

Chapter 19

International Production and Sourcing

MNCs are complex phenomena, but their ultimate objective is to sell their products to customers. While other value-chain activities (like R&D and marketing) are certainly highly relevant, the MNC must ultimately provide the goods and services it wants to offer. Sourcing the necessary inputs and producing the right outputs is a complex task that is at the core of an MNC's strategy. This Chapter briefly explains the basic decision between sourcing and production, discusses the configuration of production and sourcing activities and highlights basic production processes. In addition, different types of foreign production plants are described and the main developments in international sourcing explained.

Introduction

The term “*production*” refers to the value-generating activities that transform inputs into outputs and eventually create products. While this term includes manufacturing and service activities, this Chapter will focus mainly on manufacturing activities, i.e. the production of physical products. “*Sourcing*” includes all activities that organise the supply of the company with input goods and services that are needed but not produced within the company itself. *Sourcing* usually involves the identification of the required goods and services, supplier selection, price negotiations, etc. Generally, ensuring security of supply of products of an adequate quality and at an adequate price is the main objective of sourcing managers.

Given that in some industries more than 50% of the value of the final product stems from externally procured inputs, the relevance of sourcing for the MNC's success is enormous. However, both production and sourcing can be understood as *different operation modes* for the same activity. An early decision is providing an answer to the “make-or-buy” question (see Chapter 16). For example, if a car company needs a lighting component as an input for its final product, the company has to decide whether it wants to manufacture this component itself or procure the component from an external supplier. From the perspective of transaction cost theory, this decision merely fixes the level of *vertical integration* in a production chain, i.e., it just determines “who” is carrying out a certain activity. For international production strategies, many authors also use the term “sourcing” when referring to “*internal suppliers*”, i.e. other production units within the same MNC. In this Chapter,

*Relationship
between Produc-
tion and Sourcing*

however, the term “sourcing” is used for procurement from external suppliers.

Configuration of Production Activities

Definition

The first issue that needs to be decided is configuration. Configuration determines where in the world each value chain activity is performed, including the number of locations (Porter 1986, p. 17).

Concentration vs. Decentralisation of Production Sites

An MNC has to decide whether it wants to carry out production activities in one factory in a centralised location or whether it prefers to decentralise the activities across different countries. For example, Swiss manufacturers of luxury watches, like *IWC*, often locate all their production activities in Switzerland and serve the world market from there. Conversely, Japanese car manufacturers started to relocate their production facilities to their target markets in the 1980s and often serve regional markets from regional production sites (see the case study on *Mazda* in Chapter 7).

Advantages of decentralising production activities into different countries include:

Advantages of Production Decentralisation

- *Circumvention of trade barriers:* MNCs can save custom tariffs and overcome non-tariff barriers by locating production in the target market.
- *Acceptance by local governments:* Host country governments prefer local production which has benefits for their labour market, trade balance, etc. Often, they are willing to give incentives for locating production in their countries.
- *Easier adaptation to local markets:* Locating production facilities in the target market leads to increased sensitivity to local market needs.
- *Advantages in distribution logistics:* By locating production closer to the markets, MNCs reduce delivery costs to their foreign customers and shorten delivery times. This shortens their *time-to-market* (which is important for clothing companies like *Zara* or consumer electronics like the *Sony PlayStation*) and to deliver to their commercial customers *just-in-time*.
- *Increased flexibility:* By having production capacity in different countries rather than a single location, MNCs can reduce their risk exposure and shift production more flexibly, e.g. in the case of changes to cost structures or foreign currency exchange rates. In addition, they can exploit ar-

bitrage advantages and market imperfections, e.g. by using cheap labour in one country, better resource access in another country, differences in tax systems or interest rates, etc.

- *Better access to local inputs and better relations with local suppliers:* Local production not only facilitates access to customers but also to local inputs. This can be natural resources (oil, ores, etc.), agricultural products (coffee, rubber, etc.) or other input goods. Relations with suppliers in a foreign market are also improved by locating facilities in their proximity.
- *Potentially lower production costs:* Particularly for MNCs from high-income countries, relocating production to different foreign countries gives them access to lower input prices, most notably a labour force with a lower wage-level.
- On the other hand, concentrating production in one location (in this case, still very often the home country of the MNC) also has some major benefits, including: *Economies of scale and experience curve effects:* Having one large production plant instead of several smaller ones enhances the output volume of the factory, which results in economies of scale and positive effects on unit costs thanks to the experience gained in the production process.
- *Ease of coordination:* While the dispersion of production processes might reduce production costs, it usually drastically increases coordination costs (e.g. between factories in different countries that work in the same production chain). Concentrating production activities in one location reduces the challenge of coordinating dispersed production processes.
- *Better bundling of procurement volume:* Similarly, concentrated production usually leads to better integration of the necessary inputs. Prices for input goods that are centrally negotiated for a large volume delivered to one location are often substantially lower. The coordination effort to bundle procurement of factories in different countries is high (even with modern IT systems) and even in the case of perfect coordination, suppliers will demand higher prices for decentralised deliveries.
- *Better availability of capabilities in some home countries:* For MNCs in industrialised countries like Switzerland, the availability of skilled labour offers quality advantages that are often not available in foreign host countries.
- *Country-of-origin effect:* For many MNCs, the home country is still a major source of its image advantage. Thus, e.g., producing Swiss watches in Switzerland or a *Porsche* car in Germany provides the companies with a competitive advantage.

*Advantages of
Production
Concentration*

Fragmentation and Regional Concentration

In some cases, concentration in the home country is a consequence of *path dependency* and *inertia*. If the existing production facilities are concentrated in the home country, the *cost of relocation* is substantial. *Sunk costs* in existing facilities, existing labour contracts and supplier relations may make a switch to a foreign location – which might be better in a static comparison – too expensive. Closing a factory in the home country is usually met with great opposition by the home-country government and local trade unions. The expected negative image effects of plant closure also lead to inertia.

