Sustainable and profitable growth in the automotive industry

Master's thesis

Volume 1

Sustainable and profitable growth in the automotive industry

"Positioning Van Leeuwen Precision in the automotive industry"

In cooperation with
Van Leeuwen Precision
Deventer, The Netherlands
Represented by
Drs. MBA J.M. Sassen

Under supervision of
University of Twente, the Netherlands
Faculty Bedrijf, Bestuur en Technology
Represented by
Prof. Dr. P.B. Boorsma
Drs. S.J. Maathuis

Author
R.A.G Blokvoord
Master student Business Administration
University of Twente, The Netherlands

Executive summary

Historical background

In the 1970's the vehicle manufacturers (OEM's) relied heavily upon their captive, in-house parts manufacturing operations for as much as 70% of their requirements, but were beginning to buy increasing quantities of products from outside suppliers. Potential suppliers gained "build to print" contracts for an agreed quantity, price and time. During the last thirty years supply chain management grew extremely important. Of course the main reason for this was to control total costs, and hereby increase revenues, in different stages of the supply chain. The OEM's supply chain then was, and still is, divided into three to four distinct layers. These layers are called tiers.
This static tier-model of the automotive supply chain is beginning to be outdated and recently is replaced by a more dynamic supply chain model. Focus is more and more on the integration of the product with other products in the supply chain, described as 'module', 'system', 'component' and 'raw material'.
Some suppliers are willingly taking on the new responsibilities offered to them by the OEMs, transforming themselves into "Tier One-Half systems integrators," that engineer and build complete modules and assume both product design and development responsibilities and downstream supply chain management functions previously undertaken by the OEMs.
Consequently, other firms are choosing not to pursue this new role, consciously deciding to remain in the less demanding tiers.
Suppliers already develop and build 65% of the average vehicle; this share is expected to increase to 77% over the next decade.

Rough study of segments

Because of the time available for this study, a segmentation is needed to construct segments in this automotive industry. Then, these segments are scored according to their potential for VLP based on a quick scan. This quick scan must comprise several criteria that are important to VLP. At forehand, the scores of these criteria most favourable for VLP must be listed. Then, a preferred profile can be constructed for VLP.

		Scores 1-3	4-7	8-10
		Unfavourable	Neutral	Favourable
Criteria:	market growth	< 0%	0-5%	> 5%
	market size	large	small	average
	customer relations – contracts	< 1 year	1 - 2 years	> 2 years
	number of competitors	large	average	low
	competitors' market share division	monopoly	disproportional	proportional
	market access	bad	average	good
	geographical situation	> 750 km	750 - 250 km	< 250 km

The segments must be scored and after scoring each segment, the scores can be compared with the most favourable scores for VLP, and conclusions can be drawn on the segments.

				Criteria				
	market growth	market size	market access	number of competitors	competitors' market	duration of contracts	geographical location	total

					shares			
Segments								
Passenger car	6	6	4	4	4	4	7	35
Commercial vehicle	5	6	4	4	4	4	4	31
Bus/Coach	6	7	6	7	7	6	5	44
Heavy truck	7	7	8	7	7	6	7	49
Agricultural	5	6	8	6	6	6	5	42
Construction equipment	8	7	8	7	7	7	7	51

In the figure above the scores per segment for all criteria are presented. The Heavy Truck (HT) segment, and the Construction Equipment (CE), are both considered to have the best match with the most favourable profile I have created for VLP.
Market growth in both segments is better than in other segments, while market size tends to be more at average. This average market size is assumed to imply that there will be little less OEMs, but that their series manufactured is considerably lower. The smaller the series, the less the willingness of the mill will be to supply accounts directly, and the greater their willingness to supply accounts via Industrial Distributors.
In both HT and CE segments VLP has experience with supplying the series demanded, and it is assumed that mills will not supply these series.
Market access largely depends in my report on the existence of relevant references for VLP in that segment, assuming those references can be used as a means of presentation of VLP's ability to cope with new challenges in these segments. For the HT and CE segment both OEM, first-tier and second-tier suppliers are part of VLP's reference list.
Although the number of competing suppliers, and the division of the market shares amongst them, has to be estimated for all segments, for the HT and CE segment they are scored high because of the smaller series.
The HT and CE scores on the duration of contracts are based on long term agreements VLP has signed in both segments with OEMs. I assume that the contracts with these OEMs are also used, in terms of duration, by other OEMs.
Without doubt the geographical locations of the Passenger car, the HT and the CE segment suit VLP's European presence best. Other segments simply do not offer such coverage.
In the CE segment, and to a lesser extent in the HT segment, all products in the assortment of VLP are used for various applications, more than is the case in the other segments. A considerable amount of material is assumed to be needed to support hydraulics and mechanical engineering parts in the end-products of these segments.

The Construction Equipment segment

Construction Equipment is the industry that manufactures all possible kinds of construction machinery, and sometimes is referred to as 'Off-Highway'. This industry has centralized itself in Europe in the CECE. CECE is the Committee for the European Construction Equipment Industry. It represents and promotes the interests of this important industry sector on a European level and in close co-operation with its sister associations in North America, Japan and Korea also worldwide. CECE is an international non-profit association according to Belgium law and registered in Brussels.

CECE, together with industry players, has categorized the products of construction machinery according to their fields of use into five categories. These five categories are:

- crushing and screening
- tower cranes
- concrete equipment
- road equipment
- earthmoving equipment

Earthmoving equipment (63%) by far is the largest segment in CE in Europe, followed consecutively by road equipment (14%), concrete equipment (11%), crushing and screening (9%), and tower cranes (3%).
In CE often another typology of the end products is used, and this typology distinguishes smaller, less heavy equipment from the larger, heavy equipment machinery. Equipment then is defined to be either Compact Equipment or Heavy Equipment.

The CE industry worldwide is worth 48 billion US Dollars, and the market shares in CE are held by a great amount of OEMs. To come to a better insight, I have defined an OEM to be a relevant player whenever its market share is larger than 2%. This does not imply that other, smaller OEMs are not potential buying customers for VLP in Europe. A comprehensive list of relevant and non-relevant OEMs has therefore been added to the Annexes of this report.
The relevant players in CE are listed in the figure below:

Caterpillar		Deere	
Komatsu		Hitachi	
Terex:		Volvo	
	Terex	CNH:	
	Terex-Atlas		Case
	Terex-Fuchs		New Holland
	Terex-Kaelble		Kobelco
	Terex-Mining	Liebherr	
	Terex-Schaeff	Ingersoll-Rand (IR):	
	Terex-Genie		Ingersoll-Rand
JCB			Bobcat

After distinguishing the relevant players for Europe, I have indicated for all five categories the relation between 'units produced for European countries' versus 'units produced for non-European countries'. For four categories 60%-70% of the units produced find their way to non-European countries, in the Earthmoving Equipment category this is about 75%. This could well indicate that OEMs in time will try to move production to countries outside Europe, in order to be closer to the country of the customer.

The relevant payers thereafter have been listed on market shares and geographical location in Europe, and a list of (preferred) suppliers to CE is presented. A list of products supplied by these suppliers is provided as well.

The Heavy Truck segment

The heavy truck (HT) industry, often referred to as “truck industry” or “heavy duty truck industry”, features only two categories. Unlike the divisions based on application in the CE industry, the division in the HT industry is made based on ‘gross vehicle weight’. The gross vehicle weight is the weight of the truck including its cargo. The two categories are “6-15 tons” and “>15 tons”. Remarkably the European HT industry is not organized in one public association. The result is that market shares that are presented come from HT OEMs annual reports and presentations.

Worldwide there are only 24 large manufacturers of heavy trucks, as is indicated in the figure below. Although one could expect these manufacturers to be very much global players, they are considerably local-oriented and seem to use brand diversification in different global regions. The brand names, which are very common in North and South America, are very rare (if any is sold) in Europe, and vice versa.

The worldwide portfolios of the relevant players in the HT industry consist of the following:

DaimlerChrysler	Mercedes-Benz	Volkswagen	Scania
	Unimog		
	Freightliner	Iveco	Iveco
	Western Star		Astra
	Sterling		Seddon Atkinson
	Mitsubishi-Fuso	MAN	
Volvo	Volvo	Navistar	International
	Renault		
	Mack	Hino Motors	Hino
Paccar	Kenworth	Isuzu	
	Peterbilt		
	DAF	Terex-Tatra	Tatra
	Foden (retired)		
	Leyland	Dongfeng	
		Kamaz	

The OEMs written in green are not active in European production, and Terex-Tatra is only active in production in Czech Republic. Actually, seven OEMs dominate the European HT industry, and they are: Mercedes-Benz, Iveco, MAN, Volvo, Scania, RVI and DAF.

OEMs do not publicly keep track of Eastern-Europe market shares yet in publications. Western-Europe market shares are provided for all of them, and are presented in this report.
The relevant payers thereafter have been listed on geographical location in Europe, and for a list of (preferred) suppliers to the HT industry I refer in this report to the same list used in the CE segment. A list of products supplied by these suppliers is provided as well.

External analysis

Market information from outside the VLP organization is brought into the report in this chapter. To come to a better understanding of the external environment, I have presented a short introduction to Industrial Buying Behaviour (IBB). It describes the buying process, and comes with three buyphases: The new task buying situation, the straight rebuy situation, and the modified rebuy situation. For this report, the new task buying situation is assumed to be most frequently used, because potential customers are to be approached by VLP to achieve growth in both segments, and successes at comparable companies are to be copied to these potential customers.

For all relevant players in the HT and the CE industry I have gathered their ratings for the functions they value most when doing business with Industrial Distributors. These functions are part of the distinguishing package Industrial Distributors have over competitors such as mills. Both Rosenbloom's and Kotler's approaches towards functions have been combined, and these functions need to be stressed when convincing a (potential) customer of the added value VLP can offer.

- Make customer dedicated inventory (CDI), including fixed-lengths, available for call-off to support flexibility and timely deliveries.
- Provide warehousing to offer the customer the possibility to outsource space-consuming operations at the customer's site to VLP. Decreasing the floor space used results in both financial and operational advantages for the customer.
- Offer extensive logistical solutions to the customer to support the call-off of material and the warehousing function and to result in smooth and reliable logistical operations.
- Offer total cost management (TCM) to support long-term relationships and to lower total costs.
- Offer total quality management to assure zero defects, and to anticipate early on bad deliveries (PPM=0).
- Offer reliable deliveries at all time through the independence of mills, the stocking facilities and quality assurance efforts.
- Offer management/monitoring to support continuous improvement of existing and future projects in terms of material quality, efficiencies and costs.

Next to the functions VLP should offer as it is a Industrial Distributor, it should empower general supplier characteristics which are valued by their (potential) customer base. The ten most important characteristics when suppliers are selected, derived from the work of Dickson, have been tested in both the CE and HT industry, and I have made segment specific modifications to the list of characteristics. The results are shown below, assumptions are written in red.

The CE industry:

Hitachi:

Most important
Quality
Price
Reliable delivery
Flexibility
Less important
Technical capability
Performance history
Insurance and claim protocol
Spare parts
Geographical location
Corporate governance
Financial situation
Safety

JCB:

Most important
Price
Quality
Reliable delivery
Important
Production facility and location
Insurance and claim protocol
Technical capability
Less important
Communication system
Performance history
Financial situation
Procedural compliance

Komatsu:

Most important
Price
Quality
Performance history
Reliable delivery
Important
Insurance and claim protocol
Spare parts
Geographical location

Less important
Corporate governance
Financial situation
Safety
Flexibility

Caterpillar:

Most important
Quality
Price
Reliable delivery
Performance history
Important
Production facility and location
Communication system
Insurance and claim protocol
Technical capability
Less important
Financial situation
Procedural compliance

Volvo:

Most important
Price
Quality
Communication system
Reliable delivery
Important
Insurance and claim protocol
Spare parts
Geographical location
Performance history
Less important
Corporate governance
Financial situation
Safety

The HT industry:

Scania:	Volvo/RVI:	DAF:
Extremely important	Extremely important	Extremely important
Environmental-friendliness	Price	Price
Safety	Quality	Flexibility
Quality	Delivery	Quality
Delivery	Communication system	Delivery
Communication system	Important	Less important
Important	Performance history	Communication system
Price	Warranties and claim policies	Price
Spare parts	Geographical location	Spare parts
Geographical location	Spare parts	Geographical location
Less important	Less important	Warranties and claim policies
Warranties and claim policies	Environmental-friendliness	Financial position
Financial position	Financial position	Environmental-friendliness
	Safety	Performance history

Mercedes-Benz:	MAN:
Extremely important	Extremely important
Price	Environmental-friendliness
Quality	Safety
Safety	Quality
Communication system	Delivery
Delivery	Communication system
Important	Important
Warranties and claim policies	Price
Performance history	Spare parts
Environmental-friendliness	Geographical location
Spare parts	Less important
Less important	Warranties and claim policies
Geographical location	Financial position
Financial position	

Quality, reliable deliveries and prices are the most important characteristics of a supplier in this industry. VLP must be able to offer perfect logistic solutions and references to fit the expectations of the OEM, and price-levels can be met as long as volumes are not that large that direct competition from mills must be dealt with. This is mainly because of the great supplier-base VLP has for its products, in order to achieve both good quality and low pricing. Quality, at last, is what VLP already focuses on by providing better qualities of steel products that distinguish VLP from its competitors. However, I have learned that in this industry, and in the automotive industry in general, it is not only extremely important to supply perfect quality, but the process of achieving and maintaining this quality of both product and process at an outstanding level is as much of importance to the OEM. As a supplier in this industry you have to be able to supply products on an ongoing basis at the same high quality, over and over again.
Similar to the CE industry, we see that in the HT industry the high-ranking characteristics again have been valued as extremely important for (potential) suppliers. Quality and reliable delivery are paramount, but almost every OEM in the HT industry requires other characteristics to be incorporated in the supplier's organization. Some OEMs mention the communication system as absolutely necessary, others stress the environmental care which the suppliers must have laid down in an ISO

14001 certificate. Flexibility sometimes is extremely important, in other cases it is not even mentioned. Prices at Volvo and Mercedes-Benz are always key criteria, while Scania and MAN only indirectly mention price as a part of TCM.

Besides functions and characteristics, there is a huge (exaggerated) demand in the automotive industry towards quality in product and process. This demand is captured by the construction of a quality pack which needs to be incorporated in the company of any automotive supplier. It lifts the company to a higher level of perfection, from which the company will benefit when supplying other industries. In short, they can improve the quality of the functions and characteristics of an Industrial Distributor.

This 'quality pack' consists of:

- Quality plans

(P)FMEA	Failure Mode & Effect Analysis
PPAP	Production Part Approval Process
APQP	Advanced Product Quality Planning
PDCA	The Deming cycle: Plan Do Check and Act
Six Sigma	Quality management system that strives for near perfection

- Business philosophies
  Lean manufacturing
  TQM
  JIT
  Kaizen
  Poka Yoke

- Norms and certificates

Organization quality	ISO norm 9001:2000
Environment	ISO norm 14001/EMAS 2
Automotive quality	QS9000/TS 16949:2002
Automotive quality	VDA6.2
Social Accountability	SA 8000

The importance of this quality pack may not be underestimated, and any organization who aspires the position of a supplier to the CE or HT industry, must become familiar with the meaning of this quality pack. Ideally, the organization incorporates this quality pack in its organization before subscribing to any OEM-supplier selection phase.

SWOT analysis

I have first studied the automotive industry and concluded on the high potential segments, and constructed a list of supplier characteristics that are demanded by these segments. These demanded supplier characteristics, namely, now can be matched with the relevant strengths and weaknesses mentioned in the SWOT-analysis.
In any SWOT analysis, the strengths and weaknesses typically refer to internal aspects of the organization. The opportunities and threats are applicable to the external environment of the organization, and can be seen as the trends in the industries, both positive and negative for VLP.

Strengths:

- Few, but convincing automotive references
- Comprehensive international customer track-record – potential network
- Excellence in logistics
- Personnel (embedded) automotive knowledge
- Knowledge for mastering the 'quality pack'
- Product quality
- Price versus product quality

- Flexibility
- Delivery
- Capacity
- Warehousing
- Part of a worldwide operating Group support “act global, think local” mindset

Weaknesses:

- Quality Assurance
- Lack of ‘quality pack’
- Lack of engineering department
- EDI
- Lack of current plan of action
- Lack of automotive network’ contacts
- Warranties and claim protocol
- Reaction time
- Supply base
- Lack of European VLP offices to allow for coverage throughout Europe

Opportunities:

- Outsourcing trend among OEMs
- Demand for component suppliers rather than product supplier
- European customer base allows for strategic alliances
- Enlarging current accounts
- European successes allow for “copy of success”

Threats:

- Move towards low cost countries among OEMs and higher tier suppliers
- Regulations and law
- Mergers in the automotive industry
- Tremendous competition

From the competition can be learned that continuous improvement often is supported by a strong engineering department they have formed in-house, and which results in new product and reduction in costs for new and existing projects. In-time delivery can be guaranteed when an Industrial Distributor has created several strong networks of subcontractors around the OEMs or the higher tier suppliers. This setup is quite unique in the business, and gives anyone an advantage over competitors.

Of course, strengths and opportunities themselves already call for appropriate action taken by VLP, but combining them with other, both internally and externally, influences, recommendations can be stated as well. Using these cross-links, both segments are covered better when it comes to creating a positioning strategy, and thus a better guideline towards market entrance is provided.

Conclusions and recommendations

In any documentation created in the future and in any meeting with current or potential customers in the HT and CE segments, VLP needs to use its strengths to convince the customer of the added value VLP offers. VLP needs to position itself as the missing link, the central point between demand and supply in a rapid growing and moving network.
The opportunities need to be kept in mind when approaching (potential) customers, for they should cover the customers’ current problems and needs.
However, knowing the strengths of the organization is not enough, and simply taking into account the opportunities in the two segments is not either. The cross-links need to be made, because they allow for starting points in approaching the new customers. Strengths and opportunities need to be used, weaknesses and threats need to be decreased. The conclusions I have found in this study, that are assumed to allow for profitable and sustainable growth in the CE and HT industry, can be summarized as following:

Both industries are outsourcing many components to their suppliers. In its acquisition of new customers VLP must present current references in both industries whenever possible. Copying successes to new customers strengthens the image of VLP as a supplier, supports difficult processes to become routines, can result in efficiencies of scale and generates new turnover.
Becoming a component supplier is interesting because of higher margins and because a certain dependence on VLP from the customer is created. VLP must use its international customer record to create several geographical networks of subcontractors per country. As well, new subcontractors that are not yet customers of VLP can be selected and find their place in the networks. By creating these networks beforehand, VLP is capable of supplying components and can anticipate on customer orders on short notice.
The functions of VLP as an Industrial Distributor must be emphasized in its effort to acquire new accounts and to enlarge current accounts. This enlargement has positive side effects next to the generated turnover. The automotive knowledge base within VLP is enlarged, the reference is strengthened, the customer dependence on VLP is becoming greater, and a severe weakness of VLP is decreased: the engineering department and skills.
At last, VLP has aimed for high product quality and should continue this philosophy by offering more exotic materials. These materials, e.g. titanium and inconnell for engines, may in future provide VLP with a competitive advantage as the CE and HT industry is solving emission and combustion related problems.

The weaknesses of VLP are currently limiting its potential as a supplier, and can mostly be overcome. At first the Quality Assurance needs to be improved. Glancing at the demands in the CE and HT (or automotive) industry, these are perceived as 'killing the company'. However, these demands should be discussed at management level to create a shared attitude towards automotive. The mindset towards reasonable and unreasonable demands might be discussed, resulting in a more cooperative attitude. QA is time consuming and this calls for rethinking. The 'quality-pack' needs to be mastered before VLP presents itself to new customers. The fact that both industries are occupied with outsourcing demands a fast adaptation from VLP.
VLP presents itself as both component and raw material supplier, the one-stop-shop, but before doing so the communication system must be installed and working. This new EDI can link VLP with its customers for exchange of data. Presenting VLP without it VLP means VLP faces a tough battle of convincing the customer the EDI is not needed.
VLP lacks the 'human assets' in both competitive engineering skills as well as in 'friends in high places'. To overcome this, the opportunity of strategic alliances (SA) can be interesting. Although it can affect VLP's business negatively by becoming dependent on the partner in the SA, the partner can greatly improve the image of VLP as a competitive supplier with outstanding knowledge. The alliance must be designed as to that it consists of common interest, investment and dependence.
The weakness 'geographical location' can become lesser negative for VLP when it enters the market as a component supplier, because networks of subcontractors are designed at strategic locations near the customers. This improves the lead time towards the customer and supports the logistic strength because JIT deliveries are now possible over larger distances.
VLP must improve its supply base in order to start business as a component supplier. It would not make sense to create networks if VLP looses too much time in acquiring the raw material, if it acquires it at all.

If the move to low-cost countries is limited to Eastern European countries, than VLP should make sure the strengths of the organization are equally available there. Eastern Europe, namely, has only recently been developed by VLP.
Identifying regulations and law as vulnerable threats to VLP as a supplier, it must be aware of these aspects of doing business and remain up to date. By means of the (in future maybe exotic) products supplied, improved product quality, the automotive knowledge and the continuous improvement, VLP can anticipate upcoming regulations and law in an early stage without losing business. However, it is trivial to what extent this can be seen as a competitive advantage over competitors, since CE and HT OEMs inform their suppliers in an early stage about upcoming events and the appropriate action needed.

The potential for creating a network of subcontractors is beneficial in the light of upcoming mergers amongst first-tier and second-tier suppliers. The more VLP improves the added value, the more bargaining power it has regarding its customers.
Competition is heavy, due to mergers, Western European competitors who are expanding in Eastern Europe, new market entrants from Russia and Eastern Europe and mills that takeover gradually some of the ID's functions. Again, product quality and the creation of a network are paramount to protect business against competition. The automotive knowledge, which results in redefining product and material specifications in concurrence with the OEM/first-tier supplier, holds a protection-function here as well.

Calculating the impact of the combination of weaknesses and threats usually saddens perspectives for any organization. If the weaknesses are not covered by appropriate action, competition will outperform VLP as the industries become more and more demanding. Lacking the contacts needed and a sufficient engineering department/partner, VLP will become a small player with little bargaining power if suppliers and OEMs keep merging.
Competition must be levelled by a competitive 'quality pack', reaction times need to be improved dramatically since they can be order winners, and quality assurance performed by VLP must result in, if not just competitive, best-in-class PPM scores. This PPM ranking highly affects your image for reliable deliveries and decreases the impact of a 'warranties and claim protocol' because lesser errors are being made.

Within short notice, major weaknesses need to be improved and transformed in either a neutral status or become part of VLP's strengths. In any consecutive SWOT-analysis performed, other weaknesses that now have been overlooked, have not reached the surface because automotive is too little developed at VLP at the moment, or that have been kept outside this list of weaknesses because they are limiting VLP's potential in a lesser respect, can be stated and be given the proper attention.
VLP needs to improve its reaction time to enquiries because it affects the eventual success of a potential network. The 'quality pack' is a major weakness of VLP, but VLP can be assured that the required knowledge to obtain this pack is in-house.

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Tables and figures

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Abbreviations and explanations

AGM	–	Agricultural Machinery
AIAG	–	Automotive Industry Action Group
AM	–	Automotive
APQP	–	Advanced Product Quality Planning
CDI	–	Customer Dedicated Inventory
CE	–	Construction Equipment
CEA	–	Construction Equipment Association
CECE	–	Committee for European Construction Equipment
CLEPA	–	European Association of Automotive Suppliers
CNH	–	Case New Holland (OEM)
COP	–	Customer Oriented Processes
DFMA	–	Design For Manufacture and Assembly
DMADV	–	Six sigma related: Define, Measure, Analyze, Design, Verify
DMAIC	–	Six sigma related: Define, Measure, Analyze, Improve, Control
DIN	–	Deutsche Industrie Norm
ECE	–	East and Central Europe
EDI	–	Electronic Data Interchange
EN	–	European Norm
EU	–	European Union
FMEA	–	Failure Mode and Effect Analysis
GE	–	General Electric
GPC	–	Global Procurement Council
GM	–	General Motors
GMT	–	Gummi Metall Technik
HT	–	Heavy Truck
ID	–	Industrial Distributor
IBB	–	Industrial Buying Behaviour
IATF	–	International Automotive Task Force
IR	–	Ingersoll Rand (OEM)
ISO	–	International Organization for Standardization
JCB	–	Joseph Cyril Bamford (OEM)
JIT	–	Just In Time
KSP	–	Key Selling Point
KVP	–	Key Value Proposition
NPI	–	New Product Introduction
OEM	–	Original Equipment Manufacturer
OESA	–	Original Equipment Suppliers Association
OICA	–	Organisation Internationales des Constructeurs d'Automobiles
PD	–	Purchasing Department
PDCA	–	Plan Do Check Act
PDM	–	Purchasing Department Manager
PPAP	–	Production Part Approval Process
PPM	–	Parts Per Million
QA	–	Quality Assurance
QCLDM	–	Quality, Costs, Logistics, Delivery and Management
QFD	–	Quality Function Deployment
QS	–	Quality Standard
RFI	–	Request For Information
RFQ	–	Request For Quotation
RPN	–	Risk Priority Numbers
RVI	–	Renault Vehicle Industrielle
SA	–	Social Accountability
SC	–	Supply Chain
SEM	–	Supplier Evaluation Manual

SMC	–	Sheet Moulding Compound
SWOT	–	Strengths Weaknesses Opportunities and Threats
T / T1	–	Tier / Tier 1
TCM	–	Total Cost Management
TQM	–	Total Quality Management
UK	–	United Kingdom
USD	–	United States Dollars
VBO	–	Vehicle Brand Owner
VDA	–	Verband Der Automobilindustrie
VLP	–	Van Leeuwen Precision
VLW	–	Van Leeuwen Wheeler
5S	–	Sort, Straighten, Shine, Systemise and Sustain

OEM, an Original Equipment Manufacturer, is the last part of the automotive supply chain. This manufacturer, or assembler, constructs an automotive unit from all incoming systems, components, parts and raw material supplied by its suppliers. After this part of the chain, the unit is ready for use. All modifications to this unit after the OEM's added value must be seen as aftermarket activities.

Tier is the typical name the automotive industry has been using for a distinguished stage in the automotive supply chain. Using this terminology of Tiers, it is necessary that the definition of a 'stage' is clear and is being shared by all industry players. There are four stages which means that there are four Tiers. The stages are: systems (Tier 1), components (Tier 2), parts (Tier 3) and raw material (Tier 4). The higher the number of the Tier, the further away this stage is from the OEM in the automotive supply chain.

An automotive unit consists of several major systems; each system contains a number of components and parts. Because the systems are supplied directly to the OEM, suppliers in this stage are referred to as Tier 1 or first-tier. Suppliers of components supply the system suppliers if the component is part of a larger system, or they supply directly to the OEM because the component is not part of a larger system or the OEM assembles the system himself. Either way, suppliers of components are classified as Tier 2, or second-tier, suppliers because the components supplied become part of larger systems before assembled to the final automotive unit. In Tier 3, the suppliers are supplying parts to second-tier suppliers. Parts, in automotive, are slightly machined pieces of material that fit in a larger component. Fourth-tier suppliers supply either a third-tier supplier, or an OEM, with raw material such as tubes and barsteel. For further detail please see page 35-36 of this report.

Acknowledgement

To achieve the degree of Master of Science in Business Administration, a Master's thesis has to be carried out as final part of the study Business Administration. The Master of Business Administration at The University of Twente comprises several specialisations. This Master's thesis focuses on the activities of Van Leeuwen Precision in the European automotive industry, which is a subject of the specialisation International Management.

After completing my thesis work, it is time for me to evaluate my stay at Van Leeuwen Precision and thank the persons who have made important contributions to this report.
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Finally, I want to thank every other person who contributed to this project and broadened my scope of study. I want to thank my parents, brother, girlfriend and friends, for giving me the support I needed to finalize this study.

I sincerely wish I can meet the expectations concerned with this report, and strongly hope to make a valuable contribution to Van Leeuwen Precision in the future. I wish to express that I sincerely feel proud to start my career at this international organization.

Rob Blokvoord

Note from the author

The report in front of you is the original volume, named Volume 1. This report is an extensive document which serves the purpose of a less academic, but more informative, reference-report for Van Leeuwen Precision Europe. For Van Leeuwen Precision Europe such a document is needed, because the report serves as a guideline for the future activities for European colleagues from Van Leeuwen Precision. This guideline should comprise pragmatically useful information, exhibits and prescriptive starting points; its purpose is to pave the "road ahead" for Van Leeuwen Precision Europe in the automotive industry.

There has also been constructed a compressed volume, named Volume 2. This is a volume derived form the original report. Modifications, especially in argumentation, and abbreviations and omissions have been made to make it appropriate for an academic Master's Thesis. This compressed volume has solely been constructed for the University of Twente, but can serve as a brief summary of Volume 1 as well for those interested in such a summary. If in Volume 2 is referred to an 'original report', I refer to this Volume 1.

1. Introduction

The purpose of this chapter is to present an overview of the research and to provide the framework with which the problem will be solved. First the *background and objective* of the research are described. The background provides the context of the assignment, whereas the objective derives from this background and presents the intended outcome of the research. Then, the *problem formulation and research questions* are outlined. The problem formulation forms a specific and clearly defined question to be answered in the assignment, and is directly deducted from the objective. The problem formulation is split into a number of research questions, which each deal with a manageable component of the central research question. Finally, the *research approach and research structure* are presented. These specify how the answers to the research questions are obtained.

1.1. Background and objective

Van Leeuwen Precision (hereafter: VLP), as a subsidiary company of the Van Leeuwen Buizen Groep, functions as the principal of this graduation assignment. The abbreviation VLP in this study comprises the European Precision activities of the Van Leeuwen Buizen Groep. In 1988 the Van Leeuwen Buizen Groep incorporated J. van de Berg & Co., which at that time was known as Bergstaal. Nowadays, VLP has become an international specialist stockist and supplier of seamless and welded pipes and tubes, valves and components. This diversity of products serves several market applications, nevertheless four main market applications can be distinguished within the Precision division : automotive, hydraulic, mechanical engineering and furniture. VLP holds stocks at its logistic and sales offices in The Netherlands, Belgium, France and the UK. The supply of products outside these countries is coordinated in The Netherlands via VLP's export department.
During the last years, the automotive industry has taken a major market share in the annual turnover of VLP, approximating a current twenty-five percent. This growth in market share, together with management's perception of the automotive industry potential, make up the interest of VLP in having a clear understanding of the potential of all segments of the automotive industry. Because the automotive industry is a comprehensive industry, all segments need to be analyzed to identify those segments which offer VLP the highest potential for growth and profitability.

This brings us to the following objective for this research

> *The objective of this study is to develop a positioning strategy for the automotive industry, which leads to sustainable and profitable growth for VLP.*

1.2. Problem formulation

Based on the provided background and objective a specific central question can be stated. This central question covers the problem formulation, and should consider the following aspects:

- A strategy is a plan for interacting with the competitive environment to achieve organizational goals[1]. A strategy can be broken down into tactical and operational goals. A positioning strategy, then, is a plan for designing the company's offering and image to occupy a distinctive place in the mind of the target market. The end result of positioning is the successful creation of a customer-focused value proposition. In short, a value proposition is a convincing reason to buy the product[2]. In addition, sustainable growth means a well considered path of investments and expanding activities to achieve an annually increasing turnover.
- Considering the international presence of VLP and the comprehensive characteristics of the automotive market, the scope of the study includes Central-Europe.
- Automotive in literature is often referred to as everything 'moving by itself'. However, in the light of VLP I wish to extend this definition to 'moved by itself or moved by a self propelled unit'.
- The environment will be studied for recent characteristics and future trends, resulting in a positioning strategy for growth facing a relative short-term orientation. Moreover, the environment is dynamic and markets evolve with shorter product-life-cycles. This calls for a short-term action plan as well.
- Segmentation is the division of market segments based on shared needs, comparable products and similar characteristics.

Based on the above statements, the central question is as follows:

What automotive market segment(s) ensures the highest potential for sustainable and profitable growth for VLP, and which positioning strategy should VLP follow to target this best potential segment?

1.3. Research questions

The answer to this central question should logically consist of the content of the complete report, and therefore the central question implies the research approach to be taken. This central question can be broken down to several research questions, of which all separate answers together make up the report.

Research questions:

1. What are the organizational characteristics of VLP?
    a. What goods/services does VLP offer? What means does VLP use?
    b. What is the structure of the organization?
    c. How is the automotive industry served till now? What is the current plan of action?
    d. What are strengths and weaknesses of VLP?
2. How can the automotive industry be segmented?
    a. What are the segments and their characteristics (market share, centralized/scattered, market size)?
    b. What segment has the highest potential for VLP?

[1] R.L.Daft, Organisation theory and Design, 2001
[2] P. Kotler, Marketing Management, 2003

3. What are characteristics of this high potential automotive segment?
    a. Who are the manufacturers in this segment? What are their characteristics[3]?
    b. Who are the suppliers in this segment? What are their characteristics[4]?
    c. Where are both manufacturers and suppliers located?
    d. What are the recent and upcoming trends (e.g. geographical)?
    e. How is the supply chain organized?
4. What positioning strategy should be used?
    a. How do competitors and suppliers position themselves?
    b. What specific requirements do customers in the supply chain have?
    c. How should VLP position itself?
    d. What are key selling points for VLP?

[3] Among others: Location, strengths/weaknesses, what do they sell and to whom, market share, value proposition, image, their references, what contracts do they have?
[4] Next to the above: do they supply exclusive/non-exclusive

1.4. Research design – the theoretical framework

Above the central question, and the research questions derived from this central question, have been stated. The research questions need to be answered in the report, and finally conclusions and recommendations are to be given that answer the central question. Working towards an answer for the central question demands a theoretical framework to be drawn, because it serves as a guideline for the report and the research performed during the study. The different tasks that need to be carried out during the research must be anticipated, in order to come to an answer for the central question. The theoretical framework must be constructed in such a manner that it provides theoretical concepts – workable definitions and tools – to analyze the data in different stages of the study, and to come to funded conclusions.

Anticipating the study at hand, the stages where theoretical concepts need to support the study include:

Segmentation phase
1. segmentation of the automotive industry
2. quick scan of the segments constructed

Positioning phase
3. analysis of buying behaviour in industries
4. analysis based on specific and valued functions of VLP-like firm
5. general supplier characteristics
6. creation of marketing objectives

The use of theoretical concepts during these stages of the study assures that data is carefully collected and analyzed, and that conclusions are made because of objective reasoning and argumentations provided by theory. This allows for careful (sub) conclusions that address the research questions related to these stages.

1. Segmentation of the automotive industry
Because rarely the whole market or industry can be satisfied by one supplier in terms of the supplier's products, markets are divided into smaller groups of buyers that share the same preferences towards product and services mixes[5]. Market segments can be identified by examining demographic, psychographic, and behavioural differences among buyers. The marketer then decides which segments present the greatest opportunity for its organization[6]. For the chosen segments, VLP needs to develop a market offering that offers central benefit(s) to the buyers in the segment.
Opportunity then needs to be defined, and I wish to define it by means of the criteria used for scoring the segments. These criteria must be related to the opportunity for VLP, otherwise they make no sense as criteria for scoring segments.
Typically, a marketer does not create a segment; his task is to identify the segments and decide which one(s) to target. Segment marketing offers several benefits over mass marketing, which refers to a market segmentation in which the seller engages in mass-production or mass distribution of one or several products for all buyers. A marketer engaged in segment marketing creates a more fine-tuned product or service offering and price it appropriately for the target segment. This holds several benefits, namely that the organization can more easily select the best distribution and communication channels, and it will have a clearer picture of its competitors, which are the organizations going after the same segment(s)[7].
For the segmentation in the automotive industry, I have segmented the industry into segments that provide different services to the end-user. I assume that 'similar wants' from the buyers in the automotive industry means 'similar functionalities of the products'. If your favoured function is to

[5] Porter, M. E. (1980), "Competitive Strategy: Techniques for Analyzing Industries and Competitors", p. 52
[6] Kotler, P., marketing management, 2003, p.9; p. 278-290
[7] Kotler, P., marketing management, 2003, p. 279

move passengers, then you will find yourself a buyer in the passenger car segment. If a buyer is looking for agricultural equipment, one can assume that this buyer is looking for automotive units that assist him by means of an agricultural function. This segmentation based on similar wants and/or needs of buyers is referred to in literature as being 'needs-based market segmentation'[8].

When looking for automotive definitions, one typically finds "moving by itself". Considering the automotive industry, this definition is too generic; people move by themselves and thus they are automotive. I have defined considerations that make the current definition applicable for the automotive industry, they are:

1. the moving items primarily make use of (gear wheels or) at least 4 wheels, which are driven by an engine, and which form the fixed contact between the item and the hardened surface
2. the moving item has to be the product of manufacturing, intended for commercial and/or private use
3. this manufacturing process includes the (partly) application of materials that are supplied by VLP, or, considering the product-philosophy of VLP, can be supplied by VLP
4. every item not applying to the above three considerations, e.g. bikes, are excluded. Motorcycles are excluded as well, as they The exemptions are add-ons to automotive products that are attached to the unit, without being any kind of trailer, and any possible add-on for agricultural use that applies only to 2 and 3.

With this definition, together with the concept of segmentation, I have looked at the automotive industry. Based on the similar functionalities of the end products, which customers need, the identified segments then are:

- Passenger car
- Commercial vehicle
- Bus/Coach
- Heavy Trucks
- Agricultural
- Construction Equipment

2. Quick scan of the segments constructed

Because of the tremendous size of the automotive industry in Europe, and the limited time available for the study at hand, the segments constructed in the segmentation phase need to be scanned globally for their attractiveness. A quick scan should allow a ranking of segments along the line of general criteria that reflect segment attractiveness. Segment attractiveness, then, must reflect the greatest opportunity of VLP to enter this segment and be successful.
Because of limited time available, this scan must use general criteria. The result is that segments that have little or zero relevance for VLP, will be excluded from participation in the research without loosing too much time.
'A quick scan of the segments constructed' should therefore be supported by concepts of 'segment attractiveness' in literature. Keller distinguishes five main factors that influence the attractiveness of a segment[9]:

Segment size – the segment must be big enough to be worth targeting. Many larger businesses ignore small segments on the basis that, even if they were to dominate the market, it would have an insignificant effect on their overall sales and profits. This creates opportunities for smaller, more flexible businesses to exploit the segment. It is not always easy to measure the size (and growth) of a segment. Often one has to make a judgement based on estimates.

Segment growth - Segments with good long-term growth prospects are, by definition, the most attractive. However, businesses should be aware that segment growth may vary – particularly if the

[8] Kotler, P., marketing management, 2003, p.286; Best, R.J., Market-Based Management, 2000, p. 32
[9] Keller, K.L., Strategic brand management, 2002, p.121

segment is based on the "life-cycle" of one or a limited number of products. Also, faster growth segments are likely to attract more competition.

Segment profitability - The segment should be capable of delivering profits of the right value, assuming it can be marketed to effectively. The required "return on investment" will be a key factor in determining whether a business invests in the segment. It is important to work out which businesses are earning profits in the segment. It might be that there is a dominant market leader – who also dominates the segment profit - leaving little for existing operators or potential new market entrants.

Current and potential competition - The strength of existing and potential competition is a key issue in deciding whether to target and enter a segment.

Business capabilities - Does the business have the capabilities (e.g. brands, product knowledge) to succeed in a segment? Marketing and sales history is littered with examples of businesses that entered segments with little or no knowledge or resources, and failed.

Robert J. Best[10] has structured the segments attractiveness in his needs-based market segmentation approach by offering seven general criteria that allow for a quick scan:

- market growth
- market size
- (un)certainty of stable relationships
- number of competitors
- competitors' market share division
- market (structure) access
- geographical situation (trends, clustering and absolute distances)

Market growth, market size, and competition issues have already been addressed to by Keller. Here I want to clarify shortly the other criteria stated by Best, although they very much speak for themselves.

(Un)certainty of stable relationships:
This addresses the relationship between supplier and client, in both business-to-business and business-to-consumer markets. As well, it refers to relationships between both suppliers and end-users, and between two suppliers in a way that the one supplier sells its product to the other, buying supplier, who integrates the product bought into a larger, more complex product. The (un)certainty of these relationships between organizations in their supply chain then means whether long-term or short-term relationships are to be expected, from a supplier point of view. Of course, long-term relationships are in favour because of lesser risks involved. For instance, an advantage of long-term agreements can be that a supplier can make certain investments in assets and personnel specifically for the client with whom it has agreed upon a long-term relationship. In a short-term relationship, the risks involved will force the supplier not to make any large investment[11].

Market access:
The definition of market access is almost identical to the 'business capabilities' drawn up by Keller. Market access is defined by Best as the market and client references the organization possesses, that allow for fast segment development because the experiences of the organization can be used to convince potential markets and clients. This allows for a jump start in new potential segments, where competition is still struggling to enter the new markets. In addition, I have added the opportunity for VLP to serve a segment with its complete product range (tubes, bars and components) as an indicator of market access.

Geographical situation:
Best's definition of the 'geographical situation' can be interpreted as the demographic elements of a potential segment. First an organization must identify countries, or regions within countries, that it is

[10] Best, R.J., Market-Based Management, 2000, p. 35
[11] Best, R.J., Market-Based Management, 2000, p. 36

willing to target with its product. Mostly organizations identify regions close to their current business establishments in these countries, but can also be identified as regions where the organization holds no establishments to date. In this case, the organization will be looking for the highest potential region, and once identified, it will establish new establishments in this region. For VLP I will be studying the countries and regions where VLP already has operational establishments.
The sub-criteria of geographical situation are then limited to the trends in the geographic areas selected, the geographical locations of the organization's establishments, and the absolute distance between these establishments and potential customers.

Kotler distinguishes five criteria for segment attractiveness:

- size
- growth
- profitability
- scale economies
- low risk

These criteria have already been included in the criteria stated by Keller and Best.

Combining the criteria for segment attractiveness, I have selected the criteria that I assume to be most suitable for this study. The suitability is then related to my judgment of whether I can get hold of the information needed on relative short notice. First I will be looking for general descriptive information sources, and then I will test this data by information provided in interviews with internal members of the organization.

- Published articles and annual reports provided by segment OEMs and suppliers
- Information provided by governments and business associations involved in the segments studied
- OEMs and suppliers' websites
- Research studies executed by consulting firms and universities, related to the segments identified

The criteria that I have selected for a quick scan of the segments identified are:

- market size
- market growth
- customer relations – duration of contracts
- competition
- market access
- geographical situation (trends, clustering and absolute distances)

Profitability is hard to measure, especially in this tremendous industry for which VLP's products are so widely used throughout the segment's end-products, and for which VLP does not know yet which products it should supply. As well, some segments are already supplied by VLP throughout Europe and have shown profitable results over time. Therefore I assume there is no reason why VLP would start supplying with a loss in any of the segments; being a supplier will still remain a choice for VLP, not an obligatory aspect of the automotive industry.

3. Analysis of buying behaviour in industries

Because I lack any technical know-how, and therefore cannot make any evaluation or recommendation concerning the products offered by VLP, or products it should be offering, I assume that VLP will be able to sell its products and services when it has passed the supplier selection procedures of any OEM or first-tier supplier. This assumption can be arguable because I do not know what kind of specific products will be asked. However, VLP will be confronted with these demands only when it has already passed the supplier selection, and I am looking for the demands VLP will have to meet prior in this selection procedure. Therefore, the assumption above can be a good assumption as well, because it allows me to move forward now with other customer demands.

A tube is nothing with something surrounding it. As well, bar steel is not so complicated as well. The OEM will show his specifications, and VLP will be looking into its product range to serve the demand. Very much simplified, but still the heart of the matter.
What I think is really important then, is to uncover the other customers' demands. These demands, supplier characteristics and Industrial Distributor functions, are important because VLP will be confronted with them before and during the supplier selection procedure, and it is my intention to have VLP at least be allowed to become part of this supplier selection procedure.

Knowledge of the buying behaviour of organizations is of great importance since this is a key factor of success when formulating marketing strategies[12]. Emerging technologies are changing the traditional means of doing businesses[13]. Moreover, as stated by Gadde and Håkansson[14] the purchases of components represent a large percentage of the total cost of a vehicle and have a crucial importance for its quality and performance features.
As a result, I find it interesting to investigate how organizations in the CE and HT industry decide to purchase components.
Although the industrial buying behavior is related to the buying company, and VLP must be considered as the selling company, it is still relevant to outline this process from the customer point of view because of the customers' understanding resulting from it. This introduction to industrial buying behaviour will be kept in mind when the final recommendations are drawn in this study, and I intend to use it as background information only. However, I think it is worth mentioning in this research design because it creates awareness of buying behaviour aspects, especially when conclusions and strategies are determined.

According to Kotler buying behaviour is influenced by four factors: cultural, social, personal and psychological. Research into all these factors can provide clues to reach and serve clients more effectively[15].
Firstly, prior to the understanding how organizations make buying decisions, one must identify who makes and has input in the buying decision. People involved can be inititators, influencers, deciders, buyers, or users, and different products may involve different people. Next to this personnel identification, one should also examine the buyers' levels of involvement in the eventual decision. Of course, this is a very difficult task when it comes to new organizations because they might not be willing to share this information with third parties that do not yet have a stake in the organization.
Kotler distinguishes the following sequence of events of a buying process[16]:

-problem recognition
-information search
-evaluation of alternatives
-purchase decision
-postpurchase behaviour

Because I think this sequence of events could be more specific, and lacks the specification of the event of testing prior to the eventual series production bought, other insights are gathered.
According to Webster and Wind[17] industrial buying usually involves a large number of people in the decision-making process. Individual and organizational goals are inter-linked and highly complex. More precisely Webster and Wind define industrial buying as "a complex process of decision-making and communication, which takes place over time, involving several organizational members and relationships with other firms and institutions"[18].

[12] Baptista, Cristina; Forsberg, Lars-Ole: Industrial buying behavior in the Swedish and Polish mining industries: a comparative study, 1997, p. 101
[13] Ratnasingam. P. "The Influence of Power on Trading Partner Trust in Electronic Commerce," *Internet Research: Electronic Networking Applications and Policy*, 2000, p.56-62
[14] Gadde, J., and Hakansson, W., The changing role of purchasing: reconsidering three strategic issues. European Journal of Purchasing and Supply Management, 1994, p. 27-35.
[15] Kotler, P., Marketing management, 2003, p. 211
[16] Kotler, P., Marketing management, 2003, p. 212
[17] Webster, F.E. Jr. and Wind, Y.: A General Model for Understanding Organizational Buying Behavior, Journal of Marketing 1972a, p. 12 – 19.
[18] Webster, F.E. Jr. and Wind, Y.: A General Model for Understanding Organizational Buying Behavior, Journal of Marketing 1972a, p. 23.

Three conceptual models published by Robinson, Faris and Wind[19], Sheth[20] and Webster and Wind have had a significant impact in the field of IBB. These conceptual models laid the foundation for the study of IBB.
Moreover, these models also encouraged a significant research within the area, and the knowledge base is by now quite large. Wind and Thomas[21] categorized academic studies in the field of IBB into three major areas: the buying centre, the buying process and the factors affecting the organizational buying centre and the buying process. The two most reviewed concepts within the field of IBB are the buying centre and the buying process. Probably the most popular area of research in IBB has been the understanding of the buying process also known as the decision-making process as performed by Sheth[22].

Buying process
The buying process can be described by eight fundamental buyphases, which comprise a standard buying process within an industrial firm[23]. The different phases can be summarized as:

1) anticipation or recognition of a problem
2) determination of the characteristics and quantities of the needed item
3) description of the characteristics quantities of the needed item
4) search for and qualification of potential sources
5) acquisition and analysis of proposals
6) evaluation of proposals and selection of suppliers
7) selection of an order routine and
8) performance feedback and evaluation.

Buyphases
Furthermore, Weber, Current and Benton state that; “The selection of competent suppliers has long been regarded as one of the most important functions to be performed by a purchasing department”[24]. This is due to the increased co-operation between business buyers and sellers that has led to the reduction in the number of suppliers for many firms. Hence, Swift and Gruben[25] state, “With fewer suppliers being considered, the task of supplier selection becomes increasingly more important”.
This issue is magnified since the buyer has fewer alternatives when a supplier cannot adequately perform its function. Consequently, the buyer dependency on each individual supplier in terms of *reliability* and *credibility* increases. For this and many other reasons, the firms' supplier selection criteria are critical elements for marketers to understand.
The eight buyphases can be combined with three different buying situations[26]:

In a *new task* buying situation, the buyer has little or no relevant past buying experience and therefore needs extensive information about new alternatives to solve the problem
In a *modified rebuy* situation the buying alternatives are known but changed, consequently the buyer needs some additional information and may also consider new sources of supply.
In a *straight rebuy* no new information is required and the purchase is handled on a routine basis. The impact of the buying situation has for long been recognised as fundamental in IBB studies.
For this study it is the *new task* buying situation which is most relevant, because growth in this report must at first be interpreted as the creation new supplying opportunities for VLP, meaning both new

[19] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p.52.
[20] Sheth, J.: Organizational Buying Behavior - Past Performance and Future Expectations. *The* Journal of Business and Industrial Marketing, 1996, p. 7-24
[21] Wind, Y., Thomas, R.J., Conceptual and Methodological Issues in Organisational Buying Behaviour, European Journal of Marketing, 1980, p. 37-42
[22] Sheth, J.: Organizational Buying Behavior - Past Performance and Future Expectations. *The* Journal of Business and Industrial Marketing, 1996, p. 30-38
[23] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 79.
[24] Weber, C., Current, J.R., and Benton, W.C., "Vendor Selection Criteria and Methods," *European Journal of Operational Research*, 50, 1991, p. 2-18.
[25] Swift, C.O., and Gruben, K.H., “Gender Differences in Weighting of Supplier Selection Criteria,” Journal of Managerial Issues, Volume 12 (4), 2001, p. 502-512.
[26] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 79.

and existing customers are supplied by VLP for new product applications. A rebuy situation in nature is always a result from a new task buying situation, and therefore is beyond the scope of this report. However, it can be useful to mention the possible rebuy situations for a better understanding.

New Task
The new task refers to requirements or problems that have not arisen before. An internal stimulus or an environmental factor may trigger the recognition of a requirement or a problem. This type of buying situation requires extensive information and extensive evaluation of alternatives. New tasks occur infrequently but are of high importance because the purchase sets a pattern for the more routine purchases that will follow. Industrial buyers regard new tasks as important and associate them with high risk. New task is the most complex buyclass because of the large number of decision makers and buying influences that are involved[27].

Straight Rebuy
The straight rebuy situation is the most common in industrial purchasing. "The straight rebuy purchases describe the buying situation where the purchasing department reorders on a routine basis". Most of the purchases are made on a routine basis no further information requirements and little effort in general. In this buyclass a "list" of acceptable suppliers exists, suppliers not on the list are not considered. In a straight rebuy there may occur some variations from time to time in the quantity, physical or chemical properties, delivery time, method of shipment or the price, so long as these changes does not entail a re-evaluation of the purchasing alternatives nor cause any changes in the procurement process and patterns[28].

Modified Rebuy
"The modified rebuy involves a somewhat familiar purchase with some new information requirements and some further evaluation of alternatives". The purchase can be an "upgraded straight rebuy" or a previously new task that has become more regular. The modified rebuy does not necessarily infer that the buyer will change either the item purchased or its source[29]. The result may be that the buyer purchases the same item from the same source. The distinctive element is the re-evaluation of alternatives, often of new ones.

Buying centre
The buying centre includes all members of an organisation who are involved in a purchase of a particular product[30]. Wind and Thomas[31] have identified three major aspects of the buying centre. The first aspect, *composition of the buying centre*, refers amongst other to the size, the hierarchical levels represented, and the functional areas involved. It is hypothesised that five dimensions of the buying centre could be specified, namely:
1) vertical involvement, 2) lateral involvement, 3) extensivity, 4) connectedness and 5) centrality.
The second aspect, *influence in the buying centre*, relates to the persons who are most influential in the buying process.
The third and last aspect, *roles in the buying centre*, involves the identification of different roles played by the buying centre members (ibid.). In identifying this set of roles a marketing manager can develop a better understanding of IBB.

With a better understanding of the customer's buying process and buying centre, VLP can develop a marketing strategy in relation to the customer's buying profile. Buying situation is also commonly referred to as "buyclass" in IBB literature. This buying profile falls apart in the functions of an Industrial Distributor valued by the (potential) customer, Dickson's supplier selection characteristics a supplier in both industries should apply to, and specific automotive requirements towards products and processes. This IBB only serves as valuable background information, but is important because it enlarges the scope towards the supplier selection phases VLP can be involved in in future. It must

[27] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 80
[28] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 82
[29] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 83
[30] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 92
[31] Wind, Y., Thomas, R.J., Conceptual and Methodological Issues in Organisational Buying Behaviour, European Journal of Marketing, 1980, p. 55

make VLP European employees aware of the fact that there is more involved in supplier selection than solely VLP's value propositions and product characteristics.

4. Analysis based on specific and valued functions of VLP-like firm

VLP is an independently owned business that takes title to merchandise it handles. A wholesaler conducting these activities is named a Merchant Wholesaler[32], and within this typology it can be divided into either a 'full service' or a 'limited service' wholesaler. The latter one is characterized by providing little to no service at all to customers, which are perfectly described as cash-and-carry. No financing, no transportation, nothing but the product to cut costs. These companies strive for cost leadership and high volumes. VLP wants to distinguish itself by offering a high quality range of products, a complete set of tailored services for customers facing trouble with e.g. logistics, and not necessarily aim for lowest prices. Therefore, VLP is a full-service wholesaler offering several unique selling points with its services package. Full-service wholesalers exist in two types, based on the nature of customers. VLP is providing customers in the Business-to-Business market, indicating that VLP is an Industrial Distributor.
Industrial Distributors, or channel intermediaries, are independent businesses that assist producers in the process of making their products or services available for use or consumption. They exist because, as specialists in the performance of distribution tasks, they operate at higher levels of effectiveness and efficiency than manufacturers or end-users.

Rosenbloom[33] identifies six distribution tasks that an intermediary performs for business-to-business customers:

(a) making the product available
(b) delivering customer service
(c) providing credit and financial assistance
(d) assortment convenience
(e) breaking bulk
(f) giving advice and technical support[34].

Although 'breaking bulk' and 'making the product available', together with 'assortment convenience' discuss the fact that Industrial Distributors hold stocks and can use this stock as a source for the functions, I cannot identify a function from Rosenbloom that covers the valued service of 'in time deliveries'. Therefore I wish to add that these functions combined mean, amongst others, that Just-in-Time (JIT) deliveries are offered to the customer.
JIT deliveries are not exceptional in the field of automotive; it is regarded exceptional when you fail to deliver on time. Keeping stock, as an Industrial Distributor does, should guarantee on time deliveries to customers. The stock is distinguishing as well, since mills do not offer such a function.

Kotler distinguishes identical functions supporting the division Rosenbloom has made. Rosenbloom manages to cover the functions of an Industrial Distributor in six functions, Kotler uses a little more specific approach towards identifying the functions. Generally, Kotler says that wholesalers are being used when they are more efficient in performing one or more of the following functions:

Selling and promoting: wholesaler's sales forces help manufacturers reach many small business customers at a relatively low cost. Wholesalers have more contacts, and buyers often trust wholesalers more than a distant manufacturer.
Buying and assortment building: wholesalers are able to select items and build assortments their customers need, saving the customers considerable work.
Bulk breaking: wholesalers achieve savings from their customers through buying in large carload lots and breaking the bulk into smaller, possible heterogeneous, units.
Warehousing: wholesalers hold inventories, hereby reducing inventory costs and risks to suppliers and

[32] Kotler, P., Marketing Management, pp 548, 2003.
[33] Rosenbloom, B.,Marketing functions and the wholesaler-distributor: achieving excellence in distribution, p.17, 1987
[34] Van Bruggen, H., The Impact of Channel Function Performance on Buyer-Seller Relationships in Marketing Channels, 2004, p. 27

customers.
Transportation: wholesalers can often provide quicker delivery to buyers because they are closer to the buyers.
Financing: wholesalers finance customers by granting credit, and finance suppliers by ordering early and paying on time.
Risk bearing: wholesalers absorb some risk by taking title and bearing the cost of theft, damage, spoilage, and obsolescence.
Market information: wholesalers supply information to suppliers and customers regarding competitors' activities, new products, price developments, and so on.
Management services and counseling: wholesalers often help retailers improve their operations by training sales clerks, helping with store layouts and displays, and setting up accounting and inventory-control systems. They may help industrial customers by offering training and technical services.

Both Rosenbloom's and Kotler's approaches towards functions have been combined, and have been tested. This testing has been carried out by having interviews both internally and externally, and by having the interviewee ranking the functions as he/she values them. Data derived from external parties interviewed is given the highest priority, and it has been matched with rankings derived from internal interviews.
As well, information published by OEM's and Tier-1 suppliers has been used to verify the ranking of the functions and consultancy firms' publications concerning this subject in automotive have been used for the same verification.

5. General supplier characteristics

"Before selecting a supplier, the buying center will specify desired supplier attributes and indicate their relative importance. It will then rate suppliers on these attributes and identify the most attractive suppliers. Buying centres often use a supplier evaluation model for this identification"[35]. Here I wish to clarify the attributes, or supplier characteristics, mentioned by Kotler. To do so, I intend to use the work of Dickson as the theoretical framework for these supplier characteristics.
In the mid 1960's, researchers were developing performance criteria upon which potential suppliers could be evaluated. Dickson (1966) performed an extensive study to determine what criteria were used in the selection of a firm as a supplier. Initial observations by the researcher identified a list of approximately 50 unique and distinct factors other researchers presented as important to consider when selecting a supplier. This list of factors was later reduced to 23 criteria, of which the top ten is listed below. The Dickson work is considered a benchmark in the area of supplier selection criteria[36].

The ten most important characteristics when suppliers are selected, derived from the work of Dickson, are[37]:

1 Quality
2 Delivery
3 Performance history
4 Warranties and claim policies
5 Production facilities and capacity
6 Price
7 Technical capability
8 Financial position
9 Procedural compliance
10 Communication system

These characteristics add value to the insight of the buying situation 'new task', because suppliers are always first selected before they are quoted in the automotive industry. The selection phase of an automotive supplier by first-tier suppliers is long, time-consuming and demands several decision makers to approve the request. This can go all the way up to the OEM, because the OEM wants to know exactly what product, what material and what characteristics of this material is used in the

[35] Kotler, P., Marketing Management, 2003, p.231.
[36] Dickson, G. (1966). An analysis of vendor selection systems and decisions. *Journal of Purchasing,* 2(1): 5-17.
[37] An overview of Dickson's complete list of 23 important criteria is presented in Annex 15.

production of the assemblies. Once a supplier is approved, he or she is on the 'safe' list and can be quoted.
Having a clear understanding of what suppliers' characteristics are important to OEMs and first-tier suppliers, provides valuable insights for VLP in how it can become a supplier to these potential customers.
In the Dickson research, quality is regarded as most important for manufacturers when suppliers are selected. Surprisingly, price is ranked 6th with *delivery, performance history, warranties and claim policies and production facilities and capacity* being of more importance to manufacturers than price. Looking at the first five characteristics, we can see that they all point at the same important aspect: reliable production. Providing good quality means all products produced succeed the quality tests they will face later on, and therefore waste is reduced to the minimum. Good delivery means the production line will operate stable, and will not have to be stopped because of late or bad (quality) deliveries. The performance history gives the customer an indication of how well you did as a supplier before, how well you do in other industries or with competitors, and consequently forms a framework for the customer how well you will do, or, how reliable the production will be having you as a supplier. Production facilities and capacity as in important criteria indicates that the supplier must be able to cover up certain contingencies, must have sufficient buffer (stock and production) to respond to changes (flexibility), and its production process must meet the high quality standards the customer has because otherwise quality will be interfered. Warranties and claim policies are important and clearly spread the message: "reliable production rates, or else…". Warranties and claim policies are often used as an incentive for the supplier to do the utmost, instead of being a penalty-mechanism when something goes wrong[38].
However, the characteristics will be tested among companies, and input will be gathered from both OEMs and first tier suppliers in both the CE and HT industry. These rankings are then matched by internal interviews made, and are verified by data from OEMs' and Tier-1 suppliers' publications. The results will indicate what it takes to be a supplier in both the HT and CE industry.

6. Creation of marketing objectives

After uncovering key supplier characteristics and Industrial Distributor functions, a move must be made towards new strategy formulation. Before recommendations and conclusions can be drawn, of which the functions and characteristics are part, first an overall evaluation of a company's strengths, weaknesses, opportunities and threats is needed[39]. These four aspects, referred to as the four items, account for an internal and external environment analysis of the organization at hand.
The outcomes of such an analysis, after both item analysis cross-links between these four items, can help in formulating new marketing opportunities for VLP. Combined with the Industrial Distributor functions and supplier characteristics analyses, they account for the final recommendations for VLP in entering the HT and CE industry.
To come to the creation of new marketing objectives for VLP, I intend to use a SWOT-analysis.
A SWOT-analysis is a basic, straightforward model that provides direction and serves as a basis for the development of marketing plans. It accomplishes this by assessing an organizations strengths (what an organization can do) and weaknesses (what an organization cannot do) in addition to opportunities (potential favorable conditions for an organization) and threats (potential unfavorable conditions for an organization). SWOT analysis is an important step in planning and its value is often underestimated despite the simplicity in creation. The role of SWOT analysis is to take the information from the environmental analysis and separate it into internal issues (strengths and weaknesses) and external issues (opportunities and threats). Once this is completed, SWOT analysis determines if the information indicates something that will assist the firm in accomplishing its objectives (a strength or opportunity), or if it indicates an obstacle that must be overcome or minimized to achieve desired results (weakness or threat)[40].

The benefits of a SWOT-analysis can include:

- insight into where your business can focus to grow.

[38] Mr. R. Loohuis – Corus Tubes.
[39] Kotler, P., Marketing Management, 2003, p. 102-103
[40] Kotler, P., Marketing Management, 2003, p. 104-107; p. 306-330

- understand the industry structure by using a SWOT in your business plan.
- focus your advertising and marketing on areas that give you a competitive advantage in the marketplace.
- the foresight to see looming threats and react proactively.

For the internal analysis I have used a 2004 VLP customers' survey, carried out for all its European customers, as the guideline for the key strengths and weaknesses. In addition, I have used internal interviews as a data source to add to this internal analysis of strengths and weaknesses.
For the external analysis, I have screened information to come to an objective measurement of the opportunities and threats for VLP. Trends, visible in current customer accounts of VLP throughout Europe in the HT and OEM segments, have been taken into account. As well, interviews with both internal and external parties have indicated what the positive and negative trends in the external environment are. Complementary, I have used publications from associations in both segments as a secondary data source to uncover the trends that ate upcoming.

2. Report Outlook

Decisions upon which models and theories are useful for this study, and which will help to structure the research as planned, demand looking forward to the decisions that are to be made concerning the scope and level of study. Decisions are twofold, namely:
1) pre-study, to limit (/narrow) the scope of study, and
2) post-study, to conclude based on research outcomes.
In addition, clear and complete definitions need to be formulated of the chronological steps in this study, and decision moments need to be stated throughout the timeline of this study.

Structure of the research

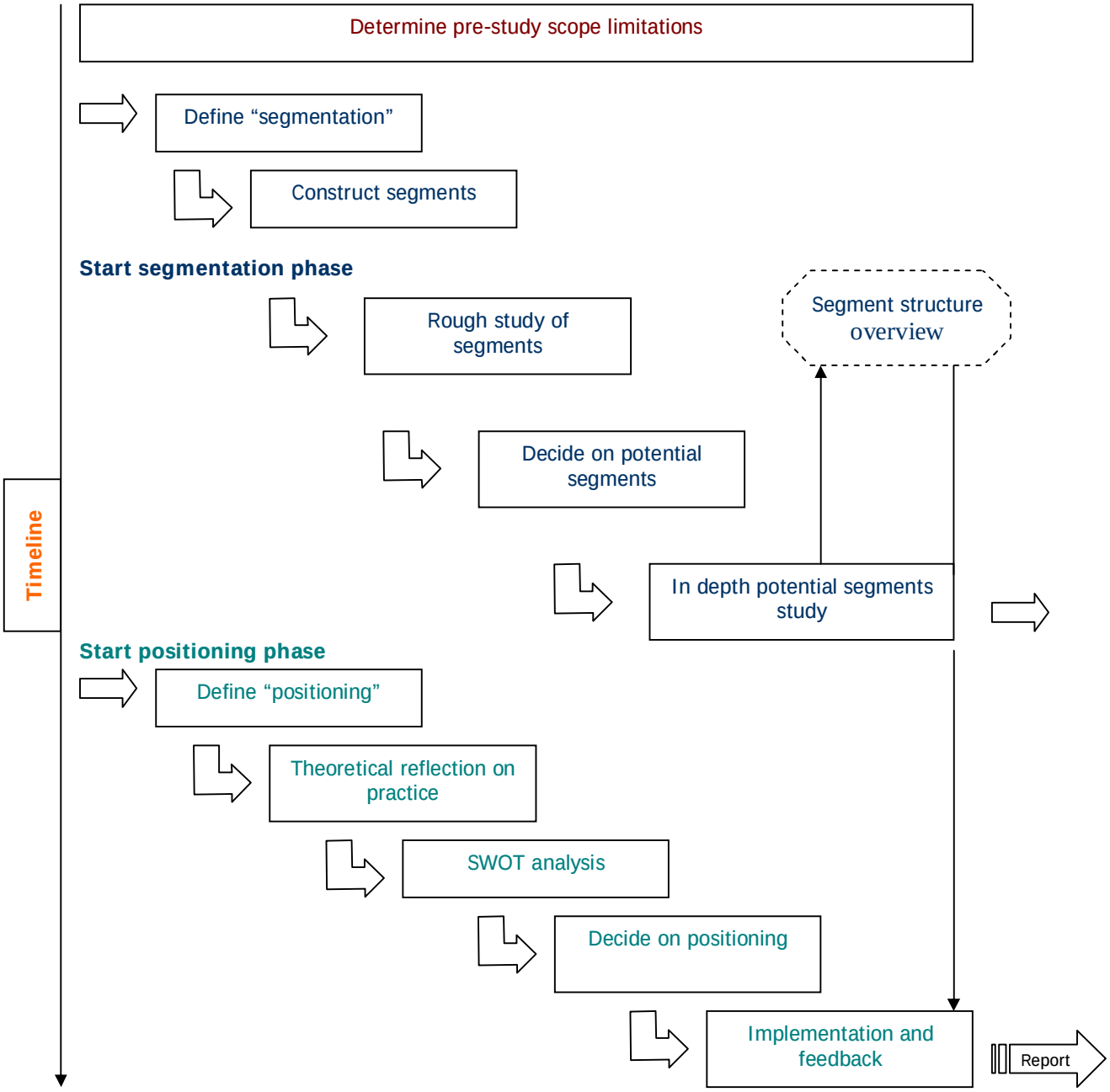


Figure 1: Structure of the research

2.1. Pre study scope limitations

2.1.1. The nature of the organization

VLP can in short be described as a Dutch stock holding distributor that has offices in several European countries. VLP takes title to the products it sells, and is an independent connection between suppliers and customers. VLP has it own staff for procurement and sales, and offers added value (services) to the customers. Specific literature will be used to describe and prescribe actions taken by a company concerned with trade. The characteristics mentioned need to be kept in mind when decisions are made concerning the future strategy of the organization. In literature these characteristics are discussed and covered by the 'wholesale' typology. Kotler[41] has distinguished major wholesale types that can stratify the organization of wholesalers, and which can be used to identify the organization of VLP. First, however, I want to make some considerations regarding the service organization.

Wholesaling company
Wholesaling includes all activities involved in selling goods or services to those who buy for resale or business use. Wholesaling excludes manufacturers because they are engaged primarily in production, and it excludes retailers. Wholesalers – or distributors – differ from retailers in a number of ways. First, wholesalers pay less attention to promotion and atmosphere because they are dealing with business-to-business customers rather than with end-consumers. Second, wholesale transactions are usually larger than retail transactions, and wholesalers usually cover a larger trade area than retailers. Third, the government deals differently with wholesalers and retailers in terms of legal regulations and taxes according to Kotler[42].

What right of existence lies underneath the wholesaling company? After all, it is opposed very often that manufacturers can sell directly to retailers or consumers. Generally one can say there are nine basic reasons why wholesalers are part of many supply chains, because they are more efficient in performing one or more of the following nine functions:

- Selling and promoting: wholesalers's sales forces help manufacturers reach many small business customers at a relatively low cost. Wholesalers have more contacts, and buyers often trust wholesalers more than a distant manufacturer.
- Buying and assortment building: wholesalers are able to select items and build assortments their customers need, saving the customers considerable work.
- Bulk breaking: wholesalers achieve savings from their customers through buying in large carload lots and breaking the bulk into smaller, possible heterogeneous, units.
- Warehousing: wholesalers hold inventories, hereby reducing inventory costs and risks to suppliers and customers.
- Transportation: wholesalers can often provide quicker delivery to buyers because they are closer to the buyers.
- Financing: wholesalers finance customers by granting credit, and finance suppliers by ordering early and paying on time.
- Risk bearing: wholesalers absorb some risk by taking title and bearing the cost of theft, damage, spoilage, and obsolescence.
- Market information: wholesalers supply information to suppliers and customers regarding competitors' activities, new products, price developments, and so on.
- Management services and counselling: wholesalers often help retailers improve their operations by training sales clerks, helping with store layouts and displays, and setting up accounting and inventory-control systems. They may help industrial customers by offering training and technical services.

[41] Kotler, P., Marketing Management, pp 548, 2003.
[42] Kotler, P., Marketing Management, pp 547, 2003

The advantages are clear, and, viewed from a competence based approach, wholesalers serve the same purpose as manufacturers do, namely "do something better than others". Kotler distinguishes in total six types of wholesalers, of which four types ('Broker', 'Agent', 'Manufacturer's and Retailer's Branches and Offices', and 'Miscellaneous wholesaler') do not match core characteristics of VLP, namely:

- VLP takes title to the goods
- VLP does not assist in negotiation between customers and suppliers on a regular basis
- VLP is independent of both customers and suppliers in its purchasing and sales of products
- VLP can not be described as Miscellaneous, for it is not active in agricultural output, petroleum bulk plants and terminals, or auction companies.

VLP is an independently owned business that takes title to merchandise it handles. A wholesaler conducting these activities is named a Merchant Wholesaler[43], and within this typology it can be divided into either a 'full service' or a 'limited service' wholesaler. The latter one is characterized by providing little to no service at all to customers, which are perfectly described as cash-and-carry. No financing, no transportation, nothing but the product to cut costs. These companies strive for cost leadership and high volumes. VLP wants to distinguish itself by offering a high quality range of products, a complete set of tailored services for customers facing trouble with e.g. logistics, and not necessarily aim for lowest prices. Therefore, VLP is a full-service wholesaler offering several unique selling points with its services package. Full-service wholesalers exist in two types, based on the nature of customers. VLP is providing customers in the Business-to-Business market, indicating that VLP is an Industrial Distributor.

2.1.2. The geographical field of study

If the Automotive industry is an absolute global industry, then VLP (VLP) is a less global player. Even though VLP is able to provide products and services throughout the world, using both its own and the Van Leeuwen Group's network, still tactical and operational strategies are geographically centralized in Europe. In addition, the majority of operations, and therefore (market)knowledge and experience gained, concerns activities carried out in Europe.
If one speaks of high potential nowadays then (Asia, e.g. China) is frequently brought forward as the market with the greatest potential, the fastest growing market with a tremendous amount of consumers, export facilities and low labour costs. If potential is created, it has to be in Asia where low labour costs are combined with high-tech production systems and investments, resulting in the recently launched € 5,000,- passenger car. Consequently, the following question must arise: "why not aiming at Asia?". The answer is more than dual.

At first, I have to limit the scope of study because the time of research is bounded to four months, resulting in a lack of time to study the global world for opportunities in which geographical areas first have to be selected on potential before continuing with a narrowed scope of study in order to meet timely demands. A pre-study of automotive industries in The Netherlands, Belgium, Germany and France indicates this industry is worth the research. In addition, VLP lacks the time for a time-consuming study because a plan of action is needed on a short term. Performing a time consuming study would cause VLP to be unable to strategically expand during the time being, which as a result may cause a delay competitors will take advantage of.

Second, Asia may well be high potential for every organization, but you have to realize what characteristics do distinguish a market in a favorable way. Sophisticated technology and low labour costs call for outsourcing activities to China that are labour-intensive but still demand high-level education and equipment. VLP does not have this labour-intensive workforce on its payroll, and it is not involved in the actual production of products. VLP's primary process is the procurement of rough, and non-labour intensive, material, and selling it at a higher price; a trade-oriented supplier and stockist of pipes, tubes and components. It can be present wherever customers have to be supplied with high-quality products and logistical solutions. VLP's objective should be to be present there where

[43] Kotler, P., Marketing Management, pp 548, 2003.

business is concentrated, and business is not only concentrated in China. If market trends indicate that the business VLP is in, is moving to other geographical zones, VLP will have to move as well. Such movement and studies then will be subject to further study.

Third, VLP is already concentrated in Western Europe. The reason for concentration in Western Europe is the business and success it has here, and the value it is adding to customers in Western Europe. Around this business VLP has created an international network of customers, suppliers, offices and warehouses, all in a way that is optimizing the logistical operations that need to be carried out. It is in line with expectations that growth and expansion opportunities are investigated in-detail at the current geographical area of presence where large investments have been made, both financial and non-financial, before conferring an eventual entry in other continents.

Fourth, VLP uses a conservative best-practice approach which means that possibilities are studied to copy success-stories within the same sector to other practices, in order to achieve instant similar (or better, due to earlier experience with common problems) succes in new areas. Therefore, a clear understanding needs be gained of the succes of current automotive projects VLP is carrying out. At this very moment VLP's automotive activities approximate a 20% share in VLP's annual turnover. VLP is still experiencing annual growth in its automotive accounts, and this study serves the goal of structurizing the future automotive actions. This study intends to pinpoint strengths and weaknesses and suitable automotive-experience of VLP that can be used for new automotive initiatives.

Europe here comprises the countries where VLP has offices/warehouses, the countries in between countries that have warehouses, and neighbor countries, all within a range of an absolute maximum of 750 kilometers if Just In Time (JIT) delivery is not to be considered, and 250 kilometers at maximum if Just In Time deliveries are necessary[44]. New products are not subject of this study, nor is the study of an eventual new warehouse. This study is based on the current European offices/warehouses VLP holds.

2.1.3. Definition of "segmentation"

Segmentation[45] is the grouping of customers who share a similar set of wants. Segments are not created by VLP, but they are identified and targeted by using a specific positioning strategy. Segmentation holds several benefits, such as the creation of a fine-tuned product or service offering combined with a segment-tailored pricing. The company can more easily select the best distribution and communications channels, and gain clearer pictures of competitors going after the same market. The degree of fine-tuned products used to serve the segments depends on both the company strategy and the segment wants. VLP's strategy can be formulated as being a high quality, full-service, wholesaler in the business-to-business sphere. Such strategy calls for tailored solutions, resulting in flexible market offerings[46]. *Naked-solutions*, concerning products and services, need to be supplied that all segment members value, and *discretionary options* that some segment members value.

2.1.4. Construction of segments

Resulting from the definition of segmentation, each segment is a grouped set of members that have similar wants. Automotive segments need to be selected based on similar wants of the customer and/or eventual manufacturer. A clear understanding of the definition of automotive is needed. A generally used definition is:
Moving by itself; the characteristic of an item of being self-propelling or self-propelled.

This definition is too generic and too excluding at the same time, and therefore there is a need for demarcation. This definition – literally speaking – includes all creatures and products which are self-

[44] Mr. E. Smid – VLP Business Development Manager
[45] Kotler, P., Marketing Management, pp 279, 2003.
[46] Anderson, J.C., and Narus, J.A., "Capturing the value of supplementary services", pp. 75, 1995

supporting (given the fact that they are supplied directly or indirectly with energy (food/fuel)) in their action of movement. Even people and animals would be included, but trailers and caravans would be excluded. A definition needs to be formulated that describes the segments of value for VLP. To filter out the unsuitable segments preliminary, I consider that:

1. the moving items make use of (gear wheels or) at least 4 wheels, which are driven, and which form the fixed contact between the item and the hardened surface
2. the moving item is automotive itself
3. the moving item has to be the product of manufacturing
4. this manufacturing process includes the (partly) application of materials that are supplied by VLP, or, considering the product-philosophy of VLP, can be supplied by VLP

5. every item not applying to all four considerations, e.g. bikes, are excluded. The exemptions are agricultural add-ons to tractors. This is a valid exemption because applications of these items require specific high-end products that reflect VLP's assortment.

Automotive for VLP can then be defined as the industry that produces items that apply to all five conditions.

The identified segments are:
1. *Passenger car*
2. Commercial vehicle - e.g. (mini) van
3. *Bus/Coach*
4. Heavy Trucks
5. Agricultural (including add-ons) applications
6. Construction Equipment

Tools will be used, such as maps and figures, to provide an overview of the market structure of segments.

2.1.5. Rough study of segments

Segment criteria need to be aligned to the pre-study limitations. Here, it means that if geographical criteria are included, these should be limited to the European countries. In addition, the nature of the organization may imply limitations and tailored criteria. This consideration will be worked out when an in-depth study of segments is performed, using specific criteria.
Roger J. Best[47] has structured the needs-based market segmentation approach by offering a seven-criterion model of segmentation. To gain insight in overall segment attractiveness he uses the following criteria:

-market growth
-market size
-(un)certainty of stable relationships
-number of competitors
-competitors' market share division
-market (structure) access
-geographical situation (trends, clustering and absolute distances)

These general criteria are used to ensure an adequate and quick selection of segments, which will be scored using scaling. The weighting of criteria depend on the scores of VLP's executives award them with.

[47] Best, R.J., Market-Based Management, 2000

2.1.6. Decide on potential segments

Preferably two segments are selected for in-depth study, according to their potential. Potential in this study is the cumulative attractiveness as scored on the scale of rough indicators or criteria, with individual personal[48] weightings used for all criteria. Because of the factor time, I wish to study the two highest-potential segments resulting from the selection.

2.1.7. In depth potential segments study

After the selection, an in-depth study is required to obtain insight in the actual and specific needs of the high-potential segments.
At first, a valuation survey needs to be performed among higher Tier[49] customers and/or OEM's to define which organization functions of a full-service Industrial Distributor are valued most. Rosenbloom[50] has proposed six key functions of an intermediary organization, supporting the nine functions Kotler distinguishes. Both will be combined in a survey to study the selected automotive-industry segments on their reflection to the theory used, resulting in their 'appreciation of' and 'willingness to cooperate with' an Industrial Distributor. In addition, automotive supplier characteristics can be determined and scored on importance. Dickson's research[51] focussed on manufacturers' valuation of supplier characteristics, and the ten highest rated characteristics will be confronted with the two high-potential segments practice.

Roosenbloom's six functions are:

1) making the product available
2) delivering customer service
3) providing credit and financial assistance
4) assortment convenience
5) breaking bulk
6) giving advice and technical support

The ten most important characteristics when suppliers are selected, derived from the work of Dickson, are[52]:

1 Quality
2 Delivery
3 Performance history
4 Warranties and claim policies
5 Production facilities and capacity
6 Price
7 Technical capability
8 Financial position
9 Procedural compliance
10 Communication system

Second, an in-depth study of the potential segments should identify the players active in the market. Therefore the Original Equipment Manufacturers (hereafter: OEM) will be mentioned, their portfolios will be discussed and their market shares will be revealed. Furthermore, the two potential segments should be mapped. The location of the European production sites, together with the products

[48] A personal score is based on a combination of VLP employees' opinions and information provided by non-VLP persons I will meet.
[49] A Tier is a stage in the supply chain. Tier 1, or 'first-tier supplier', refers to the supplier who is directly supplying to the end-manufacturer, a Tier 2 supplier normally supplies the Tier 1 supplier, and so on.
[50] Rosenbloom, B.,Marketing functions and the wholesaler-distributor: achieving excellence in distribution, p.17, 1987
[51] Dickson, G. (1966). An analysis of vendor selection systems and decisions. *Journal of Purchasing,* 2(1): 5-17.
[52] An overview of Dickson's complete list of 23 important criteria is presented in Annex 15.

manufactured at these sites, need to be clear. How the European countries contribute to these segments needs to be set out.
Next, the key suppliers to these potential segments must be identified, preferably the first-tier suppliers active in these potential segments. As well, preferred suppliers to the OEMs in the potential segments should be identified because they have to be targeted by VLP.
In addition, the in-depth study requires also a comprehensive analysis of important requirements to suppliers in these segments.
At last, the in-depth study should anticipate on the SWOT-analysis carried out later in the research plan. This SWOT-analysis will discuss trends in the high potential segments and opportunities relevant for VLP.

2.2. Positioning phase

2.2.1. Define "positioning"

Best[53] describes the positioning phase as "creating value propositions and product-price positioning strategy based on that segment's unique customer needs and characteristics". A detailed product-price strategy will not be part of this study, since market experience of sale representatives and management will determine this strategy. This study will propose a product-price strategy based on the data of study.

2.2.2. Theoretical reflection on practice

This reflection refers to the analysis of the current internal VLP organization, resulting in the specific fit between VLP and the nine functions mentioned by Kotler and Rosenbloom. As well, the fit with criteria/characteristics of Dickson concerning supplier selection will be evaluated. This is the moment to incorporate survey results concerning demanded characteristics of Industrial Distributors in the automotive-industry, as indicated by the contacted contactpersons and organizations[54].

2.2.3. SWOT-analysis

Strengths, weaknesses, opportunities and threats can partly be derived from the above mentioned. The internal analysis of functions will provide part of the strengths and weaknesses, the external analysis will indicate what theoretical functions are highly valued in the best segment(s), as well as eventual functions that have not been addressed to by literature. The SWOT-analysis should also comprise a research of competitors' strengths and weaknesses that can be compared to VLP's positive and negative functions. A competitor based research results in opportunities and/or threats for VLP when entering the segment of study. Also, segment related trends will have their effect on opportunities and threats. From the in-depth potential segments study in the segmentation phase, results of "criteria-scoring" provide opportunities and threats important for VLP to look after.

2.2.4. Decide on positioning strategy

After the theoretical reflection and SWOT-analysis, a blueprint of a positioning strategy is given. Now it is time to select a strategy from literature that takes best into account the strengths, weaknesses, opportunities, threats, organization functions (both from theory and practice) and competitors strategies. An "acid test[55]" is needed to test the proposed segment positioning strategy on its attractiveness for customers. This results in a pragmatic best-practice positioning strategy, related to successes in the past, segment characteristics, VLP strengths and weaknesses, and future opportunities and threats.
Kotler distinguishes five patterns of target market selection, namely:
1. single-segment concentration
2. selective specialization
3. product specialization
4. market specialization
5. full market coverage

These strategies vary in their nature of specificity, ranging from very specific (single-segment) to

[53] Best, R.J., Market-Based Management, 2000
[54] Comparison of results Zerust
[55] Best, R.J., Market-Based Management, 2000

generic (all-segments) approaches. These five strategies are too little tailored[56], however, and will be adjusted to fit the automotive-segment demands. The forecasted positioning strategy is a single-segment concentration, in the event of two selected and different best-segments, the single-segment concentration will be performed for each segment (parallel). The creation of key selling points (KSP) of VLP must be incorporated in the strategy of choice. The strategy should provide a plan of action of how the KVP's are tailored to segment participants.

These KVP's are means of differentiation, aiming at differences that have to be:

important	– highly valued benefit for customers
distinctive	– distinctive differences
superior	– the difference is superior to other ways of acquiring the benefit
preemptive	– not easily copied by competitors
affordable	– affordable for customer to buy the difference
profitable	– profitable for customer to introduce the difference

2.2.5. Implementation and feedback

After deciding upon the best positioning strategy, preliminary to the last stage of the second phase an overview of potential customers needs to be provided, as well as an overview of the segment structure in terms of a detailed supply chain (Tier-structure). The latter one should map the opportunities of passing the customer and supply to higher end customers and/or OEM's. This implies the use of a segment structure overview of supply chain players. An implementation of the positioning strategy is pragmatic in nature, and the feedback implies a critical review of both the segmentation and positioning phases. Modifications can be made and added to the final report.

[56] Tailored to the automotive segment means to have a clear understanding of e.g. what references are needed.

3. Segmentation phase

In this chapter the following central question will be answered:

How can the automotive industry be segmented?

To come to an answer, the following supporting questions are answered as several paragraphs highlight the issues in the questions.

- *What are the segments and their characteristics (market share, centralized/scattered, market size)?*
- *What segment has the highest potential for VLP?*

3.1. The automotive supply chain

3.1.1. Historical background

Into the 1970's the vehicle manufacturers (OEM's[57]) relied heavily upon their captive, in-house parts manufacturing operations for as much as 70% of their requirements, but were beginning to buy increasing quantities of products from outside suppliers. Even so, virtually all engineering and product design work, and all vehicle assembly was undertaken by the OEMs. OEM engineers designed most of the bought-in components, developing all product parameters in the process. The OEMs would provide detailed blueprints to potential suppliers and invite them to bid against each other for a contract, employing an auction market model in which the two lowest price bidders usually won a "build to print[58]" contract for an agreed fixed price, for an agreed quantity, supplied over a finite time period of generally not more than one year. OEMs frequently would pay for and retain legal ownership of any unique molds, tool sets, or stamping dies used to manufacture the products they engineered. Suppliers were expected to do little more than to determine how to actually manufacture the item for the lowest cost and a reasonable profit. Any cost reductions they managed to accomplish during the contract accrued for their own benefit. A third supplier frequently was selected for each item, held in reserve in case one of the primes fell out of favor. Price was the dominant factor in contract awards. Other key criteria included the prospective suppliers' manufacturing capability, capacity, reputation, and reliability. Product quality was another metric employed, but high rates of failure were tolerated, often with very little repercussion for the supplier other than to replace the rejected components at its own expense. This could be onerous, however, as the OEM's typically built large inventories of purchased parts, and could reject the entire stock, if the error rates were subsequently found to be too high.

3.1.2. Trends in the automotive industry

During the last thirty years, as changes in the industry were felt by every participant, supply chain management grew extremely important[59]. Of course the main reason for this was to control total costs, and hereby increase revenues, in different stages of the supply chain. A number of "drivers of change" can be identified as independent variables causing this trend towards increasing importance of structuring the supply chain. These drivers of change are:
Globalization without liberalization

[57] Source: http://www.ita.doc.gov - Automotive Industry Supply Chain – In the Throes of a Rattling Revolution
[58] Or: according to drawing
[59] Source: http://www.ita.doc.gov - Automotive Industry Supply Chain – In the Throes of a Rattling Revolution

Foreign manufacturers of automotive products identified opportunities in other countries, and started investing in competitors' home markets. This 'in your own backyard' rivalry triggered the industry to be more cost-efficient.

A shift in the industry's business model

New entrants in foreign markets were typically accompanied by the mother company's business model. This new business model was especially influenced by the "Just-in-Time" and "Total-Quality-Management" principles of Japanese automotive industry, meaning a collaboration between each assembler and its cadre of parts suppliers with a lean, flexible, just-in-time (JIT) assembly process and a zero-tolerance focus on quality.

Trade liberalization

Declining tariffs, quota restrictions, and technical trade barriers in the emerging markets, coupled with fiercely competitive domestic and West European markets that will grow at most by 2% a year over the next 5-10 years – while some emerging markets are growing 15% a year – have encouraged competition on a global scale.

Globalization of the entire auto industry

The global auto industry is shrinking, coalescing[60] through both mergers and acquisitions and via collaborative efforts, seeking to create manufacturing alliances focused on driving down costs and creating greater economies of scale than the competition enjoys. In the early 1960s there were some 100 independent vehicle manufacturers scattered around the globe. In 2004, six separate corporate clusters representing 25 large volume manufacturers produced 75% of the world's output.10 While these Global 6 will still be operating in 2010, and will still represent 75% of the world's output, where they produce those vehicles will have started to shift significantly.

New tier structure and expanding supplier responsibilities

Increasingly, the major OEMs are moving toward a "Vehicle Brand Owner" business model, in which each VBO eventually will be responsible primarily for managing, marketing, and maintaining a stable of nameplates, having surrendered more and more responsibility for content engineering and even for vehicle assembly to outside suppliers, and having transferred more and more costs, responsibilities, and product knowledge to them in the process. Some, including GM (Saab), DaimlerChrysler (Chrysler), and even Porsche, have already begun to subcontract production of complete low-volume "niche" vehicles to specialty assemblers. Suppliers now are being evaluated, not only on the basis of near-term price and long-term cost reduction programs, but also for their corporate stability, product design and production engineering capabilities, for down-stream management of their own supply chains, delivery reliability, willingness to locate plants in closer proximity to the OEM's – wherever they are located – and for participation in the assembly process.

3.1.3. Automotive industry – OEMs and Tiers

Historically[61] the OEM's supply chain was divided into three to four distinct layers. These sometimes overlapping layers are occasionally identified using annual sales as a determining indicator. Normally, however, they are divided along the line of machining and using the amount of integration into the end-product as an indicator. The layers, at last, are called "Tiers" in supply chain management whenever a product is assembled from a variety of components. E.g. an OEM (vehicle manufacturer) is supplied with complete modules by a supplier in Tier 1 (first layer), Tier 1 is supplied with systems by Tier 2 (second layer), and Tier 2 subsequently is supplied by Tier 3 (third layer). Graphically this is constructed in figure 1.

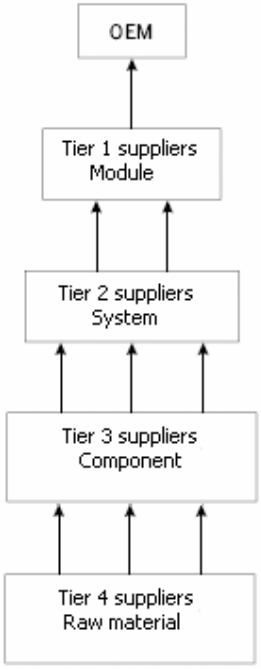


Figure 2: Tier structure

[60] Or: to grow together; to fuse

[61] COMMISSION OF THE EUROPEAN COMMUNITIES DG Enterprise, Innovation, Networking and Services, AutoChain, Final report, January 2001

This is a very static supply chain model, in which hierarchy is playing a dominant role. However, a Tier 3 supplier can supply directly to the OEM whenever a component (f.i. a tube for a wiring) is needed by the OEM that requires little or no machining. This, however, is very much an exception in especially the passenger car automotive industry.

Although this static Tier model in literature is outdated and replaced by a more dynamic supply chain[62] (figure 2) model, the typology of Tiers is still used to distinguish suppliers in the automotive industry. Focus is more and more on the integration of the product with other products in the supply chain, in figure 1 described as 'module', 'system', 'component' and 'raw material'.

The Generic Automotive Supply Chain Model ('the Model') shows the essential topology of the European automotive supply chain. The Model illustrates the key types of organizations involved and the nature of their relationships in the supply chain. The thousands of relationships is shown as a schematic model. The Model is an efficient means of expressing the current state of the European automotive supply chain and supports the VBO principle of nowadays supply chain design.

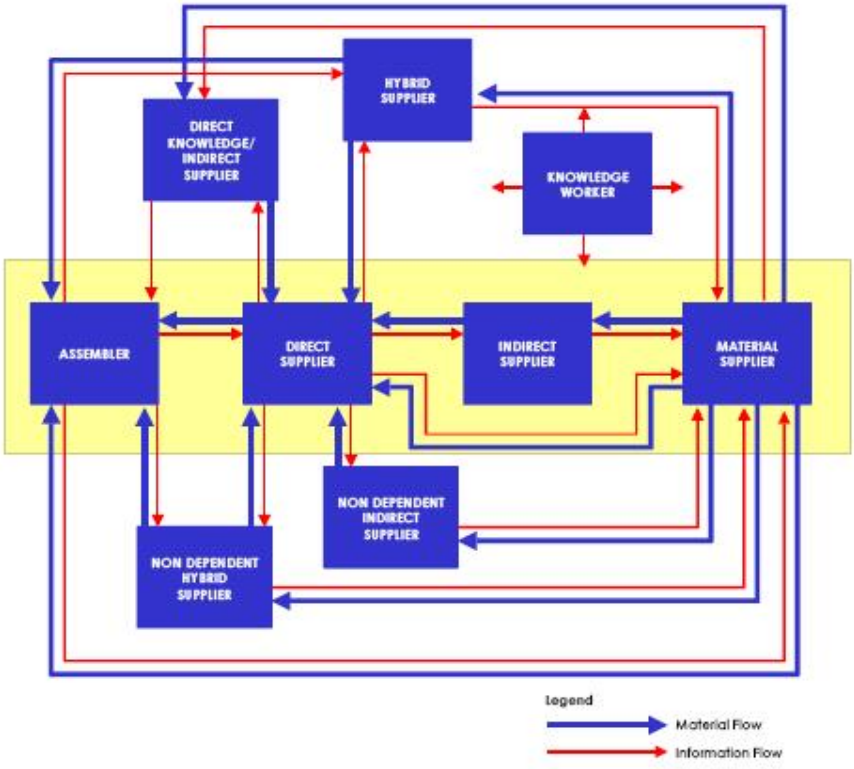


Figure 3.1: Generic Automotive Supply Chain Model

The key characteristic of the late '90s automotive supply chain is change. Auto makers are rationalizing their exposure to the supply chain in an attempt to move the cost responsibility out of their hands. The reduction in the direct suppliers to the world's leading auto makers is dramatic: e.g. the Ford Escort had over 800 direct suppliers. The Focus, which replaces it has only 190, 150 of which were actively involved in development work.
The reduction in direct suppliers has meant that these suppliers have had to accept new responsibilities and so are becoming suppliers of systems and modules. The 'systems suppliers', as they are becoming known, are altering their relationships with their supply base. It is this change further down the automotive supply chain which is driving so many companies up the chain to re-evaluate the way they do business within it.
The Model illustrates nine positions which are filled by a bewildering array of organizations. Some companies will exist in multiple stages of the supply chain simultaneously. The idea of 'tiering' is now considered to be out-dated and an increasingly irrelevant concept. The automotive supply chain is being recognized as a network of participants with multiple

[62] COMMISSION OF THE EUROPEAN COMMUNITIES DG Enterprise, Innovation, Networking and Services, AutoChain, Final report, January 2001

relationships rather than the previous view that tiers are layered on top of each other and can be constructed for every OEM separately without overlap with the tiers of other OEM's networks.

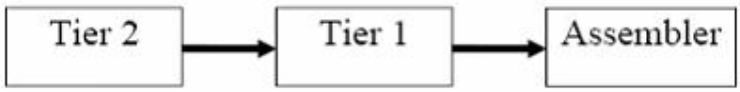


Figure 3.2: Traditional Tier Automotive supply chain

The nine organizational positions in the model in figure 2 are not permanent and organizations can hold multiple positions. Companies are increasingly attempting to leverage their position to maximize their returns. It is a strategic decision where to place a supplier on the automotive supply chain. It is also challenging and offers many pitfalls. However, it is only by truly understanding ones position on the chain can a company evaluate where its strengths and exposure to threats lie.

3.1.4. Dynamics in the model

The domestic parts industry is in the throes of responding to these new challenges. Some suppliers are willingly taking on the new responsibilities offered to them by the OEMs as VBOs, transforming themselves into "Tier One-Half systems integrators," that engineer and build complete modules (for example, an entire interior, 4-corner suspension sets, an entire rolling chassis) and assume both product design and development responsibilities and downstream supply chain management functions previously undertaken by the OEMs. These suppliers are scrambling to add to their capabilities and product lines; building additional plants to satisfy JIT requirements and minimize inventory exposure, adopting global best manufacturing practices, investing in their own development of new technologies, or buying or merging with firms that can contribute new skills, complementary products, and new technologies.

Consequently, other firms are choosing not to pursue this new role, consciously deciding to remain in the less demanding tiers. Studies by McKinsey suggest that they actually may be more profitable in the near term, but some eventually could find themselves in an exceedingly competitive environment of highly cost sensitive, commodity products – particularly if they are unable to differentiate their offerings. The OESA/RB study notes that only 14% of its surveyed participants managed to meet their cost reduction targets in 2000-2002. Unfortunately, producers don't see this pressure slackening. In fact, 12% expect to be struggling with 20% reduction targets in 2003-2006, versus the 6% that faced this bogey in 2000-2002. It's not surprising that many suppliers have exited the business, either through bankruptcy or by refocusing their efforts to serve other industries.

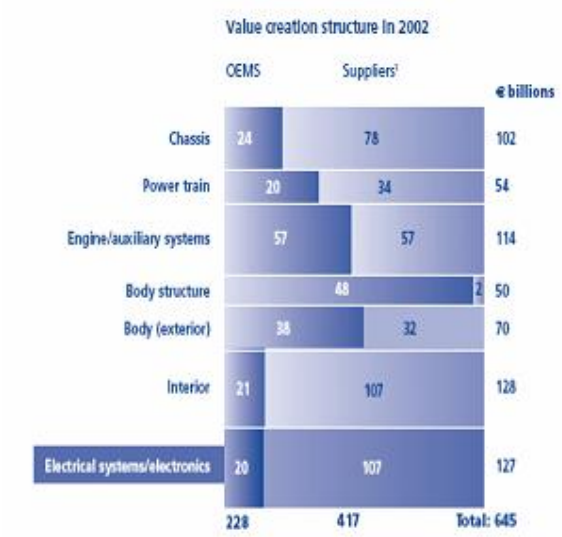


Figure 4: Value creation 2002

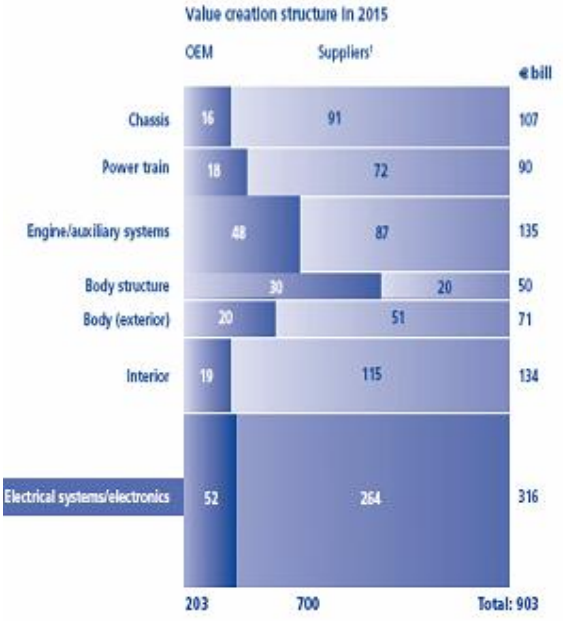


Figure 5: Value creation 2015

As automakers move downstream, more engineering and production will shift to suppliers and service providers for engineering or assembly. Today, they already develop and build 65% of the average vehicle; this share should increase to 77% over the next decade as suppliers assume more engineering and production of the body, paint, and other components. The money that automakers spend on pre-development and series development will remain nearly constant; among production activities, they will continue to increase investment only in electronics.
Suppliers will become the main engine of job and value growth in the industry. Companies such as Bosch, Continental, Delphi, Lear, Siemens VDO Automotive, ThyssenKrupp, and Visteon will increase their value creation 70% by 2015, growing to an aggregate €700 billion. To accommodate this growth, suppliers and service providers will have to create an additional 3.3 million new jobs worldwide, most of them requiring skilled workers.
What activities will suppliers take on? Among the different modules of an automobile, electrical systems and electronics will experience the greatest growth as more electronics are incorporated into engine management, communications, comfort, and safety. Consolidation will continue to shrink the base of suppliers. Ongoing cost pressures, expansion in the range of competencies required, and the growing need for investment and hence capital favor larger and fewer firms.

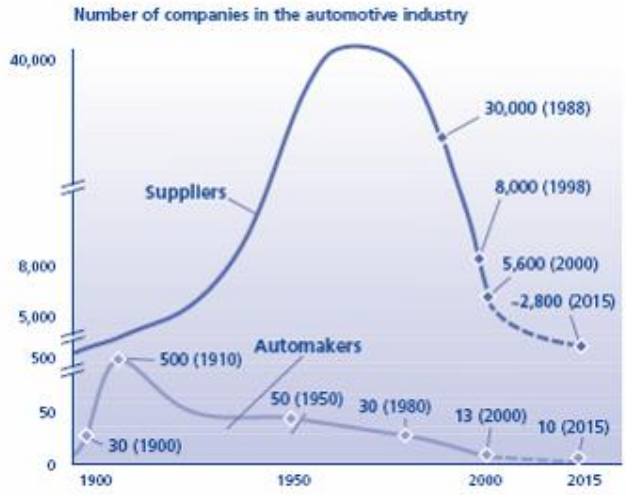


Figure 6: Companies in automotive industry[63]

[63] Source: Automotive Industry Development group, University of London, 2003

3.2. Rough study of segments

The automotive industry is a comprehensive industry, with a great variety of end products produced and a tremendous number of manufacturers (OEM) and suppliers. Because of the time available for this study, a segmentation is needed to construct segments in this automotive industry. Then, these segments need to be scored according to their potential for VLP based on a quick scan. This quick scan must comprise several criteria that are important to VLP.
At forehand, the scores of these criteria most favourable for VLP must be listed. Then, the segments can be scored and after scoring each segment, the scores can be compared with the most favourable scores for VLP, and conclusions can be drawn on the segments.
Ultimately, this quick scan must allow for a quick elimination of less interesting segments. Preferably two segments remain, which will be studied into more depth. This is due to the comprehensive nature of the automotive industry and the limited time I have available for this study.
In the latter, more sophisticated study of the two highest potential segments, the demands of these segments need to become clear. Based on these segments' demands, the positioning phase can be started, in which VLP will be positioned in a way that it best corresponds with the two segments' demands.
Although I wanted to include supplier information that aims more at the different products supplied, and the arguments for these choices to supply these products, I completely lack technical know-how of how these products are manufactured, what raw material is used to manufacture these products, and how VLP could benefit from these arguments. As well, so many different products are produced that I think it is too much asked to map all products from all suppliers.

Segmentation, serves another goal next to being helpful when time is limited. By constructing segments, a company can more easily target its potential customers, and gain insight in competitors going after the same market. The degree of fine-tuned products used to serve the segments, depends on both the company strategy and the segment demands. VLP's philosophy can be formulated as being a high quality, full-service, wholesaler in the B2B market. Such strategy calls for tailored solutions, resulting in flexible market offerings[64]. This means that products and services need to be supplied that all segment members value, and discretionary options that only some segment members value. In defining the most favourable scores of the criteria VLP's philosophy will naturally be kept in mind. One can argue if VLP should be open minded, and alter its philosophy if the segments demand such thing. It is my judgment that this should not be the case, because I think it is not in the scope of this study to construct a complete new business philosophy, such as aiming at low pricing, poor quality, or production of steel tubes instead of wholesale of these products. VLP must stick to its roots, and a match for these roots must be found.

3.2.1. Europe: production of automotive units

Introduction
In this paragraph I wish to outline the market size around the world in which all manufacturers operate when building a unit that is considered automotive.
Automotive manufacturers, or manufacturers of automotive solutions, are global players. They have taken advantage of the continuously liberalised world trade in terms of exports and have opted for local production/ investment in countries with still well protected markets. Automobile manufacturers are breaking the global boundaries and are pooling global resources.

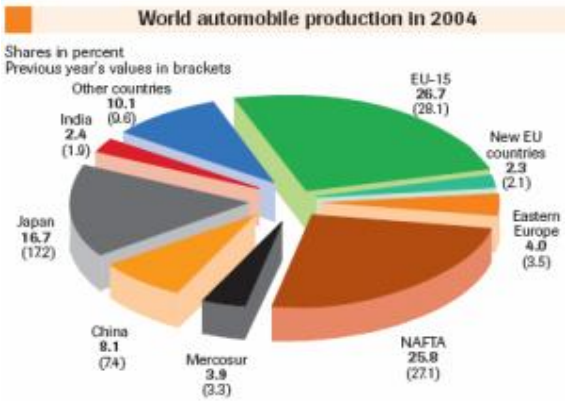


Figure 7: World automobile production 2004

[64] Anderson, J.C., and Narus, J.A., "Capturing the value of supplementary services", pp. 75, 1995

Their strategy of export activities and key-market presence has resulted in their position as a key industry world wide.

Market size

The worldwide production of automobiles for 2004 was 52.8 million passenger car units (including pick-up trucks and SUV's/MPV's) and 10.2 million commercial vehicle (van, light truck and heavy truck) units, adding up to 63 million automobile units[65]. The overall 5% growth of the automobile industry has had its effect for 2004 as well: +4% growth for passenger cars (compared to 2003), +12% for commercial vehicles. Quite surprising, the global automobile production can be divided on continent (Europe, America, Asia) in almost equal thirds[66]. One can argue that this comparison compares united states (EU, NAFTA) with single countries such as Japan, and thus does not provide a representative figure.
However, the above figure shows a detailed and clear breakdown of contributions in worldwide automobile manufacturing:

- **Western Europe** (EU-15) is first and produces an annual 16.8 million units, which means a total market share of 26.7% of global annual automobile production.
- **NAFTA**, including Canada, United States and Mexico, is second with 25.8% (16.2 million units). Japan and China are third, contributing to global production with a market share of 24.8% (Japan: 10.5 million units; China: 5.1 million units).
- **Mercosur**, uniting South American member-countries Brazil, Argentine, Uruguay, Paraguay and Venezuela, holds 3.9% of the global market, equalling 2.5 million units.
- A little more automobiles rolled out of the factory in **Eastern Europe**, 2.5 million (on the positive side compared to Mercusor) meaning 4% market share.
- **New EU countries** increased their market share with 0.2% to a final 2.3% (1.5 million units) for 2004.
- **India** grew to 2.4% and 1.5 million units in 2004; **other countries** (such as various in the Middle-East and Africa) contributed the remaining 10.1% to complete the "automobile pie".

The scope of this study aims at an accumulated 33% (20.8 million units) of the total automobile market, namely the combined shares of Western Europe (EU-15), New EU countries and Eastern Europe.
In 2001 the European automobile industry achieved a world wide turnover of €452 billion euros, of which €271 billion euros in Western Europe, providing direct employment to 1.1 million people in the EU (1.6 million world wide) to which another 11 to 12 million directly or indirectly supported jobs can be added. Thus the sector involves roughly 8,5% of the EU's active workforce[67]. An estimation for the turnover of 2004 can be made using turnover rates from previous rates, linked to automobile production numbers concerning these years[68]. Compared to 2001 statistics (reports show an average annual growth rate of 4-5%), the European automobile industry 2004 world wide turnover approximates €513 billion euros. This equals a 13.5% growth from 2001 to 2004, meaning that the annual growth rate mentioned before is representative. This 13.5% growth will have had its effects on European employment as well, although this correlation may not be expected to be linear.

[65] http://www.vda.de/en/service/jahresbericht/auto2005/en
[66] http://europa.eu.int/comm/trade/issues/sectoral/industry/auto/index_en.htm
[67] http://europa.eu.int/comm/trade/issues/sectoral/industry/auto/index_en.htm
[68] 2001 figures: market share Europe = 33%, units manufactured world wide = 55 million

Defining criteria
Before starting the rough study of segments, I need to point out the criteria that will be used. As well, I need to state the most favourable scores of these criteria for VLP.

Segment criteria need to be aligned to the pre-study limitations. Here, it means that the segments are limited to the European countries. In addition, the nature of the organization implies that need to be taken into account in this rough study of segments. As mentioned before, they are important because when you do not relate the organization's philosophy and nature to the criteria, the quick scan may result in interesting segments that demand VLP to change more than lies in the field of this study.

Robert J. Best[69] has structured the needs-based market segmentation approach by offering model of segmentation by using seven criteria.

- market growth
- market size
- (un)certainty of stable relationships
- number of competitors
- competitors' market share division
- market (structure) access
- geographical situation (trends, clustering and absolute distances)

Because of vagueness of criterion 3, and the similarity between criterion 4 and 5, I wish to use

- market size
- market growth
- customer relations – duration of contracts
- competition
- market access
- geographical situation (trends, clustering and absolute distances)

Stating the most favourable scores of these criteria for VLP forces me firstly to think how I can measure these criteria. Official publications from OEMs and large suppliers in these segments, relevant associations, and professional research institutes are my primary sources of information. Relevant associations mean that they represent one or more of the following stakeholders: OEMs, suppliers, customers, employee organizations and governments. A professional research can be universities or renowned consultancy firms that have published concerning the segment's criteria at hand.
Although these figures can be subjective, it is impossible for me to perform a better (scientific) research that covers this supportive information because of the limited time. I have tried to add, when possible, VLP employees' experiences to this rough segment study. These experiences, my secondary sources of information, are relevant if I judge them to be so (convinced by the VLP employee), and I understand this cannot be seen as objective decision-making.
When no absolute figures are presented, I have to make assumptions based on the information provided in my primary and secondary source of information. These assumptions are subjective in nature, and when concluding on a segment they will be taken into account as a possible cause of errors. I will indicate whether, and why, I think conclusions can or cannot be made based on assumptions.
The last problem arising in this rough study of segments is related to the term 'favourable'. To decide what is favourable and what is not, I have based my judgment on the opinion of several VLP employees, and I have given the most value to the conception of the European Division Director. I have not used any external influences, but for this quick scan I believe the perception of VLP employees will be sufficient. Scores for market size, number of competitors, competitors' market share division, and market access can only be terms instead of absolute figures, because this data is not presented, not nominal, or not relevant to make quantifiable. For instance, market access is the ease with which a market can be accessed by a new player. In nature, this criteria is quantifiable. The segments still can be compared with each other and in that way result in a "more favourable" or "less favourable" segment compared to the other.

[69] Best, R.J., Market-Based Management, 2000

The combined favourable scores of these criteria make up a preferred profile of the potential segments. The scores of the criteria will at first be compared with the profiles below, and then more sophisticatedly scored ranging from 1 till 10, with 10 being favourable and 1 being unfavourable. Unfavourable then ranges from 1 till 3, neutral from 4 till 7, and favourable from 8 till 10, the exact value depending on the information at hand.

For VLP the preferred profile is presented in the column 'Favourable'.

		Scores		
		1-3	4-7	8-10
		Unfavourable	Neutral	Favourable
Criteria:	market growth	< 0%	0-5%	> 5%
	market size	large	small	average
	customer relations – contracts	< 1 year	1 - 2 years	> 2 years
	number of competitors	large	average	low
	competitors' market share division	monopoly	disproportional	proportional
	market access	bad	average	good
	geographical situation	> 750 km	750 - 250 km	< 250 km

All segments have been scored on these indicators where possible and the overview is presented below. The boxes filled with red scores mean there is too much doubt that an assumption had to be made. For all segments it is unclear how many competitors there are, and subsequently it is difficult to decide on the market share distribution amongst them. In these assumptions there has always been taken into account the market size of that segment, assuming a greater number of competitors when the market size is greater. As well, from a supplier point of view I have assumed that they supply not only one segment, but supply segments based on their products and thus can well be supplying more segments at the same time. For instance, I have assumed that the commercial vehicles segment is considerably identical to the passenger car industry, since products in these two segments are manufactured by the same OEMs. This means that the OEM can use the same network in both segments, and is assumed to do so. The suppliers will act in the same way too, because they will find themselves demanded to supply by the OEMs, meaning greater turnover rates and more opportunities to achieve efficiencies.
As well, all scores are accumulated at the end. One can argue that the criteria had to be weighted in order to construct a multi-criteria analysis (MCA). Here I decided not to do that, and to give every score an identical weight. On the one hand I made this decision because the nature of a quick scan; a quick scan simply overlooks other criteria because it focuses more on general criteria rather than specific criteria, and therefore is not complete. Second I do not support a MCA when part of the scores are based on assumptions. Third, the two segments that have the highest potential scored the highest values for all criteria. Therefore one can argue the way these scores have been granted is questionable in terms of reliability, because I cannot guarantee if the same research result would have been achieved when the study is repeated.
However, assuming the scores are reliable, the need for a MCA is zero when there are two segments that have the highest scores on all consecutive criteria.

3.2.1.1. Passenger car

Market size and growth
The European Union has calculated total output-numbers of the passenger car industry in Europe, divided by country, and figures are gathered for the subsequent years 2003, 2004 and 2005. Below these three-year figures are given in Annex 1, here only conclusions will be stated.
In the last three years the passenger car industry output in Europe showed an average increase of roughly 2%, although the last year (2005) showed a decline of 1.2%. Europe is divided into the European Union (EU), where production fell behind with 2.4% compared to 2004, and East and Central Europe (ECE). This latter part of Europe saw its production growing with 15% compared to 2004; moreover, the growth rate in 2004 compared to 2003 was 68%. Booming business one could conclude, but to keep it in perspective: ECE holds 9% market share of total European production, the other 91% is still manufactured in the EU countries.
Direction of growth: In absolute figures, ECE saw its numbers growing by +500,000 in 2004 and an additional +200,000 in 2005. The EU accounted for +100,000 in 2004, but total production decreased during 2005 by -400,000 units. This means a net increase of +400,000 units for whole Europe during these last three years, meaning that the EU may have lost part of its production to these low labor-cost ECE countries, but passenger car industry in Europe as a whole has improved its attractiveness as well. Namely, the absolute increase in ECE is greater than the decrease in the EU, meaning that this market is still growing. Supporting this last fact, Turkey has seen its production growing (in one year!) by 50% in 2004, to an absolute 447,000 units.

Market access
Passenger car manufacturers, especially the high-volume manufacturers such as Volkswagen, Ford en GM, build large series which means their daily demand is large as well. These large series provide manufacturers with great buying power, used in the negotiation-process with suppliers concerning prices. Next to this argument, prices can be considered to be under pressure because passenger cars generally have to compete on price, a condition that will be levied on the suppliers as well. Of course, the upper-end passenger car market where luxury and image is more important, can be considered to be less price-elastic. In this market units produced are typically less in number.
Wherever larger series are being built and demanded, it will be more difficult to defend your margin as an intermediary. The added value VLP provides as an Industrial Distributor is either not outsourced, but insourced, by the two parties that form the supply and demand sides of the market, or not sourced at all (meaning both parties are not buying the service from VLP, but are not substituting it internally either), all because of the margin demanded by VLP.

> **Success:** success stories, however, of Industrial Distributors managing these constraints and acquiring their right for existence do exist. Thiel&Hoche, a German based company, has acquired its ever growing market share as a trade company (only stocking when really needed) by offering more than just a product; they offer a complete solution. They employ numerous engineers to fulfill custom-made, and according to drawing, demands from passenger car manufacturers, and have them Just-In-Time delivered at the site of the customer. They match the application-needs (product functions) with the most suitable quality of raw material, buy the raw material, have it modified (by subcontractors near the customer) to fit the right shape, and supply continuous product improvements for both actual and future orders. VLP would have to make great investments in personnel to benchmark this ability.

Customer relations
Contracts are more strict and imply more conditions, face more financial obligations for the supplier (e.g. when deliveries are not in time), and the relationship is more one-sided leaving the supplier in a less favorable position[70]. Contracts usually have the duration equal to a passenger car's model market time, at average six years. However, after the first 'face-lift' of the model (after 2-3 years) the manufacturer make enquiries for products supplied by competitors of his current supplier, strengthening his negotiating position when the contract is discussed with his supplier after the face-lift. One could say that contracts last 3 years, and if performance is positive they will be lengthened to

[70] Derived from interviews concerning Automotive at fairs, as well as with Zerust employees.

6 years[71].
In line with these contracts and hierarchical implications, the possibility for a Third-Tier supplier, such as VLP, to supply directly to the OEM and hereby passing Second-Tier and First-Tier suppliers, is regarded as little.
The current and historical successes of VLP in this segment are little, experience is lacking and a best-practice method would imply other segment' successes to be copied to this segment. Concluding, VLP is somewhere in between where there is no match with this segment on the mentioned criteria.

Geographical situation
Market coverage should include the present presence in passenger car manufacturing countries as well. Although VLP is not situated in Germany, Annex 1 shows that roughly 7.6 million passenger cars are manufactured in countries where VLP has offices (The Netherlands, Belgium, France, United Kingdom, Czech Republic and Poland). These 7.6 million units mean 42% of total passenger car production in Europe. Other major countries, such as Germany (32%), are within (considerable) reach from The Netherlands, Belgium and France, as are they from Poland and Czech Republic. This market coverage is good and provides good perspectives for growth of VLP's automotive activities.

Competition
Of all possible automotive segments, the competition in this passenger car segment is the absolute greatest. Severe competition among suppliers, as in an 'oligopoly[72]', can be (partly) associated with low margins since suppliers have little or no influence on price, high OEM-demands, and hostility among competitors.
Two problems arise when identifying the suppliers for each tier.
At first, it turns out[73] that some companies exist in multiple tiers of the supply chain simultaneously. The automotive supply chain is being recognized as a network of participants with multiple relationships, e.g. a first-tier supplier to Ford can be a second-tier supplier to Volkswagen-car model as well.
Second, suppliers are measured by turnover[74] in order to classify for a 'tier 1 supplier'. The result of this is an estimation covering not only tier 1 suppliers, but tier 2 suppliers as well.
These two barriers mean I have trouble identifying the suppliers in this segment, which means that conclusions can be made only in a general sense.
However, rough estimations exist and can be stated. In 2001 an estimated 2,500 tier-1 suppliers were active throughout Europe[75]. Hence these are different organizations and not different production plants. For 2005, it was forecasted that this number of tier 1 suppliers would decrease to 1,500 due to a concentration of activities and improved competition. Roland Berger & Partners[76] expected a decrease of first tier suppliers per module/segment from 7-8 in 2001 to 3-4 in 2005. The number of tier 2 suppliers can be estimated[77] to equal a rough 50,000 in 2001 and 5,000 in 2005. The number of tier 3 suppliers can be estimated, but this estimation has less relevancy because companies that have parts of their annual sales in automotive do, either not mention, or not know they are in automotive. An approximately 250,000 firms are tier 3 supplier to this industry[78]. Result of this all: lots of competition, lots of business as well, but little understanding of the structure in this segment.
Who are VLP-competitors? The competitors can be divided threefold, namely:
-*mills* that directly supply tier 2 suppliers or higher.
-*industrial distributors* that, as VLP, provide the same products to the tier 2 supplier.
-*solution distributors* that, unlike VLP, have tailored their services as an industrial distributor to a 'solution-based' approach rather than a VLP-like 'product-based' approach. With this I mean Industrial Distributors who have enlarged their scope by supplying fully machined components rather than solely unmachined tubes and bars.

[71] http://www.caw.ca/whoweare/ourmembers/sectoranalysis/majorauto/cawinthesector_index.asp
[72] www.haworthpress.com
[73] Interview with an employee at www.autoindustry.co.uk; Commission of the European Communities, Autochain 2001, final report.
[74] Scaling on annual turnover means it is very easy to make a top-100 list of biggest tier-1 suppliers, but no one will put his efforts in constructing a full-coverage list, and that as well is the reason why authors tend to use percentages instead of absolute figures.
[75] Commission of the European Communities, Autochain 2001, final report.
[76] Automotive development in Europe: Suppliers and the OEM, Roland Berger & Partners.
[77] Conbined figures from Roland Berger & Partners and PriceWaterhouseCoopers.
[78] Derived from PriceWaterhouseCoopers estimations, Global Automotive Financial Review 2002, 2003, 2004.

The first type of competitor (mills) mostly demands a competition based on volume and prices, which is not an area VLP wants to move to. The series are bigger, which calls for products in this segment as a whole, resulting in a less favorable position for an industrial distributor.
The second type of competitor (industrial distributor) means competition on prices and only partly on technical know-how, with little added-value for VLP to provide since the product-based approach is maintained.
The third type of competitor (solution distributor) means an industrial distributor, either internally or externally, constructs a network of distinguishing technical know-how, subcontracted machining companies and steel suppliers, in order to support automotive customers with custom-made products.
The last type of competitor is most attractive for benchmarking, and this competitor typically supplies tier 1 and tier 2 suppliers. Competition and OEM-pressure[79] cause lower margins, the leverage of claims by the OEM on suppliers when the accorded quality is not delivered, consolidation, switch from components to systems to ensure tier status, movement away from commodity products and a shift to low-cost locations.

Concluding
It is incorrect to conclude that the passenger car segment is not interesting as a segment for VLP to concentrate itself on. However, in this study I would like to pinpoint the most attractive segment. Attractiveness can be expressed in other terms than turnover – which is also under pressure in the passenger car segment – namely:

- market entrance without necessary financial and non-financial (e.g. technical know-how, personnel, etc.) investments.
- revenue generated with the least of financial and non-financial means, with products from, or complementary to, the products within VLP's range.

Both are scored low, and therefore the passenger car segment is not very much promising for VLP.

[79] M. Durwell, OESA/PricewaterhouseCoopers M&A, Conference Deal Perspective on the Automotive Industry

3.2.1.2. Light commercial vehicle

Market size and growth

VDA[80] is regarding the commercial vehicle as part of the group 'automobile'. This group typically consists of light commercial vehicles (e.g. (mini-) van), heavy trucks, and buses and coaches. Agricultural equipment and construction equipment are not included[81].

While the overall sales of automobiles in 2004 grew by 5 percent to 59.2 million euros, the sales of commercial vehicles grew even more: 12% growth compared to 2003, ending up with an accumulated sales of 9.7 million units worldwide and 2.2[82] million units in the countries of scope (EU and ECE). The light commercial vehicles' output-numbers have been calculated by the European Union, again divided by country. These figures are gathered for the subsequent years 2003, 2004 and 2005, and a complete overview is given in Annex 2. Below, only conclusions are stated.

As can be derived from the data provided in Annex 2, the annual production of light commercial vehicles in 2004 is back at the 1999-level. The year 2000 was absolutely a booming year, showing an increase of 15% compared to the production numbers of 1999. Since 2000, the trend in production for this segment has been downwards, although a minor recovery has been made in 2003. Austria and its light commercial vehicle activity have pulled the plug, whether or not production has been moved to other countries is uncertain. The ECE countries show an increase of 80% between 1999 en 2004, in absolute figures this equals 40,000 units of light commercial vehicles.

Direction of growth: EU countries have gained a 0.3% increase in production units between 1999 en 2004, which are an absolute 6,000 units. France, Portugal and Italy are winners, Belgium, and to a lesser extent Germany, saw their production rates shrinking. The ECE countries show better results, namely 80% increase (40,000 units) of total units produced. In the ECE the Slovak Republic withdrew itself from production in 1999, Slovenia entered the market in 2003 and grew rapidly. However, all fade when Turkey is discussed: Turkey puts itself in 3rd place behind France (385,000 units, 2nd place) with over 329,000 units in 2004, a growth of 280,000 units compared to 1999 (560%).

Market access

What was applied to the passenger car segment, seems to be applicable for the light commercial vehicle as well. The light commercial vehicles are manufactured by OEM's which generally are in manufacturing passenger cars on a large scale as well. Example: Ford (Transit), Volkswagen (Transporter and LT), and Mercedes-Benz (Vito and Sprinter) all have vans in their product range next to the passenger cars. They may well be manufactured in different plants in smaller series (ref. Volkswagen production plant in Poznan, Poland), the plant still is part of the OEM's total production, will be managed in the same way and using the same guidelines for e.g. profitability as do passenger car plants of that same OEM, and using the corporate negotiation power. It makes sense to consider the OEM's demand for light commercial vehicle parts as a part of the corporate demand, because greater series mean lower fixed costs and thus lower prices. As well, the same standards towards quality and timely deliveries are motivations for using corporate Tier 1 suppliers. Therefore, again I state that wherever larger series are being build and demanded, it will be more difficult to defend your margin as an intermediary. The added value VLP provides as an Industrial Distributor is either (not outsourced, but) insourced by the two parties that form the supply and demand sides of the market, or it is not sourced at all (meaning both parties are not buying the service from VLP, but are not substituting it internally either), all because of the margin demanded by VLP. Because of the relation of the product at hand (light commercial vehicle) with the passenger car OEM's, "**customer relations**" and "**competition**" are being regarded as identical.

Geographical situation

Spain is by far the largest light commercial vehicle manufacturer in Europe, as it possesses 33%[83] of the "European Union – 15 countries" market share, 31% if the new member (ECE) countries are included, and 23% if measured for the complete continent Europe. Spain is, viewed from the local presence of VLP in countries throughout Europe, difficult to serve. Spain cannot be sufficiently

[80] http://www.vda.de/en/service/jahresbericht/auto2005/en
[81] Not included in VDA report; http://www.vda.de/en/service/jahresbericht/auto2005/en
[82] http://www.autoindustry.co.uk/statistics/production/world#all
[83] See Annex 2

supplied from France, especially when JIT deliveries are a decisive condition. Of course, this is applicable for Portugal (4.2% in EU-25) even more as it is for Spain.
Italy holds 15.4% of total combined EU and ECE market share, and is not a favorable country due to the absolute distance for delivery and past experiences of the Van Leeuwen Pipe and Tube Group in Southern European countries[84]. The remaining countries, including Germany where VLP does not have a warehouse, account for 49% of the EU and ECE market and are covered by the current VLP offices.

Concluding
The relation between the light commercial vehicle segment and the passenger car segment is striking, because typically the OEMs active in these segments are the same. If the OEMs are similar, I presume that the supply chains are very similar too, and thus I want to state that:

- market entrance in this segment is presumed to be impossible without necessary financial and non-financial (e.g. technical know-how, personnel, etc.) investments.
- revenue cannot be generated with the least of financial and non-financial means.

[84] Offices have been opened and closed, because the countries did not accept a foreign company entering this local market as well as the way of doing business did not match with the Van Leeuwen Group's way of doing business.

3.2.1.3. Buses and coaches

Market size and growth

VDA[85] is regarding the commercial vehicle as part of the group 'automobile'. This group typically consists of light commercial vehicles (e.g. (mini-) van), heavy trucks, and buses and coaches. Here the buses and coaches will be discussed.

At first we need to define buses and coaches, because many varieties exist. A bus or coach, here, is a vehicle for commercial passenger transport with a minimum weight of 5 tons. Smaller buses are gathered under light commercial vehicle and do not belong to this segment.

The sales of commercial vehicles in 2004 grew heavily: 12% growth compared to 2003, ending up with an accumulated sales of 9.7 million units worldwide and 2.2[86] million units in the countries of scope (EU and ECE). Buses and coaches, as well as heavy trucks, do not contribute to this 2.2 million units in an equal way as do the light commercial vehicles, but are interesting because of other market aspects.

The buses and coaches output-numbers have been calculated by the European Union, again divided by country. These figures are gathered for the subsequent years 2003, 2004 and 2005, and a complete overview is given in Annex 3.

In 1998, this market already showed an increase of 10%. In Europe in 2003 this market gained 20% in annual production units produced, and in 2004 this market has been growing with 2% to a resulting 71,576 units However, it turned out to be an incidental increase, for it was lost in the years after again. While Europe sees its production units growing every year, the EU-15 and EU-25 countries production rates are declining. This decline is not visible every year, but both groupings of countries on the average have lost 20% of its annual production units between 1997 and 2004. Sweden's losses are the greatest, where the total output units are almost halved in the 1997-2004 years. Germany also lost about 15% of its units produced, meaning production was decreased from 11.5 thousand units to 9.9 thousand units in the given eight years.

The ECE countries did not improve their results by shifting EU production to their countries. Although the Czech Republic has improved its production with an annual average 12.5%, Hungary and Poland both have lost more than the Czech increase. Overall, this segment seems to be not meant for the ECE countries, as it is producing less than five thousand units in 2004 meaning a total decline of 25%.

Direction of growth: Europe is expanding, but not the EU countries nor the ECE countries are showing sound growth figures. The growth can be found elsewhere, namely in Turkey and Russia. These countries are outside the scope of this study, however.

In absolute figures, Russia grew in eight years from 9.4 thousand units in 1997 to 18.8 thousand units in 2004. This means a doubled production in only 8 years, making it the largest producer of buses and coaches in Europe with a market share of 25%. Turkey is second with almost 15,000 units, while 1997 only had 3,400 units. A market share of 19%, and an even more impressive growth than Russia.

Market access

This segment is far smaller than the passenger car segment, and although this segment does not seem to be promising, it has special features that make it accessible. The first advantage is one that is shared by all more industrial/commercial vehicle segments, namely the less sophisticated machined material used in buses and coaches. Although product categories, such as steering and engine, are present in all segments, the sizes of the products are bigger and the necessary machining of the product is, generally speaking, less sophisticated[87] than the passenger car OEM's demand[88]. The series are smaller and the units demand more VLP products per unit. The business model used is more friendly (meaning a more equal relationship in terms of power between OEM and supplier) and offers more possibilities for second and third tier suppliers to start operations with the OEM[89]. The supplier is asked to add more value, explaining the shift from component to system suppliers in this segment. Next to this, the supplier bears less risk than passenger car suppliers. A bus and coach OEM may be part of a large passenger car OEM, they do have their own specific demand and do not

[85] http://www.vda.de/en/service/jahresbericht/auto2005/en
[86] http://www.autoindustry.co.uk/statistics/production/world#all
[87] Of course, buses and passenger cars share a common basis of sophisticated components like engines, driveshafts and steering shafts, but considering the blueprint of a bus, one can fit in more, larger, and not bended tubes in a bus than in a car.
[88] Employee at DTI - auto industry; Mr. Remmelink (NEVAT) and NEVAT meeting.
[89] NEVAT

necessarily make use of the existing network (other than the light commercial vehicle segment)[90]. Manufacturers are smaller in size and bargaining power, and will recognize the advantages, the added value, an industrial distributor as VLP can perform. The services VLP can supply them with can save floor space and money the OEM can invest in other more important aspects of their business. Being a more friendly business[91] with less risks and more opportunities for suppliers in the negotiation phase, together with the relative absence of "competition on price" of the end product, all make this segment more accessible for VLP.
The **current and historical successes** of VLP in this segment are little, experience is lacking and a best-practice method would imply other segment' successes to be copied to this segment. The Construction division of the Van Leeuwen Pipe and Tube Group has been a supplier for years to this segment, but this reference could only be used for complementary products since the products supplied by Construction are out of VLP's assortment.

Customer relations
Contracts support the friendly business model[92] and, consequently, imply less conditions, face less financial obligations for the supplier (e.g. when deliveries are not in time), and the relationship is more two-sided leaving the supplier and the OEM in a more equal situation[93].
Inter-firm relations have been strengthened on two levels. First, relations between assemblers and suppliers have been transformed as assemblers have passed on greater responsibilities to their Tier-1 suppliers. Second, relations between firms in the supply chain appear to have been strengthened, as Tier-1 suppliers have become specialized manufacturers, responsible for the effective management of the supply chain and product assembly[94]. The OEM is willing to construct long-term relationships with suppliers because advantages, other than the absolute lowest price, are gained through such. The aim, thus, in this segment is to construct long-term relationships, especially for the system/module suppliers[95]. Contracts have an estimated duration of 6 years[96], and the OEM is not 'shopping' as indicated in the passenger car segment.
In line with these contracts and hierarchical implications, the possibility for a Third-Tier supplier, such as VLP, to supply directly to the OEM and hereby passing Second-Tier and First-Tier suppliers, is regarded as present. Historically the busses and coaches OEMs have been producing the complete product in-house, only buying in the engine. The process of subcontracting has entered this segment as well, however it appear that these OEMs still do a lot of production/machining themselves.

Geographical situation
Stable markets are present in The Netherlands, Belgium, France, Italy, Spain, Portugal and the UK. The Netherlands, Belgium and France can sufficiently be supplied by the VLP offices in these countries. These stable countries show equal or increasing units produced compared to 1997, while the EU and ECE are in a trend downwards. Also, the presence of VLP in Czech Republic is interesting because the only increase in ECE countries is measured here. A rough 30% of the total EU output is manufactured in countries where VLP holds offices, with another 25% nearby in Germany. However, the fact that more than half the production of busses and coaches is already taking place in other than EU countries is not a positive indicator. Market coverage therefore is good thanks to stable markets in countries of presence, but market coverage trends are clear and not in favor of this market.

Competition
The absence of large production numbers in absolute figures implies difficult competition aspects. The network of suppliers and OEMs has been constructed, the trend towards system suppliers has been introduced, and the number of players are limited due to the fact of relative little units produced. It will be hard to enter this segment and grow rapidly, because good relations of current players will not allow VLP to gain market share. As well, the lack of success stories in this segment, meaning an absence of strong and convincing references, does not help entering he segment because these

[90] DTI – auto industry
[91] A more friendly business model must be interpreted as a business model in which all parties consider each other equal to themselves. The bargaining power is evenly distributed and demands, relationships are long-term and demands are reasonable.
[92] Sie footnote 49
[93] Derived from interviews concerning Automotive at fairs, as well as with Zerust employees.
[94] http://www.ilo.org/public/english/dialogue/sector/techmeet/tmtem05/tmtem-r.pdf
[95] http://www.cepal.org/ddpeudit/proy/clusters/posthuma.pdf
[96] DTI – auto industry

references are needed when entering a new market and networks are tight and close. In Annex 4, all OEMs in bus and coach manufacturing are stated for the EU countries. These 43 OEMs produce a rough 35,000 units, meaning at average that every OEM does not exceed 1,000 units annually. Apart from supplying to subcontractors in the bus and coach supply chain, VLP has difficulty to enter this segment[97]. It is difficult to say how many first tier, second tier and third tier suppliers are supplying this segment, but considering the units of output in this segment they cannot be many.

Who are VLP-competitors? Again, the competitors can be divided threefold, namely:
-*mills* that directly supply tier 2 suppliers.
-*industrial distributors* that, as VLP, provide the same products to the tier 2 supplier.
-*solution distributors* that, unlike VLP, have tailored their services as an industrial distributor to a 'solution-based' approach rather than a VLP-like 'product-based' approach.
The last type of competitor is most attractive, because then solution instead of a product is supplied. Still, for both industrial and solution distributors this is a good segment, because I assume that sophisticated parts together with unmachined raw material is demanded for the end product. A good opportunity for VLP would be to invest in its network of organizations capable of performing machining, and this can well be a function of NEVAT[98].

Concluding
A declining EU segment, lack of experience and difficulties entering this segment all add up to a little attractive segment. The advantages of this segment - the less sophisticated products, less contractual implications and a more decent business model - make the general impression of this segment arbitrary. Regarding the products VLP could supply this segment with, some key distinguishing aspects of an industrial distributor may well be at their place in this segment. As seen in the heavy truck accounts[99], continuous improvement of quality and price is very important and relatively easy. The technical know-how needed for e.g. complementing products is less than in passenger car and light commercial vehicle segments. Because applications in great commercial vehicles (compare the exhaust-pipe of a truck with a passenger car) are more clear, straight-forward and understandable, successes are anticipated if a market entry is made.

[97] VLP – Mr. T. Martinez
[98] NEVAT – Nederlandse Vereniging voor Algemene Toeleveranciers (Dutch suppliers organization)
[99] VLP - Mr. L. Keulen

3.2.1.4. Heavy trucks

Market size and growth

VDA[100] is regarding the commercial vehicle as part of the group 'automobile'. This group typically consists of light commercial vehicles (e.g. (mini-) van), heavy trucks, and buses and coaches. Agricultural equipment and construction equipment are not included[101]. Here the heavy trucks are discussed, which have a weight of >12 tons.

While the overall sales of automobiles in 2004 grew by 5 percent to 59.2 million euros, the sales of commercial vehicles grew even more: 12% growth compared to 2003. The heavy truck's output-numbers have been calculated by the European Union, again divided by country. A complete overview is given in Annex 5. Below, only conclusions are stated.

Heavy trucks are in the lift. Whether they are outperforming the train, airplane and/or ship as the best logistical solution for short-distance and long-distance transport or not, the heavy truck is showing excellent results. As the commercial vehicle market presented 12% growth in 2004, the heavy truck segment presents more impressive figures. Over 16% growth in Europe, 14.2% in the EU-15 countries, and 14% when EU-25 countries are considered. This means that former Russian countries (including Russia itself), and Turkey both showed more than 16% growth in 2004 compared to 2003. Turkey, however, is somewhat hard to anticipate future outcomes given its crisis in 2001[102], but Turkey seems to be on its way back.

European countries did well, and the fact that Sweden has lost market share has all to do with assembling trucks elsewhere in Europe. Spain, Germany and The Netherlands are the countries with the greatest growth in manufactured units. Apparently, the ECE countries have trouble to interest heavy truck OEMs to invest in these countries, for Hungary is the only country showing increased production. Czech Republic made a major backdrop, and Poland was almost out of business in 2004.

Direction of growth: there is no real direction of growth visible as in a shift in production to lower wage countries. EU countries have made great performances, meaning that OEMs have invested in these production facilities as well.

Market access

Considering market access, this segment is assumed to be attractive because of:

-strong, rapid and stable growth,

-total units produced is smaller than in e.g. the passenger car segment, implying that the total demand for products could be insufficient to buy directly from a mill. Being an intermediary company, VLP could pick up this missing link between demand and supply, and strengthen its position by supplying extra services as well as keeping products on stock for the OEM,

-considerable heavy truck parts can be supplied relatively un-machined[103] for production; 'shape and weight follow function', meaning that in this segment the utility of the product and mechanical specifications of the products are more important,

-historical successes already exist within VLP accounts, as VLP is a privileged supplier to DAF.

These favourable arguments have their impact on market access. Strong, rapid and stable growth could well mean that production facilities suffer under-capacity problems, logistical issues and insufficient floor space. VLP has a function here as being a stockist with excellent logistical know-how, as well as in the area of relatively un-machined products. Technical know-how is limited, which means personnel technical knowledge can be limited as well while product and application improvements can still be proposed. The success story with DAF can either be copied to another heavy truck OEM or at least be used as a strong reference for market entry, using it as a key selling point.

Customer relations

Contracts at the moment still support the friendly business model[104]. Inter-firm relations have been strengthened on two levels. First, relations between assemblers and suppliers have been transformed as assemblers have passed on greater responsibilities to their Tier-1 suppliers. Second, relations between firms in the supply chain appear to have been strengthened, as Tier-1 suppliers have

[100] http://www.vda.de/en/service/jahresbericht/auto2005/en

[101] Not included in VDA report; http://www.vda.de/en/service/jahresbericht/auto2005/en

[102] http://www.autoindustry.co.uk/statistics/production/world#all

[103] As become clear at the Carrosseriebeurs where a closer look has been taken at the components a DAF truck has, which VLP could and does supply.

[104] Derived from interviews concerning Automotive at fairs, as well as with Zerust employees.

become specialized manufacturers, responsible for the effective management of the supply chain and product assembly[105]. The OEM is willing to construct long-term relationships with suppliers because advantages, other than the absolute lowest price, are gained through such. The aim, thus, in this segment is to construct long-term relationships, especially for the system/module suppliers[106]. Contracts have an estimated duration of 6 years[107], and the OEM is not as much 'shopping' as indicated in the passenger car segment. However, the growth in this segment has a downside as well, namely that the business model used at the passenger car (complete with all contractual constraints and financial risks) is rapidly gaining access to the heavy truck segment[108]. If this segment is to be served and VLP wants to enter this market, now is the time to start action and claim its presence.
In line with these contracts and hierarchical implications, the possibility for a Third-Tier supplier, such as VLP, to supply directly to the OEM and hereby passing Second-Tier and First-Tier suppliers, is regarded as present. Hence, DAF is supplied directly out of VLP warehouses.
Historically heavy truck OEMs have been producing the majority of the product in-house, but the process of subcontracting has entered this segment as well. It is uncertain if every OEM is still performing a lot of production/machining themselves, or that they are subcontracting every aspect to component and system suppliers. DAF, and maybe others, still do some machining themselves (f.i. exhaust) as it is regarded as expertise they rather keep in-house.

Geographical situation
VLP holds offices in EU countries that altogether serve a rough 29% of the market, with a major contributing country as Germany within reach from both the East and the West. Germany alone contributes 36% to the total EU market. A list of all heavy truck manufacturers is presented in Annex 7, where the OEMs are structured according to the biggest market share. It is uncertain what VLP can expect from its ECE offices, but clearly trends do not indicate a shift of heavy truck production to this geographical area yet. VLP's home markets The Netherlands and France find themselves in a growing heavy truck segment, the UK segment is declining and Belgium performs stable throughout the past 8 years.
Successes at DAF can be copied to PACCAR companies (e.g. Leyland, also a PACCAR company and from whom VLP receives minor demand as from DAF) as non-PACCAR companies. Market coverage is good, although an office in Germany in a central heavy truck area could really make its contribution to building a brand in the heavy duty segment.

Competition
In the passenger car segment a division of competitors was made in threefold, namely:
-mills that directly supply tier 2 suppliers or higher.
-industrial distributors that, as VLP, provide the same products to the tier 2 supplier.
-solution distributors that, unlike VLP, have tailored their services as an industrial distributor to a 'solution-based' approach rather than a VLP-like 'product-based' approach.
The argument for using the same classification of competition as in the passenger car segment, is that identical product categories (with varying products) can be found in every automotive segment. An example would be a powertrain manufactured by Eaton Corp. and finding its way to both Volvo trucks and passenger cars. For this segment, the latter two are both very important because not only sophisticated solutions are needed, but tubes and profiles which are practically un-machined can find their way to the end-product easily as well. In the latter case one can think of a supporting tube for wires or handles that need little or no machining. Therefore this segment implies more competitors are present as in the passenger car segment, demanding a well considered approach towards product categories to be supplied.
The absence of both very large and very small production numbers in absolute figures imply difficult competition aspects. The network of suppliers and OEMs has been constructed and the trend towards system suppliers has been introduced, for the OEMs in all segments tend towards being an assembler of components and demanding the tier suppliers to add as much value as possible[109].
It is estimated that a best-practice approach will work very well in this segment, using the experience

[105] http://www.ilo.org/public/english/dialogue/sector/techmeet/tmtem05/tmtem-r.pdf
[106] http://www.cepal.org/ddpeudit/proy/clusters/posthuma.pdf
[107] DTI – auto industry
[108] NEVAT – Mr. L. Remmelink
[109] http://msl1.mit.edu/msl/meeting_05082000/prz_pdf/Globalization.pdf

and quality gained from DAF to copy it to other similar situations.

Concluding

This segment is increasing rapidly, the business is located within reach and experience with the segment and the resulting success is already part of VLP. It is often recognized in automotive business that a major advantage is that your quality, efficiency and (logistical) operations are all taken to a higher level, of which your whole organization benefits and will result in better performances in other branches[110]. However, you have to select a segment whose players recognize the value VLP can add to the business, rather than seeing the VLP-margin that could be cut out of the chain.

It is VLP's experience that you must not try to convince organizations that do not recognize the added value VLP can offer, for it is considered to be a waste of time[111]. Thus, segments need to be selected that either match, or can be matched by investing in e.g. personnel, the characteristics of VLP. Those segments are attractive, and will provide stable and short and long-term growth. A segment with little constraints and with demanded products and technical know-how you can.

References are very important, so are continuous improvement of quality and prices. If both are fulfilled, your automotive sales will grow. Assuming these considerations, it is understandable that a market segment is chosen which has the least constraints. The heavy truck segment is such segment.

[110] VLP – Mr. B. van der Worp

[111] Considering this a waste of time is the result of VLP's long experience with organizations sharing this attitude. Key personnel in these organizations, f.i. the purchasing department manager, oppose delivery from an Industrial Distributor because of personal, non-objective, judgement by the manager.

3.2.1.5. Construction Equipment

Market size and growth

The industry comprises 1,200 companies from 11 European countries. These equipment manufacturers in 2004 had a total turnover of €17.5 billion Dollars. European countries have a share of about 30% in the worldwide production of Construction Equipment. Manufacturers are to a large extent small and medium-sized companies; but also the big European and multinational companies with production sites in Europe are represented in this figure[112].

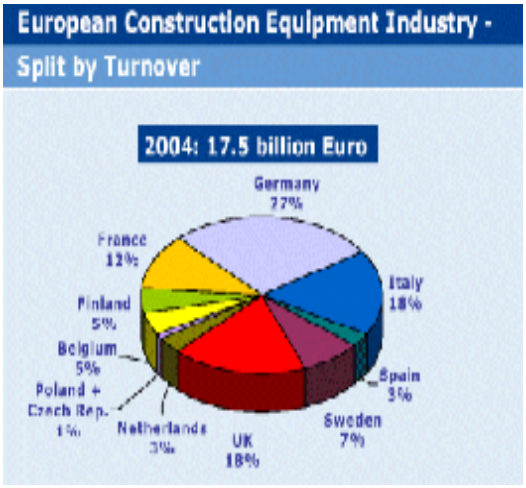


Figure 8: CE in Europe by country

Construction equipment, as can be derived from all kind of sources[113], is booming business. All equipment manufacturers are said to be booked completely full (the same apparently goes for the marine industry), new orders are placed on lists as the market size is still growing.
Construction equipment is like a subdivision of automotive, because it comprehends several product applications. To understand how construction equipment is defined in this report, the applications are stated (market shares between brackets) in figure 9:

-earthmoving equipment (63%)
-crushing and screening (9%)
-tower cranes (3%)
-concrete equipment (11%)
-road equipment (14%)

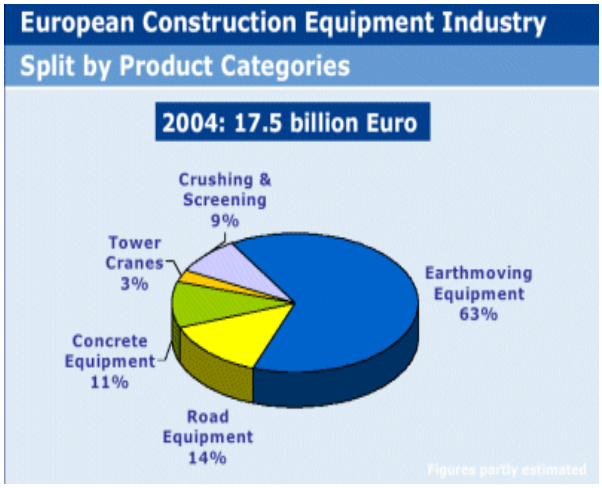


Figure 9: CE in Europe by machine

In 2005, the heavy construction equipment was up with 4% compared to 2004, the compact construction equipment sector increased with 8% compared to 2004. In figure 8 the European countries are mentioned that are home to OEMs in construction equipment.
The Netherlands, France, Belgium, Poland and Czech Republic, and the UK are the countries where VLP holds offices. These countries together contribute 39% of the total European production of construction equipment. With Germany in the vicinity this total can be increased by 27%, resulting in a 66% market share within reach.
Because the earthmoving equipment application is by far the biggest of all construction equipment applications, this application will be broken down to the following end-products (see figure below):

[112] www.cece-eu.org
[113] VLP sales, internet, conversations at fairs.

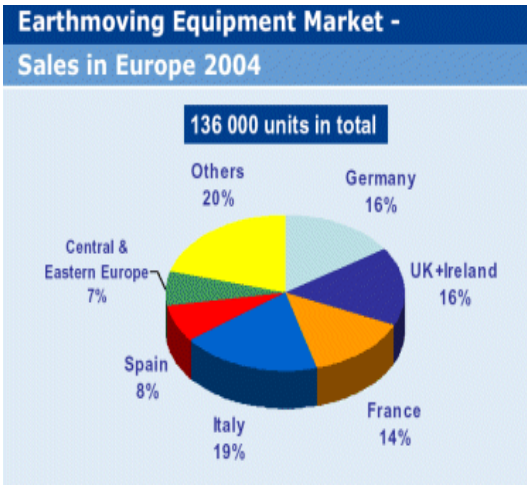


Figure 10: CE sales in 2004

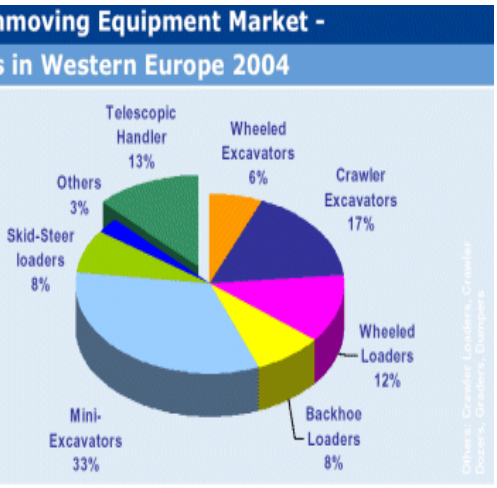


Figure 11: CE sales by machine in 2004

Below (figure 12) you see the results of the major European construction equipment countries of the last six years. This figure views the demand side of the market, whereas figures above were concerned with the supply side of the market. Here we see that Germany gave away its leading position incrementally to the UK (1) and Italy (2), both facing rapid growth rates in 2004. No real direction of growth can be found in public information for the other countries.

Market access

This segment is very much appealing. Not only is it interesting because of the magnitude of the projects and the track record VLP already has in this segment (especially in the UK). It is an interesting segment because of the products VLP could supply to it as well. Namely, a lot of hydraulics and mechanical engineering is needed for the specific functions of the end-products of this segment (crawling, digging, hauling, etc.), elements that are not present in the passenger car segment.

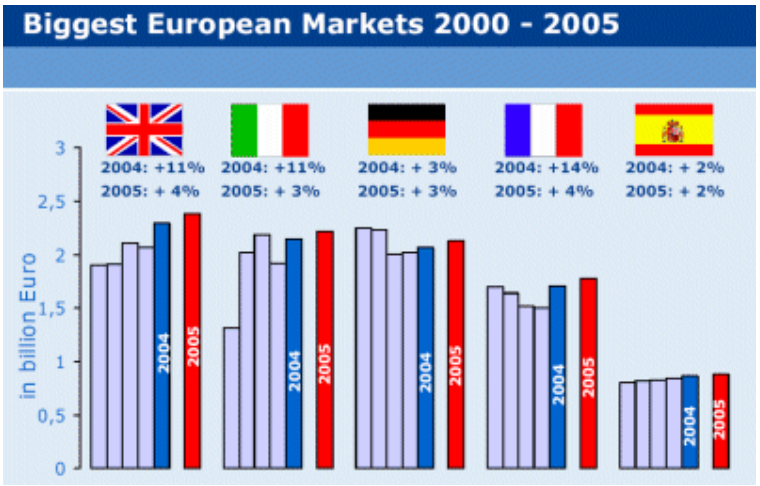


Figure 12: CE markets 2000-2005

Apart from the common product categories such as engine, transmission, gearbox, safety and chassis, the extra functions such as hydraulic systems demand a great amount of relatively un-machined material. As well, these end-products of construction equipment do compete on technical function, not on shape and to a lesser extent on price.

Next to this, the segment is now rapidly growing, total units are built in small series (high turnover is the result of high pricing of the product). Additionally, some manufacturers reach their capacity[114] and need to outsource warehousing and logistical operations.

The smaller series again can imply total demand for products could be insufficient to buy directly from a mill. As an industrial distributor, VLP could pick up this missing link between demand and supply, and strengthen its position by supplying extra services as well as keeping products on stock for the OEM.

[114] Mr. J. Sassen – VLP European Division Director

Also, historical and current success in industrial automotive sectors such as the heavy truck segment are anticipated to be useful as references in this segment, or can even be copied to this segment. Furthermore market can be accessed through several companies in Europe, and contractual implications are less severe than in e.g. the passenger car segment. The construction equipment segment has a more open business model with less strict OEM-demands to apply to[115].

Customer relations

Contracts at the moment still support the friendly business model and, consequently, imply less conditions, face less obligations for the supplier (e.g. when deliveries are not in time), and the relationship is more two-sided; the supplier and the OEM are in a more equal situation[116].
The trend for increased outsourcing in the automotive supply chain has had its introduction in this segment as well. Greater assembling activities and responsibilities are being passed on to suppliers, in this segment mainly because of the growth in demand in the market[117].
The OEM construction equipment OEM is willing to construct long-term relationships with suppliers. By doing so, advantages of efficiencies and delivery are gained through such. The aim, thus, in this segment is to construct long-term relationships, especially for the system/module suppliers[118].
Estimations of contract durations are not presented, but the OEM is not 'shopping'. Downside of this segment is the conjuncture characteristics of the segment's financial situation, going up- and downwards every once in few years[119].
As was indicated by GMT, the OEM still holds several machining/production activities in-house, leaving a possibility for (as the exhaust pipes for DAF) an industrial distributor to supply directly to the OEM. The ability of 'thinking in solutions' rather than in products does apply to this segment, but not as much as it does for other commercial and passenger vehicles.

Geographical situation

VLP holds offices in EU countries that, as mentioned before, serve 39% of the European market directly, and 66% if Germany can be supplied as well. Among others, VOLVO, Caterpillar, Komatsu, Hitachi, JCB and CNH are market leaders as we will see later on (see Annex 7 for a list of all OEMs). The UK and France are both growing construction equipment markets when the last 3 years are regarded, implying at least a short-term positive future outlook. Market coverage is excellent (although unequally divided in the UK), an office in Germany however could increase the automotive intentions greatly when situated in a central construction equipment area.

Competition

This is assumed to be quite similar to the heavy truck segment, where competition comes from:
-mills that directly supply tier 2 suppliers or higher.
-industrial distributors that, as VLP, provide the same products to the tier 2 supplier.
-solution distributors that, like Thiel und Hoche, have tailored their services as an industrial distributor to a 'solution-based' approach rather than a VLP-like 'product-based' approach.
The argument for using the same classification of competition as in the passenger car segment, is that identical product categories (with varying products) can be found in every automotive segment. For this construction equipment segment, the latter two are both very important because not only sophisticated solutions are needed, but tubes, barsteel and profiles which are practically un-machined can find their way greatly to the end-product easily as well. In the latter case one can think of a supporting tube for wires or handles that need little or no machining, hydraulic cylinders for shovels or other earthmoving machines, hydraulic systems for drilling, and so on. Therefore in this segment less sophisticated competition is present than in the passenger car segment.
The absence of large production numbers in absolute figures implies difficult competition aspects. The network of suppliers and OEMs has been constructed and the trend towards system suppliers has been introduced, but it has to be reminded that it is easier to enter a market that is expanding than one which is shrinking.

[115] As an employee of GMT said, Caterpillar did not urge them to become ISO certified.
[116] Derived from interviews concerning Automotive at fairs, as well as with Zerust employees.
[117] http://www.ilo.org/public/english/dialogue/sector/techmeet/tmtem05/tmtem-r.pdf
[118] http://www.cepal.org/ddpeudit/proy/clusters/posthuma.pdf
[119] www.volvo.com – annual report 2005

Concluding

This segment is increasing, the business is located within reach and experience with the segment and the resulting success is already part of VLP. VLP needs to use its services to add value to the product, because offering more than just a product will keep the customer close.

This segment matches the characteristics of VLP, although investments need to be made in personnel to serve the function of an advisor for both mechanical-engineering and supply chain management better. It appears to be a segment with less demands to fulfill, and more decent business to be in. A segment with little constraints and with demanded products and technical know-how VLP could team up with. References are very important, meaning that VLP must enhance a best-practice method to enter the market. This means VLP has to learn from its historical successes in this industry, and find the common reason why OEMs and 'higher tier suppliers' have chosen for VLP as their supplier. At last, continuous improvement of quality and prices are a challenge for VLP to master itself.

3.2.1.6. Agricultural equipment / machinery

Market size and growth

Very little is known of the agricultural equipment manufacturers, and therefore the analysis of this segment will somewhat be different from the other segments. All market data had to be gathered per country and combined to make one pool. At first the total market for agricultural machinery was equal to 39 billion USD in 2001[120], of which approximately 13 billion USD is in Europe. This 13 billion USD has to be divided be only a few major agricultural equipment manufacturers, namely CNH (Case New Holland – Fiat S.p.A), John Deere & Co., AGCO, Claas, Kubota and Caterpillar.

France has the largest market for agricultural machinery (AGM) in Europe. Market figures for 2004 show average growth of nearly 13.3 percent over the previous year. Totaling USD 4.93 billion in 2004, it represents approximately 25 percent of the total European AGM market[121]. Spain[122] has 1.279 billion USD in 2004 (see Annex 9), and the German market for agricultural machinery declined by almost 10% in 2003 to reach a value of €2.26 billion (US$2.56 billion). Over the five-year review period, the market decreased by more than 34% in value terms. Agricultural Machinery in the UK in 2004 grew by 1.4% over 2003 to reach a value of £1.01 billion (US$1.8 billion). Growth over the review period reached 2.2%. A rough 3 billion USD is still left and must be divided among the UK, The Netherlands, Belgium, Italy, Portugal, Sweden, all where the major players have some kind of component factory as well. This means that the biggest countries have been mentioned. Overall annual growth rate the last few years has been a constant 4% in agricultural equipment.

Market access

Very little is known of this segment and its accessibility, still this segment is being sensed as an interesting segment. The majority of turnover is brought together by the sales of tractors[123], which are costly per unit. The total number of output in this segment can then be regarded as medium, and a lot of extra applications can be found in this segment for VLP products. Namely, hydraulics (and hydraulic-like products such as pneumatics) and mechanical engineering are all integrated in the end-products of this segment such tractors and cutters. These items, as well as the e.g. backhoe, are less sophisticated and consequently call for less machined material than passenger cars. This offers a possibility for VLP. However, the products, or solutions provided by VLP, demand more machining than in the heavy truck and construction equipment segments. As in the construction equipment industry, these end-products of construction equipment do compete on technical function, not on shape and to a lesser extent on price. However, John Deere's aim is to compete on price[124]. This is somewhat awkward, since Deere wants to differentiate itself with continuously new and leading products and is known as one of the costliest tractors money can buy. Being in the upper market typically means VLP will have less difficulty to defend its margin.

The segment is growing constantly, and shows no severe ups and downs. The concentration phase of OEMs has come to an end, up till this moment there are only six 'mother companies'. This hampers the market access. These few, big mother companies can be big enough to buy directly from a mill, leaving VLP out of sight. However, VLP in France holds a strong reference in this segment, as it is a supplier to CNH with success.

Furthermore, the market can be accessed through several countries in Europe, and contractual implications are estimated to be less severe than in e.g. the passenger car segment. It has become clear that a lot of very small companies exist supplying simple, agricultural applications, but which are complete fading away when it comes to market shares, because there are so many players in this segment.

Customer relations

Contracts are less strict, imply less conditions and face little financial obligations for the supplier, but the relationship is more one-sided due to the absence of more big players in this market and leaving the supplier in a less favourable position[125]. Contracts' duration times are unknown. Confronting this

[120] CNH management figure - http://media.corporate-ir.net/media_files/NYS/CNH/reports/CNH_20F_01.pdf
[121] http://www.buyusa.gov/france/en/205.html
[122] http://buyusainfo.net/docs/x_3097952.pdf
[123] http://www.ncsu.edu/scrc/%20DOWNLOADS/student/fall01/SCSfinal.doc
[124] www.deere.com
[125] Derived from interviews concerning Automotive at fairs, as well as with Zerust employees.

these contracts' and hierarchical implications, the possibility for a Third-Tier supplier, such as VLP, to supply directly to the OEM and hereby passing Second-Tier and First-Tier suppliers, is regarded as little present. It appears that these OEMs still do a lot of manufacturing themselves, having the outsourcing limited to a lesser extent of the final product as in other segments[126].
There are **current and historical successes** of VLP in this segment, however they comprise only the CNH account in France. The segment shows overlap with the construction equipment segment in both end-products and OEMs active in the segment. The experience in France, together with a best-practice method learned from the construction equipment segment, could be a strating point for accessing this segment.

Geographical situation
VLP holds offices in France, the country where the most agricultural equipment is being produced within Europe. Germany, where VLP has no office, has been on the downside of the market for a few subsequent years. Apparently the one automotive segment it does not play a key role in. With France already a third of the European market is served and VLP is already participating in (minor) agricultural applications in France. This 33% market share entails both an advantage as a disadvantage. If VLP manages to serve the this segment well, a lot of business can be expected. However, if VLP does not manage to serve this segment accordingly, all can be lost at once. France is still a growing market over the last few years, implying at least a short-term positive future outlook. Market coverage is average (and unequally divided in France), and spreading the risk could be appropriate.

Competition
Competition is assumed to have overlapping characteristics from both the construction equipment segment as well as the heavy truck segment. In this segment, if VLP does not distinguish itself properly, it will end up with three competitors:
-mills that directly supply tier 2 suppliers or higher.
-industrial distributors that, as VLP, provide the same products to the tier 2 supplier.
-solution distributors that, like Thiel&Hoche, have tailored their services as an industrial distributor to a 'solution-based' approach rather than a VLP-like 'product-based' approach.
The remaining inhouse manufacturing of parts by OEMs increases the possibility of receiving direct supply from mills or industrial distributors, meaning that the bulk breaking and 'demand and supply connecting' functions of the industrial distributor are an important part of VLP's possible added value. Because the most important share of agricultural equipment, the tractor, requires reasonably more engineering than the other agricultural applications, a role for a 'solution-driven' subcontractor can well be performed within this segment. Already is John Deere subcontracting parts of the tractor that need to be tailor-made when they enter the assembly-line, for instance the roof. Below is a shortlist of John Deere's demands for its subcontractor127.

- 150 tractors a day capacity
- just-in-time & sequency delivery
- fully equipped with lamps, wiper, speakers etc.
- ready to put on the cab
- same design used with predecessor model
- 35 to 41kg of SMC per tractor roof
- hatchway 2 versions, one with glass window

These tailor made products require VLP to gather around its offices/warehouses a network of machining companies that altogether can ensure a total package ready to be delivered to the OEM. As it appears, tier structure seems to be less rigid implying in more opportunities for the third tier supplier to supply the OEM directly. The extra material (f.i. needed for hydraulics and handles) for both the tractor as for the add-on equipment means VLP could offer a more comprehensive set of products, and by doing so creating a relationship that can last.

[126] www.cnh.com – www.deere.com
[127] http://www.smc-alliance.com/gallery/JohnDeere/johndeere.html

Concluding

This segment is increasing, the business is located within reach and experience with the segment and the resulting success is already part of VLP. VLP needs to use its services to add value to the product, although this can be difficult when the relationship is one-sided. This deviance in negotiation power can be evened out by offering more than just a product.

This segment matches, or can be matched by investing in e.g. personnel and technical tailored products/material/networks, the characteristics of VLP. It appears to be a segment with less demands to fulfill, and more decent business to be in. A segment with little constraints and with demanded products and technical know-how VLP could team up with. Also the additional material that may be demanded, normally not supplied in passenger car-like segments, can help gaining a position of continuous improvement and long-term bonding. Because, if you supply 'nothing', you improve 'nothing'. References are very important, so are continuous improvement of quality and prices. The accessibility seems to be good, and therefore this segment looks promising.

3.2.2. Decide on potential segments

		Criteria							
		market growth	market size	market access	number of competitors	competitors' market shares	duration of contracts	geographical location	total
	Passenger car	6	6	4	4	4	4	7	35
	Commercial vehicle	5	6	4	4	4	4	4	31
egments	Bus/Coach	6	7	6	7	7	6	5	44
	Heavy truck	7	7	8	7	7	6	7	49
	Agricultural	5	6	8	6	6	6	5	42
	Construction equipment	8	7	8	7	7	7	7	51

Figure 13: rough study results

In the figure above the scores per segment for all criteria are presented. The Heavy Truck (HT) segment, and the Construction Equipment (CE), are both considered to have the best match with the most favourable profile I have created for VLP.

Here I would like to pinpoint the arguments why these two segments are best for VLP.
At first, primary and secondary data sources pointed out by means of facts, and by means of my assumptions, that these two segments have the highest potential for VLP. Market growth in both segments is better than in other segments, while market size tends to be more at average. This average market size is assumed to imply that there will be little less OEMs, but that their series manufactured is considerably lower.

> **Example:** Passenger car OEMs' outputs range from 1500 to 2500 cars a day produced at Toyota and Renault-Nissan plants throughout the world, DAF Trucks manages to produce almost 200 Heavy Trucks a day and given the equal division of market shares among OEMs this is assumed to be also the output number of other OEMs in HT. JCB can produce 23 CE units a day and typical output numbers from Caterpillar's Construction Equipment units range from 20 to 70. Hitachi can produce in its Dutch assembly line up to 25 CE units a day.

As pointed out in my report, the total number of series produced per day is assumed to relate with the possibility of the mill to supply the OEM directly, surpassing the Industrial Distributor VLP is. The smaller the series, the less the willingness of the mill will be to supply accounts directly, and the greater their willingness to supply accounts via Industrial Distributors.
In both HT and CE segments VLP has experience with supplying the series demanded, and it is assumed that mills will not supply these series. This assumption is true, until proven wrong, although it has been true for over many years now.
Market access largely depends in my report on the existence of relevant references for VLP in that segment, assuming those references can be used as a means of presentation of VLP's ability to cope with new challenges in these segments. For the HT and CE segment both OEM, first-tier and second-tier suppliers are part of VLP's reference list.
Although the number of competing suppliers, and the division of the market shares amongst them, has to be estimated for all segments, for the HT and CE segment they are scored high because of the smaller series. As well, the Bus/coach segment scores high for exactly the same reason. The Agricultural segment is scored less, because I have many doubts whether the information gathered is

representative. Passenger car and Commercial vehicle segments are assumed to face much more competition because of the size of their subsequent markets.
The HT and CE scores on the duration of contracts are based on long term agreements VLP has signed in both segments with OEMs. I assume that the contracts with these OEMs are also used, in terms of duration, by other OEMs.
Without doubt the geographical locations of the Passenger car, the HT and the CE segment suit VLP's European presence best. Other segments simply do not offer such coverage.

Next to the results of the quick scan with the mentioned criteria, there is another important consideration why I believe these two segments have the highest potential for VLP. In the CE segment, and to a lesser extent in the HT segment, all products in the assortment of VLP are used for various applications, more than is the case in the other segments. A considerable amount of material is assumed to be needed.
For instance, bar steel is needed for the axles of passenger cars, but a lot more hydraulics and mechanical engineering is integrated in the end-products of these segments.
Quality and high-tensile products are more important than in other segments, because the operational demands are assumed to be much higher. Especially CE machines have heavy-duty applications, face severe conditions, and have to perform continuously at constant levels. Chances that higher-quality products are needed are greater than in other segments, and that VLP could supply them with those materials required.
VLP can supply these two segments with products from all three VLP's branches, namely Hydraulics, Special Welded, and Mechanical Engineering. By doing so, the automotive segments can become a kind of corporate identity, for which all branches have to work together.
As well, these end-products do compete on technical function, less on shape and to a lesser extent on price. Manufacturers reach their capacity and need to outsource warehousing and logistical operations. Often there is a role

After combining the above stated with the quick scan results, I have decided to conclude the HT and CE segments as the segments with the highest potential. These two segments will now be subject to an in-depth study.

4. In-depth potential segment study

First I want to refer to the research questions I want to be answered after this in-depth study. The central question for this chapter is:

What are characteristics of the high potential automotive segments?

This central question was supported by the supporting questions:

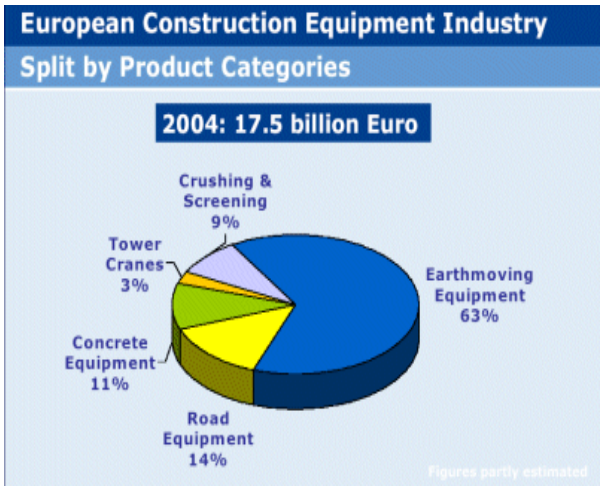
- *Who are the manufacturers in this segment?*
- *Who are the suppliers in this segment?*
- *Where are both manufacturers and suppliers located?*

In this chapter I want to answer these questions. I continue treating both segments individually, and am I trying to make both segments more explicit. At first I will explore the CE segment, followed by the HT segment. For both segments have I used the same logic, and are the same assumptions applicable.
At first I want to clarify the different categories within CE, because it needs to be understood what is meant with CE.
I will use figures and information derived from reports provided by CECE, the Committee for the European Construction Equipment. Next to this, I want to point out who the OEMs are in this segment, and what their market shares in this segment are. A clear insight is needed into the players in this segment, and where they are located, if VLP wants to start targeting this segment. Therefore I have mentioned the most important OEMs in CE and have I combined market share information provided by these OEMs. A list of all European OEMs in CE is added in the annex of my report.

I have tried to identify the main suppliers in this segment, it has resulted in stating the twenty-four largest first-tier suppliers. It is impossible for me, due to limited time and to difficulty to get hold of any information, let alone that it is the right information, to uncover all first-tier, second-tier, and third-tier suppliers. I have been able to uncover several preferred suppliers to CE OEMs. These preferred suppliers were found in publications from either suppliers, OEMs, or bachelor and master theses carried out by university students in Europe, working at OEMs or suppliers.
All these efforts aim at gaining a clear picture of this segment, and how it is embedded in Europe.

4.1. The Construction Equipment segment

Construction Equipment, sometimes referred to as 'Off-Highway', is the industry that manufactures all possible kinds of construction machinery. This industry has centralized itself in Europe in the CECE. CECE is the Committee for the European Construction Equipment Industry. It represents and promotes the interests of this important industry sector on a European level and in close co-operation with its sister associations in North America, Japan and Korea also worldwide. CECE is an international non-profit association according to Belgium law and registered in Brussels.



CECE, along with industry players, have categorized the products of construction machinery according to their fields of use. These five categories are **crushing and screening, tower cranes, concrete equipment, road equipment, and earthmoving equipment**, and are illustrated in the figure on the left.

In order to give a right insight in what is meant by these five categories, a short description of all five will be provided.

Figure 14: CE in Europe by category

Crushing and screening

Crushing and screening equipment is equipment that crushes the input (f.i. earth in the mining industry) via multiple shredders, and conveys this input over transportation lines through various screening positions. The result is that worthy input and worthless input have both been separated, without being labor-intensive. Crushing and screening equipment is self-propelled (by means of various engines), but to work it depends on other construction equipment that feeds this crushing and screening equipment with input, and that removes the output as well. It is a part of the construction equipment industry, and it is mostly applied in the mining industry.
As the illustration points out below, excavators typically feed this equipment and wheel loaders carry the output away. This division entitles for 9% of the total European Construction Equipment Industry market.

Tower cranes

Everybody knows the sight of big tower cranes that fill the horizon in tourist-booming places on earth. Tower cranes in the construction equipment industry fulfill the simple need they do in other industries as well: lift whatever the other equipment cannot lift, due to the weight of the item lifted or due to the height the crane can provide to the lifted object. Next to this application, these cranes find themselves in swinging hooks from side to side whenever buildings need to be crushed using a giant ball. Main makes of tower cranes are Terex, Liebherr and Manitowoc. A 3% share of the European CE market is reserved for tower cranes.
Manitowoc is manufacturing its cranes in Germany, Italy, France and Portugal. Liebherr is producing its cranes in Spain, Germany and Austria. Terex has positioned its crane division in Germany and France.

Concrete equipment

Concrete equipment is quite often presented as 'paving and concrete equipment', meaning that this machinery helps paving, drilling, cutting and stabilizing surfaces at hand. Although overlapping with the actual 'road equipment' which is up next, this is a stand-alone category because its main application is not the road. It is the first step to be executed on rough terrain when a concrete foundation needs to be made for the construction of buildings. Concrete Equipment holds an 11% share in the European CE market. Main makes are Terex (United Kingdom and Italy), Putzmeister (Germany and Spain) and Liebherr (France and Germany).

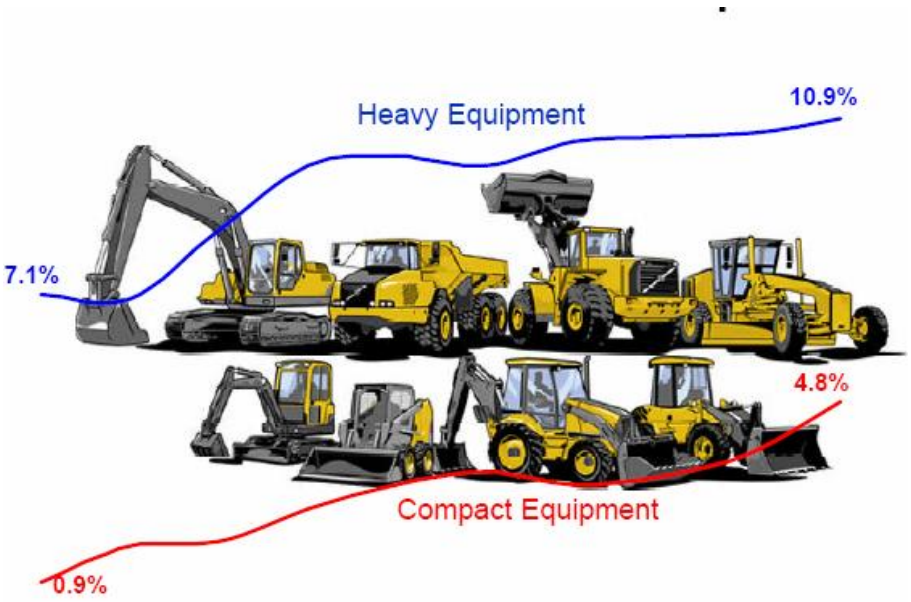
Road equipment

The road equipment machinery focuses itself solely on, not surprisingly, the road. Asphalt cutters which are categorized as 'Concrete equipment' assist the asphalt-paving equipment, the asphalt-milling equipment, and all other road-specific equipment. This division has a 14%

market share in the total European CE market. Main makes are Caterpillar (Belgium, France and Italy), fayat (France), Ammann (Germany) and Hofmann (Germany).

Earthmoving equipment

Earthmoving equipment sometimes is mistaken for being the only division of construction equipment. Some literature seems to forget about the four other divisions and regard this division as CE. Earthmoving equipment entitles for 63% of the total European CE market share, and famous of course are the dump trucks, backhoe's, excavators[128], wheel loaders, shovels, scrapers and so on. The biggest of them all is the off-highway truck, which is illustrated in the picture below. All share the same purpose: moving earth. The smaller they are (JCB for instance is famous and market leader for its relatively small backhoe), the more independent they become. The larger machinery such as dump trucks and off-highway trucks are all (dependent on other equipment and) fed by large excavators or wheel loaders.
Often, OEMs make another division when they regard the CE industry. They then divide the machinery in *Compact and Heavy Equipment*. Compact equipment can best be regarded as small business to business (gardener, contractor) products that are allowed to perform lower duty operations, as the heavy equipment is made for the heavy business to business market. The illustration below shows the division of the two.



[128] Dutch translation: "graafmachine"

4.1.1. OEM market shares - CE

It is difficult to identify solely European players in this market and extract European production and turnover rates from corporate annual accounts that Construction Equipment companies publish. They find themselves in global markets where absolute distances are becoming less and less important, and pool subsidiaries' results in one annual account: "consolidation". Going after consolidated figures will be very much time-consuming, and therefore I have not performed this task.
However, the primary intention of this paragraph is to identify the players in this market, and to uncover the brand names they have in their portfolio. Therefore I would like to start with market shares distribution in this global market among relevant players (a relevant player is considered to have > 2% of the total market share)129, see figure 16 below.

While interpreting these market shares I must state at first that no CE OEM makes the differentiation between European and non-European markets. Whenever competitors are regarded or mentioned by any OEM, there are no geographical boundaries in play and the world market is regarded as the industry's playground. The figure presented by Volvo is no exception to this rule, as it indicates the world market of CE with a total value of 48 billion US Dollars.
Construction Equipment historically come from the United States, Europe or Japan. European OEMs have approximately 30% of the CE market (Volvo, CNH, JCB, Liebherr and Others[130]. OEMs with their origin in The United States hold 47% (Caterpillar, Deere, Terex, Kobelco and Ingersoll-Rand) and Japanese OEMs contribute 19% (Komatsu and Hitachi). How accurate these figures are is hard to determine, fact is that every OEM publicizes slightly different figures. In the figure presented by Volvo it is hard to understand to what extent corporate figures have been consolidated, both for Volvo itself as for competitors. For instance, Kobelco Europe and Kobelco America has been a member to the Case New Holland Group since 2002, but is presented as an independent player because of its large home-market (Japanese) activities. In addition, the group with others (16%) is considerably large when compared to market leader Caterpillar and 2nd best Komatsu.
It could well be that, for instance the Terex group, has not been consolidated as well. Then German subsidiaries of the Terex Group, such as Atlas (in the Terex group mentioned as Terex-Atlas) and Schaeff (Terex-Schaeff) can be identified as being 'others'.

[129] Shareholders presentation Volvo CE President Mr. Helsham, 2003.
[130] 30% is an accumulated figure based on information from Volvo and European calculations executed by CECE. The figures mentioned by Volvo regarding Volvo itself, CNH, JCB and Liebherr have been corrected by CECE in order the mentioned 30% reflects the actual total European production.

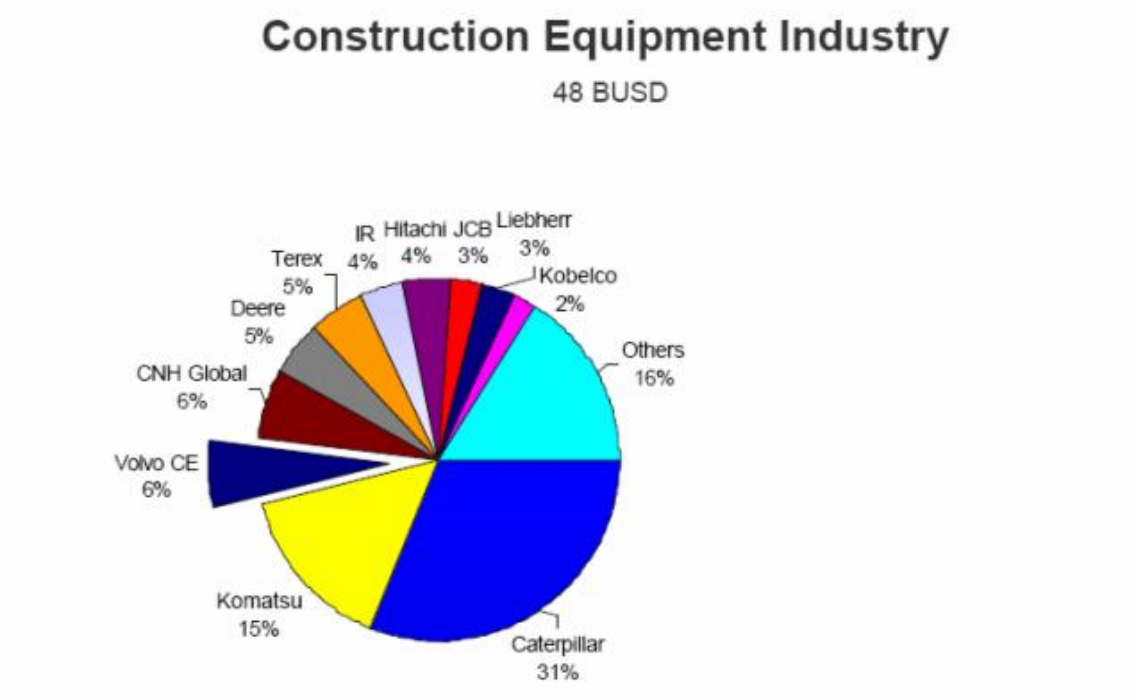


Figure 15: CE industry market shares by Volvo

To confront this Volvo-figure, which is derived from an annual report presented in public by Volvo, I want to present a figure derived from the Terex-group's annual report in figure 17[131].
Again Caterpillar is the market leader, as it has been the renowned leader in construction equipment ever since, and Komatsu is second. But this time the Terex-group's result is consolidated and ranks itself as the third largest manufacturer in the world. Gaps are small, especially between Deere, Hitachi and Volvo. The one thing to learn about these figures is that these players are all tremendous in annual turnover, but they slightly favor themselves over others when figures are to be published.

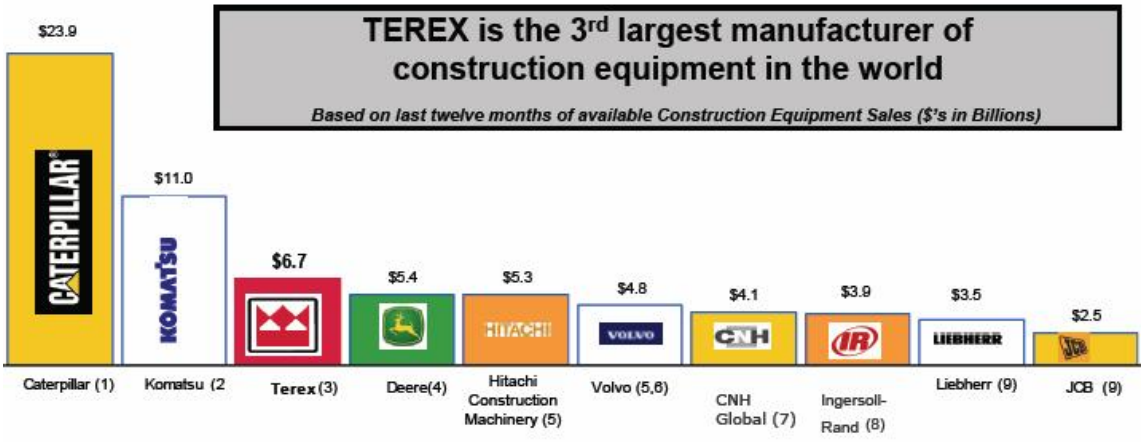


Figure 16: CE industry market shares by Terex

[131] Terex-group shareholders presentation, 2006.

The portfolios of the relevant players in CE consist of the following:

Caterpillar		**Deere**	
Komatsu		**Hitachi**	
Terex:		**Volvo**	
	Terex	**CNH**:	
	Terex-Atlas		Case
	Terex-Fuchs		New Holland
	Terex-Kaelble		Kobelco
	Terex-Mining	**Liebherr**	
	Terex-Schaeff	**Ingersoll-Rand (IR):**	
	Terex-Genie		Ingersoll-Rand
JCB			Bobcat

Although the JCB representative[132] I spoke with indicated that JCB has a market share of 8,2% in 2003 which ranks them 5th in 2003, and by the end of 2006 they would be 3rd, I need to make a preservation. The market share JCB pointed out is their share in total number of units manufactured worldwide instead of total revenue from total sales. Exactly the reason why Bobcat, as a subsidiary of IR, and Kubota both rank high on this JCB list but in total revenue are considered to be 'small' players. JCB, Bobcat and Kubota, together with many others, are famous for their compact construction equipment. JCB is even market leader in backhoes, worldwide. The reason for their large numbers, of course, is that compact equipment finds itself in a bigger market than the heavy equipment machinery. Smaller equipment requires less investment (less costly), and have a bigger diversity of applications compared to the large off-highway trucks and tower cranes, which are very static in their sole application.
The list provided by JCB is as follows[133]:

2003 Top Ten Construction Equipment manufacturers	Units worldwide	Share in total nr. units
1. Caterpillar	53,032	15.1%
2. CNH	52,887	13.7%
3. Bobcat	40,140	11.2%
4. Komatsu	32,764	9.1%
5. JCB	30,043	8.2%
6. Volvo	16,462	5.3%
7. Deere	16,407	4.9%
8. Kubota	13,291	4.0%
9. Hitachi	12,533	3.7%
10. Yanmar	8,714	2.3%

To give an indication of how much this Construction Equipment industry is growing[134], JCB will produce approximately 54,000 units in 2006, and manufactured 47,000 units in 2005. Comparing the 2006 figure with the 2003 result, we see production has almost doubled in nearly three years[135].

In Annex 7 I have tried to gather a list of all European manufacturers of CE, divided by application. This list is comprehensive but never complete.

[132] Mr. Paul Hennessy, JCB, East-Midlands
[133] Mr. Paul Hennessy, JCB, East-Midlands – Sheet out of corporate presentation JCB
[134] Of course, JCB is a sound organisation and a success-story itself, however increased prices of raw material/resources must be pointed out as the main driver for growth in this industry – Mr. Paul Hennessy, JCB.
[135] Mr. Paul Hennessy, JCB, East-Midlands

4.1.2. Construction Equipment in Europe

As mentioned before, Europe contributes to the total worldwide production with a 30% share in production units. These units have been manufactured mainly by the ten competitors of Volvo, as well as by Volvo CE as well. Although this 30% may be somewhat misleading[136], there is a tremendous business available for European suppliers.
Firtsly I want to indicate the ratio between manufacturing for the domestic, European, market versus the manufacturing for export, Non-Europe, markets. Because the CE industry is such a global industry, I think it is valuable to know the value of this ratio. If any OEM is visited, it gives the visitor an insight in destination of the end-products. Thereafter I would like to point out as much as possible the European production sites of these top rated CE OEMs.
Following the division structure CECE has made, the five categories, *crushing and screening, tower cranes, concrete equipment, road equipment, and earthmoving equipment*[137], can be worked out. Countries involved in this more detailed screening are particularly Western-Europe countries because of three reasons:
-only recently a trend can be discovered that Eastern-Europe is being explored for opportunities, and business is set up marginally. These start-up results have not been reported by the CECE, the European body of all European CE manufacturers with 1200 members[138].
-no accurate information can be found for local Eastern-Europe production units.
-CE OEMs are very much likely to expand to Asian countries, surpassing Eastern-Europe as a growth area[139].
A strong growth in export will be visible when looking into the Construction Equipment sections. This strong growth in export is caused by the increasing world economy, thus an increasing demand for resources, and consequently an increasing demand for machinery that enables companies to handle these resources. Although these resources once were superfluously available in Europe in the 19th and 20th century, a shift is made to areas outside Europe where these resources nowadays are still largely available. An example is the cutting of (rain) forests in Brasil at high rates. On the contrary, more and more mining activities in Europe are shut down. Besides developing economies such as Asia and Africa, need construction equipment to facilitate the construction of roads, (concrete) structures, and earthmoving operations.

<u>Road equipment</u>

Road equipment is mainly manufactured in France, Italy, Germany, Spain and the United Kingdom. The production in these countries is can be divided into home-market sales and production for export-sales. 31% of total production in 2004 accounts for home-market sales, and 69% for export[140]. The decline compared to 2003 seems the home-markets sales is caused by a strong growth in export sales.

Figure 17: Road equipment export-domestic

[136] Mr. P. Mussert (Hitachi) - Japanese origin companies such as Hitachi and Komatsu tend to be, because of strong relations and restrictions from the Japanese headquarters, assembly plants, assembling Japanese parts locally in Europe. The units then are manufactured in Europe, but the business for European suppliers is very little since Japan is the key-supplier.
[137] Annex 12 shows a list of European potential OEM customers for each category.
[138] www.cece-eu.org – annual report 2005
[139] Mr. Paul Hennessy, JCB, East-Midlands; www.volvo.com; www.blonnet.com; www.cece-eu.org.
[140] www.cece-eu.org – annual report 2005

Concrete equipment

Concrete equipment machinery production is concentrated in France, Germany, Italy and Spain. Regarding the road equipment, to which the concrete equipment division is complementary, it is noticed that there is no production in the United Kingdom. In 2004 33% of the total European production was reserved for the home-markets, while 67% has been exported to countries outside Europe. Again, export grew larger than home-market sales in 2004.

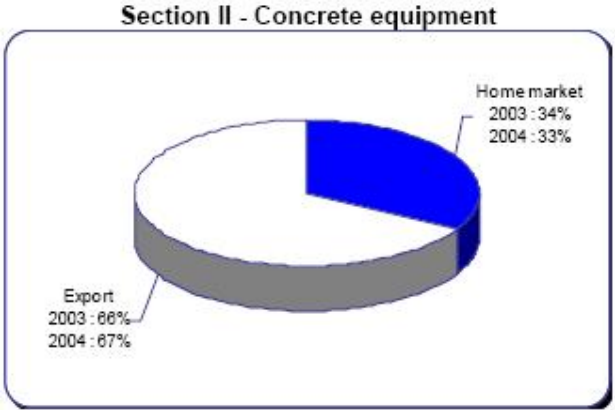


Figure 18: Concrete equipment export-domestic

Tower cranes

Tower cranes are manufactured in Germany, France, Italy and Spain. The latter three countries all operate in the shade of Germany, since worldwide market leader for tower cranes Liebherr has established itself firmly throughout Germany. With the worldwide market leader in Europe, one can expect higher exports than home-market sales, and this is confirmed by the CECE information. 38% home-market versus 62% export sales for 2004[141].

Crushing, screening, washing and sizing equipment

This division of Construction Equipment has concentrated itself in France, Germany, Italy, Spain and the United Kingdom. These countries apparently form the heart of CE in Europe. The trend of growing sales in export is continued in this division, as export accounts for 69% in 2004 and 65% in 2003. Consequently, home-market has lost shares in percentages, but gained in absolute figures.

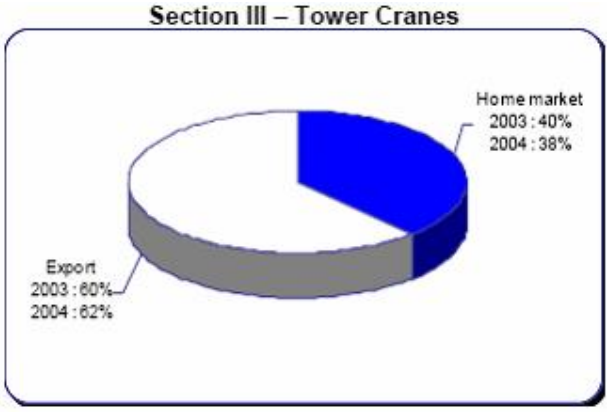


Figure 19: Tower cranes export-domestic

[141] www.cece-eu.org – annual report 2005

Earthmoving equipment

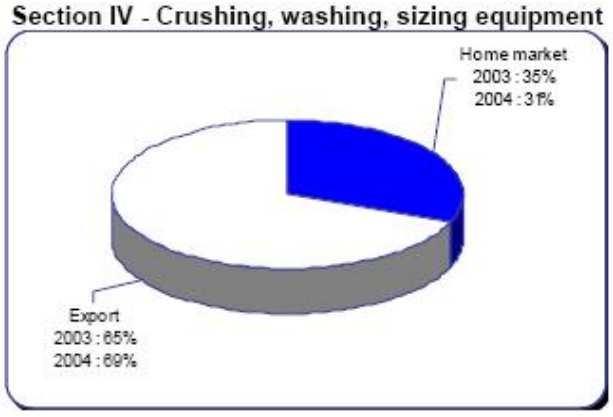


Figure 20: Crushing, washing, sizing export-domestic

Earthmoving equipment is the only division where export has lost shares compared to 2004, and home-market sales has increased its share. The cause is twofold:
-as indicated before, earthmoving equipment is by far the largest division in the CE industry. OEMs are seeking into opportunities for production of earthmoving equipment outside Europe rather than relying on export, since there is a tremendous market to explore outside Europe. This is the first of five divisions for which OEMs are investigating (and investing in) local production outside Europe. As Volvo's CE president Mr. Helsham indicates at the shareholders convention in 2005, Asian countries have already become countries where OEMs have to compete on price. OEMs have therefore already installed local production sites. Export was the first step towards exploring new markets for CE, but after a market has proven to be profitable, this market entrey strategy will logically be replaced by any means of local production[142].
-competition outside Europe is strong, both in America and in Asia. In the other four divisions we can see niche-players are active, as production units are smaller and OEMs strive to diversify their products on other aspects than price[143]. As well, since earthmoving equipment accounts for the part of the annual turnover for the big players, I can imagine that competition in this division is typically tough. Giving up this division as an OEM in CE means that you either have to focus on the other four divisions as being a niche player, or either shut down your CE activities completely.
Concluding, home-market sales has increased its share compared to export in 2004, due to competition and foreign investment for local production.
Earthmoving equipment has concentrated itself in Germany, France, Italy, Spain and the United Kingdom, but this time three new countries have gained considerable shares: Sweden (Volvo), Belgium (Caterpillar, Komatsu) and The Netherlands (Hitachi). In the latter two countries OEMs have situated themselves near international sea-harbors and airports.

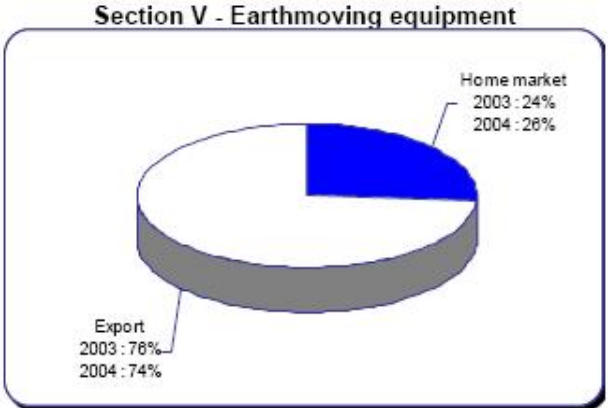


Figure 21: Earthmoving equipment export-domestic

The fact that earthmoving equipment is the biggest division in CE, makes it most attractive in general for research, and this results in an overwhelming amount of information compared to the other four divisions. Especially Western-Europe is in the picture, however Eastern-Europe is appropriately mentioned when digging out the earthmoving equipment industry in Europe. Total units sold in 2004 per country can be divided as in the figure below. This segmentation gives you an insight in how the domestic-market production, mentioned in the figures above, is divided among the European countries.
As we can see Italy is ranked first closely followed by the United Kingdom and Ireland which is ranked second, notably due to the centralized establishment of top-rankers Caterpillar and JCB in these parts of Europe. Germany, with niche players as Liebherr, Terex-subsidiaries and many more, is ranked third. France, Spain and Benelux are other countries of special interest, the remaining part of 17% of

[142] http://www.blonnet.com/2005/07/02/stories/2005070201900200.htm
[143] www.cece-eu.org – annual report 2005

total units sold can be divided over the remaining countries: Austria, Czech Republic, Denmark, Finland, Greece, Hungary, Iceland, Norway, Poland, Portugal, Slovakia, Sweden and Switzerland.

For the earthmoving equipment a product mix can be constituted, as visible in figure 24 (below).

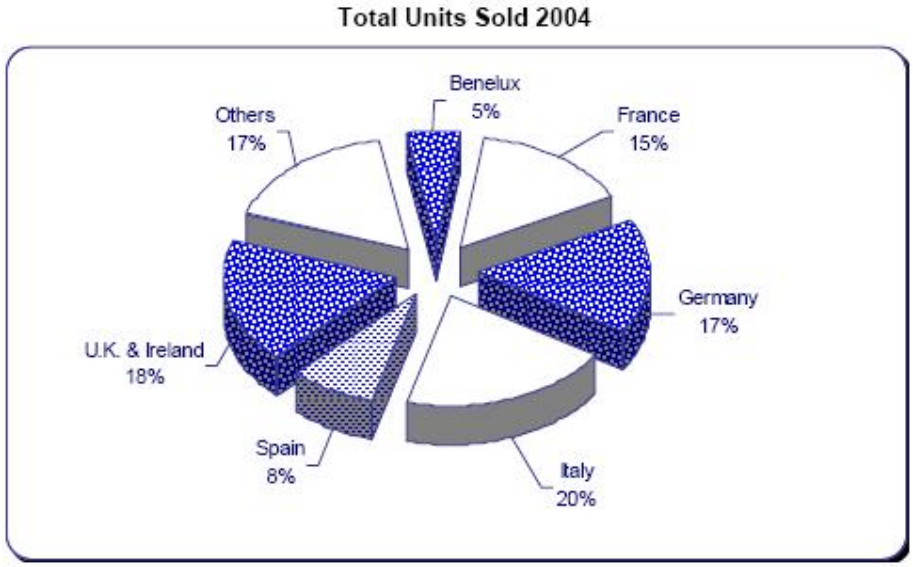


Figure 22: Total CE units sold in Europe 2004

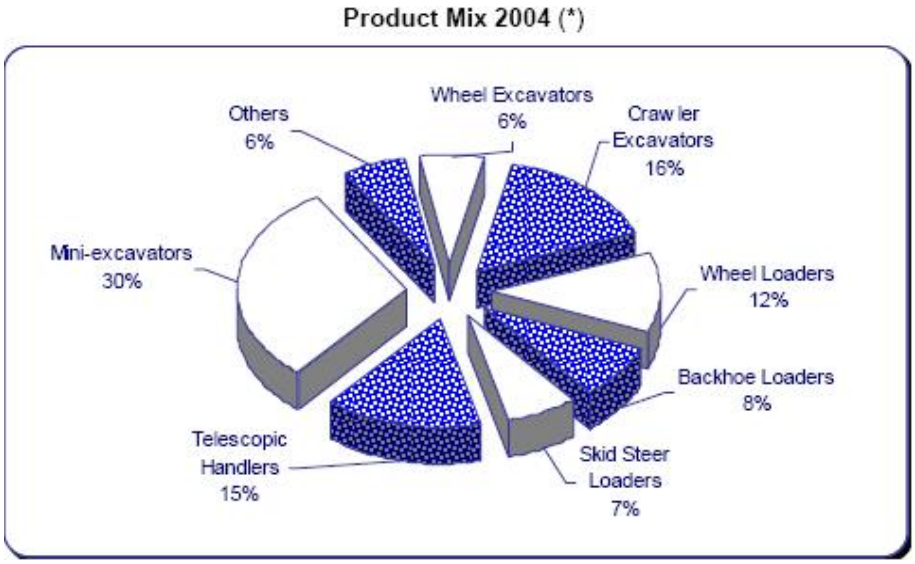


Figure 23: Product Mix in Europe 2004

Without going into too much detail, the product mix provides a clear overview of all machinery included in earthmoving equipment. Besides, it makes clear that shares are not that much unevenly distributed among the products/items. The mini-excavator is a clear number one though, and the group 'others' comprehends:
-Crawler loaders
-Crawler dozers
-Graders
-Dumpers

Further detail is presented in Annex 10 where a distribution per type of machines is given per country, and insights are given into the distribution of machines per country. Here a visualisation is in place, to provide a better understanding of the products mentioned.

Excavator

Telescopic handler

Wheel loader

Backhoe-loader

Skid-steer loader

Bulldozer

Grader

Dumper / Dump Truck

4.1.3. OEM production sites in Europe - CE

Above we have seen which countries contribute to what extent to the total European production of output numbers for the CE industry. Here a list[144] is presented which identifies the twelve most relevant CE players in the countries they are active in. The twelve are the result of combined Volvo, Terex and JCB top listings in CE. To view the list that includes the product that is made in the country of concern, and the residence where the production site/plant can be found, please refer to Annex 8.

OEM	Country	OEM	Country
Caterpillar	The Netherlands	**Terex**	Germany
	Belgium		France
	Germany		United Kingdom
	France		Spain
	Switzerland		Italy
	United Kingdom		Belgium
	Poland		Poland
	Hungary		Sweden
Deere	Finland	**Volvo**	Germany
	Sweden		France
	Norway		United Kingdom
	Ireland		Sweden
			Poland
Komatsu	Germany		
	United Kingdom	**CNH**	Belgium
	Italy		France
	Sweden		Germany
	Norway		Italy
	Netherlands		United Kingdom
Hitachi	Netherlands	**Liebherr**	Austria
	France		France
	Germany		Germany
	Spain		United Kingdom
	United Kingdom		Spain
			Switzerland
IR	Germany		
	France	**Yanmar**	France
	Czech Republic		
		Kubota	France
JCB	United Kingdom		Germany
			United Kingdom
			Spain

Table 1: CE production sites in Europe

A glance at this table shows us what already was suggested in the 'Construction Equipment in Europe' paragraph, namely Construction Equipment has centralized itself in mainly Germany, France, and the

[144] Sources: Mr. P. Hennessy (JCB), Mr. P. Mussert (Hitachi), annual reports, Kompass, corresponding websites of Caterpillar, Volvo, CNH, IR, Deere, Hitachi, Komatsu, Terex, Liebherr, JCB, Yanmar, Kubota, and publications concerning production activities at internet.

United Kingdom[145]. Runners up are Italy and Spain, and Eastern-Europe has not very much been explored by the industry players. Aerial platform manufacturer Genie, which is a subsidiary of Terex, has been included in the Terex countries. To provide a true reflection on reality, the market leader in aerial platforms has to be included then as well. This company, JLG, holds manufacturing plants in the United Kingdom and France.

4.1.4. Suppliers to the OEMs - CE

It is difficult to identify clearly the relevant suppliers for the European construction equipment, and that is because of a number of reasons:
-suppliers are not keen on sharing information about their customer-base with others, because of severe competition and large customer accounts.
-OEMs do not only get supplied by the capitals of industry (typically tier one suppliers), but still are served by local, lower-tier suppliers that do not focus primarily on CE with their product philosophies. These companies I cannot get hold off well, simply because they do not advertise their activities in CE well.
-contracts are timely, especially for non-niche products. Although the shrinking of the supplier-bases is a trend in the entire automotive industry with all of its divisions[146], still OEMs shop for commodity products to accomplish annual cost-down from their suppliers. Therefore, OEM-suppliers I identified, based on historical information found, do not have to be the suppliers at the present time. This makes it very hard to guarantee valuable information.
-there are a tremendous amount of suppliers!

[145] See Annex 13 for United Kingdom CEA members.
[146] Mr. N. Atterbury – Dana Driveshaft, UK

Although the Tiers and Tier-structure become more and more outdated, I wish to refer to them in this chapter because of the valuable information based on it in recent history. At first I present on this page and on the next page the 24 largest first tier suppliers in the world for automotive. Here it becomes clear how interrelated automotive is, because many of these suppliers supply both construction equipment and passenger car industries. Examples are Robert Bosch (Volvo CE; Volkswagen), Dana (Caterpillar, JCB; Land Rover), ZF (Hitachi; BMW, Audi), and so on. The first tier suppliers' products are presented, and

Company	Headquarters	Total worldwide parts sales $ millions 2003	Total worldwide parts sales $ millions 2002	Employees 2003	Employees 2002	Percent North America 2003	Percent Europe 2003	Percent Asia-Pacific 2003	Percent rest of world 2003	Products
Robert Bosch GmbH	Germany	29 736	29 358	229 439	225 897	23	61		16	Fuel injection systems, chassis systems, energy and body systems, automotive multimedia and electronics
Delphi Automotive Systems	United States	26 200	25 527	189 000	196 000	74	21	3	2	Steering, chassis, electrical, energy thermal and engine management; interiors, electronic components, entertainment systems
Denso Corporation	Japan	16 856	15 348	95 461	89 380	23	12	65		Thermal, power train control, electronic and electric systems; small, motors, telecommunications, industrial and environmental systems
Visteon Corporation	United States	16 513	16 900	72 000	77 000	67	18	8	7	Chassis, climate control, cockpits, electronics, exterior/interior systems, power train control, engine management, fuel systems
Lear Corporation	United States	15 747	14 400	111 022	114 694	60	36		4	Interior systems, seats, instrument/door trim panels, overhead, flooring and acoustic systems, electronic/electrical distribution systems
Magna International Inc.	Canada	15 345	12 422	75 000	73 000	68	30	1	1	Interiors, exteriors, body and chassis systems, seats, mirrors, closures, electronics, engines, transmissions
Johnson Controls Inc.	United States	15 192	13 714	118 000	111 000	53	39	7	1	Seats, interior trim, batteries, electronics, cockpits and instrument panels
Aisin Seiki Co. Ltd.	Japan	13 534	10 716	44 132	40 234	12	7	80	1	Body systems, brake and chassis systems, electronics, drive train and engine components
Faurecia	France	12 700	10 000	52 041	52 226	10	86	3	1	Seats, cockpits, doors, acoustic packages, front ends, exhaust systems
TRW, Inc.	United States	11 300	9 900	60 800	64 000	41	50		9	Steering, suspension, braking, engine components, fasteners, occupant restraint systems, electronic safety and security
Siemens VDO	Germany	9 500	8 500	43 600	43 000	18	73	7	2	Electrical and electronic components and systems

Figure 24: First-tier suppliers

all modules/systems they supply are ready for assembly onto the automotive unit in the OEMs plants. This means that a complete dashboard is fit in,

complete drivelines, complete transmissions, the sub-assembly has all taken place in the first-tier suppliers' assembly plants.

Company	Headquarters	Total worldwide parts sales $ millions 2003	Total worldwide parts sales $ millions 2002	Employees 2003	Employees 2002	Percent North America 2003	Percent Europe 2003	Percent Asia-Pacific 2003	Percent rest of world 2003	Products
Valeo SA	France	8 879	7 693	68 200	69 100	19	71	7	3	Transmissions, climate control, engine cooling, lighting, electrical and wiper systems, motors and actuators, security systems, switches, electronics
ZF Friedrichshafen AG	Germany	8 200	6 900	53 487	53 281	20	70	7	3	Transmissions, steering systems, suspension components axles, clutches, dampers
Dana Corporation	United States	7 918	7 315	59 000	63 100	70	19	6	5	Axles, driveshafts, structures, sealing, thermal management, fluid transfer and engine power products, chassis
Continental AG	Germany	7 600	5 600	32 000	32 000	30	60	5	5	Electronic brakes, stability management systems, tyres, foundation brakes, chassis systems, safety system electronics
ThyssenKrupp Automotive AG	Germany	7 300	6 218	68 829	65 127	50	46	1	3	Body systems, chassis modules, power trains, suspensions, steering systems, drive trains
Yazaki Corporation	Japan	5 900	5 800	41 414	38 425	38	11	43	8	Electrical distribution systems, electronics, instrumentation, connectors and components
DuPont	United States	5 510	5 400	120 000	120 000	50	35	11	4	Coatings, engineering polymers, fibres, chemicals, refrigerants and finishes, small motor and transmission components
Calsonic	Japan	5 436	4 468	81 000	79 000	26	8	66		Climate control, engine cooling and exhaust systems; instrument clusters, console box, cockpit modules, instrument panels
Autoliv, Inc.	Sweden	5 301	4 443	32 100	30 100	35	50	10	5	Airbags, inflators, seat belts, sensors, steering wheels
Michelin Group	France	4 676	4 650	121 345	121 017	27	44		29	Tyres
KOYO SEIKO	Japan	4 062	3 516	6 185	6 557	11	27	60	2	Bearings, hub units, steering systems, driveshafts
Collins & Aikman Corp.	United States	3 984	3 886	23 900	25 000	73	25	1	1	Cockpit modules, instrument panels, flooring and acoustic systems, fabrics, trim, convertible top systems and accessory mats
Arvinmeritor	United States	3 915	3 594	32 000	n/a	50	40	7	3	Air and emission technologies, aperture and undercarriage systems, drive trains, braking and suspension systems, specialty components

Figure 25: First-tier suppliers

However difficult, visits to Dana, JCB, Komatsu, Hitachi and Corus Tubes, and performing extensive desk research, has lead to some insight in the CE supply-base as it is.

Relevant Japanese CE players (Hitachi, Komatsu and Kubota) have to buy a lot of sub-assemblies from their Japanese mother firm. The typical Japanese business model entails an extensive conglomerate (keiretsu[147]) with all subsidiaries doing business with each other. A very protected way of doing business, since the outside suppliers have no chance of supply unless the conglomerate has no internal alternative[148]. What goes for Hitachi goes for all Japanese CE players[149].

> **Highlight:** 80-90% of the total value of any Hitachi end-product exists of parts which are imported from Japan. These parts are either bought in Japan from subsidiaries (undercarriage, cabin, engine) or non-subsidiaries (hydraulic cylinders). European plants are mainly assembly plants, Hitachi in Europe welds, assembles and paints. To do so they have three machine centers in use in The Netherlands and in France.
> Already mentioned, hydraulic cylinders are for 95% imported from Japan. Hitachi used to make these themselves, but the Japanese firm has outsourced this activity. Hydrauto[150], the Swedish cylinder manufacturer, has lost its contract years ago since they did not offer a range that was broad enough for Hitachi. The missing 5% is manufactured for small Hitachi equipment applications in France by Sahleduc. Other parts supplied by local suppliers are:
>
> -Axles – supplied by ZF
> -Transmissions – supplied by ZF
> -Crawler – Italtractor ITM / Berco
> -Tires – Bridgestone
> -Boom (out of 1 part) – supplier in Czech Republic (classified)
> -Boom (out of 2 parts) – supplier in Poland (classified)
>
> Hitachi is localizing some parts that by now are still imported from Japan. Mr. Mussert knows this division between local suppliers and imported Japanese parts is applicable for other Japanese companies (Komatsu and Kubota) as well. My visit to Komatsu in Belgium[151], and the information sent after the visit, confirms this division of sub-assemblies although Komatsu does not want to inform outside people about their supplier-base.
>
> Not only Japanese OEMs manufacture many parts in-house. JCB[152] manufactures its own engines, transmissions, cab systems, manufactures part of their own barsteel, and up till now manufactures part of their own hydraulic cylinders. The hydraulic business unit (HBU) may however be outsourced in the long run to Asian countries.
>
> Caterpillar has its own stand-alone engine unit, the subsidiary Perkins[153]. Furthermore Caterpillar makes, among others, its own hydraulic cylinders[154] and transmissions. Volvo CE manufactures its own engines, transmissions, cabins and drivelines.

[147] "A group of financially connected companies that tend to do business among themselves" – Ball et al., International Business, p. 443.
[148] Ball et all, International Business, 2003.
[149] Mr. P. Mussert, Manager Procurement Hitachi Europe, Amsterdam.
[150] A profile of Hydrauto, together with some competitors in Europe, is present in Annex 14.
[151] Mr. S. Verbist, Komatsu, and forwarded information by colleagues.
[152] Mr. P. Hennessy, Purchase manager JCB, UK.
[153] www.perkins.com
[154] http://www.globalspec.com/FeaturedProducts/Detail/Caterpillar/Caterpillar_Hydraulics/12817/0

DANA Driveshaft[155] has a special Off-Highway business unit supplying drive and non-drive axles, driveshafts, gearboxes, (powershift) transmissions, and so on. Its end users are JCB, Caterpillar, and heavy truck customers such as Leyland (part of PACCAR).

It is obvious that in the CE industry a lot of parts are still manufactured in-house, but as the automotive industry as a whole is aiming towards assembly by the OEM, and consequently outsourcing of other activities to suppliers, together with the starting 'local mindset' of Japanese OEMs, business for suppliers in this section will be tremendous.
Few units will (maybe) never be outsourced, because they are key to the OEMs. JCB's transmissions and Volvo's engines[156] are examples of these key products. But every CE unit needs some sort of seating, heating, cooling, electronics, everything the first tier suppliers offer to them.
In addition to the first tier suppliers which are presented together with their products, some 'preferred suppliers' from the CE industry have been found.

Several preferred suppliers:

Parker:	Manufactures valves and hydraulic components, as well as motion and control components. Production sites are all over Europe. Preferred supplier to: Volvo CE
Remploy Automotive:	Assembles powertrains, fuel systems, braking systems, final drive, suspension, chassis, interiors and steering systems. Holds eight locations throughout the United Kingdom. Preferred supplier to: JCB, Bergstrom
Bergstrom:	Manufactures cab climate systems. Production site in Wales. Preferred supplier to Caterpillar, New Holland
Gruppo Fontana:	Manufactures fastenings. Preferred supplier to: Caterpillar
GKN:	Manufactures steering axles, fixed axles, suspension and wheels. Production is in the UK, Germany, Denmark and Italy. Preferred supplier to: Caterpillar, Deere, CNH
SKF:	Manufactures among others rolling bearings and linear motion products. All over Europe, production units are classified. Preferred supplier to: Volvo CE
AGJ:	AGJ manufactures boom and bucket for the CE industry in Hungary. Preferred supplier to: Caterpillar
Raba Futomu:	Produces heavy truck and CE axles in Hungary. Preferred supplier to: Terex
Timken:	Produces bearings, precision components and alloy steel. Production sites in France, Spain, Sweden, Germany and Belgium. Preferred supplier to: Volvo CE, Caterpillar, CNH

[155] Mr. N. Atterbury, DANA project manager, UK.
[156] Mr. Helsham, president of Volvo CE – publication; Mr. P. Hennessy, JCB.

4.2. Heavy Trucks

As well for the heavy trucks I wish to answer the research questions, in order to provide a first clear understanding of the European OEMs in the HT segment.

What are characteristics of the high potential automotive segments?

This central question was supported by the supporting questions:

- *Who are the manufacturers in this segment?*
- *Who are the suppliers in this segment?*
- *Where are both manufacturers and suppliers located?*

The heavy truck (HT) industry, often referred to as truck industry or heavy duty truck industry, features worldwide, compared to the CE industry, only two subdivisions. Unlike the divisions based on application in the CE industry, the division in the HT industry is made based on 'gross vehicle weight'[157]. The gross vehicle weight is the weight of the truck including its cargo. The two categories then, 6-15 t[158] and >15 t, are very understandable categories. Although the application of trucks in both categories is performing the transport function they have, the gross vehicle weight limits the first category in its applicability. Remarkably the European HT industry is not organized in one public association. The result is that market shares that can be presented come from HT OEMs annual reports and presentations, and both may slightly favour the OEM's own position.

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When VDA is speaking of 6-16 t trucks, they actually measure the < 15 t category trucks according to DAF measures. This difference between 15 and 16 is something I cannot clarify, it is simply a point of reference used. Although the application of trucks in both categories is performing the transport function they have, the gross vehicle weight limits the first category in its applicability.
Remarkably the European HT industry is not organized in one public association. The major OEMs in the HT industry have been a member to the 'European Automobile Manufacturers Association', but surprisingly the HT industry does not want to position itself as an industry apart from passenger cars and light commercial vehicles[161]. The result is that market shares that can be presented come from HT OEMs annual reports and presentations, and both may slightly favour the OEM's own position.

[157] www.truckindustry.com
[158] t = ton kilos = 1,000 kilos
[159] www.truckindustry.com; gross vehicle weight is the total allowed weight of the truck when cargo is included.
[160] t = ton kilos = 1,000 kilos
[161] I find this surprising because of the public function an HT association could have in Europe, to represent and support the transport sector that face high pressure from national governments.

4.2.1. OEM market shares - HT

Worldwide there are only 24 large manufacturers of heavy trucks, as is indicated in figure 27. Although one could expect these manufacturers to be very much global players, they are considerably local-oriented and seem to use brand diversification in different global regions. The brand names which are very common in North and South America are very rare (if any is sold) in Europe, and vice versa.

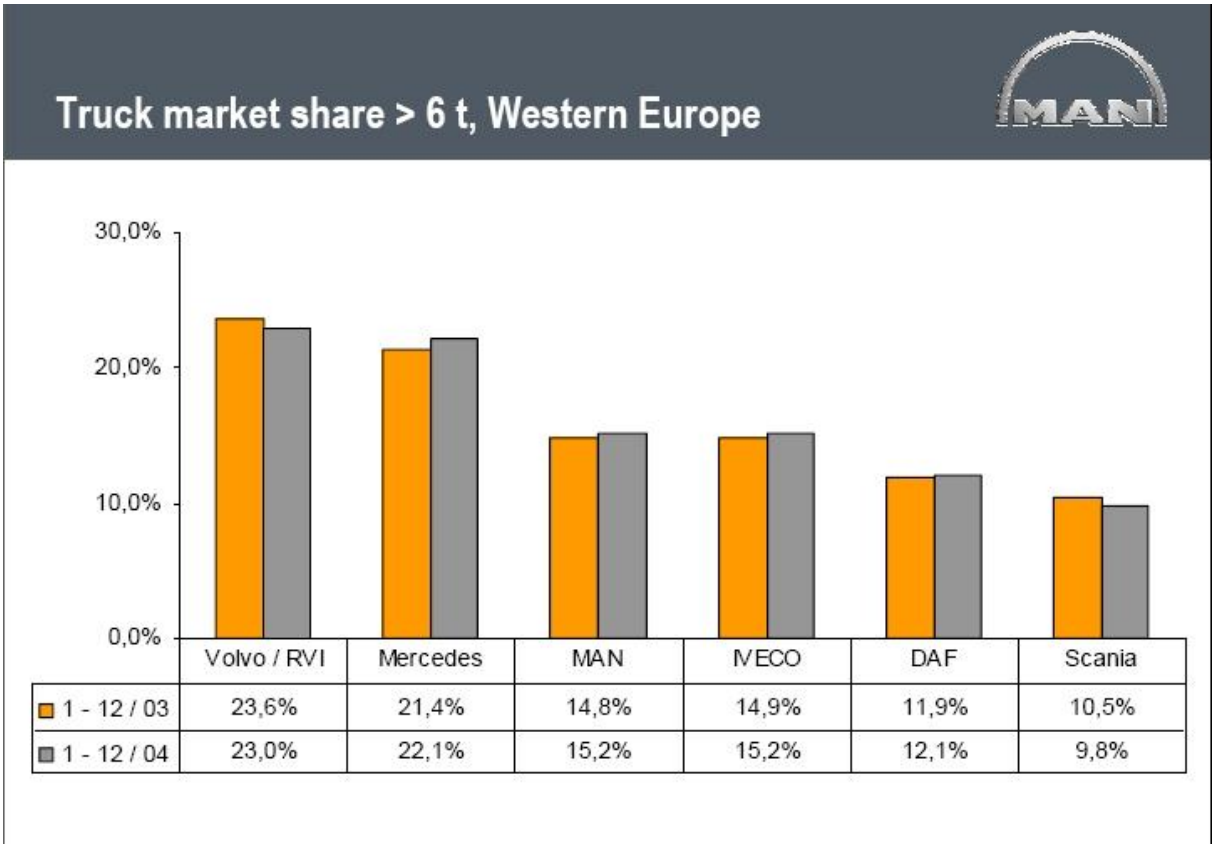
The portfolios of the relevant players in HT consist of the following:

DaimlerChrysler	Mercedes-Benz	**Volkswagen**	Scania[162]
	Unimog		
	Freightliner	**Iveco**	Iveco
	Western Star		Astra
	Sterling		Seddon Atkinson
	Mitsubishi-Fuso	**MAN**	
Volvo	Volvo	**Navistar**	International
	Renault		
	Mack	**Hino Motors**	Hino
Paccar	Kenworth	**Isuzu**	
	Peterbilt		
	DAF	**Terex-Tatra**	Tatra
	Foden (retired)		
	Leyland	**Dongfeng**	
		Kamaz	

Figure 26: HT industry players

As is visible in the figure above, restructuring and mergers have been around in this worldwide industry ever since and the result is clear. The 24 brands have merged into eleven greater mother firms, but still the industry is moving. Only recent (2001) Volvo's attempts to acquire Scania were cancelled by the European Commission, after which Volkswagen decided to invest in Scania as a majority-shareholder.
In Europe the OEMs written in green are not active in European production, and Terex-Tatra is only active in production in Czech Republic. Actually, seven OEMs dominate the European HT industry, and they are: Mercedes-Benz, Iveco, MAN, Volvo, Scania, RVI and DAF. Unimog is purely a specialty product with very little production, and both Foden and Leyland only are manufactured and sold in the United Kingdom.
Again, Eastern-Europe is only in the start-up phase for the HT OEMs[163], and OEMs do not keep track of Eastern-Europe market shares yet in publications. Western-Europe market shares are provided for all of them, and are presented in figure 28 below[164].

[162] I will refer to volkswagen-Scania as 'Scania'.
[163] MAN – Capital Market Day 2005
[164] MAN – Capital Market Day 2005



	Volvo / RVI	Mercedes	MAN	IVECO	DAF	Scania
1 - 12 / 03	23,6%	21,4%	14,8%	14,9%	11,9%	10,5%
1 - 12 / 04	23,0%	22,1%	15,2%	15,2%	12,1%	9,8%

Figure 27: Western Europe Truck market shares > 6t

Volvo and its Renault division (Renault Vehicules Industrie, RVI) combined form the market leader in Eastern-Europe with a share of 23,0% in 2004. Had Volvo not been consolidated on the Eastern-Europe market, than Mercedes-Benz would have been market leader. Mercedes even increased its market share in 2004 compared to 2003. It is noticed that market shares in Eastern-Europe are quite evenly distributed, with Scania ranking number 6 and still having nearly 10% of the market. Although this picture provides good insights into the current market shares' distribution, it shows no real trend in declining or increasing shares among players. The figure[165] below provided by DAF does show these developments over time, but only aims at trucks > 15t. Nevertheless we see a trend which is very interesting, and that is a since 1997 declining market share for Mercedes Benz in the HT industry in Western-Europe. Mercedes is still market leader in this category, but the decline must not last for another five years. Other OEMs struggling with their market shares are Scania, Iveco and to a certain degree RVI. The real advantage is taken by DAF who managed to realize a growth since 1995 with only a minor fall in 1998.
In the 6t-15t category we see a completely different situation of the division of the market among the European players, as is shown in figure 30[166]. Renault, which owns Nissan's truck activities for 44%, is a minor player in the market < 15t. Mitsubishi, as part of the DaimlerChrysler company, also is small compared to the market leaders. Iveco, one of the smallest in > 15t heavy trucks, manages to gain an overall market share of 15,2% in the HT industry by being market leader in the < 15t with 30.2%. DaimlerChrysler, or Mercedes-Benz, is second with 28.1%. A minor difference between the two leaders then, while Volvo/RVI and MAN seem to aim for a shared third place with both at around 15% of the market. DAF scores well

[165] DAF – Purchasing Presentation DAF
[166] VDA – "Commercial vehicles – a mobile future", Mr. B. Gottschalk.

with little more than 8% for PACCAR, and Scania is showing why Volkswagen has taken over the company: ranking number five in the > 15t category, and no participation in the < 15t category, makes it the smallest of the seven.

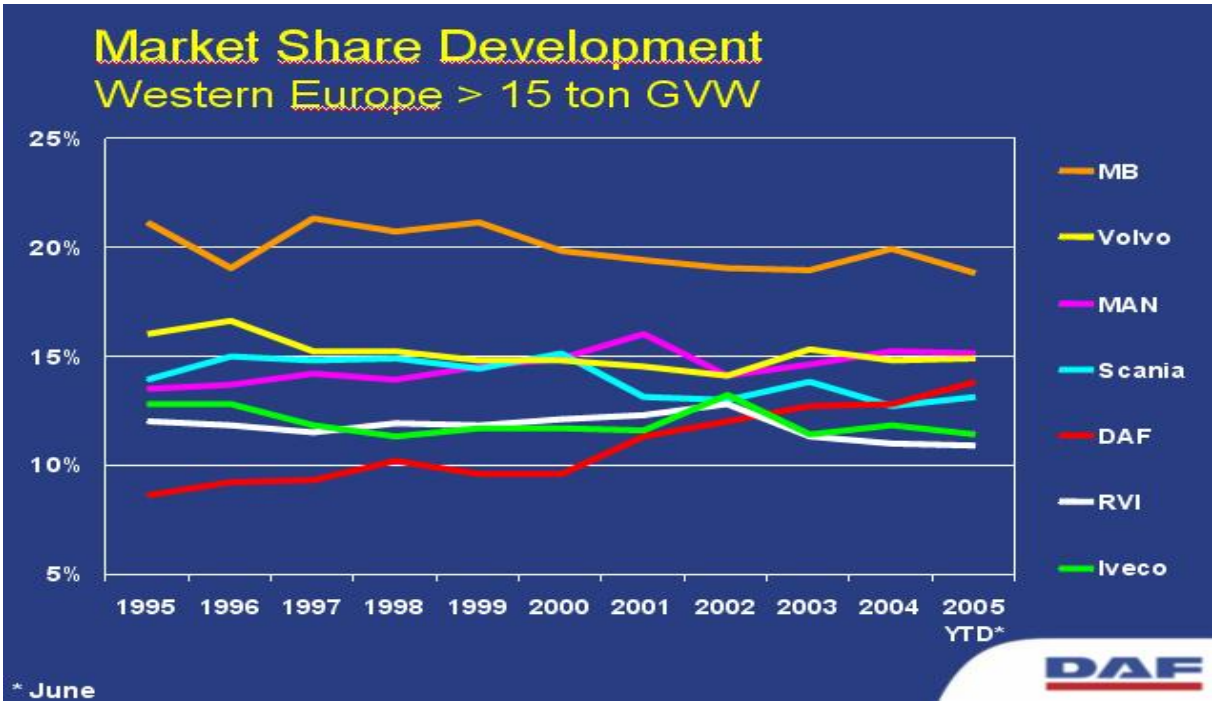


Figure 28: HT Market shares trucks > 15 t

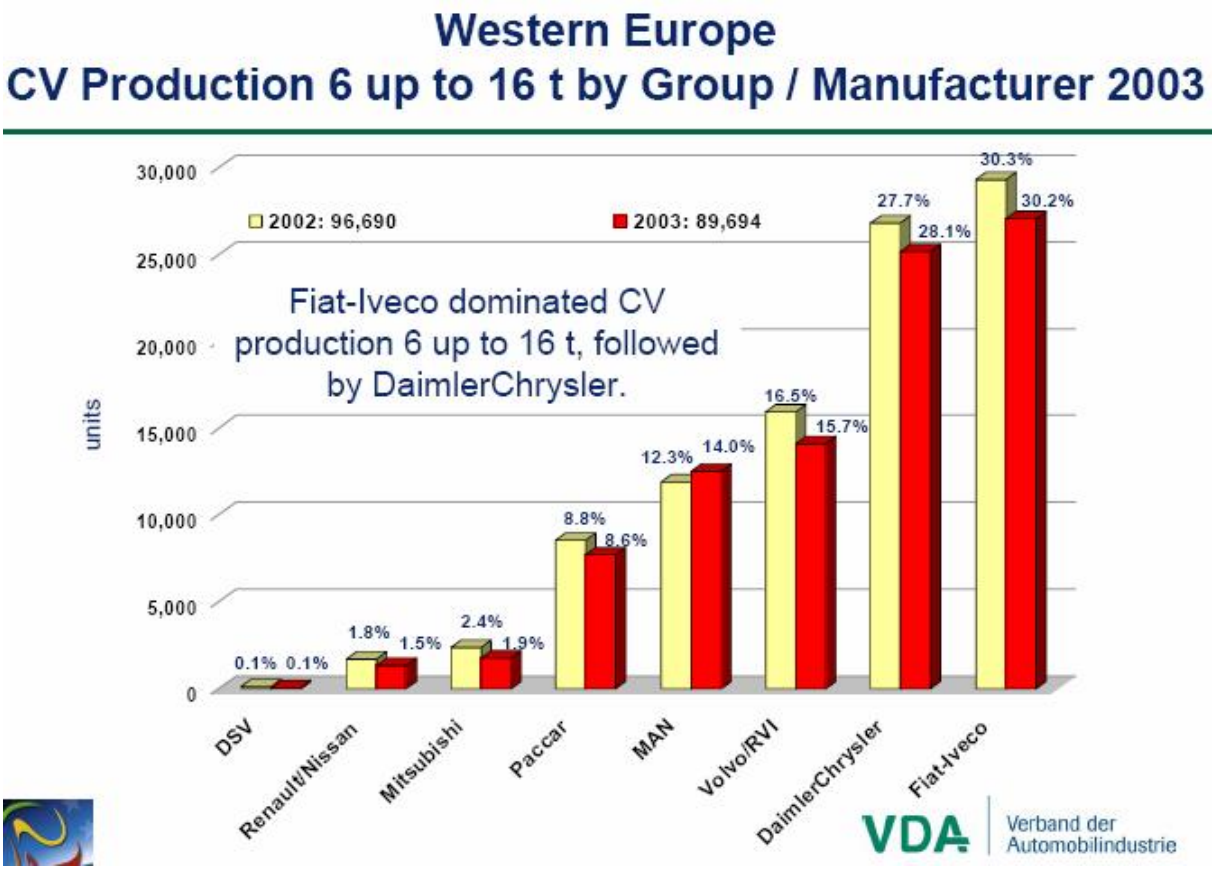


Figure 29: HT Market shares trucks > 16 t

4.2.2. OEM production sites in Europe - HT

Now that we have seen what players are participating in the HT industry in Europe, and how they have divided the total market among themselves, I would like to map the countries they are active in terms of assembly[167]. The figure below gives an accurate insight into the countries where these OEMs manufacture their end-products, for product-groups and residences I refer to Annex 9.

Brand	Country	Brand	Country
MB	Turkey	**PACCAR**	Netherlands
	Spain		Belgium
	Portugal		United Kingdom
	France		
	Germany	**Scania**	Sweden
			Poland
MAN	Poland		Netherlands
	Austria		France
	Germany		
		Volvo	Sweden
Iveco	Italy		Belgium
	Spain		
	Germany	**RVI**	France
			Spain

Table 2: HT European production sites

Analyzing the figure above it becomes clear that the European production sites are fragmented over the European countries. Unlike the CE industry, I cannot identify production clusters in certain geographical areas for the HT industry.
The German-origin OEMs (MAN and Daimler-Chrysler) are the sole OEMs that are present in Germany as manufacturers of heavy duty trucks. MAN has remarkably situated its production sites in Eastern-Europe, whereas MB, the other German-origin OEM, has centralized its truck production at its massive plant in Wörth (Germany). Turkey is the other country where MB manufactures its trucks.
PACCAR has centralized its European operations in the Benelux, with DAF production sites in both The Netherlands and Belgium.
Volvo and Scania both confirm their Swedish roots, but Volvo is the only one still manufacturing trucks in the country of origin (3 plants). Scania has moved its assembly to the Netherlands, in the other countries supporting parts are manufactured.
Iveco and RVI both have established production in the southern countries of Europe: Italy, Spain and France. Moreover, Iveco holds production sites in Germany as well (heavy duty and fire trucks).

[167] Sources for this information are the subsequent websites of these OEMs.

4.2.3. Suppliers to the OEMs - HT

Although the end products differ greatly on the outside among both industries, at least a comprehensive part of the total parts supplied to the HT industry are identical to the CE industry. Looking at the capitals of industry, we see for instance that DANA divides its product range for shafts along the various applications. Parts made for CE are part of the application 'Off-highway', and parts for the HT industry are known as the 'commercial vehicle' application.
Siemens VDO uses the same division, and Johnson Controls, Robert Bosch, and Visteon also supply both HT and CE. As mentioned by the DANA representative, 'if you serve the one you will serve the other'[168] because of the interrelation between both segments. Technical requirements are similar due to heavy duty functions they need to fulfil and products from first-tier suppliers are designed for relatively small batch-sizes. Therefore the figure with the top 24 largest first-tier suppliers
is appropriate here as well as it is for CE.
For the HT industry the same reasons are applicable why relevant suppliers are difficult to identify.
In short:
-suppliers are not keen on sharing information about their customer-base
-lower-tier suppliers do not focus solely/primarily on CE with their product philosophies
-contracts are timely and OEM-suppliers vary over time
-there are many

However, there are differences. First, heavy trucks are manufactured for the public road and therefore have to comply with government regulations such as public safety, emission standards, visibility and lighting, and so on. Naturally, CE products have to be safe as well, but these perspectives logically differ from each other. The regulations mentioned have their implications on the products supplied to HT manufacturers, because a simple example of weight saving will lead to less fuel consumption, lower taxes paid, cleaner vehicles, and several more benefits. It can be expected that research and development activities in the HT industry aim for perfection of the truck's function, and that truck-parts, more than in CE, have been continuously improved and have become highly specialized aspects of a truck.

Second, HT OEMs demand less specific material because trucks are bounded to one sole application, namely the towing of loads from place to place. CE products, for instance a backhoe, combine towing, lifting and digging functions in one complete product. A greater diversity of applications naturally demands more specific components such as hydraulic units and mechanical engineering.

Third, compared to CE, HT OEMs are more assembly sites as they have outsourced more systems than the CE industry. 73% of a DAF truck's value already is purchased[169], and this outsourcing of components can partly be explained by governmental regulations. Because trucks require more sophistication and perfection in their sole function to comply with both governmental regulations and exterior attractiveness, parts of a truck have become highly specialized and subsidiaries have specialized themselves in the products and techniques required. Regarding effieciencies, an OEM cannot master itself all the skills, knowledge and material to manufacture all specialized parts by itself.

Concluding we can say that trucks are machines that are very much specialized to meet the high standards of only one function, whereas the CE machine combines multi functionality with less

[168] Mr. N. Atterbury – Dana Driveshaft, UK
[169] DAF Purchasing Presentation 2006

sophistication. For sure, xenon lighting was introduced on a truck before it had crossed the minds of the CE industry[170].

Knowing that the HT industry is subject to the automotive trend of increased outsourcing, an insight in the supply base of the OEMs is valuable because more and more business is becoming available to suppliers. Derived from Annex 9, all HT OEMs assemble their own engines. Other common parts that are assembled by the OEM themselves rather than outsourced completely are cabins.
MB and MAN are more active in assembly than the other OEMs. Cylinder heads and transmissions are examples of parts that MB would like to keep in-house, while MAN focuses on welded parts and axles more than others. This creates a conservative image compared to competitors, although there may be good reasons why these parts are not being supplied by outside firms.
As far known, Iveco and Volvo are the only OEMs that assemble their own powertrain. Of course, RVI, as a subsidiary of Volvo, can benefit from the powertrain activities of the mother firm.

> **Highlight:** whereas Japanese CE OEMs are decreasing mother-firm relations and start to mix themselves in the local supplier markets, the HT industry is already one step beyond. OEMs in the HT industry are more and more evaluating their supplier's ability and willingness to start supplying on a global basis: global sourcing[171]. Not only new production sites in Asian countries have been among the recent developments, the opening of production sites in South-American countries has been part of the recent history as well. Rather than selecting local suppliers, OEMs as Volvo are looking into partnerships with several current preferred suppliers resulting in joint investments abroad. In stating specific suppliers to the HT industry, it is this list from Volvo I have combined with the preferred suppliers of DAF trucks. In addition, other suppliers, and their competitors, that have acquired a 'preferred' status for their products have been found and will be stated. Whenever an 'x' is stated, I do not have sufficient information to fill proper competitors' names.

Preferred suppliers in the HT industry

Supplier	Product	Competition
Alpino	Pipes and stamped parts	x
ArvinMeritor	Driveline, suspension, axles	TRW, DANA, ZF
Autoliv	Seats	Isringhausen
Behr	Air conditioning systems	Manuli
Benerti	Machining parts	x
Bilstein	Shock absorbers	Monroe, Koni
BTR	Transmissions	DANA, Getrag, ZF
Carello	Lighting (part of Magneti Marelli)	Hella
Continental	Brake systems, powertrain, chassis	Siemens VDO, Delphi
DANA	Axles, powertrain, transmissions	Delphi, Visteon, Bosch, Valeo
Delphi	Chassis, interior, powertrain, steering	Delphi, Visteon, Bosch, Valeo
Eberspaecher	Silencers, exhaust systems	GP Silencers
Firestone	Suspension	ZF
Getrag	Transmission, drivetrain	DANA, ArvinMeritor
Haldex	Brake components	Wabco, Knorr Bremse

[170] "Trends in Heavy Duty Trucks", 2006, www.truckworld.com
[171] "Transfer of Export Process from Customer to Supplier, Volvo Trucks, Goteborg University, 2003

Hella	Lighting	Magneti Marelli
Inalfa Roof Systems	Hatches	x
Isringhausen	Seats, springs	Autoliv
Johann Hay	Shafts	DANA
Jost Werke	Landing gear	Power Packer
Koni	Shock absorbers	Monroe, Bilstein
KS Kolbenschmidt	Air supply	x
Magneti Marelli	Lighting, exhaust systems, powertrain	Hella
Mahle	Piston steel, valve train systems, powertrain	ZF, DANA, Delphi, Magneti Marelli
Manuli	Air conditioning systems	CTR, Behr, SKG
Monroe	Shock absorbers	Koni, Bilstein
Onca	Pressing tubes	x
Pierburg	Pistons	Mahle
Power Packer	Cabtilt, landing gear, stabilizer leg	Jost Werke
Robert Bosch	Injected components	Delphi, Visteon, Valeo, DANA
Sadef	Machined tubes	VLP
Siemens VDO	Chassis, interior, powertrain, steering	Delphi, Visteon, Bosch, Valeo
Sifco:	I-beams, crankshafts, camshafts, axle shafts, steering arms	DANA, VCST
Schulz	Castings	x
TRW	Airbag systems, suspension	ArvinMeritor, DANA, ZF
Valeo	Air cooler	Delphi, Visteon, Bosch, DANA
VCST	Transmission axles	DANA, ZF
Voss Automotive	Tube and hose assemblies	x
Wabco	Pneumatic valves, air system parts, brake components.	Haldex, Knorr Bremse
Webasto	Sunroofs, car body	Power Packer, Jost Werke
ZF	Steering and suspension, transmission	Carraro, Eaton, GKN, Getrag
ZWN	Transmission	DANA, Getrag, ZF

Table 3: Preferred suppliers HT industry

4.3. Suppliers

All OEMs and first tier suppliers have 'supplier-portals' where potential suppliers can find information on how they can become a supplier. VLP can always apply for a supplier status, certainly when exact product demands are given as well. E.g. Terex-Schaeff provides information about the products, and consequently the accompanying supplier, they are currently looking for. Applying for becoming a supplier could be very much interesting, and can be a starting point for future business. In this comprehensive industry, where really no boundaries exist, it is hard to distinguish an aspect of CE for VLP tubes because tubes are so common in many of the first tier suppliers' products. How to identify a starting point for VLP regarding the first tier suppliers with the best potential for VLP?
There are over 100 first tier suppliers, and even more in the lower tiers. Although it may be regarded as an action that lacks consideration and understanding of the market, directly approaching the OEM might well be a very attractive option. VLW supplies £ 3 million of tubes and barsteel on an annual basis to JCB, while it could be £ 13 million. Using a -top down- OEM approach, this potential can be identified. When the industry is approached bottom-up, using second and first tier suppliers as contacts, this OEM potential is neglected. It is my assumption that whenever an OEM is approached, but this OEM does not need to be supplied directly, VLP will be forwarded to the appropriate OEM-supplier to start business with. If this is not the case, the supplier selection schemes presented at OEM websites make no sense.
As well, any OEM wants to approve all suppliers in lower tiers, so VLP must be able to save valuable time in the supplier selection phase by using the top-down approach.

5. External analysis

In the last chapter I have clarified who the important OEMs and suppliers are in the two segments. Knowing a little bit more about the market as it is in Europe, I still need to answer the question "what to do now?".
In this chapter I wish to look for answers for this question, as I try to answer the research questions below.

How should VLP position itself in the high potential segments?

Before I can answer this question, supporting questions need to be identified and answered in this chapter. They are:

- What supplier characteristics are demanded in these two segments
- What are strengths, weaknesses, opportunities and threats of VLP in the segments chosen, and how can they be studied?
- How do competitors and suppliers position themselves?
- What specific requirements do customers in the supply chain have?

Because I lack any technical know-how, and therefore cannot make any evaluation or recommendation concerning the products offered by VLP, or products it should be offering, I assume that VLP will be able to sell its products and services when it has passed the supplier selection procedures of any OEM or first-tier supplier. This assumption can be arguable because I do not know what kind of specific products will be asked. However, VLP will be confronted with these demands only when it has already passed the supplier selection, and I am looking for the demands VLP will have to meet prior in this selection procedure. Therefore, the assumption above can be a good assumption as well, because it allows me to move forward now with other customer demands.
A tube is nothing with something surrounding it. As well, bar steel is not so complicated as well. The OEM will show his specifications, and VLP will be looking for a supplier. Very much simplified, but still the heart of the matter.
What I think is really important then, is to uncover the other customers' demands. These demands, supplier characteristics and Industrial Distributor functions, are important because VLP will be confronted with them before and during the supplier selection procedure, and it is my intention to have VLP at least be allowed to become part of this supplier selection procedure.

5.1. Industrial Buying Behaviour

Knowledge of the buying behaviour of organizations is of great importance since this is a key factor of success when formulating marketing strategies[172]. Emerging technologies are changing the traditional means of doing businesses[173]. Moreover, as stated by Gadde and Håkansson[174] the purchases of components represent a large percentage of the total cost of a vehicle and have a crucial importance for its quality and performance features.

[172] Baptista, Cristina; Forsberg, Lars-Ole: Industrial buying behavior in the Swedish and Polish mining industries: a comparative study, 1997, p. 101
[173] Ratnasingam. P. "The Influence of Power on Trading Partner Trust in Electronic Commerce," *Internet Research: Electronic Networking Applications and Policy*, 2000, p.56-62
[174] Gadde, J., and Hakansson, W., The changing role of purchasing: reconsidering three strategic issues. European Journal of Purchasing and Supply Management, 1994, p. 27-35.

As a result, I find it interesting to investigate how organizations in the CE and HT industry decide to purchase components.
Although the industrial buying behavior is related to the buying company, and VLP must be considered as the selling company, it is still relevant to outline this process from the customer point of view because of the customers' understanding resulting from it.

5.1.1. Industrial Buying Behaviour (IBB)

According to Webster and Wind[175] industrial buying usually involves a large number of people in the decision-making process. Individual and organizational goals are inter-linked and highly complex. More precisely Webster and Wind define industrial buying as "a complex process of decision-making and communication, which takes place over time, involving several organizational members and relationships with other firms and institutions"[176].
Three conceptual models published by Robinson, Faris and Wind[177], Sheth[178] and Webster and Wind have had a significant impact in the field of IBB. These conceptual models laid the foundation for the study of IBB.
Moreover, these models also encouraged a significant research within the area, and the knowledge base is by now quite large. Wind and Thomas[179] categorized academic studies in the field of IBB into three major areas: the buying centre, the buying process and the factors affecting the organizational buying centre and the buying process. The two most reviewed concepts within the field of IBB are the buying centre and the buying process. Probably the most popular area of research in IBB has been the understanding of the buying process also known as the decision-making process as performed by Sheth[180].

5.1.2. The buying process

The buying process can be described by eight fundamental buyphases, which comprise a standard buying process within an industrial firm[181]. The different phases can be summarized as:

1) anticipation or recognition of a problem
2) determination of the characteristics and quantities of the needed item
3) description of the characteristics quantities of the needed item
4) search for and qualification of potential sources
5) acquisition and analysis of proposals
6) evaluation of proposals and selection of suppliers
7) selection of an order routine and
8) performance feedback and evaluation.

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[175] Webster, F.E. Jr. and Wind, Y.: A General Model for Understanding Organizational Buying Behavior, Journal of Marketing 1972a, p. 12 – 19.
[176] Webster, F.E. Jr. and Wind, Y.: A General Model for Understanding Organizational Buying Behavior, Journal of Marketing 1972a, p. 23.
[177] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p.52.
[178] Sheth, J.: Organizational Buying Behavior - Past Performance and Future Expectations. *The* Journal of Business and Industrial Marketing, 1996, p. 7-24
[179] Wind, Y., Thomas, R.J., Conceptual and Methodological Issues in Organisational Buying Behaviour, European Journal of Marketing, 1980, p. 37-42
[180] Sheth, J.: Organizational Buying Behavior - Past Performance and Future Expectations. *The* Journal of Business and Industrial Marketing, 1996, p. 30-38
[181] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p.63.

Buyphases

Furthermore, Weber, Current and Benton state that; "The selection of competent suppliers has long been regarded as one of the most important functions to be performed by a purchasing department"[182]. This is due to the increased co-operation between business buyers and sellers that has led to the reduction in the number of suppliers for many firms. Hence, Swift and Gruben[183] state, "With fewer suppliers being considered, the task of supplier selection becomes increasingly more important".

This issue is magnified since the buyer has fewer alternatives when a supplier cannot adequately perform its function. Consequently, the buyer dependency on each individual supplier in terms of *reliability* and *credibility* increases. For this and many other reasons, the firms' supplier selection criteria are critical elements for marketers to understand.

The eight buyphases can be combined with three different buying situations[184]:

In a *new task* buying situation, the buyer has little or no relevant past buying experience and therefore needs extensive information about new alternatives to solve the problem

In a *modified rebuy* situation the buying alternatives are known but changed, consequently the buyer needs some additional information and may also consider new sources of supply.

In a *straight rebuy* no new information is required and the purchase is handled on a routine basis. The impact of the buying situation has for long been recognised as fundamental in IBB studies.

For this study it is the *new task* buying situation which is most relevant, because growth in this report must at first be interpreted as the creation new supplying opportunities for VLP, meaning both new and existing customers are supplied by VLP for new product applications. A rebuy situation in nature is always a result from a new task buying situation, and therefore is beyond the scope of this report. However, it can be useful to mention the possible rebuy situations for a better understanding.

New Task

The new task refers to requirements or problems that have not arisen before. An internal stimulus or an environmental factor may trigger the recognition of a requirement or a problem. This type of buying situation requires extensive information and extensive evaluation of alternatives. New tasks occur infrequently but are of high importance because the purchase sets a pattern for the more routine purchases that will follow. Industrial buyers regard new tasks as important and associate them with high risk. New task is the most complex buyclass because of the large number of decision makers and buying influences that are involved[185].

Straight Rebuy

The straight rebuy situation is the most common in industrial purchasing. "The straight rebuy purchases describe the buying situation where the purchasing department reorders on a routine basis". Most of the purchases are made on a routine basis no further information requirements and little effort in general. In this buyclass a "list" of acceptable suppliers exists, suppliers not on the list are not considered. In a straight rebuy there may occur some variations from time to time in the quantity, physical or chemical properties, delivery time, method of shipment or the price,

[182] Weber, C., Current, J.R., and Benton, W.C., "Vendor Selection Criteria and Methods," *European Journal of Operational Research*, 50, 1991, p. 2-18.

[183] Swift, C.O., and Gruben, K.H., "Gender Differences in Weighting of Supplier Selection Criteria," Journal of Managerial Issues, Volume 12 (4), 2001, p. 502-512.

[184] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 79.

[185] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 80.

so long as these changes does not entail a re-evaluation of the purchasing alternatives nor cause any changes in the procurement process and patterns[186].

Modified Rebuy
"The modified rebuy involves a somewhat familiar purchase with some new information requirements and some further evaluation of alternatives". The purchase can be an "upgraded straight rebuy" or a previously new task that has become more regular. The modified rebuy does not necessarily infer that the buyer will change either the item purchased or its source[187]. The result may be that the buyer purchases the same item from the same source. The distinctive element is the re-evaluation of alternatives, often of new ones.

5.1.3. Buying centre

The buying centre includes all members of an organisation who are involved in a purchase of a particular product[188]. Wind and Thomas[189] have identified three major aspects of the buying centre.
The first aspect, *composition of the buying centre*, refers amongst other to the size, the hierarchical levels represented, and the functional areas involved. It is hypothesised that five dimensions of the buying centre could be specified, namely:
1) vertical involvement, 2) lateral involvement, 3) extensivity, 4) connectedness and 5) centrality.
The second aspect, *influence in the buying centre*, relates to the persons who are most influential in the buying process.
The third and last aspect, *roles in the buying centre*, involves the identification of different roles played by the buying centre members (ibid.). In identifying this set of roles a marketing manager can develop a better understanding of IBB.

With a better understanding of the customer's buying process and buying centre, VLP can develop a marketing strategy in relation to the customer's buying profile. Buying situation is also commonly referred to as "buyclass" in IBB literature. This buying profile falls apart in the functions of an Industrial Distributor valued by the (potential) customer, Dickson's supplier selection characteristics a supplier in both industries should apply to, and specific automotive requirements towards products and processes. With this IBB background, I would like to set out the functions of the Industrial Distributor and characteristics of a supplier in CE and HT that are important to identify.

[186] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 82
[187] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 83
[188] Robinson, P. J., Faris, C.W., and Wind, Y. *Industrial Buying and Creative Marketing*. Boston, MA: Allyn and Bacon, 1967, p. 92
[189] Wind, Y., Thomas, R.J., Conceptual and Methodological Issues in Organisational Buying Behaviour, European Journal of Marketing, 1980, p. 55

5.2. Industrial Distributor – Theoretical functions

What right of existence lies underneath the wholesaling company? After all, it is opposed very often that mills can sell directly to retailers or consumers. Channel intermediaries are independent businesses that assist producers in the process of making their products or services available for use or consumption. They exist because, as specialists in the performance of distribution tasks, they operate at higher levels of effectiveness and efficiency than manufacturers or end-users.
Rosenbloom[190] identifies six distribution tasks that an intermediary performs for business-to-business customers:

(a) making the product available
(b) delivering customer service
(c) providing credit and financial assistance
(d) assortment convenience
(e) breaking bulk
(f) giving advice and technical support[191].

Although 'breaking bulk' and 'making the product available', together with 'assortment convenience' discuss the fact that Industrial Distributors hold stocks and can use this stock as a source for the functions, I cannot identify a function from Rosenbloom that covers the valued service of 'in time deliveries'. Therefore I wish to add that these functions combined mean, amongst others, that Just-in-Time (JIT) deliveries are offered to the customer.
JIT deliveries are not exceptional in the field of automotive; it is regarded exceptional when you fail to deliver on time. Keeping stock, as an Industrial Distributor does, should guarantee on time deliveries to customers. The stock is distinguishing as well, since mills do not offer such a function.

Kotler distinguishes identical functions supporting the division Rosenbloom has made. Rosenbloom manages to cover the functions of an Industrial Distributor in six functions, Kotler uses a little more specific approach towards identifying the functions. Generally, Kotler says that wholesalers are being used when they are more efficient in performing one or more of the following functions:

Selling and promoting: wholesalers's sales forces help manufacturers reach many small business customers at a relatively low cost. Wholesalers have more contacts, and buyers often trust wholesalers more than a distant manufacturer.
Buying and assortment building: wholesalers are able to select items and build assortments their customers need, saving the customers considerable work.
Bulk breaking: wholesalers achieve savings from their customers through buying in large carload lots and breaking the bulk into smaller, possible heterogeneous, units.
Warehousing: wholesalers hold inventories, hereby reducing inventory costs and risks to suppliers and customers.
Transportation: wholesalers can often provide quicker delivery to buyers because they are closer to the buyers.
Financing: wholesalers finance customers by granting credit, and finance suppliers by ordering early and paying on time.

[190] Rosenbloom, B.,Marketing functions and the wholesaler-distributor: achieving excellence in distribution, p.17, 1987
[191] Van Bruggen, H., The Impact of Channel Function Performance on Buyer-Seller Relationships in Marketing Channels, 2004, p. 27

Risk bearing: wholesalers absorb some risk by taking title and bearing the cost of theft, damage, spoilage, and obsolescence.
Market information: wholesalers supply information to suppliers and customers regarding competitors' activities, new products, price developments, and so on.
Management services and counseling: wholesalers often help retailers improve their operations by training sales clerks, helping with store layouts and displays, and setting up accounting and inventory-control systems. They may help industrial customers by offering training and technical services.

Both Rosenbloom's and Kotler's approaches towards functions have been combined. In practice VLP is sometimes confronted by potential customers, or current customers where the purchasing department has been restructured, with the question why companies buy from Industrial Distributors rather than from a mill directly[192]. To deal with these troublesome questions, the distinguished functions serve not only the purpose of convincing the customer that VLP is better than any other Industrial Distributor, but as well to convince customers that VLP provides added value that positions VLP in a positive way when compared to mills. Ultimately, it can serve the goal of convincing a mill to start distributing products via selected Industrial Distributors instead of supplying directly to customers. The advantages for mills can be growing volumes demanded by the Industrial Distributors because they start buying from one mill instead of a various number of mills, and offering better customer services the mill itself cannot provide. The Industrial Distributors can benefit because they gain extra volumes and accounts from the mills and exchange competition for collaboration.

<u>Make specific product available</u>
- Customer dedicated inventory (CDI) available for call-off
- Purchase-department tasks, like finding and selecting new products, can be outsourced to industrial distributors by using their expertise and global network.

<u>Warehousing</u>
- Decreasing, or complete outsourcing of, stocks held by the OEM, resulting in decreasing financing of (consignment) stocks
- Outsourced stocks result in floorspace where value can be added instead of lost.
- Risk of contingencies (loss/theft/damage) can be absorbed by the distirbutor.

<u>Transport</u>
- Excellence in logistics and logistic standards such as JIT and Kanban. Cost-saving and reliable deliveries due to logistic excellence and stocks.
- Direct deliveries to the assembly line, with frequent deliveries per day/week

<u>Provide customer service</u>
- Market information: competitors, products and prices
- Assistance in process optimalization, problem-solving and technical support
- Assistance in outsourcing through extensive customer record

<u>Credit and financial support</u>
- Buyer's credit for financial support

<u>Selection from assortment: building assortment through independency and stocks</u>
- Total Cost Management: independency of mills results in best prices and products that aim at lowering total costs.

[192] E.g. when the purchase manager at DAF was changed, the same issue arose.

- Total Quality Management: distributor can perform additional quality control. Combined with consignment stock this leads to an ongoing assembly line, uneffected by bad quality manufacturing.
- Independency results in reliable delivery, customer specific quality and continuous improvement.

'Bulk' breaking and connecting demand and supply

- Low price through purchasing bulk from mills
- Stocking material when demand and supply do not occur at the same time

Advice and technical support

- Continuous improvement: existing and future projects are continuously monitored to reach better quality and total cost savings.

5.3. Supplier Characteristics

In the mid 1960's, researchers were developing performance criteria upon which potential suppliers could be evaluated. Dickson (1966) performed an extensive study to determine what criteria were used in the selection of a firm as a supplier. Initial observations by the researcher identified a list of approximately 50 unique and distinct factors other researchers presented as important to consider when selecting a supplier. This list of factors was later reduced to 23 criteria, of which the top ten is listed below. The Dickson work is considered a benchmark in the area of supplier selection criteria[193].

The ten most important characteristics when suppliers are selected, derived from the work of Dickson, are[194]:

1 Quality
2 Delivery
3 Performance history
4 Warranties and claim policies
5 Production facilities and capacity
6 Price
7 Technical capability
8 Financial position
9 Procedural compliance
10 Communication system

These characteristics add value to the insight of the buying situation 'new task', because suppliers are always first selected before they are quoted in the automotive industry. The selection phase of an automotive supplier by first-tier suppliers is long, time-consuming and demands several decision makers to approve the request. This can go all the way up to the OEM, because the OEM wants to know exactly what product, what material and what characteristics of this material is used in the production of the assemblies. Once a supplier is approved, he or she is on the 'safe' list and can be quoted.
Having a clear understanding of what suppliers' characteristics are important to OEMs and first-tier suppliers, provides valuable insights for VLP in how it can become a supplier to these potential customers.
In the Dickson research, quality is regarded as most important for manufacturers when suppliers are selected. Surprisingly, price is ranked 6th with *delivery, performance history, warranties and claim policies and production facilities and capacity* being of more importance to manufacturers than price. Looking at the first five characteristics, we can see that they all point at the same important aspect: reliable production. Providing good quality means all products produced succeed the quality tests they will face later on, and therefore waste is reduced to the minimum. Good delivery means the production line will operate stable, and will not have to be stopped because of late or bad (quality) deliveries. The performance history gives the customer an indication of how well you did as a supplier before, how well you do in other industries or with competitors, and consequently forms a framework for the customer how well you will do, or, how reliable the production will be having you as a supplier. Production facilities and capacity as in important criteria indicates that the supplier must be able to cover up certain contingencies, must have sufficient buffer (stock and production) to respond to changes (flexibility), and its production process must meet the high quality standards the customer has because otherwise quality will be interfered. Warranties and claim policies are important and clearly spread the

[193] Dickson, G. (1966). An analysis of vendor selection systems and decisions. *Journal of Purchasing,* 2(1): 5-17.
[194] An overview of Dickson's complete list of 23 important criteria is presented in Annex 15.

message: “reliable production rates, or else…”. Warranties and claim policies are often used as an incentive for the supplier to do the utmost, instead of being a penalty-mechanism when something goes wrong[195].
However, the characteristics will be tested among companies, and input will be gathered from both OEMs and first tier suppliers in both the CE and HT industry. The results will indicate what it takes to be a supplier in both the HT and CE industry.

5.4. Functions and characteristics in practice

All functions are important, because they are empirical results derived from research in the past. Both Rosenbloom’s and Kotler’s input reflect practical evidence of valued functions, however they are not solely focused on the CE and HT industry specifically. For these industries a ranking can be constructed of the functions Industrial Distributors provide that are most valued. This ranking has been tested at OEMs and Tier 1 suppliers, and is consolidated for both industries because rankings in both industries turned out to be identical[196]. Because the reference group is rather small[197], I have decided not to accumulate all individual function-scores gathered from the respondents and select the highest ranked scores out of this pool. I have selected the seven functions that are ranked as most important by the small reference group. If VLP wants to expand in these two industries, it should emphasize the functions below:

1. Make customer dedicated inventory (CDI), including *fixed-lengths*, available for call-off to support flexibility and timely deliveries.
2. Provide warehousing to offer the customer the possibility to outsource space-consuming operations at the customer’s site to VLP. Decreasing the floor space used results in both financial and operational advantages for the customer[198]*.
3. Offer extensive logistical solutions to the customer to support the call-off of material and the warehousing function and to result in smooth and reliable logistical operations**.
4. Offer total cost management (TCM) to support long-term relationships and to lower total costs.
5. Offer total quality management to assure zero defects, and to anticipate early on bad deliveries (PPM[199]=0).
6. Offer reliable deliveries at all time through the independence of mills, the stocking facilities and quality assurance efforts.
7. Offer management/monitoring to support continuous improvement of existing and future projects in terms of material quality, efficiencies and costs.

Caterpillar is a great example of how these seven functions can and need to be combined into practice. If a company wants to become a supplier to Caterpillar, they are screened for “QCLDM” functions they need to be capable of to perform. This abbreviation refers to quality, costs, logistics, delivery and management[200]. Any supplier that is unable to convince Caterpillar about its performances on any of these items will not move on in the supplier selection phase.

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[195] Mr. R. Loohuis – Corus Tubes.
[196] Mr. N. Atterbury confirmed this statement as he mentioned “Typically you supply both of them because they are very much related. Components for trucks are designed to be more sophisticated and interrelated to fit in more types of end-products, still technologies are greatly overlapping.”
[197] HT OEMs: Volvo, Scania, MAN and DAF - CE OEMs: Caterpillar, JCB, Volvo, Komatsu and Hitachi – Tier 1 suppliers: DANA, Corus Tubes and ArvinMeritor.
[198] Accountancy is familiar with the ‘use of facilities’ method (translation of the Dutch ‘kostenplaatsen-methode’), meaning that joint (indirect) company costs are divided according to the use of the portion of the total floor space available.
[199] PPM = Parts Per Million disapproved.
[200] Caterpillar UK; Dave Jenkins, Van Leeuwen Wheeler.

*DAF has outsourced its warehousing activities to gain space for its painting activities as well for research and development. Caterpillar has outsourced its warehousing activities to acquire more space for actual assembly lines. Both indirect (DAF) and direct (Caterpillar) production activities create added value, whereas a warehousing function performed by the customer typically create costs. These costs arise from considerable and diverse material demands, and from products that are space consuming to stock.
**Up till now Hitachi performs its own logistical operations because of guidelines provided by the Japanese mother-company. However, as the Japanese CE OEMs are localizing their demands for components, Hitachi Amsterdam expects logistical operations will be localized in the near future as well.

5.4.1. Supplier characteristics in CE

"We want to pay the lowest possible price for the quality needed. Defects in products delivered should be equal to zero, and the delivery of the material should always be in time." This is the core of any organization stating supplier conditions and do not require any comment. They make complete sense, but refer to an ideal world that does not always reflect actual practice. In practice, compromises have to be made by the OEMs because not all important supplier characteristics can be satisfied by the supplier. The CE industry has made several attempts to make their suppliers aware of the expectations they hold on to, both formal and informal. At first I want to discuss the Japanese-origin OEMs: Hitachi and Komatsu

Hitachi:	**Komatsu:**
Most important	**Most important**
Quality	Price
Price	Quality
Reliable delivery	Performance history
Flexibility	Reliable delivery
Less important	**Important**
Technical capability	Insurance and claim protocol
Performance history	Spare parts
Insurance and claim protocol	Geographical location
Spare parts	
Geographical location	**Less important**
Corporate governance	Corporate governance
Financial situation	Financial situation
Safety	Safety
	Flexibility

Hitachi ranks quality most important, and the price is something both OEM and supplier can agree upon when the quality provided is good. However, Hitachi demands annual cost-down achievements from its suppliers along a typical learning-curve. This learning curve implies that any supplier must be able to gain efficiencies in its operations after a certain period of being a supplier. The annual cost-down should start after at maximum two years, or a fixed number of products delivered. Hitachi is supportive in achieving the demanded cost-down by actively helping and advising the supplier. Hitachi focuses on long term relationships with its suppliers. Reliable deliveries are highly important since demand is rising and assembly lines are continuously

producing products. Flexibility from the supplier is needed since 2006 is the fourth operational year and (operational and planning) errors still occur on a frequent basis[201].
Both Quality and TQM are highly valued, but still controllable at Hitachi due to a relatively low line-speed and a customization centre where finished products go when customer specific requirements need to be installed on the products. Hitachi is redesigning the current assembly lines, as well as building new lines in a complete new factory, to cope with the growth in demand.
Other supplier characteristics are considered to be less important and subordinate to the four prime characteristics. However, Hitachi will take them into account when suppliers are selected. Technical capability deserves a short note, as Mr. Mussert indicates this more important to function as a mirror for his own engineering department rather than fulfilling an advisory function to the company.
Komatsu is focusing on growth and aims at becoming the number one player in the industry. Currently, Komatsu has a strong position on the Japanese market and is trying hard to grow outside Japan. The strategy is to grow through establishing joint ventures. Komatsu believes it will get faster access to markets, lower-cost components, and access to new technology[202]. In contrast to Caterpillar, Komatsu designs its products on a cost basis, which means that it first decides a price for its products and then constructs it accordingly[203]. This explains the importance of the aspect 'price'. Reliable deliveries are paramount according to Komatsu[204], and so is the quality of the product. Komatsu's quality principles can be derived from the fact that production is completely designed for "lean manufacturing", a management philosophy that will be discussed later. Komatsu can be seen as the low cost price-fighter, ranking safety and flexibility low due to stable and strict planning.

Caterpillar:	**Volvo:**
Most important	**Most important**
Quality	Price
Price	Quality
Reliable delivery	Communication system
Performance history	Reliable delivery
Important	**Important**
Production facility and location	Insurance and claim protocol
Communication system	Spare parts
Insurance and claim protocol	Geographical location
Technical capability	Performance history
Less important	**Less important**
Financial situation	Corporate governance
Procedural compliance	Financial situation
	Safety

Caterpillar knows it is not the OEM with the lowest price for CE products, but wants to stress in its strategy that its quality is the best-in-class. Price is not the most important selection criterion for suppliers, because at Caterpillar it is all about quality and efficiencies. Typically, here we can see how interrelated functions of industrial distributors and characteristics of suppliers can be, because Caterpillar's 'QCLDM' can well be discovered in their ranking, except for the management function. Furthermore, communication system (EDI) is important although not paramount. The

[201] Mr. P. Mussert.
[202] Komatsu Annual report 2002
[203] Cooper, R., Chew, B., "Control Tomorrow's costs through today designs" *Harvard Business Review,* Jan.-Feb. 1996
[204] Mr. S. Verbist / Mr. G. Tessier, purchase department Komatsu Belgium.

location of suppliers' facilities is important in order to achieve reliable deliveries and reductions on transport costs. The demand for perfection of both products and processes has resulted in the incorporation of several management philosophies supporting this ideology. Caterpillar is an early adopter of Six Sigma, PPAP and APQP. Also NPI, a protocol for new product introduction, is important within Caterpillar. These philosophies will be dealt with later.
Furthermore, it is remarkable that after seeing Caterpillar's ranking, price inclines can be passed on by VLW to Caterpillar and VLW supplies them satisfactory without having a formal contract. Partly their willingness can be ascribed to the tremendous growth in demand for their products, resulting in an assembly line that needs to be kept running at all time. Therefore they will accept relatively higher prices to guarantee reliable deliveries. Other reasons are their awareness of the relative scarceness of the product steel, and their mindset that makes them 'easy to work with'[205].
Volvo is most comparable with Caterpillar, as it strives for high quality without wanting to become the low-cost price fighter.[206] Not surprisingly, the Volvo rankings presented here are identical to the Volvo HT supplier-characteristics ranking, because all Volvo-Group suppliers first have to comply with the 'automotive purchasing' standards[207]. This means that price and quality are highly important, and corporate governance, financial situation of the supplier and safety standards at suppliers are stressed much less. Volvo requires perfect communication systems (EDI) compatibility from its suppliers, and a lack of EDI means you will not be given a chance as a supplier[208].
Remarkably, growth in demand for CE products means for many OEMs, but not for Volvo, that they start outsourcing warehousing and component-production activities, in order to create space for their assembly. Caterpillar is outsourcing more and more components they used to manufacture themselves, and also Komatsu is in the market for outsourcing small and large components. But Komatsu has outsourced its cabs to Volvo CE, requiring even more capacity from the Volvo plant than ever before.
At last, Volvo CE emphasizes that the supply of spare parts, for production and after market, is important because downtime in construction is very costly and customer value is high within Volvo CE[209].

JCB:

Most important
Price
Quality
Reliable delivery

Important
Production facility and location
Insurance and claim protocol
Technical capability

Less important
Communication system (EDI)
Performance history
Financial situation
Procedural compliance

[205] Mr. D. Jenkins, Van Leeuwen Wheeler.
[206] Volvo CE, *Key Value Propositions*, Andersen, H., and Nylander, K., 2001.
[207] All suppliers to Volvo are selected using the same standards for all divisions.
[208] Mr. X. Joly, Volvo CE, Belgium
[209] Key Account Management in an International Context, Goteborg University, 2002.

JCB is highly focussed on costs, resulting in annual cost-down efforts made by suppliers. Quality is paramount as well, due to a relative high speed of the assembly line. As well, they have weekly (and even daily) fluctuations in schedules concerning the material needed, and this makes reliable deliveries and the right quality very much important. JCB supports suppliers in logistical solutions, although geographical production facilities are not too much important since JCB is located very much in the country. Technical capability is not too important for JCB, neither is the performance history. JCB is (looking into) outsourcing components that are currently manufactured in-house, but only from a costs-saving point of view. Asian countries are attractive for this global sourcing. At last, a communication system is less emphasized compared to other CE OEMs[210].

Conclusion

Although I still have to assume that purchasing managers value these characteristics by using the mindset of the OEM they account for, not following their own opinions. The doubtful values presented in red are assumptions because primarily and secondary data was lacking. With Caterpillar I have not been able to speak to a purchasing manager, but their offered publications are so superfluous that I have been able to derive much of their valuation from these data.

Hitachi:

Most important
Quality
Price
Reliable delivery
Flexibility
Less important
Technical capability
Performance history
Insurance and claim protocol
Spare parts
Geographical location
Corporate governance
Financial situation
Safety

JCB:

Most important
Price
Quality
Reliable delivery
Important
Production facility and location
Insurance and claim protocol
Technical capability
Less important
Communication system
Performance history
Financial situation
Procedural compliance

Komatsu:

Most important
Price
Quality
Performance history
Reliable delivery
Important
Insurance and claim protocol
Spare parts
Geographical location

Less important
Corporate governance
Financial situation
Safety
Flexibility

Caterpillar:

Most important
Quality
Price
Reliable delivery
Performance history
Important
Production facility and location
Communication system
Insurance and claim protocol

Volvo:

Most important
Price
Quality
Communication system
Reliable delivery
Important
Insurance and claim protocol
Spare parts
Geographical location

[210] Mr. P. Hennessey, JCB; Mr. J. Miller, Laystall.

Technical capability	Performance history
Less important	**Less important**
Financial situation	Corporate governance
Procedural compliance	Financial situation
	Safety

Table 3: Supplier characteristics in CE, source: own

These very much different OEMs in the CE industry share similarities when it comes to supplier characteristics. It may not be astonishing news, but quality, reliable deliveries and prices are the most important characteristics of a supplier in this industry. VLP must be able to offer perfect logistic solutions and references to fit the expectations of the OEM, and price-levels can be met as long as volumes are not that large that direct competition from mills must be dealt with. This is mainly because of the great supplier-base VLP has for its products, in order to achieve both good quality and low pricing. Quality, at last, is what VLP already focuses on by providing better qualities of steel products that distinguish VLP from its competitors. However, I have learned that in this industry, and in the automotive industry in general, it is not only extremely important to supply perfect quality, but *the process of achieving and maintaining this quality of both product and process* at an outstanding level is as much of importance to the OEM. As a supplier in this industry you have to be able to supply products on an ongoing basis at the same high quality, over and over again.

5.4.2. Supplier characteristics in HT

The same list of supplier characteristics is tested among OEMs in the HT industry, to understand how VLP must present itself when these organizations are visited. Of course, VLP's extensive experience in this HT industry, with DAF as one of its prime customers nowadays, must be copied to other manufacturers in the field as much as possible. However, I need to know what characteristics they value in order to generate a tailored positioning that, in the eye of the OEM, fits exactly their expectations.
At first I would like to have a look at the supplier characteristics the Swedish-origin truck manufacturers value.

Scania:	**Volvo:**
Extremely important	**Extremely important**
Environmental-friendliness	Price
Safety	Quality
Quality	Delivery
Delivery	Communication system
Communication system	
Important	**Important**
Price	Performance history
Spare parts	Warranties and claim policies
Geographical location	Spare parts
	Geographical location
Less important	**Less important**
Warranties and claim policies	Safety
Financial position	Environmental-friendliness
	Financial position

Already when we have a short look at these two OEMs, the major differences become clear. Scania seems to be the 'soft' manufacturer putting environment first, stressing safety and downgrading price in importance. Volvo, on the contrary, appears to be the 'hard' one by not aiming at safety and environmental-friendliness, while ranking price, quality and delivery high. However, Scania is not that soft as it may look like.
The suppliers that Scania contracts are selected from a list of qualified suppliers (for the relevant product segment)[211]. The qualified suppliers are evaluated every year in order to ensure that the suppliers can attain the demands from Scania, the parameters evaluated are usually logistics and quality. The Purchasing Development Manager (PDM) at Scania explains that new suppliers are found at special events such as trade fairs. When searching for new suppliers the basic demands from Scania must be fulfilled, they look at the commercial and technical potential. The suppliers are then evaluated at a Global Procurement Council (hereafter GPC) meeting. The GPC consists of people from the purchasing division, production division and the construction division, who determine the qualified supplier list in consensus. If a supplier does not meet the demands at a later stage, a new GPC meeting is held and the supplier might be dismissed. A potential supplier that does not meet up with the basic demands is not to be considered at all.
The basic demands include requirements of that the suppliers should be ISO 9000 and/or

[211] Buying behaviour in the Swedish Truck Industry, Lulea University, 2002

QS 9000 as well as ISO 14001 certified. