

CHAPTER 2 General insights about Automotive Supplier Parks

The objective of the present chapter is to give a broad evaluation of the concept of an Automotive Supplier Park (ASP). The chapter is structured as follows: The first part is dealing with the main characteristics of the supplier parks, followed by a description of the supplier park landscape, i.e. where did the supplier park initially appeared and in which parts of the world supplier parks are mostly concentrated. The third part is dedicated to the description of the three main different types of supplier parks, illustrated by one example for each type.

Afterwards, I am going to describe the reason for both car manufacturers and suppliers to participate in the supplier park and name the main advantages and disadvantages a supplier park offers, pointing out the 4 dilemmas of supplier parks. The seventh part is investigating the actual general situation in supplier parks and which current trends they are undergoing. The last part of this chapter is dedicated to the elaboration and analysis of alternative concepts for the supplier to assure adequate JIT-deliveries to the car manufacturers.

2.1 Definition of an Automotive Supplier Park

In literature, one can find various definitions and concepts called *supplier parks*. The objective in this part of the thesis is to define the basic characteristics of a supplier park, on which theoretical concepts the idea of the park is founded and what benefits the park is supposed to bring for their participants.

2.1.1. Characteristics of an Automotive Supplier Park

Number of participants

The first question to analyze is the number of participants in the supplier park. A common definition in many articles is that there has to be a group of suppliers needed in order to call it a Supplier park (Volpato & Stocchetti (2001), Becker (2005)). Sihm & Schmitz (2007) go a step further and define a supplier

park as a cluster of more than two suppliers which are established adjacent or close to the assembly plant.¹

In general terms, one can say that the number of suppliers in a supplier park varies in a range between 5 and up to 20 suppliers, always depending on the type and the design of the park.

Proximity

A very important aspect in the definition of a supplier park lies in the proximity between the suppliers' facilities and the final assembly plant of the car manufacturers. Hereby, the various definitions differ from each other. Whilst Volpato & Stocchetti (2006) say that the supplier are located precisely on a single adjacent site of the car manufacturer's plant, Sako (2003) points out that supplier can either be on a adjacent site of the OEM's plant or close to them. It depends also on the type of the supplier park, which are going to be explained in part 2.3.

Planning

A particularity of a Supplier Park, which meets a consensus in the literature, is the holistically and deliberate planning of the park. A member of a supplier park chain should be willing and able to plan, as well as implement a design for the supplier park. In almost every case the OEM takes care of the planning and coordination of the infrastructure, sometimes with the help of the local governments². This distinguishes the supplier park significantly from other types of industrial clusters, where suppliers locate their plants close to the OEM on their own initiative.

Physical layout

Concerning the physical layout of the Supplier Park, one can find three different approaches. The first one is the location of both the suppliers' production and the car manufacturers' final assembly under the same roof. A second possibility is to locate the suppliers on one adjacent site of the OEM's final

¹ Sihm & Schmitz (2007), p. 480

² Becker (2005), p. 30

assembly. The last scenario is to locate the suppliers in the nearest proximity of the car manufacturer and connect the plants with a ground or aerial conveyor in order to transport the goods.

Transport of the goods

The transport of the goods and the logistic in the supplier park can either be handled by the suppliers itself, by the OEM or by a third-party-logistics provider (3PL). In the last case, a third-party logistics provider can be working for all suppliers in the park. A good example would be the Supplier Park of VWN (Volkswagen Nutzfahrzeuge) in Cologne, Germany, where *Schenker Logistics* provides all kinds of logistic transport network, which also includes the establishment of transport software which is used to guarantee the best logistic flow.³

Another option would be to contract a 3PL for single processes, for example only for transport or for stuffing the goods in a warehouse, depending on the necessities of the participants.

Information flow

Supplier parks rely heavily on the use of information systems. In many cases, the car manufacturers oblige their suppliers to use the same computer-integrated systems as they do in order to be able to transmit the data efficiently. Nowadays, both OEM and suppliers dispose of integrated systems such as: ERP, Inter- or Intranet to facilitate the communication and information flow among each other. An example of how information flow can occur in a supplier park can be depicted in figure 1.

³ Becker (2005), p. 106 ff.

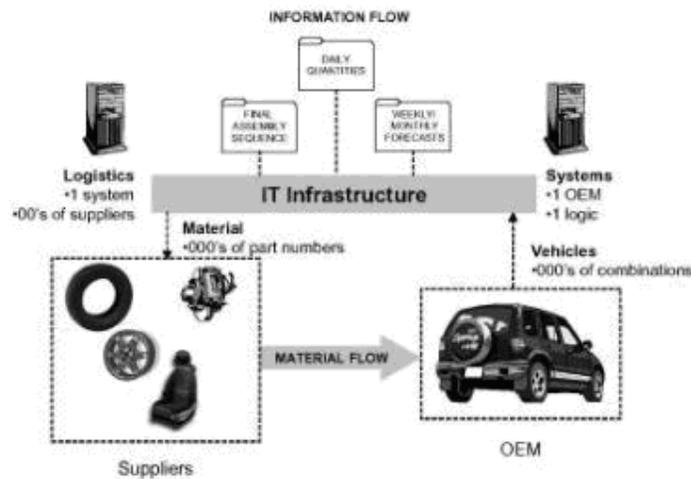


Fig. 1

Source: Desouza (2006), p. 152

Underlying theoretical concepts behind supplier parks

Lean Production

Lean production emerged for the first time in the decade of the 1980's in Japan. It is an advancement of the Fordism, which was characterized by mass production and its emphasis on long production and economies of scale on purchasing, low costs units, and dedicated technology⁴

Lean production is, in a very general way, a logistic system that is demand led rather than production led and seeks to match output with demand in a precise sequence. Basic elements to lean production are Just-in-Time (JIT) deliveries from the suppliers to the assembly plants, low inventories (except for emergency buffer stocks) and flexible technology, among others. The essential difference between Lean production and Fordism is the difference between push- and pull systems. Whilst Fordism is “push”-based, i.e. the firms have to sell their products in whatever way possible, Lean production nowadays is “pull”-based, i.e. it seeks to provide the consumer with the car of their choice.⁵

⁴ Donnelly, Morris, Donnelly (2006), p. 4

⁵ Donnelly, Morris, Donnelly (2006), p. 5

Clustering

In the case of supplier parks, a cluster is related to the geographic concentration of the different firms. As Porter defines, *a cluster is a geographic concentration of interconnected companies and institutions in a particular field [...]. Clustering leads to high productivity and innovation because it gives good access to resources such as employees, suppliers and specialized information*⁶.

Although clustering is not the most important factor whether a supplier park works well or not, it is considered as a useful tool and can cause desirable outcomes.

Modularization

Another important concept that motivated the diffusion of Supplier Parks is modularization.

Many Tier-1 suppliers have moved from being simple part producers towards providing sub-assemblies or modules which can be fitted in sequence onto vehicles⁷.

Modularization is said to bring the following benefits

- Flexibility (enabling the OEM to meet a wider variety of customer demand)
- Speed and Exchange Design Capability (enabling the firms to shorten the time to piece together new products)
- Cost reduction (expecting labour cost to be lower in supply firms)

Outsourcing

The tendency to outsource parts of the production by the car manufacturer has become a major trend in the automotive industry. Nowadays, the amount of components value owned by the car manufacturers in the supply chain is around 35 % while the remaining 65 % is in the hands of the suppliers (see figure 2)

⁶ Sako (2003) p.6, based on Porter (1998)

⁷ Donnelly, Morris, Donnelly (2006), p. 4

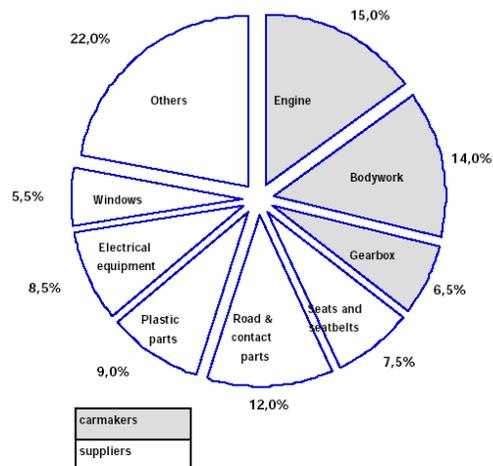


Fig. 2

Source: Volpato & Stocchetti (2006), p. 7

2.2 Automotive Supplier Park landscape

Taking a look at the worldwide supplier park landscape, one can detect two regions where supplier parks are mainly widespread: Brazil and Europe. Brazil was the country where the first supplier parks were constructed in the 1990s. Brazil has been treated by many US and European car manufacturers as an experimental ground - a laboratory- for testing new manufacturing concepts.⁸ Most of the parks have been built up at Greenfield sites⁹. Especially Ford and General Motors (GM) built up large pilot projects.

In case of the European car manufacturers one has to mention Renault, whose plant in Curitiba provided the basis for their supplier parks in Sandouville, Douai and Palencia (Spain).

In Western Europe, the supplier park landscape is much diversified. Every important car manufacturers has at least one supplier park running. As in Brazil, Ford also played a pioneering role in bringing industrial parks or supplier campuses to the region, starting with Valencia, Spain and Saarlouis, Germany,

⁸ Sako (2003)

⁹ Greenfield sites are fields which had been used for agriculture or orphaned before.

both producing the *Focus*. Ford also owns European's biggest supplier park in Genk, Belgium, with a total surface of 900.000¹⁰ sq meters.

Analogue to Ford, many European carmakers have built up a considerable number of supplier parks. Due to the broadening of the European Union towards Central and Eastern Europe, an increase in supplier parks is expected, as car manufacturers receive a large amount of incentives (i.e. low taxes, low labour costs) in this region. In 2008, more than 3,000,000 cars are expected to be produced by the car manufacturers.¹¹ At the same time most of the car parts are still coming from Southern and Western Europe. The consequences are cost intensive and long-distance transportation throughout Europe. Therefore, automotive suppliers are expected to follow the way of the car manufacturers, which can lead to an increase in the number of the ASP's.

In the USA supplier parks are not as widespread as in Europe or Brazil. The first supplier park was opened by Ford in Chicago in 2004 and is seen as an enhancement of Ford's European supplier parks, taking into account North American particularities.

Unlike Ford, some European OEM's treated Greenfield sites in the US as experimental grounds, particularly Mercedes M-Class at Tuscaloosa Alabama, which served as a role model for its ASP in Austria.

In opposite to the USA, Latin American countries, particularly Mexico, become a very attractive ground for US and European car manufacturers. VW has established the first Supplier Park (*Parque FINSA*) in Puebla in 1996. Chrysler recently opened a new supplier park which consists of 8 suppliers at the end of 2007¹².

The Asian region is so far almost completely excluded in terms of Supplier Parks. One example for a supplier park on this continent is the one built by Nissan in Tochigi, Japan¹³. Nevertheless, integrated production-site concepts used for

¹⁰ Becker (2005), p. 65

¹¹ Sihn & Schmitz (2007), p. 479

¹² http://wardsautoworld.com/ar/auto_chrysler_opens_supplier/

¹³ Juergens (2003), p 26

supplier parks largely follow Japanese examples and essential features for their operations (JIT, JIS) have been developed in Japan long before. European and American carmakers carried some basic ideas further and used, as already explained, their new plants in emerging countries (such as Brazil) as experimental grounds.¹⁴

2.3 Types of Automotive supplier parks

As elaborated in part 2.1, definitions of supplier parks vary, not only depending on the authors but also on the type and design of the parks. Therefore, the objective in this part is to explain the three main supplier park types and their basic characteristics. Furthermore, each of the types is going to be illustrated by one specific example.

2.3.1 Integrated ownership (Modular consortium)

The modular consortium is an extreme form of a Supplier Park. In theory, the **OEM does not get directly involved in manufacturing** or in assembly operations, but **remains in charge of the value chain** through its role in product design and marketing. The suppliers' facilities are built around or on an adjacent site of the OEM's plant. A simplified example of a modular consortium can be depicted in figure 3.

The responsibility for production is transferred to the suppliers, who are seen as partners. One by one each supplier constructs one module. The OEM upstream takes responsibility for coordinating the product's design, meanwhile downstream it is responsible for marketing the product.

In theory, the modular consortium idea also implies that the suppliers are involved in the financing of the park (facilities, machinery), but in many cases (e.g. the parks in Brazil), the OEM found it very hard to find suppliers being able to contribute to the founding.

¹⁴ Juergens (2003), p.27

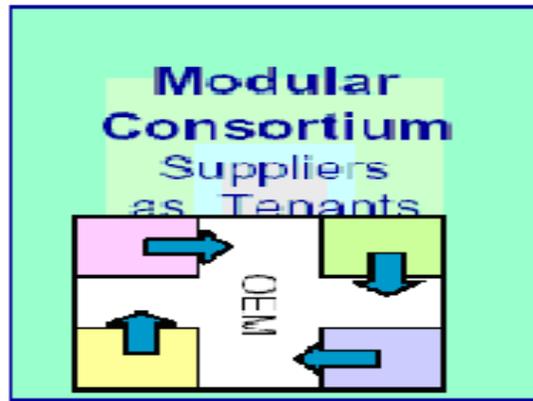


Fig. 3

Source: Sako (2003), p.2

Case - VW Resende

The VW truck plant located in Resende, in the state of Rio de Janeiro Brazil, opened in 1996 and was perhaps the earliest example of an automotive supplier park and an appropriate example of a modular consortium in its pure form. Their initial goal was to produce 30,000 bus-chassis and trucks every year. The biggest part of this production was to be for exportation, primarily to the Mercosur, the USA and Europe.¹⁵

The park is structured as follows: It consists of 7 suppliers, known as “partners”, of which 5 are housed under the same roof. The responsibility for production and module operations and for their assembly on the trucks and buses is transferred to the Tier-1 suppliers¹⁶. Volkswagen, as the car manufacturer, is responsible for marketing the product through its distribution network. The particularity of the Resende truck plant is that none of the VW employees get directly involved in production of final assembly operations, as these tasks are executed by the parts makers’ staff. VW remains in charge of basic design, quality assurance, R&D and coordination amongst suppliers through an Executive Committee and a Co-ordination Committee that meet regularly to define long-

¹⁵ Ramalho & Santana (2000), p. 3

¹⁶ Frigant & Lung (2002), p. 3

term strategy and manage shorter term issues respectively¹⁷. At VW Resende, the OEM owns:

- The entire land, and the suppliers do not pay any rent
- All the buildings, and the suppliers do not pay rent
- All machinery and equipment, including those in paint and body shops, as they designed and paid by VW
- Inventories of materials and components.