As a general trend in recent decades, production processes have become increasingly fragmented (i.e., split into different production stages which are located in different countries, an issue that will be discussed later in this Chapter). At the same time, each stage in the production process has become proportionately more concentrated, to avoid inefficient duplication. *Lower logistics costs* (in the last few decades) and *reduced trade barriers* are responsible for this trend. For instance, in areas of regional integration like the European Union, many companies no longer have dedicated factories for each country, instead centralising production to one or a few factories that deliver throughout the region. This trend can be observed clearly in the consumer goods industry (e.g. companies like *Unilever* or *Procter & Gamble*) where in previous decades national factories were created, but where companies are now increasingly concentrating their production. Increased logistics costs – caused by rising oil prices and climate control regulation – may change this trend in the future.

Influence Factors on the Configuration Decision

Given the opposing forces towards concentration and decentralisation, specific influence factors on this decision must be considered (Zentes/Swoboda/Morschett 2004, pp. 390-402; Griffin/Pustay 2013, pp. 486-490). Ultimately, these influence factors help the MNC manager to decide on the optimal production configuration and explain why the optimal decision differs strongly among MNCs.

Product and Production Technology Re- lated Issues

An initial set of influence factors is provided by product and production technology related factors. These include:

- *Product-specific trade barriers*: While some products no longer face major trade barriers, encouraging centralisation, others are still exposed to high custom tariffs, pulling production to the target markets.
- *International standardisation of product*: If there are few national differences in consumer taste and preference for products, the need for local responsiveness is reduced, facilitating centralised manufacturing.

- *Value-to-weight ratio*: Logistics costs are strongly driven by the weight (and volume) of products. If value-to-weight is low (as in the case of beer as illustrated by the case study on *AB InBev* in Chapter 14), there is greater pressure to manufacture the product in multiple locations; if it is high (as in the case of luxury goods), logistics costs do not pose a barrier to producing the product in a single location and exporting it to other parts of the world.
- *Product-specific country image*: Country-of-origin image advantages are usually only present for certain industries, like high-tech products from Japan or the USA, highly reliable products from Germany or Switzerland, or design-oriented products from Italy.
- *Characteristics of the manufacturing technology*: In some industries, *fixed costs* (e.g. for setting up a manufacturing plant) are very high and *minimum efficient scale* (at which most economies of scale are exploited) is also high. In these cases, a company is more likely to centralise its production in one or a few plants (and vice versa). As another characteristic of the manufacturing technology, it has to be considered whether the production process can be separated into different stages or not. If yes, this may influence the location choice for each stage separately, while one continuous and inseparable process often leads to concentrated production in the home country.

In addition, country-related issues have to be considered. Obviously, the MNC's *home country* plays a major role for location decisions, since in most cases *relative advantages* are considered. MNCs from industrialised countries already have access to a skilled but relatively expensive labour force. In addition, the home country's inclusion in regional trade agreements (like ASEAN or the EU) or free trade agreements influences the relevance of trade barriers. Besides home country factors, a plethora of characteristics of the potential *host countries* play a role in location decisions. These include competitiveness, country risk, host government influences, corruption, trade barriers, regional integration agreements, national culture and many more.

Configurational decisions also depend on the MNC, its characteristics and its *strategy*. For example, the competitive strategy (cost leadership vs. quality leadership), the production and inventory strategy (e.g. just-in-time), the international orientation (e.g. global strategy vs. multinational strategy), the configuration of the other value-added activities (like marketing, R&D, etc.) will all have an impact on the configuration of production facilities.

Additionally, customer- and marketing-oriented factors will influence the optimal configuration decision. For example, if the company is attempting to *standardise* its products worldwide, the centralisation option is more viable than in the case of multinational marketing with adaptation of the products

Country-Related Issues

MNC-Related Issues

Customer- and Marketing-Related Issues

to each country. The necessity of flexibility in production and the importance of *delivery times* (like in the high-fashion industry) will shift production closer to the target markets, and the exploitation of the country-of-origin image differs with the marketing strategy. Also, customers' production strategies (in the case of business-to-business transactions) will influence the necessity of locating the MNC's production facility close to the customer.

Location Choice

Countries differ and so does their attractiveness as potential locations for foreign production. The varied characteristics of these different countries (and, linked to this, the customer-related factors) have been discussed above.

Table 19.1

Example of a Scoring Model for the Selection of a Production Location

Location Characteristic	Importance of Criterion in Percent (w_i)	Evaluation of Country (e_i) (from 1 - very bad to 10 - excellent)	Combined Score ($w_i \times e_i$)
Attractiveness of Local Market	20%	8	1.6
Logistics Costs	5%	4	0.2
Wage Level	15%	2	0.3
Availability of Skilled Labour	15%	9	1.35
Innovativeness of Country	10%	8	0.8
Availability of Suppliers	20%	8	1.6
Stability of Local Currency	5%	9	0.45
Political Risk	10%	4	0.4
SUM (Overall Score)	100%	-	6.7

The selection of a certain location is – as becomes evident when looking at the different reasons for concentration vs. decentralisation – important because it influences production costs, logistics costs (procurement logistics, production logistics and distribution logistics), access to resources and customers but also the development of capabilities, e.g. the ability to adapt products to a certain market. Given the various reasons for establishing international production sites, the weight that companies attach to these individual factors naturally differs. Thus, a *scoring model* is usually a pragmatic instrument for selecting a location for a production facility, since it integrates location characteristics and considers the differing requirements of each company. An example is given in Table 19.1. Here, a single location is evaluated. The overall score of different locations has to be compared for the final selection.

