speak of an international activity of the company. This is the case, extremely seldom in practice, when the unique location of the production unit is decided in one country, which is not the country where the company is headquartered. For example, we find the establishment of production units in cheap labor country, from where the world market is supplied.

The types of manufacturing illustrated in figure 2 are even more important for the international configuration of the production activities. The linked and parallel international production can be generally summarized as “*international production*”.

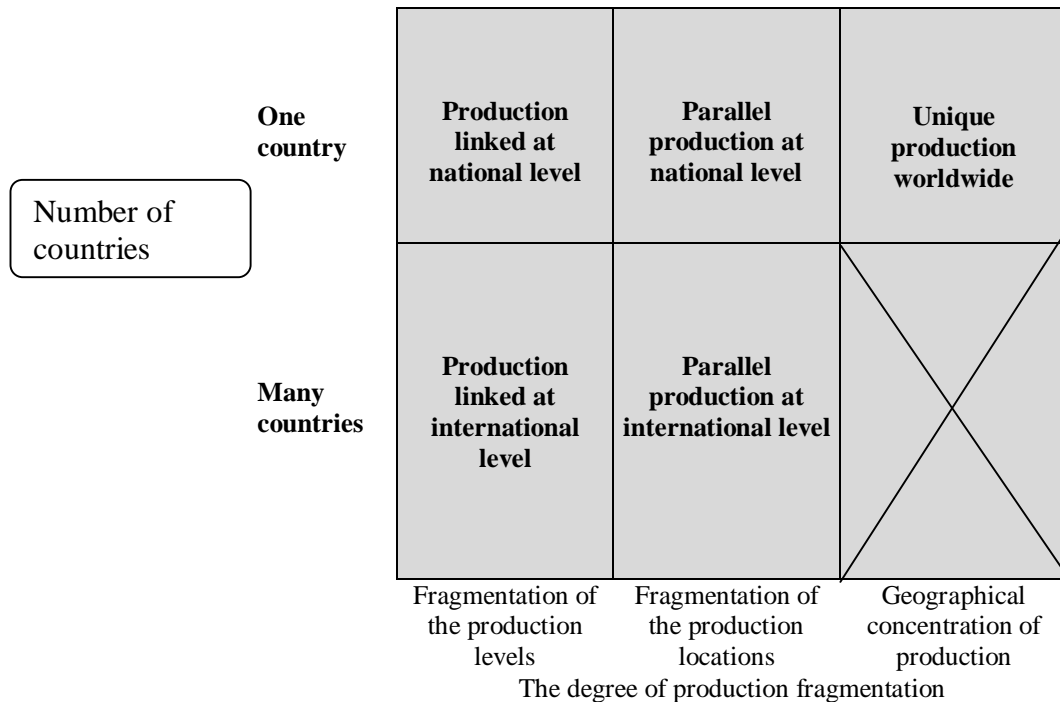


Fig. 2. Basic forms of production structures in a company

Source: Perlitz, M. - *Internationales Management*, 4. Aufl., Stuttgart, 2000, pag. 394

Generally speaking, a series of interdependent questions are raised in relation with the international production:

- Where should manufacturing take place?
- What should we manufacture and where (parts production or full assembling)?
- What production units should supply certain markets or the own assembling facilities?

The economic concentration principle refers to the geographical distribution of the required production capacities and is defined as the share of the production capacities in a certain location out of the overall production capacity. It is an indicator in determining geographical aggregation (concentration), or desegregation (dispersion) respectively, of the production capacities a company needs to manufacture a product. This degree of concentration needs not to be consistent for all functions within an enterprise, but can be differentiated according to company's market interests /strategy.

We will continue by presenting various types of manufacturing. Multi-level approach of the production processes needs to include research of the geographical dislocation of each individual stage and analysis of the relations between various production stages. On simplification purposes, we shall start from the assumption that the entire production process consists of three production levels (raw materials processing, interim manufacturing and final production).

Unique Worldwide Production

In case of the *unique worldwide production* there is only one single production unit to manufacture the final product. The unique worldwide production has the highest geographical concentration, this term being often used to define production centralized in one country, in case

of a production process structured on various levels. In such a case, access to foreign markets is done by exporting (see figure 3).

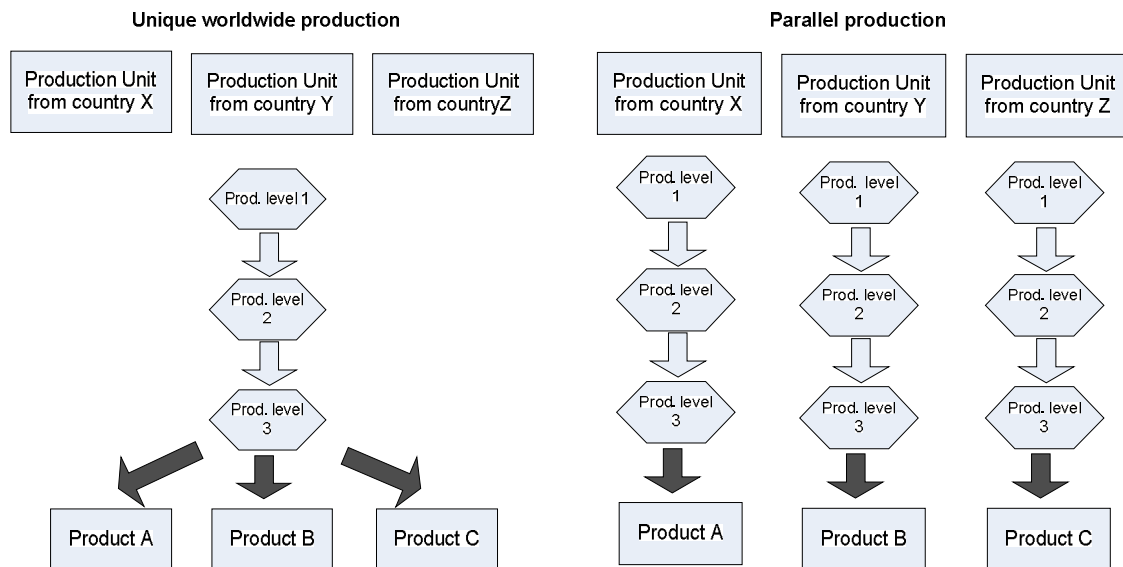


Fig. 3. Unique worldwide production vs. parallel production

Parallel Production

The *international parallel production* is characterized by geographically dislocated production, whereby the same product is independently manufactured in different geographical location, while all the links of the value chain are vertically integrated in these production units (figure 3). The entire production process for the same products repeats several times within a company (usually multinational), this meaning that it is completely carried-out simultaneously in a number of locations. In the technical readings such a production way is also known as *fragmentation of the production location*.

Production Relocation Trend in the Car Industry in Japan [7]

Regression of Japanese cars production and export is also related to the close link with the enhanced relocation of the production units right on the target markets, such as Europe, USA and China. The trend to manufacture cars as close as possible to the potential customers has led in the latest years to a significant decrease in the number of cars exported by the production units in Japan, mainly to Europe

In case of the parallel production consisting in regional production units, there is one factory for a certain product which supplies various countries in the region, while in case of a national production unit, a company is located in each country so that the supply of the country-markets is entirely ensured by means of local production.

The regional or national production units are mainly set-up when the restrictions imposed to goods movement become a key trigger of foreign direct investment, meaning that this is aimed at overrunning trading obstacles.

International Linked Production with Representative Types

Besides the complete relocation of the production processes, the possibility of partial relocation should be considered from the point of view of the advantages driven.

The international linked production is defined as a production process on many levels that are vertically interdependent and that is featured by a cross-border /transnational movement of raw materials, production in process or final products.

One of the effects of linked production processes consists in a less enhanced specialization of the relocated production units, compared to that of the initial /original process.