Since the suppliers use only materials and components “on consignment”, they are not paid for material inputs they work on, and therefore have no scope for earning profit on their price.¹⁸

Taking all the facts into considerations, the suppliers’ hands are tied as Volkswagen owns everything except labour. But even in labour management Volkswagen takes an informal leadership role in imposing uniform employment governance, and pay and conditions are identical for all workers at VW and partner suppliers.¹⁹

To summarize, VW Resende is an extremely pure case of a modular consortium in which even the final assembly is outsourced to the partner suppliers on site.

2.3.2 Non-integrated ownership (Relational governance)

Supplier parks with a non-integrated ownership are also called *Industrial Condominium* (or in some cases industrial park). In this variant **the car manufacturer owns the premises and leases out or rents space to the suppliers**. The suppliers are either on the OEM site or within reasonable proximity (proximity can vary between 0-10km from the plant²⁰). The transportation of goods from the suppliers to the car manufacturer can either be carried out by a Third-party-logistic-provider (3PL) or by a ground or aerial

¹⁷ Sako (2003), p. 10

¹⁸ Sako (2005), p. 14

¹⁹ Sako (2005), p. 16

²⁰ Pfohl & Gareis (2005), p. 306

conveyor (see figure 4). In contrast to the modular consortium, the OEM generally maintains the control of the final assembly.²¹ Thus an institutional separation dominates with the OEM being the key player.

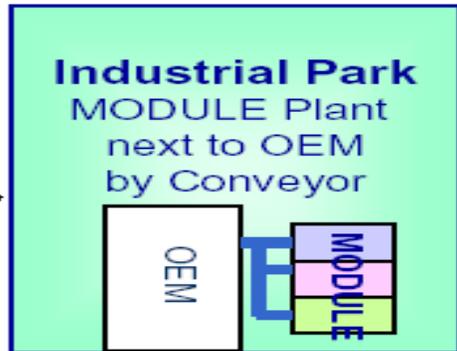


Fig. 4

Source: Sako (2003), p. 2

Case - GM Gravataí

The General Motors (GM) in Gravataí, Rio Grande do Sul, Brazil, also called the *Blue Macaw project*, started in 1996, in order to develop a small subcompact car, with a modular product architecture based on the Corsa platform.

The production of a Corsa derivative, called *Celta*, started in 2000 with 16 *sistemistas*, as the suppliers are called, which came to locate on the Gravataí site. The whole site was initially bought by the state government, which in turn sold little by little to GM and the suppliers. Thereafter, each company erected its own factory building, and purchased its own machinery and equipment²².

At GM Gravataí the degrees of outsourcing of asset ownership and tasks are both less than at Resende. That is, suppliers purchase their own piece of land and construct their own separate factory building. In return, GM retains final assembly in-house.

²¹ Frigant & Lung (2002), p. 3

²² Sako (2006), p. 15

Its vision also included:

- Full participation of suppliers who would co-design, co-validate and co-locate
- The implementation of lean manufacturing concepts, and
- A high degree of de-proliferation (i.e. a base car for which only a small option variety is offered).

Suppliers' ownership of assets was considered unproblematic by GM, whose manager expected suppliers to stay around for a long time.

Whilst respecting supplier autonomy in matters of asset ownership, General Motors at Gravataí takes a lead in instituting a uniform human resource system. Therefore, *The Personnel Policy Committee (PPC)*, consisting of HR managers from GM and the 16 suppliers, meets once a month to discuss matters concerning personnel services, labour relations, and the human resource system²³.

Labour relations on site is governed by a five-year collective works contract, signed between the *Força Sindical* union and the *Gravataí Industrial Complex* (i.e. GM and supplier managements all put together), to implement a common system of flexible work hours, disciplinary steps, and conflict resolution procedure. Lastly, there is a common wage scale that applies to all companies on the site²⁴.

2.3.3 Non-integrated ownership (*Spot governance*)

The non-integrated ownership with spot governance is similar to the relational governance, i.e. the suppliers are located either on site or in relative proximity to the OEM and the car manufacturers keep the control over the final assembly. The essential difference lies in the absence of many relational contracts between the parties. Each supplier has the possibility to negotiate the rent for the building, decides about the specific investment on site, and has its own human resources system. This type of Supplier Park is quite common in many

²³ Sako (2006), p. 16

²⁴ Sako (2006), p-16

Brownfield sites²⁵ in Europe and it reflects the cost-cutting motive of outsourcing as it is estimated that supplier wages are generally lower than automakers' wages which would benefit the car manufacturers and enabling them on initial capital investment cost and on labour costs.²⁶

Case - Renault Sandouville

Renault Sandouville, near Le Havre in Northern France, was established in summer 2000. As various other Supplier Parks built at that time in Europe, Sandouville's role-model was the company's pilot project in Curitiba, Brazil, built in the middle of the 1990's as an experiment for further Renault operations in Europe.

Renault produces in Sandouville cars of the medium- and high-quality branch. They first started with the Renault *Laguna 2* in 2001, followed by the Renault *Velsatis* in January 2003. Besides, in summer 2002 Renault started producing the *Espace 4*.

Sandouville unifies 5 suppliers in the park (see Appendix 1), in order to produce what they called "synchronic sequences" of completed products. Those modules are:

- Fuel tanks
- Door panels, flooring, consoles, dashboard
- Seats
- Roof
- Wiring harnesses
- Luggage trunk

Concerning the workforce in the park, it is clearly dominated by Renault, who employs approximately 6000 people in the park (date: 2005), meanwhile all the suppliers together employ approximately 1000 people. The park is owned by Renault, who rents the other facilities to their suppliers. The park has a surface of 36000m² and the car manufacturing and supplier plants are connected by a

²⁵ Brownfield sites are spots where the car manufacturers already established a plant before the suppliers arrived and built their facilities.

²⁶ Sako (2005), p. 25

payable aerial tunnel in order to transport the parts to the final assembly. The transport of the goods is accompanied by Renault workers.

In terms of quality and speed of production, Renault maintains the overall power. This goes to such lengths that timekeepers of Renault come to their suppliers to stop the time of production. Concerning employment issues, the personnel of the suppliers is under a constant pressure from the client.

Facility management is also completely in the hands of Renault, which can be somehow disadvantageous as, in case of a problem, the suppliers have to call Renault and the problem maintains until Renault employees solve this problem²⁷, which can also lead to production delays.

Labour hours are also closely linked to Renault, i.e. same starting time, same pauses, same closing days, but it can be different concerning the modality, which means that the suppliers don't need to change their proper schedule lines (day-, night shifts).

To summarize this part, each supplier park type with its basic characteristics and an example is listed in the resumptive figure 5.

²⁷ Gorgeu & Mathieu (2005), p. 20

Supplier park type	Example	Characteristics
Integrated ownership (modular consortium)	VW Resende	<ul style="list-style-type: none"> - Suppliers are located either under the same roof or next to the OEM's plant - Responsibility of production is transferred to the suppliers - OEM remains in charge of product design and marketing - The OEM often owns the entire land, building and machinery
Non-integrated ownership relational governance (industrial condominium)	GM Gravataí	<ul style="list-style-type: none"> - Suppliers are located on an adjacent site or in the immediate proximity of the OEM's plant (connected by conveyors) - OEM usually remains in charge of the final assembly - Suppliers generally purchase their own buildings and machinery
Non-integrated ownership - spot governance (industrial condominium)	Renault Sandouville	<ul style="list-style-type: none"> - Suppliers are located on an adjacent site or in the immediate proximity of the OEM's plant (connected by conveyors) - OEM remains in charge of the final assembly - Suppliers usually maintain their autonomy of their facility investments and human resources administration

Fig. 5

Source: Proper elaboration

2.4. Reasons for entering Automotive Supplier Parks

2.4.1 Aims of Automotive Supplier Parks

The creation of the supplier park has the objective to optimize the balance in the triangle quality-cost-time.²⁸ By taking advantage of the proximity between the OEM's plant and the suppliers, the goal is to reduce transportation and logistics cost, improving the quality by having constant data and information exchange and

²⁸ Adam-Ledunois, Guedon, Renault (2006), p. 12

above all, an increase in their reactivity, i.e. to be able to react rapidly in case of quick demands.

The goals of a supplier park are not only quantity-based. Furthermore, a supplier park is created for the interactive apprenticeship between the actors and the creation of common resources in order to increase the benefits of proximity²⁹.

2.4.2 Motives of the Original Equipment Manufacturer (OEM)

According to Becker, the reasons for the OEM of planning supplier parks can be divided into primary and secondary objects. As an important primary object he defines a **reduction of transportation costs** between their suppliers and its own plant as the geographic proximity between the facilities reduces the delivery time for car parts significantly. Moreover, in case that a Third-party-logistics provider (3PL³⁰) provides the logistics and transportation processes, the OEM can save transportation time and transportation costs. Another motive for the OEM is an increase in the **process security** due to the fact that the plants of suppliers and OEM are really close so the probability of an interruption in the production seems to be lessened.

In case of inventory management, the OEM expects to **reduce its buffer-stock**³¹ because as already mentioned, due to the geographic proximity, the risk of an unforeseen production stop can be reduced significantly.

Furthermore, the OEMs expect a considerable **sharing of risks**. The OEM outsources internal activities to its suppliers so they assume more responsibility and risk in the production process. The car manufacturers, at the same time, do not assume all the charges in the production process.

As a secondary object for creating supplier parks, Becker names the **simplification of communication** between the OEM and the suppliers³². This is

²⁹ Adam-Ledunois & Renault (2006), p. 6

³⁰ A 3PL is an outsourced provider that manages all or a significant part of an organization's logistics requirements and performs transportation, locating and sometimes product consolidation activities (Source: http://www.logisticslist.com/2006/02/definition-of-third-party-logistics_06.html; taken from the definition of the Bridgefield Group)

³¹ According to eyefortransport, a buffer stock is a quantity of goods or articles kept in store to safeguard against unforeseen shortages or demands. (<http://www.eyefortransport.com/glossary/ab.shtml>)

particularly important, as beside the habitually communication via email and telephone there exist more possibilities of informal face-to-face contact and short-date appointments in order to develop and tighten the relationship between both parties.

Another important feature a supplier park offers is a **simplified communication on behalf of a software program and Electronic Data Interchange (EDI)**, which can be applied in the whole supplier park.

2.4.3 Motives of the Suppliers

Taking a look at the suppliers' motives for entering supplier parks, one can notice that some of the reasons that they name are quite congruent to those of the OEM. One reason is to **tighten relationships** with the OEM as a result of building up loyalty by intensive integration of the processes in the supplier park³³. If the relationships are tight, the suppliers argue that this would assure more planning reliability.

Besides, being close to the car manufacturers leads to an **increase in the delivery service**. As the distance to the car manufacturer's plant is short, the suppliers do not need to consider external obstacles during the transport. As a consequence, the suppliers can assure a higher level of delivery.

Another very important reason for the suppliers is, in many cases, the **avoidance of expensive innovation & investments in own facilities** as in most cases the facilities and territories belong to the OEMs so the suppliers would only need to rent it. On the other hand it would lead to a greater dependency on the OEM, but especially for companies which are not willing to take risk in large facility investments it is considered a worthwhile alternative to rent the buildings.

2.5 Advantages of Automotive Supplier Parks

The main advantage and the main column for the existence of supplier parks is the geographic proximity between the plants. Physical proximity between firms

³² Becker (2005), p. 33

³³ Pfohl & Gareis (2005), p. 305

can implicit a lot of positive consequences, which will be illustrated in the following:

A very important added value for spatial geographic proximity and spatial concentration lies in the fact **that the OEM and the suppliers get closer to each other**. The nearness of the plants augments the possibility of JIT- delivery. Besides, it enhances the probability of delivering the parts/modules without any damage. If the plants were farer apart from each other, JIT-delivery would be more insecure because both car manufacturers and suppliers would face obstacles such as deficient infrastructure (particularly important in Latin America or Central/Eastern Europe) or possible damage of goods (caused by old and badly-maintained transport facilities).

Organizational proximity

Proximity is not only linked to the geographical component, but also to the organizational function as spatial proximity plays a key role in the establishment of personal relations³⁴. The geographical proximity has direct effects on the evolution of the relations. In effect, the recurrence of the contacts among the actors progressively drives to the homogenization and to the elaboration of common languages and approaches. This way, the organized proximity of the different actors in the park increases the number of interactions among them.

Exchange of tacit knowledge

Physical proximity between firms increases the number of opportunities to engage face-to-face encounters, a type of communication that is particularly useful as it allows exchange of tacit knowledge³⁵. Beyond the fact that it can be directly applied to problem solving, spatial concentration helps to create organizational proximity on the productive site. Furthermore, besides the direct application to some problem occurring in the production process, this informal relation between the car manufacturers and the suppliers also permits the obtaining of strategic information, better establishment of confidence between the

³⁴ Adam-Ledunois, Guedon, Renault (2006), p. 14

³⁵ Frigant & Lung (2002), p. 8

parties and the possibility of implementing changes in a faster and more informal way.³⁶

Establishment of information network

Supplier Parks cannot just reduce the communication boundaries concerning face-to-face contact, but also in terms of Electronic-Data-Interchange. If there is one unique software system in the park which is obligatory for everyone, it will help to improve the communication between the OEM and the suppliers significantly and will avoid misunderstandings in the data exchange.

2.6. Disadvantages of Automotive Supplier Parks

Geographic proximity, which was described as the biggest advantage in the concept of supplier parks, can at the same time **turn into the biggest disadvantage**. Proximity cannot resolve all problems of co-ordination associated with those inter-firm relationships that are of strategic importance for modular assembly.³⁷ Spatial concentration can therefore lead to increasing tension concerning the following issues.

Interdependency OEM-suppliers

As already mentioned, a very important requirement for a good performance of supplier parks lies in the close and intensive relationship between the car manufacturer and its suppliers and it is obvious that both parties have an interest in seeing their relation last. Unfortunately for the suppliers, in practice **the OEM has a much stronger position** in the park and the suppliers' activities are exclusively dedicated to their proximate clients.³⁸ **This strong interdependence can, under a number of conditions, lead to a source of blockade**. It can cause serious problems in case a relationship between the car manufacturer and one of

³⁶ Adam-Ledunois, Guedon, Renault(2006), p.16

³⁷ Frigant & Lung (2003), p.9

³⁸ Adam-Ledunois, Guedon, Renault (2006), p. 18

its suppliers is irreparably damaged, as both could be faced with expensive switching costs in finding alternative buyers/suppliers.³⁹

Incompatibility of technological systems

In supplier parks, inter-firm management becomes a major issue, in the sense that co-operation is the predominant way of coordinating the relationships.⁴⁰ The problem found here is the incompatibility of technological competences between OEM and suppliers. It is very difficult to articulate different technical systems (i.e. the interface between plastic, electronic, and metallic units) if their compatibility is not thought out beforehand. It becomes necessary to perfect the interface modes between various modes.