Given the effort required to evaluate many locations using this procedure and in particular to gather the necessary data, *multi-stage selection procedures* are often applied. Here, many countries are initially screened based on very few, often macroeconomic, criteria. This greatly reduces the set of feasible alternatives. In a second stage, more criteria are included for the reduced country set and all countries below a certain threshold are eliminated. In the third stage, specific locations within countries are compared using a more detailed set of criteria that are customised to the MNC's specific objectives.

Re-Relocation

The last few decades have seen major shifts in global production. Often, companies have relocated their production to foreign countries. However, many studies also reveal that relocation is not a one-way street. Instead, *divestment* from foreign countries is also a very common phenomenon, where companies close down (or sell) foreign production plants and relocate their production back to their home countries. The most frequently cited reasons for “re-relocation” or “reshoring” are the low flexibility of foreign production sites (in particular with regard to the integration of foreign production processes into production chains with home-country factories), logistics costs, transport times, lower delivery reliability, product quality problems in many low-wage countries and the increased cost of coordination. Specifically, foreign production sites require intensive travelling by production managers, frequent meetings, etc., which are too expensive for many SMEs. For the US, where many manufacturing MNCs are currently reconsidering the location of their production activities, further aspects are relevant: a weak dollar, rising wages in developing countries and falling energy prices (due to shale gas exploitation in the US) (UNCTAD 2013, p. 26).

*Divestment
and
Reshoring*

Split Production Processes

The case implicitly considered in the preceding sections is a rather simple one: a one-stage production process and a company that only produces one product. Reality, however, is much more complex. Here, production processes are usually fragmented into *multi-stage production processes* where the different stages have to be linked to form complex production chains.

As a typical example of such multi-stage production processes, a process from the clothing and textiles industry can be illustrated: the manufacture of a pair of jeans. For a pair of jeans that is eventually sold in France, the cotton may be grown and picked in Uzbekistan, then spun into thread and woven into cloth in India. From there, the parts are transported to Bangladesh.

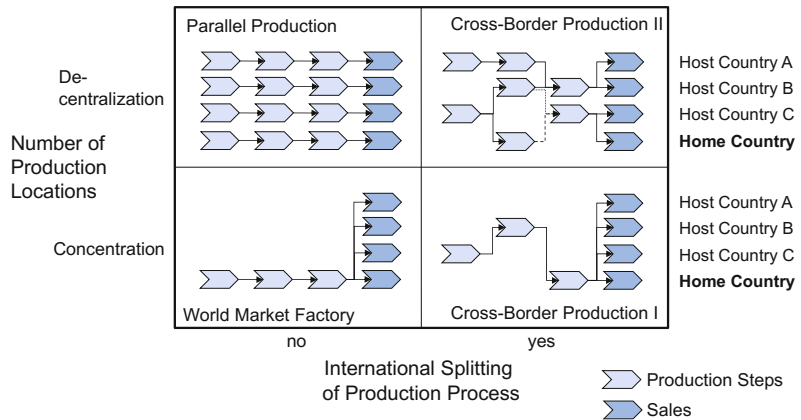
*Multi-Stage
Production
Processes*

Buttons that have been produced in South Korea and labels that are manufactured in Mexico also arrive in Bangladesh where the cloth is cut and made into a pair of jeans. From Bangladesh, the finished jeans are transported via ship to the destination port in Le Havre (for a negligible transport cost of approximately 0.20 EUR per garment).

To give an overview of the basic options for a company in such a case, a (still simple) three-stage production process will be investigated in the subsequent section. A company produces some parts from input goods and raw materials in stage 1, then manufactures components out of those parts in stage 2 and finally assembles finished products in stage 3.

Figure 19.1

Basic Types of Production Configurations



Source: Grünig/Morschett 2012, p. 301.

*World Market
Factories and
Parallel
Production*

Figure 19.1 illustrates four basic solutions for the configuration of such multi-stage processes based on two dimensions: Is the production process split across different countries and are there one or several production locations for each production step? In the case of a *world market factory*, a product is completely produced in one factory (often in the home country) and transported from there to the different international markets. This is the highest possible level of concentration and it takes advantage of all concentration benefits. It also suffers from all the disadvantages of concentration. In the case of *parallel production*, full production chains are replicated in different country markets and each factory serves its local market. Frequently, high trade barriers are the motivation for this production strategy. This strategy is

also employed in cases where different or highly adapted products are produced for the different markets.

Nowadays, multi-stage production processes are very often designed as *split cross-border production processes*. These are characterised by geographically dispersed production stages that are in a vertical flow relationship and by the international flow of goods between the MNC's different production units (given the interrelatedness of production and sourcing, some of those production units might not even belong to the MNC but to suppliers, outsourcing partners, etc.). For each production step, it is still possible to determine whether one country is chosen as location or whether each (or at least one) production step is carried out in several countries.

This fragmentation and separate configuration of the production process has major advantages. In the case of a non-separated production chain, all production stages are exposed to the same country conditions. However, different production stages might have different requirements (e.g. different intensity of capital or labour) which logically results in suboptimal locations for most of the stages in the case of a combined location. This disadvantage can be overcome by splitting production stages and selecting optimal locations for each specific production stage. For instance, labour intensive manufacturing steps can be located in low-wage countries while knowledge and capital intensive stages can be located in countries where skilled labour and the necessary infrastructure are available. However, even in the case of fragmentation, the interrelatedness of the production stages must be considered, i.e. the coordination effort and the logistics costs that result from the overall production chain.

The majority of MNCs are *multi-product companies*. Thus, in addition to being split into different production stages, the production may or may not be split by product type. The *specialisation* of factories to single products (or product groups) has advantages but reduces economies of scope that might emerge from efficiency advantages when several products are produced jointly.

In practice, companies do both simultaneously. For example, *Mercedes-Benz* produces only engines and other components at its factories in Berlin, Hamburg and Stuttgart-Untertürkheim (thus, single production stages), while it undertakes many production stages for its M-class in Tuscaloosa (USA) and the S-class in Sindelfingen (a type of world market factory). For the C-class, as of 2014 the company has started to produce it at four production sites on four continents: Germany, South Africa, China and the USA. Thus, this is a type of parallel production.

Fragmentation of Processes

Product Split

Types of International Production Plants

Foreign production plants are frequently categorised using a model developed by Ferdows (Ferdows 1989; 1997). It is accepted that foreign production plants are often established with one dominant motive. This can be either *access to low cost production factors*, *proximity to attractive sales markets* or the use of superior *local technological resources*. But the competence of the site or, more concretely, the *extent of technical activities* carried out at foreign production plants also varies widely. Six groups of foreign production plants can be identified based on those two dimensions (see Figure 19.2).

Figure 19.2

Types of Foreign Production Plants

Extent of Technical Activities at the Site	high	Source	Lead	Contributor
	low	Offshore	Outpost	Server
		access to low cost production input factors	use of local technological resources	proximity to market
		Strategic Reason for Establishing the Plant		

Source: Ferdows 1989, p. 8; 1997, p. 77.

For example, an *offshore factory* is mainly established to exploit low labour costs in a foreign country. Certain simple parts or components are produced there and usually delivered to the MNC's main production site in the home country or a third country. *Job processing*, where only certain labour intensive production stages are carried out in a nearby foreign country, is a typical example of this factory type (the *maquiladoras* on the Mexican-US border are an extreme example). Technical competence at the site can be very limited and it merely implements production processes that are decided centrally at the HQ or in other factories. A *server factory* often assembles final products from components that are delivered from the home country. Server factories are established to circumvent trade barriers or to adapt the last production stages to the local market needs. With a similar objective but a more complete value-added chain, a *contributor factory* serves local markets (often in the form of parallel production). As a final example, the *lead factories* strategically contribute to the success of the MNC by realising full value-chains

and developing products and production processes based on local technical competence.

International Sourcing

Production involves the transformation of inputs into outputs. It is a question of vertical integration whether the company produces necessary inputs by itself or sources them from external suppliers. A detailed discussion of this decision was presented in Part IV.

Over the past few decades there has been a general trend towards reducing companies' own value-adding and replacing companies' internal production activities with those of external suppliers. The global car industry has demonstrated the benefits of this strategy, with Japanese manufacturers leading the way. As has been pointed out in Chapter 16, this reduction in companies' own value-added has been combined with a development from traditional sourcing to modular sourcing. In *traditional sourcing*, a "one-tier" model was used where numerous suppliers delivered single parts or raw materials to a company. This company then carried out the complex assembly and production task. In *modular sourcing*, a few module suppliers deliver a few complex and pre-assembled modules to a company that only does the final assembly and few of its own production steps.

However, these advantages of single sourcing for strategic components and systems must be balanced with the disadvantages. For certain goods, it might be better to focus supply on a few suppliers rather than just one, e.g. in the case of so-called *dual sourcing*. While the procurement volume from each supplier is lower, with the attendant disadvantages for the negotiation of procurement prices, dual (or more generally multiple) sourcing enhances the *security of supply*. If one supplier cannot deliver, e.g. due to a strike or a political disruption, the other supplier can often replace this volume.

Configuration of Sourcing Activities

For sourcing, the optimal configuration of these activities must also be decided. Given the close association of production and sourcing, many of the arguments mentioned above for and against concentration and decentralisation and activities in foreign countries also hold true for sourcing. The trend towards *global sourcing* has a number of causes (Zentes/Swoboda/Morschett 2004, pp. 313-315):

- unavailability of certain products in the home market

*From Traditional
to Modular
Sourcing*

*Single Sourcing
and Multiple
Sourcing*

*Global
Sourcing*

- cost reduction by using international sourcing markets, e.g. due to lower wages, prices for raw materials, taxes, etc.
- improving the quality of inputs due to a wider selection of suppliers
- improving innovation by monitoring different procurement markets
- securing and stabilising supply by spreading the procurement volume across different countries
- stabilising procurement prices by avoiding sudden volatility in specific regions (e.g. with regard to foreign currencies).

Furthermore, the opening of procurement markets in Eastern Europe and China, which were previously very difficult to access, drastically increased *international procurement*. The increasing competition and strong cost pressure on MNCs resulted in efforts to reduce input prices and, in the last few decades, global sourcing has often been seen as the response to this pressure.

Counter-Trend towards Regional Sourcing

However, the trend towards international or even global sourcing is opposed by a counter-trend towards national or even *regional procurement*. The reasons for bringing back sourcing to the home country or at least home region are manifold. First, the trend towards reduction of inventories and *just-in-time production* as well as towards close supplier relationships promotes local relationships and nearby suppliers than can reliably deliver goods on time. Tight business relationships in *regional clusters* (see Chapter 8) are based on similar arguments. In the motor vehicle industry, *supplier parks* have been developed that gather all relevant suppliers in a geographic location near the manufacturing plant to be able to realise those strategies. *Security of supply* is demonstrably higher in the case of domestic sourcing. Furthermore, consumers increasingly value *regional products* in a globalised world; a trend which has been strengthened in recent years by concern about environmental problems resulting from global transport chains. In the near future, *climate problems* and the scarcity of oil are likely to result in rising logistics costs that may make regional sourcing more efficient.

Objectives and Trade-Offs for International Sourcing

To summarise, international sourcing has to follow four main objectives simultaneously:

- reduction of *costs* of input goods
- *security* of supply
- improvement of *quality* of input goods
- *speed* of delivery.

An international sourcing strategy must balance these four objectives since they are partly complementary but also partly conflicting. For example, sourcing from China is usually substantially cheaper than sourcing from Western Europe, but products take several weeks to transport by container ship or are very costly to transport by plane. The quality level is – as some recent cases have highlighted – not always guaranteed and, given the long transport routes, the security of supply is at risk throughout the logistics chain. On the other hand, from the perspective of a Western European MNC, sourcing in the home country might secure supply and guarantee the quality with very short delivery times, but the cost level might be prohibitive. In this case, Eastern Europe might be a good sourcing location when considering the four objectives simultaneously.

Overall, it is important to note that sourcing decisions should not be solely based on cost considerations but on a bundle of objectives. Also, cost considerations have to include not only the purchasing price of the goods but also logistics costs, risk premiums, etc., which often makes more proximate solutions optimal. Studies have shown that, in the case of German companies, approximately 15% of the total costs of procurement in China are logistics costs.

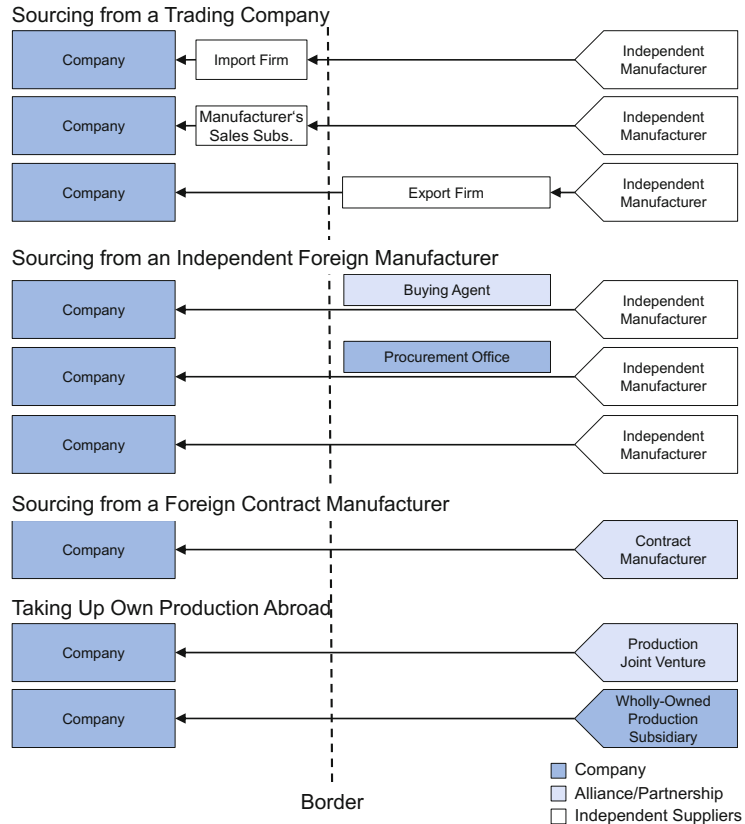
Operation Modes for Production and Sourcing

As mentioned above, from the perspective of transaction cost theory, production and sourcing merely fix the level of vertical integration in a production chain, i.e., it just answers determines “who” is carrying out a certain activity. In a more detailed view, the available operation modes, illustrated in Figure 19.3, can be broadly categorised into four groups, with different options within each (Grünig/Morschett 2012, p. 187):

- A company can buy products from foreign manufacturers *via trading companies*. These can be located in the home country or in the host country. Foreign manufacturers often establish sales subsidiaries in different markets that act as pure trading houses for their products.
- In the second group of operation modes the domestic company buys directly from an *independent manufacturer abroad*. In this case, the company usually buys products from the foreign supplier’s standard product programme. The product technology is usually owned by the foreign manufacturer.

Figure 19.3

Alternative Modes for Producing and Sourcing from Abroad



Source: Grünig/Morschett 2012, p. 188.

- In the third category, a foreign manufacturer produces on behalf of the domestic company. The product specifications are determined by the domestic company, which also owns the product technology. The manufacturer abroad is independent but bound by a *manufacturing contract* (see Chapter 17).
- The last group comprises *companies' own production abroad*. In this case, the domestic company uses foreign direct investment in the selected production market to own or co-own (in the case of a joint-venture) the production facilities. These modes are also referred to as *internal sourcing*, since the supplier is a foreign affiliate.

Conclusion and Outlook

Production and sourcing are core activities for an MNC. Recent decades have seen a dramatic increase in internationalisation of these activities. New locations like Eastern Europe, China and India have emerged as potential locations for production and sourcing. Cost pressures in industrialised countries force companies to internationalise production and reduce sourcing costs. New technologies (in information technology and logistics) act as enablers, reducing transaction costs for cross-border transactions.

Cross-border production processes are the rule, not the exception, as confirmed by the fact that about one-third of world trade today occurs as intra-company trade. However, decentralisation, cross-border production and international sourcing are not only beneficial. There are risks and costs for companies as well as externalities, and it is by no means clear whether this trend will remain or might even be reversed in the coming decades. In any case, optimal management of operations is necessary to achieve the MNC's objectives efficiently and effectively.

Further Reading

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Case Study: Audi*

Profile, History and Status Quo

In 1910, the first *Audi* car was produced in Zwickau, Saxony. In 1932, *Audi* merged with three other *Saxony* car manufacturers (*DKW*, *Horch* and *Wanderer*) to form the *Auto Union AG*. The four rings in *Audi's* logo have their origin in this merger. The company produced cars under the four original

* Sources used for this case study include the corporate websites and various annual and interim reports, investor-relations presentations and explicitly cited sources.

Creation of the Company in Ingolstadt

brands but production under the *Audi* brand was stopped in 1940. After World War II, the former production sites of *Auto Union* were in the Soviet occupation zone and the company was expropriated.

In 1949, the former managers of *Auto Union* recreated the company in Ingolstadt in Bavaria in West Germany. Production began again with the four ring logo but under the brand *DKW*. In 1958/1959, *Daimler-Benz* acquired 100 per cent of *Auto Union*, which in 1965 was sold to the *Volkswagen Group* to which it still belongs today. In 1965, the company also switched from two-stroke engines to the modern four-stroke engines, a move that was accompanied by a brand change. From 1965, the *Audi* brand was used again.

Merger with NSU in Neckarsulm

A further merger, in 1969, with car manufacturer *NSU* is also noteworthy. *NSU* was located in Neckarsulm, were the headquarters of the new company was located from 1969 until 1985 when it moved to Ingolstadt. The merger also brought the production site in Neckarsulm into the company.

Two other acquisitions brought new brands to the company that are still used and very popular today. Since 1998, the Italian luxury sports car manufacturer *Lamborghini* belongs to *Audi*; in 2012, *Audi* acquired *Ducati Motors*, the Italian manufacturer of high-performance motorcycles.

Surpassing Mercedes

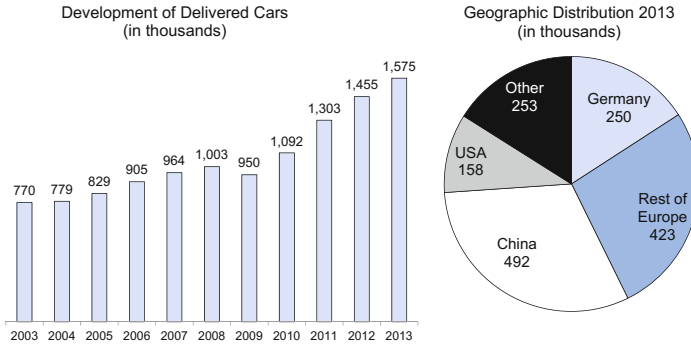
The *Audi* brand has developed very well since its rebirth in 1965. It slowly moved into the premium segment of the passenger car market, i.e. against its main competitors *BMW* and *Mercedes*. Sales grew steadily. In the last ten years, sales have more than doubled (see Figure 19.4). In 2011, *Audi* surpassed *Mercedes-Benz* to become the No. 2 premium car manufacturer in the world. The strategic target for 2020 is to sell more than 2 million cars.

Underperforming in the USA

Audi's largest single market is China, where it achieves more than 30 per cent of its sales and where it is the leader ahead of *BMW* and *Mercedes* (see Figure 19.4). From the perspective of the current production strategy it is notable that the USA only makes up 10% of *Audi's* sales. In this market, *Audi* is much less successful than its main rivals *BMW* and *Mercedes*.

Deliveries (Sales) of Audi – Development and Geographical Distribution

Figure 19.4



Source: Audi 2014a and several annual reports.

Production of Audi Vehicles around the World

Audi operates under the slogan “Vorsprung durch Technik”. With a workforce of 73,000 people, *Audi* currently produces cars with the *Audi* brand in the two traditional German production sites in Ingolstadt and in Neckarsulm and in eight more countries in Europe (Hungary, Belgium, Spain, Russia, Slovakia) and Asia (China, India, Indonesia). Two further production countries are planned for the near future: Mexico, where production should start in 2016, and Brazil, where production will start in 2015 (see Figure 19.5). The different factories produce different car models or components and they serve different purposes which will be explained below. One challenge is to guarantee consistent quality. In light of this, *Audi* has the same motto for every factory: “one name, one standard, everywhere”.

2014 marks the first year when *Audi* will produce more cars outside Germany than in its two factories in Germany.

Figure 19.5 Audi Production Sites around the World



Source: Adapted from Audi 2014b, p. 145.

Production Sites in Germany as the Traditional Core of the Production Network

Home Country as Largest Production Country

Ingolstadt is *Audi's* most important location. It is where the company was founded in 1949, it is the location of the headquarters and it is also *Audi's* biggest manufacturing site. More than one third of all *Audi* cars are produced in Ingolstadt (577,000 cars in 2013). It has all the major parts of the car manufacturing production process: a body shop, a paint shop, an assembly line and even a press shop.

The factory builds some of the company's most important car models (A3, A4, A5 and Q5). For many of the models, Ingolstadt serves almost as a world market factory, supplying most countries with their respective models, and having a high level of value added for these models.

The Ingolstadt factory even has an in-house tool making department which develops and builds meta-forming tools and assembly-line systems for the factory but also for other factories in the *Audi* and the *Volkswagen Group*.

Audi's second German location is in Neckarsulm, about 250 km away from Ingolstadt. It is another major production site with a production of about 275,000 cars. It is characterised by a broad product diversity, building the *Audi* A4 sedan, *Audi* A5/S5 cabriolet, *Audi* A6 (sedan, Avant, S6, allroad

Quattro, hybrid), *Audi A7/S7*, *Audi A8* and *Audi A8*, and *Audi R8* models (in its different versions) as well as the high end models for different *Audi* ranges (RS).

Production in other European Countries

Audi had established its first foreign production site in 1993 in Győr, Hungary. Its main task is to be the global production centre for engines, with an output of almost 2 million engines per year (compared to 1.6 million *Audis* sold last year), supplying the other *Audi* factories and some other customers. The site has also been responsible for the assembly of various models of *Audi* TT since 1998, with the body being built and painted in Ingolstadt. The factories in Ingolstadt and Győr are linked by rail to transport the components between them. In an extension of the factory, *Audi Hungary* has recently taken up series production of the *Audi* A3 (sedan and cabriolet). These two models are the first to be built entirely in Győr. In 2013, about 40,000 cars were produced in Győr.

In 2005, *Audi* started to assemble its SUV Q7 in Bratislava, the capital of Slovakia. From there, the Q7 is exported globally (there are two more assembly sites for the Q7, Russia and India, but these merely assemble, have low value-added and serve only their local markets). It is the final stage in a cross-border production process in which many body components are produced in Ingolstadt and Neckarsulm and the engines are produced in Hungary before being assembled in Bratislava. Győr and Bratislava are only 80 km apart. The factory produced 63,500 Q7s in 2013.

Since 2007, *Audi* also has a factory in Brussels, Belgium. It took over this factory from *Volkswagen*. *Audi* Brussels focuses on the production of the A1 series (A1, sportback, S1, S1 sportback) and it is the only *Audi* site to produce these models. Its output in 2013 was 121,000 cars. An “Automotive Park” helps to link the *Audi* factory to its suppliers. The logistics and supply centre is adjacent to the *Audi* plant and has a direct link to the production site via a bridge.

In Spain, *Audi* recently started to use a production site owned by *SEAT* (another division of the *Volkswagen* Group). *SEAT* and *Audi* invested a combined 330 million EUR in the now joint production site, helping both divisions to achieve larger economies of scale in their production and creating synergies within the *Volkswagen* Group. Since 2011, the SUV *Audi* Q3 has been produced in a factory in Martorell, with an output of 107,000 cars in 2013. Martorell is the world market factory for the Q3, from which it is exported globally. One exception is the Chinese market, where the Q3 is locally produced.

*Engine
Production in
Hungary*

*Assembling the
Audi Q7
in Slovakia*

*Producing the
Audi A1
in Belgium*

*Producing the
Audi A3 in Spain*

*SKD Assembly in
Russia in the
Automotive
Cluster Kaluga*

Audi has experienced strong growth rates in Russia over recent years, with sales of 36,000 cars in 2013. Even though the economy is currently weak, Russia is considered one of the strategic growth markets for *Audi* in Europe. To begin production in the country, *Audi* established a production site in Kaluga in 2013. This is an SKD production site for the *Audi* A6, A7 and A8L sedans and the Q5 and Q7 SUVs. *Audi* has not reported their planned production figures for the Kaluga plant. Kaluga has developed into an automotive cluster within Russia (see Chapter 8). The *Volkswagen Group* has been in the city since 2007, with full production processes for *Volkswagen* and *Skoda*. Other companies have also come to the city: *PSA Peugeot Citroën* for passenger vehicles and *Volvo* and *Renault* for trucks. Further, automotive suppliers such as *Magna International*, *Continental*, *Benteler*, *Severstal-Govvarri* have followed their customers and built plants in the region (Russian-German Chamber of Commerce 2014).

Production in China, Audi's Most Important Market

China is *Audi's* most important market, with sales of 492,000 vehicles in 2013. This is way ahead of *BMW* and more than twice as many cars as *Mercedes* sold in this country. *Audi's* long relationship with the market and local production spanning more than two decades have certainly played a role in this success.

*Production in a
Joint Venture*

Audi produces in a production site in Changchun, a complete production facility owned by *FAW-Volkswagen Automotive Company*. This joint venture was created between *First Automotive Works (FAW)*, a state-owned Chinese company and one of China's largest automotive companies, and *Volkswagen* in 1991. In 1995, *Audi* became the third joint venture partner, with an equity holding of 10%. At that time, it was not possible for a foreign company to wholly-own a production plant in China. Currently, the plant in Changchun produces the *Audi* A4L and *Audi* A6L, in particular the long-wheelbase versions, which are very popular in the Chinese market. In fact, the *Audi* A6L is *Audi's* bestselling car in China; the *Audi* A4L is the second highest selling model. The *Audi* Q3 and *Audi* Q5 SUVs are produced mainly for the local market for a total output of 420,000 cars in 2013.

*Establishment of
a Second
Production Site*

Given that the compact market in China is fast-growing, it is also important to produce cars in this segment in the country. In 2013, the *FAW-Volkswagen-Audi* joint venture established a second production plant, also a complete production facility, in Foshan in Southern China. The *Audi* A3 sedan and the A3 sportback are produced at this site, and production in the first year is expected to reach 150,000-200,000 cars.

Local production in China has a number of advantages. Among other things, it helps *Audi* to avoid the 25% import tax in China (Team 2014).

Production in India and Indonesia

In India, *Audi* has had a small-scale production in a contract manufacturing agreement with *Skoda*, another *Volkswagen* division, since 2007. *Škoda Auto India Private Ltd.* assembles about 9,000 *Audis* for the Indian market, of different models (A4 sedan, A6 sedan, Q3, Q5, and Q7).

In fact, the value-added in India is very low; the cars are assembled from parts produced in Europe. For example, the *Audi A6* is assembled from ca. 2,500 parts that are shipped in containers from Hamburg and Bremerhaven in Germany. Car bodies are already painted, the engines completed and many components (like the front seats) are preassembled. From these parts and components, the workers in India assemble the final cars.

Indonesia has a very strong growth rate, and with 240 million inhabitants and a growing middle class it is likely to soon become the largest car market of South-East Asia. However, import tariffs are very high, at 40% for vehicles. This makes local production or at least assembly favourable. The tariff duties in Indonesia for CKD kits (completely-knocked-down kits of cars that are then assembled) are substantially lower, approx. 10% (DB Research 2011, p. 9).

Audi has some of its models for the Indonesian market assembled in the country. In 2011, it began a cooperation with *PT National Assembler*, a local vehicle assembly company (and a subsidiary of *Indomobil*), which also assembled some *Volkswagen* models. This partner assembles the A4 and A6 models for the Indonesian market in an SKD (semi-knocked-down) process. In this process, the cars are first completely produced and assembled at other *Audi* plants (mainly in Germany). They are then disassembled again and packaged as assembly kits which are shipped to Indonesia. *PT National Assembler* completes the car and employees specially trained by *Audi* carry out the final quality inspection. The capacity and long-term plan is for several thousand cars per year (the original target was set at 2,700 cars by 2015) but the current development is very weak. In 2013, only 186 *Audis* were produced in Indonesia, following a weak demand due to devaluation of the local currency.

Establishing a New Major Factory in Mexico

Audi is strong in Asia but it is weaker than its rivals in the US. *BMW* and *Mercedes* have both established production plants in the USA which gives them advantages in the country. In January 2012, *Audi* stated that strong growth in the USA would be crucial for the company's strategy and that an *Audi* production plant in the region would be important to achieve this ob-

Assembling in India

SKD Assembly in Indonesia

Location Choice for North America

jective (Handelsblatt 2012). In a series of press releases, *Audi* revealed more details about this plan.

In mid-2012, the company announced that its North American plant would be located in Mexico. The location close to the US market, competitive cost structures, good infrastructure and the over 40 existing free trade agreements between Mexico and other countries (including integration in the NAFTA) were cited as reasons (see the case study in Chapter 7). Later, it was announced that a detailed location evaluation process, with more than a dozen locations analysed, had chosen San José Chiapa, State of Puebla (less than 100 km from an existing *Volkswagen* plant in Puebla City) and *Audi* would invest about 900 million EUR in this production site. A number of criteria were mentioned for this location choice – site conditions, logistics link, infrastructure, well-qualified employees and quality of life. Highly reputable universities and colleges of advanced technology as well as internationally recognised schools help to find qualified employees but are also important to *Audi* for international assignments. As HR director T. Sigi explained: “When deciding on a new site, it is important that we can find well-qualified employees there. Internationally recognised schools for the children of employees sent on assignment to Mexico are also crucial” (Volkswagen AG 2012).

World Market Factory for Q5

Production in Mexico is planned to start in 2016; *Audi* will produce its SUV Q5 in the plant and supply the world market for this model from Mexico. The expected volume is about 150,000 cars per year. Some additional features are noteworthy in the case of *Audi* in Mexico (Stadler 2013):

Very Strong Local Sourcing

- *Audi* declared that it intends to have a local content of 65% in the medium term; thus, 65% of all sourced parts for the Q5 will come from North America, increasing to 90% in the long-term.
- Thus, global suppliers are encouraged to relocate their production for the Q5 to Mexico as well. The *Volkswagen Group* will build a just-in-sequence suppliers’ park halfway between San José Chiapa and Puebla City, from where suppliers will be able to quickly supply both the *Volkswagen* plant and the *Audi* plant.
- The plant brings enormous benefits for the local economy. *Audi* expects that for each job at *Audi*, another five jobs will be created in the vicinity, at suppliers and in the rest of the economy. In total, they expect up to 20,000 new jobs to be created as a result of the new production site.

Made by Audi in Mexico

The new plant in Mexico also illustrates the standardisation of production at *Audi*. As the Chairman of the *Audi* board pointed out in a speech when laying the foundation stone to the factory: “The 3D animation of the factory’s layout shows: Each machine here will have the same position as all over the

world, thanks to our modular production toolbox. Our *Audi* Production System ensures that our customers all over the world can rely on the seal of quality ‘*made by Audi*’” (Stadler 2013).

Establishing Production in Brazil

As a further step to increase its international production footprint, *Audi* also announced that it would begin production in Brazil from 2015. The *Audi* A3 sedan and the *Audi* Q3 will be produced in Curitiba in Southern Brazil. The car market in Brazil is booming and the premium segment is growing particularly strongly. With production in Brazil, *Audi* wants to have a basis for further growth in the region. Starting in 2014, *Audi*’s competitor *BMW* is producing in its own plant in Brazil. These moves are certainly to circumvent the high tariffs on imported cars and take advantage of the tax incentives given by Brazil for such investments.

Production will take place in a *Volkswagen* brand production plant but *Audi* will invest in a specific production line for its models. *Audi* also intends to buy locally. Up to 35% of the sourced parts for the A3 should come from Brazil. To achieve this objective, *Audi* has started to build up relationships with Brazilian suppliers.

Production of other Brands of the Audi Group

The production configuration of the *Audi Group*’s two other brands is rather simple. *Lamborghini* manufactures its sports cars at its headquarters in Sant’Agata Bolognese in Italy.

Ducati has until recently only manufactured its products in its site in Bologna in Italy. But in 2011 *Ducati* opened an assembly factory in Thailand in order to better penetrate emerging countries. It has shifted the final assembly of some models for Southeast Asian markets to this plant in order to avoid the extremely high import tariffs on foreign-made motorcycles. Furthermore, *Ducati* now lets a contract manufacturer (*DAFRA*) assemble its motorcycles in a CKD process in Manaus in Brazil from parts produced in the Italian factory. This is to improve its position in the emerging markets of South America and particularly Brazil, which is the third biggest motorcycle market in the world for medium- to high-capacity bikes.

Summary and Outlook

Audi uses a sophisticated production strategy in which different configuration strategies are used for different models and components. The increasing shift of market growth away from Western Europe to Asia and the Americas

Production Together with Volkswagen

Centralised Production for Lamborghini

Some Foreign Assembly for Ducati

requires a shift in production locations. The new production locations do not replace the existing ones but complement them in meeting the new demand in other parts of the world.

Similarly, *Audi* does not apply the same operation mode in every production country. In some cases, *Audi* establishes wholly-owned subsidiaries; in others, it partners with other divisions of the *Volkswagen Group*; and in other countries, alliances with local companies, on different levels and with different strategic relevance, are considered the optimal choice.

With different partners and different production countries, it is a challenge to guarantee a uniformly high quality. *Audi* follows a standard production system everywhere, which is intended to ensure that “*made by Audi*” entails the same quality no matter where the product comes from.

Questions

1. *BMW*, *Audi*'s main rival, has announced a strategic principle of “production follows the market”. Analyse whether *Audi* also follows this principle.
2. In China, *Audi* cars are produced in a joint venture with *Volkswagen* and a local, state-owned automotive company. Discuss the benefits and risks of this approach.
3. For the North American market, *Audi* has decided to locate its production in Mexico. Just a few years before, *Volkswagen* decided to establish a production site in the USA in order to conquer this market. Compare both strategies.

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