In case of concentrating production processes in only one location, the entire relocation process becomes subject to a special development of the production means in each location. Since each of the production levels implied different production means provisions requirements, it results that, according to the intensity of using the labor and capital, some stages of the production process cannot be performed most cost-effectively. Such a disadvantage can be overrun by relocating only certain production levels, according to the advantages the specific location can drive from the relevant production level.

Therefore, a company can outsource certain activities in the value chain whenever a specific comparative advantage exists. Production based on intensive use of labor can be relocated, for example, in countries with cheap labor, while processes based on intensive capital use require highly qualified staff. Subsequently, production shall be always directed towards external locations providing for an appropriate labor qualification and required infrastructure. With regard to the best geographical distribution of the production process, one needs to examine each production level with its own cost structure (determined by the intensity of labor and capital use) to be able to assess the efficiency of relocating the relevant level. On the other hand, we need also to consider production's logistic costs, and especially transport and warehousing costs.

Generally speaking, distribution of the production levels in different countries can be established according to the needs and features of each location, considering the logistic and transfer costs. Such a production configuration is very often meaningful when transport costs for the components and final products are relatively low.

The link production, in fact a configuration of the production capacities as a network, helps avoiding both the tariff and non-tariff barriers. This structure provides the advantage of allowing the company to observe Local-Content clauses with respect to the host country while carrying-out intensive import and export operations. Exports, therefore, can operate as a balance factor for potential importing restrictions. Such a network structure needs thorough coordination to avoid the risks of facing delivery difficulties – an issue whose complexity would only increase if for each component or final products more production units in different countries were set-up.

Types of International Linked Production

A critical point for international relocation of production is that, in principle, for each production level the best concentration degree needs to be identified. This offers the possibility, on one hand, to capitalize the advantages of the production means specific to that location while obtaining economies of scale.

In case of a high degree of concentration, each stage of production can be performed /concentrated in only one country, while the other levels located in minimum 2 different countries. Contrarily, raw materials and final product are obtained in a number of production units spread over more than 2 countries, while interim production is geographically concentrated. This shows that international linked production can be realized in various forms (the figure 4 shows the main types of international linked production, but the possible combinations are in a larger number).

This helps accomplishing, for example, the first level orientated on supply from different countries, while the next 2 levels – interim and final production – are concentrated in one country. The other way around, the last level is orientated on selling more products, while the first 2 levels operate centralized.

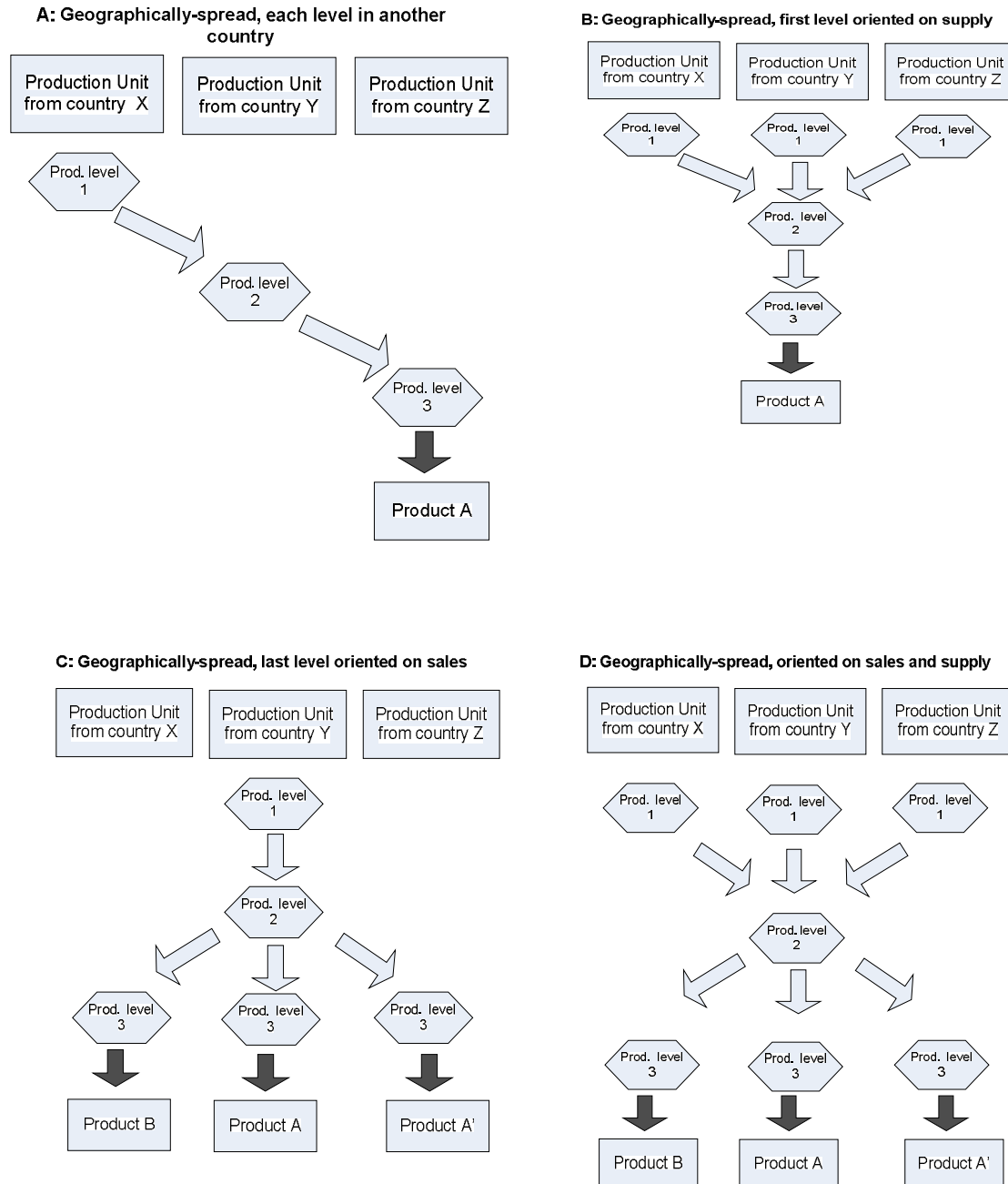


Fig. 4. Geographically-spread international linked production models, geographically-spread

Source: Knüppel, A. - *Beschaffung, Produktion und Absatz in multinationalen, Industrieunternehmen*, Lohmar-Köln, 1997, pag. 139

Therefore, in case of the dispersion of the last level of the international linked production, there are various variations of the final product, without however involving disadvantages for the efficiency of production. Based on the unique supply levels and interim production, the same

product can be manufactured in different countries (product A), there can be slight variations of the final product (product A and product A') or a different product (at least in part) can be obtained – starting from the same unfinished products and building on the modular structure of a product (product A and product B). A relevant example in this respect is provided by Renault that developed Megan and Logan models based on the same structure (interim product), however modulated differently for each of the models. It's all about component parts and standardized interim products that are subsequently assembled in own assembling facilities located close to the target markets. Such an adaptation is only possible in case of proximity between the final product manufacturing location and buyer, due to communication reasons, and it is preferred vs. concentrating all the production levels in one country from where exports are made to the target markets.

A key advantage of coordinating all partial processes from a single location is the reduction of transport costs and risks with regard to raw materials and production in progress. This is mainly explained by the shorter transport routes. This also ensures risks mitigation since on short distances shortages and quality defects are less likely to occur compared to the cross-border transport on long distances, as required in case of decentralizing all production levels. Geographical spreading of the production levels leads, besides high transport costs and risks, also to the necessity to set-up expensive buffer warehouses for each level to avoid interruptions of the transport chain and subsequently a breakdown of the production levels to be introduced in the production cycle.

Ford Industrial Supplier Park [10]

Since very long now, Ford factory in Saarlouis is perceived as a raw model in cars production. The permanent optimization of the manufacturing locations and processes, as well as introduction of the latest work structures, Saarlouis factory ranks among the most modern cars factory in the world. As “Lead Plant” – where Ford Focus is produced – it is responsible for observance of the highest quality standards within all Ford locations in Europe and overseas. At the same time with the launch of the Ford Focus model, “Ford Industrial Supplier Park” was opened in factory's proximity. The Saarlouis location thus became a model function for innovative logistics and a more flexible manufacturing process. Ford Industrial Supplier Park is a long-term future-orientated project aimed at reducing production costs and optimizing logistic activities in Saarlouis location. FORD Industrial Supplier Park covers a surface of 200,000 sqm in the close proximity of the Ford plant and created approximately 1,600 jobs. Currently, in the premises of the park operate 11 suppliers of complex body elements and parts that are delivered to Ford production lines not only “Just-in-Time”, but even “Just-in-Sequence”, meaning at the right time and in the right manufacturing sequence. This park also brought along the related services provision. The core concept of the supplier industrial park is represented by the “on the line” transport system. This brings various parts or components directly from the supplier park to wherever production requires them.

The modern concepts of Supply Chain Management, as well as Just-in-Time are hard to accomplish in case of the grouped production levels since such concepts are representative only if the production levels are located close to each other.

Among the supply-oriented advantages driven by relocating the first production levels we list, besides the proximity to raw materials, also the geographical proximity to the key suppliers. They allow for a better contact that, together with better prices and conditions, can lead to logistics improvements. Even if a close cooperation with the suppliers in the field of assembling and development can usually bring certain advantages.

Assumptions of Grouped Production

The international grouped production is impossible, or at least unprofitable, due to a series of factors. The potential barriers can be of either internal or external nature.

As internal assumptions for the initiation of an international group production we can list the technical capacity to divide the production process, the technical capacity to transfer both the production process and the product [3]:

- the first key assumption to partially relocate production is the *technical capacity to divide the production process*. In this respect, the production process needs to include at least 2 levels that can be divided in partial transferable processes, without jeopardizing the proper operation of the entire process.
- additionally, the adding-value processes need to support cross-border transfer as well, meaning that the *technical capacity to transfer both the production process and the product* needs to be ensured. This transfer can be prevented by environmental regulations enforced in the relocation country. If production is closely related to certain regional, physical and chemical features or to the climate, then transferability shall be limited. Frequently, by adjusting or modifying the production process, in case of abroad productions, the advantages deriving from different costs of production means are used.
- *the technical transferability capacity of the product* is ensured providing that the supply of raw materials, unfinished products or equipments allows for their physical cross-border transfer. Product's features requiring special transport conditions are generally set-off by the comparative advantage of the relocation place (labor costs, proximity to raw materials or market etc.). Therefore, the physical and technical features of the products are critical for its transferability. Other product features that are important in terms of supply are, among others, size and weight, warranty period, perishability and warehousing capacity.

As external barriers, we list, for example, limitations in the transfer of the raw materials and unfinished products – as key assumption for each form of linked international production. They can be divided into natural and artificial transport restrictions [3].

- *natural transfer restrictions* are those related to the technical, climatic and social and cultural features that render impossible the cross-border transfer of goods. As social and cultural influence factors we considered those related to the social environment (work discipline and the way work is perceived by the local workers).
- the most important *artificial transfer restriction* consists in the political and legislative interventions in the investment host or exporting countries. There are usually reference external factors from the enterprise that are critical for the structure of a linked production. On one hand, the existence of such restrictions affects the establishment of new systems, while the possibility of introducing a new one can be influenced by risks management aspects in favor or against a certain system.

Conclusion – Comparison between Different Manufacturing Types

The key features of the international linked production is complexity, while in case of the unique worldwide production and parallel production, a lot of autonomy is to be found in execution due to the lack of resources transfer within the production processes.

Meanwhile, one can find various reasons to support relocating production activities abroad, according to whom the type of fabrication is decided. While relocation of fully integrated production processes is based most of the times on reasons related to the market where products are sold, the decisions to individually relocate only some levels of production grounds on the endowment with production means, respectively on their costs. While provision of production means, as a parameter of international production relocation, is mainly responsible for direct investment in the primary sector, in the productive sector the key parameters of the international linked production are the differences between production costs.

We also need to consider the distinguishing between various forms of production refers, at all times, to one single product. With regard to the unique worldwide production or parallel production, the question raised regards the achievability of the final product in one or many locations, in one or many stages. In reality, the complexity of this question is higher as the enterprise manufacturing a product is an exception to the rule, while mixing manufacturing of various products in only one location on levels of raw materials, unfinished products and final products is the rule.

Example of Production Network BMW [8]

BMW Group is present in more than 160 countries. Its production network numbers 6 BMW cars and motorcycles factories, as well as the Oxford plant for producing Mini model in Great Britain, with different manufacturing programs:

- Regensburg: Production of 3 Series;
- München: Production of 3 Series, assembly of Z8 model, engines manufacturing;
- Dingolfing: production of 5 and 7 series, as well as of M5 model and varnishing 3 Series;
- Rosslyn (South Africa): Production of 3 Series;
- Spartanburg (USA): production of X5 and Z4 models;
- Berlin: motorcycles production.

As of 2003, the production in the Rolls-Royce branch in Southern England was initiated, while as of 2005 the BMW plant in Leipzig doubled its production capacity. Thus, we can speak of an unique worldwide production for 7 Series, of parallel production in case of 3 Series, while all the other series being subject to linked production concept.

The engines factories in Austria, Anglia and Brazil, as well as the one in München supply all the cars production entities within the group. The production network is completed by manufacturing component parts in four locations in Germany, namely Landshut, Wackersdorf, Berlin and Eisenach, as well as by the competence centers located in the production units or operating individually as research and development centers.

In certain instances, when proving profitable, external partners can be attracted in the mass production (assembling) of certain models, as in the case of BMW X3. Key competences as design, engine construction, supply, testing, customer service and guarantee are kept, together with the related know-how, within BMW group.

BMW's strategy to set-up production units in various part of the world is viable also for smaller developing markets where customs regulations render difficult ready-assembled cars import. In such countries, BMW group uses assembling plants that produce according to "Completely Knocked Down" principle.

The CKD system requires that certain parts and components are packed for specified assembling levels and exported for assembling to the relevant countries. BMW parts exported are completed by other that can be supplied by the local industry. The assembling is performed on the national market where the product is sold, according to the international quality standards applicable to the group.

Currently, BMW group produces cards using CKD assembling in eight locations – in most of the cases in partnership. In Thailand and Mexico it coordinates alone its production units, while in Indonesia, Malaysia, Vietnam, Egypt, Russia and Philippines they approached cooperation with external producers. For 2005, they intend to start production Series 3 and 5 with a local producer in China, as well.

In reality, in companies that manufacture a number of products, the types of manufacturing as combined, which shows that production configuration is not entirely dependant on the form of transaction.

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Aspecte actuale și tendințe ale producției internaționale

Rezumat

Vechea abordare a producției de bunuri dintr-o țară și vânzarea lor într-o altă țară a pierdut teren în fața activităților de producție internațională. Progresele realizate în domeniul tehnologic au permis ca producția de bunuri să se împartă în faze diferite, care pot fi realizate separat, în țări diferite. Costul redus al transportului și comunicațiilor, împreună cu liberalizarea comerțului în țările străine au constituit factori economici favorizanți pentru stabilirea fazelor specifice de producție într-o țară. În prezent, companiile trec de la producția unică pentru întreaga lume la producția paralelă, concentrându-se în specializarea producției din fiecare țară, în concordanță cu avantajul comparativ oferit de fiecare stat.