Geographic proximity therefore can help to implement the sort of interactive process that is necessary for adjustments to take place. This also implies a large number of actors. But what can be seen in the supplier parks is that the suppliers try to keep their own interface technology, also due to pressure occurring from their parent companies.

In the following one can find all advantages and disadvantages or both OEM and suppliers in a resumptive table.

³⁹ Donnelly, Morris, Donnelly (2006), p. 13

⁴⁰ Frigant & Lung (2002), p. 9

	Advantages	Disadvantages
OEM	<ul style="list-style-type: none"> - Possibility of organizing and structuring the park based on their own plans - Reduction in transportation costs - Risk sharing due to outsourcing internal activities to its suppliers - Decrease of inventories - Exchange of tacit knowledge 	<ul style="list-style-type: none"> - Loss of competencies due to outsourcing - Strong interdependence can under certain circumstances turn into a damage of the relationship with its suppliers
Suppliers	<ul style="list-style-type: none"> - Planning security due to long-term contracts with the OEM - Increase in delivery service - Simplification of communication - Decrease of inventories - Exchange of tacit knowledge 	<ul style="list-style-type: none"> - Strong interdependence from the OEM - Little free of decision making - Incompatibility of their technologies in comparison with those of the OEM - Difficulties to cope with OEM's quality standards

Fig. 6

Source: Proper elaboration

2.6.1 The four dilemmas in Automotive Supplier Parks

Concerning disadvantages and challenges in Supplier Parks, Mari Sako⁴¹ determines at least four main areas in which automotive suppliers face a challenge, when deciding on the principles upon which they are initially constructed.

⁴¹ Mari Sako is professor of International Business at the Saïd Business School, University of Oxford.

Modularity vs. Outsourcing dilemma

A lot of attention is paid to modularity. In discussions about supplier parks, there is a certain peculiarity that modularity has to go hand-in hand with the proximity of supplier location. But, if modules have well-defined interfaces and each module sub-assembly can be examined and tested before shipment, then little communication between OEM and supplier is needed and proximity therefore not really necessary. So the question here would be: If the trend in the supplier park goes from a platform strategy to a modular strategy, which advantage does proximity offer?

The main efficiency gain from modularity in production comes from the ability to produce the modules independently of each other.⁴² Thus, tasks in each module can be carried out in parallel to one another, reducing the total throughput time of assembling the car.

Nonetheless, modularity in terms of product architecture which facilitates the parallel processing of modules does not require proximity. There is supposedly minimal amount of tacit knowledge or informal know-how-exchange needed. Of course, many people say that the car is not 100% modular, and its product architecture is still integral which therefore requires close coordination between car manufacturers and suppliers, both in design and in production. This might explain why the sub-assembly of cockpits and doors, whose module boundaries are not so well-defined, has to take place more approximate to the final assembly than the sub-assembly line of engines and seats.

So what would be the particular benefit that geographic proximity implies in the production of modules?

According to Sako, geographic proximity in this case can act as a buffer to cope with failure in order-to-delivery sequencing.⁴³ This would mean that modularized production does not need to be planned as accurately as from outside of supplier parks. This assumption is somehow vague and cannot be used as a principal reason for the modular production in ASPs. So the motives for the

⁴² Sako (2003), p. 16

⁴³ Sako (2003), p. 18

settlement of modular production in supplier parks are based on a shifting fundament.

Dilemma: Modularity vs. Outsourcing
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Commitment vs. Flexibility

According to Sako, this challenge consists of the OEM's and suppliers to obtain the optimal balance between commitment, also called voice, and maintaining a good amount of flexibility (exit) in their trading relationships⁴⁴. A recent trend in the creation of supplier parks is that the car manufacturers are increasing their degree of outsourcing meanwhile they reduce significantly their number of suppliers which now deliver bigger pieces of the car.

According to Sako, the suppliers theoretically can easily pack away their assembly equipment and re-locate elsewhere. In this case, the intensive collaboration that has resulted has not undercut the flexibility in switching trading partners. However, this easiness of packing away their assembly equipment as Sako mentions cannot be applied that facile in practice as the sole-sourcing of modules that a supplier has contributed to designing and developing, and the supplier's purchase and ownership of land, buildings and equipment particularly designed for a supplier park, is based on a deeper relationship that goes beyond proximity and specific investments visible on production sites.

To summarize this part, supplier parks have indeed become the most visible sign of the umbilical cord between OEMs and suppliers. But they may be a production feature that involves R&D and product design activities that go beyond the supplier park. The extent of exit (flexibility) and voice (commitment) therefore cannot be judged by just looking at the existence of a supplier park at a time, but must involve an examination of what happens beyond to the creation of a supplier park.

Dilemma: Commitment vs. Flexibility
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⁴⁴ This can be interpreted differently. According to Hirschman and his book *Exit, Voice, and Loyalty- Responses to Decline in Firms, Organizations and States* (1970), exit refers to the withdraw of the relationship between two companies , meanwhile he calls the way of catching management's attention "voice". However, in this part I will be using the definition of exit and voice according to Sako.

Employment Dilemma

Talking about types of supplier parks, a main difference between modular consortia and supplier parks is the management of labour. In this difference lies another dilemma, which is going to be described in the following:

One reason for OEM's in creating a supplier park is to outsource internal activities so they are able to have access to low-cost-labour and often a non-unionized work environment. The uniform human-resources-system would, to a certain extend, negate the outsourcing basis as it is assumed that in an harmonized employment environment in the park the labour costs would be higher than in an non-unified employment ambience. That is why the OEM in general prefers diversified employment governance. But, and this is the other part of the dilemma, a diversified human-resources system can lead to two basic inconveniences:

- Highly varied HR-practices with the consequences of possible labour turnover and absenteeism⁴⁵.
- Possibilities of interferences from trade-unions in order to fight for higher salaries or even for harmonized HR-practices in the park.

So to summarize this point, it is important to know the advantages and disadvantages that both concepts could imply in order to make a decision for one type of system.

Dilemma: Unified or non-unified Human Resources

Governance Ambiguity

Supplier parks represent a simultaneous implementation of vertical integration of production flows and vertical disintegration of ownership. The latter is a product of OEMs wishing to save on capital costs as an attempt to enhance their return on capital employed. But this has led to the notion of coordinating the whole production process without direct ownership.

In many cases, management by committee consisting of OEM's and suppliers' personnel is seen as a major form of coordination and control. Furthermore, participative governance would improve communication and

⁴⁵ Sako (2003), p. 20, based on Rothstein (2002)

information exchange, which can help to detect problems quickly and easily. But, due to their power, OEMs in general continue to take a lead in such committees, giving direction and command to suppliers which are otherwise autonomous.

Dilemma: Participative or non-participative governance of a supplier park

To conclude this part, the four dilemmas explained by Sako reflect the wide gap that exists in the functioning between modular consortia and industrial condominiums.

All the dilemmas with their basic characteristics are summarized in figure 7.

Dilemma	Characteristics
Modularity vs. Outsourcing	Outsourcing with modular product architecture does not necessarily require proximity.
Commitment vs. Flexibility	OEMs struggling to have the best of both commitment (voice) and flexibility (exit) from suppliers.
Employment	A unified employment undermines suppliers' cost advantage, but a diversified system creates variety that can be difficult to develop standardized work practices in the park.
Governance ambiguity	Vertical integration of production, but with vertical disintegration of ownership, challenges coordination and authority relations.

Fig. 7

Source: Proper elaboration

2.7. Status analysis and current trends of Automotive Supplier Parks

In this part I am going to deal with the actual situation in automotive supplier parks and illustrating the current trends the parks undergo. In this context, I am going to describe which impacts and consequences the trends entail for the suppliers.

Supplier Park foundations – decrease in (Western) Europe, increase in emerging markets

The decade of the 1990's was the time where supplier parks in Europe had their outburst. Each of the big multinational car manufacturers constructed various parks in Western European countries. Nowadays, the number of supplier parks foundation is decreasing rapidly (see figure 8). The main reason for this trend is satiation, as Western Europe is reseeded with supplier parks.

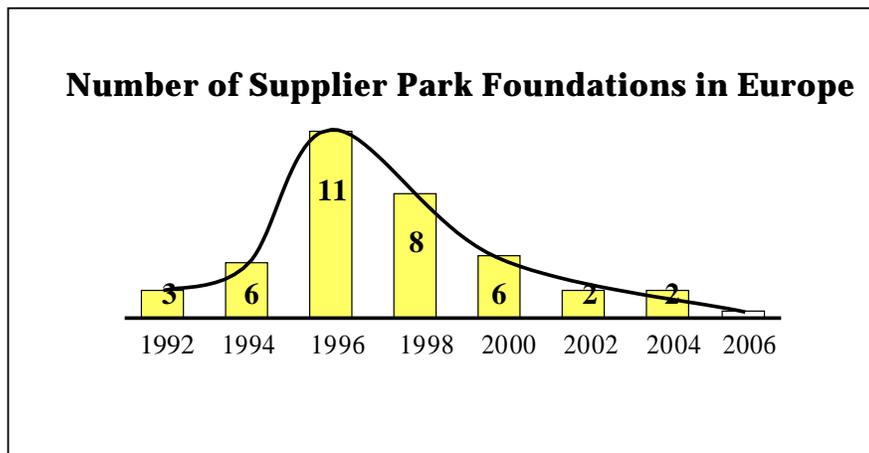


Fig. 8

Source: Becker (2005), p. 68

In opposite to Western Europe, in emerging markets such as Central/Eastern Europe and Latin America the big car manufacturing companies are starting to make big investments in Supplier Parks. Especially Central and Eastern Europe is considered to be a region with very high potential as many car manufacturers have switched their production to those countries due to high incentives from the local governments, lower production and labour costs.

Concentration on a small number of big suppliers

When taking a look at the Tier-1-suppliers located in the Supplier Parks, one can observe more or less the same companies that appear. Those companies are powerful, global acting suppliers like Johnson Controls, Siemens VDO, Delphi, Magna or Bosch. Based on their size, expertise and financial strengths, they have developed core competences with a capacity of innovation and identifying future

trends across the range of areas and are able to offer them to the OEMs. This leads also to a change in the OEM-supplier-relationship. The assemblers can no longer simply issue instructions to their suppliers on the size, shape and performance of the module.

Furthermore, the suppliers are not prepared anymore to accept unilateral price cuts by their suppliers.⁴⁶ That's why the negotiating component comes more and more into play, not only in terms of price agreements and working conditions, but also to the whole production process. As the Tier1-suppliers have the knowledge, expertise and competences that enable them to design, develop and produce modules, coordination of the production becomes more of negotiation and cooperation. Nowadays, even the issue of Research and Development (R&D) is question of both parties. Such relationships imply a lot of trust and information sharing, but it can lead to improvements and learning sharing network. An example for such a learning sharing network is the *Renault Technocentre* in Paris, where several hundred designers and engineers from suppliers work alongside their Renault counterparts⁴⁷.

The concentration of a small number of big suppliers also implies that smaller and medium-sized suppliers will face more difficulties to access to supplier parks, unless they offer very specialized car parts or services.

Relation with OEM

As mentioned in the last paragraph, the relationship between suppliers and OEM become closer, even as far as the questions of R&D is concerned. As a result, suppliers get more and more responsibility in the whole process due to increasing outsourcing. In the increase of outsourcing lies a crucial problem for the car manufacturers, which is the risk that they could lose technical competency. By focusing on its core business and by delegating the task of designing and managing major subsystems to their suppliers, manufacturers will find it more and more difficult to evaluate the projects being proposed by their suppliers⁴⁸. In this

⁴⁶ Donnelly, Morris, Donnelly (2006), p. 10

⁴⁷ Donnelly, Morris, Donnelly (2006), p. 10

⁴⁸ Frigant & Lung (2002), p. 12

context, several car manufacturers have tried to develop such competencies internally in order to create more competition between external suppliers and their own plant. This idea though, is aligned with a considerable increase in the substantial costs and not really efficient as the initial aim of the car manufacturers is trying to minimize their costs by outsourcing activities to suppliers.

Strategies from the suppliers, conditioned by the client – loss of strategic autonomy

Nowadays, the supplier landscape in supplier park is dominated by a small number of worldwide acting suppliers (Valeo, Johnson Controls, and Magna, among others). Those suppliers often operate in different supplier or industrial parks with a different strategy, depending on the car manufacturer they are working for. As a consequence differences between the parent company and the local managers in terms of strategy can occur easily. However, it is essential that the suppliers have to adopt in a certain way to the requirements of the different car manufacturers in achieving a maximum performance.

Passage from Platform strategy to Modular strategy

The first supplier parks established in Brazil in the 1990's, started operating their plant based on a platform strategy, which means that they are declining models from the same platform.⁴⁹ Nowadays, they changed their strategy towards modularization, i.e. the car is decomposed into various modules (engines, transmissions, fuel systems). Often one single supplier (which emphasizes the trend towards big suppliers being able to construct the whole module), is responsible for one module. After that, all modules are put together in the final assembly.

As seen in this part, the tendency in supplier parks is towards the concentration of a small number of big suppliers which form an exclusive circle of partners for the OEM. Due to their size and their acquired knowledge they are able to produce entire modules, which represents a second trend in the parks.

⁴⁹ Frigant & Lung (2002), p. 10

Furthermore, the big suppliers can adapt different strategies specific to the car manufacturer they are working for, which is one the one hand a certain loss of autonomy, on the other hand the adoption is necessary to meet with the OEM's requirements.

This current situation is not favorable for smaller and medium-sized suppliers who have a lot of difficulties to enter the supplier parks, also due to their lack of specific knowledge and capacity to produce entire car modules. So that is why they are usually located further away from the parks.

However, a lot of those suppliers still are an important piece in the whole network of the car manufacturers and therefore have to assure that their car part arrive at the OEM's plant just-in-time. The question is which alternatives those suppliers might use in order to assure JIT-delivery without being too proximate to the OEM's plant. The search and evaluation of possible alternatives to ASP's will be the principal objective in the forthcoming part.

2.8. Alternative concepts to Automotive Supplier Parks

This part of the chapter is dedicated to the evaluation of possible alternatives to ASP's, starting with the analysis of two different types of warehouses, followed by the explanation of a distribution and freight traffic center. The last alternative to mention is the new concept of a Multi-Customer Supplier-Park.

Warehousing

According to Lambert and Stock, warehousing can be defined as that part of a firm's system that stores products (raw materials, parts, goods-in-process or finished goods) at and between point-of origin and point-of consumption, and provides information to management on the status, condition and disposition of items being stored.⁵⁰

Warehousing is used for the storage of inventories during all phases of the logistics process. To make it some simple, two basic types of inventories are distinguished. Firstly, the inventory for raw materials, components and parts

⁵⁰ Lambert & Stock (2001), p. 390

(physical supply) and secondly inventory for finished goods (physical distribution). There may also be goods-in-process-inventory, although they only account for a small amount of a total company's investment in inventory. The role of the warehouse is more properly viewed as a switching facility as contrasted to a storage facility.

Lambert & Stock name 4 different types of warehouses, which are

- Consolidation warehouse
- Breakbulk warehouse
- Manufacturing support warehouse
- Product-mixing warehouse⁵¹

In the following the first two types of warehouses will be explained more specifically.

Consolidation warehouse

A consolidation warehouse is a form of warehousing where usually small shipment orders from a number of sources (plants, suppliers) are shipped to the warehouse in the same geographical area, either in Truckload (TL)⁵² or Carload (CL). Then the consolidation warehouse combines them into larger, more economical (either TL or less-than truckload (LTL⁵³)) shipping loads intended for the same area (see figure 9).

⁵¹ Lambert & Stock (2001), p. 391 ff.

⁵² Truck load (TL) is defined as Volume of cargo that fills a truck trailer—typically weighing about 4,500 kilograms or 10,000 pounds, but usually of any weight that does not exceed the allowable tare. (Source: <http://www.businessdictionary.com/definition/truckload-TL.html>)

⁵³ Less than truckload (LTL) can be defined as any quantity of freight weighting less than the amount required to the application of a truckload (TL) rate. (Source: Lambert & Stock (2001), p. 316n)

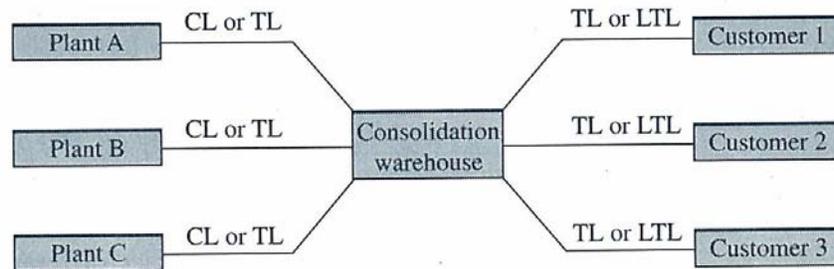


Fig. 9

Source: Lambert & Stock (2001), p. 392

Generally those warehouses are held and maintained by third party logistic providers or, in some cases, freight forwarders. Consolidation warehouses can either be client-dedicated, i.e. they are used by one manufacturer or company, or multi-user facilities, which can be used by more than one manufacturer or company.

The primary benefit of consolidation warehouses is the combination of logistic flows from various small shipments to a specific market area, which is a more efficient way of transportation, especially for car manufacturers as they receive a large quantity of bundled goods in one shipment which also leads to lower total distribution costs.

Internal inventory levels in the companies would be lower because customers can now place smaller and more frequent orders, instead of having to stock up in their plant.

As the warehouse is usually held and maintained by a 3PL, both car manufacturers and supplier do not need to take responsibility for logistical framework and so can focus more directly on their core competencies.

Nevertheless, there are still some concerns and disadvantages regarding consolidation warehouses. Firstly, there is a lot of information between car manufacturers and suppliers entering the warehouse. Those information need to be aligned together with the information of the 3PL which can lead to an information cost increase for all parties. Secondly, the 3PL takes control over the product transportation, which on the one hand could be an advantage for the OEM and the suppliers (by focusing on their core competences), but on the other hand it

could also be a disadvantage as they lose control of the transportation. Therefore, the 3PL and the other parties need to forge close links between each other.

The consolidation warehouse can be considered a very good alternative for suppliers. First of all, they can transport the goods destined to various suppliers to the warehouse, and the car manufacturer receive goods from various suppliers. Under the assumption that the internal warehouse logistic is working well, it can to a certain extent compensate the distance between OEM and suppliers.

Breakbulk Warehouses

Breakbulk warehouse is a facility which receives large shipments of products from a single manufacturing plant, ordered by several customers. After the shipment arrives from the manufacturer's plant at the warehouse, the goods are divided or broken down into smaller LTL-shipments, which then are sent to the customer's plant nearby (see figure 10)

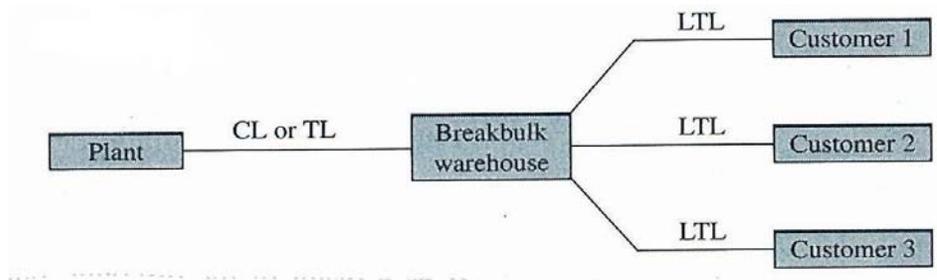


Fig. 10

Source: Lambert & Stock (2001), p. 392

Break bulk warehouses operations are similar to consolidation warehouses except that no storage is performed. The break bulk warehouse sorts and splits individual orders and arranges for local delivery.

The particular advantage of a break bulk warehouse is a decrease in transportation costs as they are used for large long-distance shipments.

This type of warehouse is an adequate alternative in case that various car manufacturer and specific supplier are willing to make use of a breakbulk warehouse. However it could be hard for the supplier to convince the car manufacturers to carry the goods via breakbulk warehouse, and usually it is the

car manufacturer who sets up the rules and this alternative cannot be considered ideal for him.

Distribution centers

A distribution center can basically be seen as a type of warehouse which holds minimum inventory of high-demand goods⁵⁴.

The term distribution center is often misleadingly used as a synonym for a warehouse. In truth, there are substantial differences between those concepts.

A distribution center's objective is to assure cost-effective and supply for the receiving points (in most cases end-consumers). The number of participants of a distribution center is small, as it will often be operated by one logistic service provider or by an internal logistics department of the operating user.⁵⁵

The processes during operation of the distribution center cover mainly logistics activities. In contrast to a warehouse, where products are mostly handled in four cycles (receive, store, ship and pick), the distribution centers often handle only two processes (receive and ship).

Another main difference between warehouse and distribution center is the fact that warehouses store all kinds of products; meanwhile distribution centers are holding a minimum of inventories and mainly high-demand items⁵⁶.

The distribution center can only be considered an appropriate alternative in case the external logistics, i.e. the coordination between OEM and suppliers, works well. As in theory distribution centers do not store any goods, but just consolidate them for immediate transport, both parties (in conjunction with the responsible third-party-logistics-provider for the center) have to assure that the goods are trespassed more or less directly from one truck to another. As especially in emerging markets infrastructure and collaboration are not always working well, it is very difficult to take advantage of this kind of concept.

⁵⁴ ctl.nsuok.edu/drupal/files/Warehousing%20SLIDES%20ONLY%202007.ppt

⁵⁵ Pfohl & Gareis (2005), p. 312

⁵⁶ Lambert & Stock (2001), p. 391, Dawe (1995)

Freight traffic centers

The freight traffic center is a node in the network of the transport-oriented logistics in an economy or a node in several supply chains, which can be reached, theoretically, by two different modes of transport (e.g. rail and road) and can be seen as an intermediary spot between local and long-distance traffic.⁵⁷ An example can be observed in figure 11.

The focus of such freight traffic centers lies on logistic activities. The participants, which are several logistics, industrial or other service providers interested in marketing their assets and services, try to take advantage of the offering a set of complex and diversified logistic services to increase sales volume contributing margins. Besides, a very important advantage of freight traffic centers are logistics cost savings as the participants profit from integrated logistics services offered like the avoidance of empty miles or bundling of transportation.

The relationships between the companies in the freight traffic centers are usually close and aimed for a long-term basis as in those centers a great importance is attached to joint actions in order to obtain synergy and rationalization effects, e.g. by common use of information and communication systems. Nonetheless, each company involved in the park is usually legally and economically independent. Small forms of cooperation can be found in the administration and the supply of real estate, buildings and infrastructure.

In order to be a serious alternative to an automotive supplier park, it is indispensable to have a greater cooperation between all participants than it is described in theory. Furthermore, instead of various logistic providers there should be one exclusive provider being responsible for all kinds of activities within the center in order to avoid interferences and misunderstandings.

⁵⁷ Pfohl & Gareis (2005), p. 309

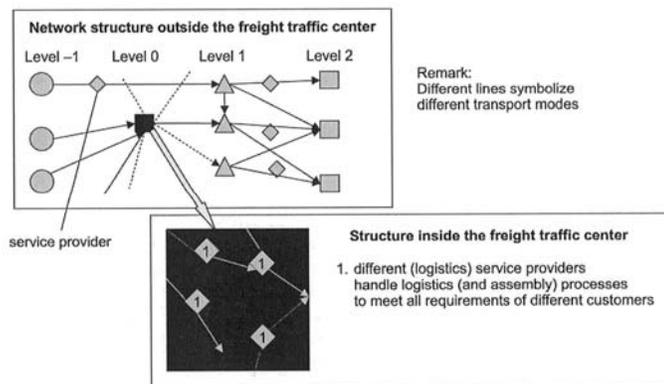


Fig. 11

Source: Pfohl & Gareis (2005), p. 309

Multi Customer-Supplier-Parks

A new alternative to the classic Supplier Park is a concept called Multi Customer Supplier-Park (MCSP). The basic idea behind it is the supply of several OEM in one region of an intelligent supplier structure where several suppliers with component products are established⁵⁸.

The supplier park consists of

- Suppliers producing components in time for several suppliers
- A central logistic hub operated by one or more logistic service provider
- A central production hub carrying out production services for all suppliers
- A central park operator being responsible for the park infrastructure.

The logistic processes are divided in inbound-, park- and outbound logistic.

The structure of the park and the logistic processes is depicted in figure 12.

⁵⁸ Sihm & Schmitz (2007), p. 480

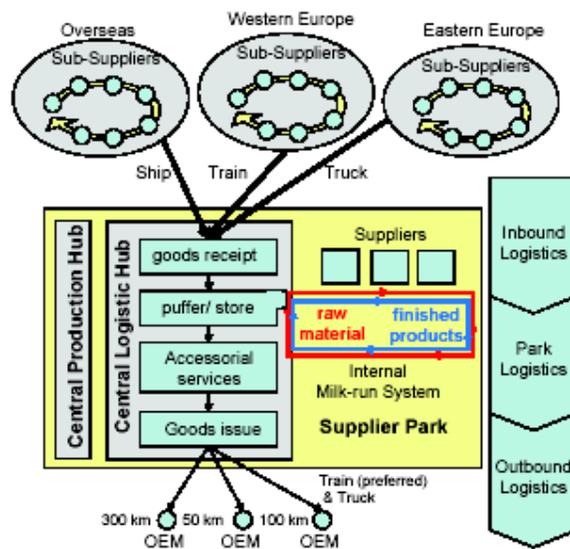


Fig. 12

Source: Sihn, Schmitz (2007), p. 481

One particular advantage that offers a MCSP is the ability to consolidate and combine small transport goods with larger and more economic goods. As a consequence, the cost of transport items, the item cost at the product entry and exit as well as the stock in the entire supply chain decreases.⁵⁹ Furthermore, it is advantageous for the OEM as it reduces the interfaces for them.

One disadvantage of this concept would be a loss in control over the logistic process and the loss of core competences due to the outsourcing of their logistic activities. In order to avoid complication, a good communication and collaboration between OEM, park provider and suppliers has to be built up.

The concept of a Multi-Customer-Supplier-Park is an interesting concept which, in case of a good coordination among all the participants, could be a really appropriate alternative to the classical ASP. The biggest problem hereby is the need of good internal and external infrastructure. Especially in emerging markets the external infrastructure is still not permitting the optimal distribution of goods to the final customer. It can work well for short-distance transportation, but for long-distance transportation the deficient infrastructure (streets in bad shape, old transport facilities) does not permit an optimized flow of goods. Furthermore, the

⁵⁹ Sihn & Schmitz (2007), p. 481

complex organization of this park would need an excellent coordination of tasks and communication. If this is not the case, the park would turn into a chaotic place.

In order to illustrate the established alternative solutions, figure 13 gives an overview of the concepts and its basic characteristics.

	Consolidation warehouse	Breakbulk warehouse	Distribution Center	Freight traffic center	MCSP
Advantages	<ul style="list-style-type: none"> Combination of small logistic flows to a specific market area Lower inventory levels 	<ul style="list-style-type: none"> Suppliers are able to transport large shipment for various clients Reduction in transportation costs as it is designed for long-distance transportation 	<ul style="list-style-type: none"> Small number of participants => clearly arranged Rapid transshipment of goods 	<ul style="list-style-type: none"> Reduce in logistic costs due to highly specialized logistic services 	<ul style="list-style-type: none"> Consolidation and combination of smaller and larger goods Reducing in interfaces for the OEM Reduction in transportation costs for long-distance shipments
Disadvantages	<ul style="list-style-type: none"> Large information flow => requires very good coordination among the parties 	<ul style="list-style-type: none"> Exclusive benefit for suppliers => difficult to convince OEM 	<ul style="list-style-type: none"> Requires excellent coordination among participants 	<ul style="list-style-type: none"> Low cooperation between the companies Various logistic service providers offering services => might be chaotic 	<ul style="list-style-type: none"> Requires excellent internal AND external infrastructure Possible loss of clarity due to the bid complexity
Complexity	High	Medium	Low	High	Very high
Coordination within the complex	High	Medium	Low	Very high	Very high
Interdependence between the companies	High	Medium	Medium	Low	Very high
Advantageous for OEM	++	-	--	-	++
Advantageous for Suppliers	++	++	-	-	+
Conclusion	Most appropriate solution as it offers benefits for both OEM and suppliers and it is not too complex to handle.	Good alternative to ASP in theory, but not realizable as it does not offer any benefit for the OEM	Not realizable as it requires a lot of coordination among the participants and the consideration of external factors	Not favorable for both suppliers and OEM due to the little cooperation between the participants and the intransparent division of responsibilities within the complex.	Interesting and good alternative, but difficult to realize due to its extremely high complexity and the consideration that external influences (e.g. infrastructure) can impede the good functioning of the park.

Fig. 13

Source: Proper elaboration

Summarizing this chapter, a lot has been commented on the advantages, disadvantages and dilemmas of supplier parks. The current situation has been analyzed and possible alternatives have been evaluated. In the forthcoming of the thesis the specific focus will be put specifically put on the Mexico. In the upcoming two empirical studies the objectives are, on the one hand, to take a look at the supplier parks in Mexico and to see whether the advantages, disadvantages and dilemmas can also be observed in this country, on the other hand to see whether the alternative solutions established in the present chapter can also be applied to an emerging market like Mexico and which role freight forwarders can play in these alternatives. Before analyzing the results, I am going to illustrate the methodology of the studies in the upcoming chapter.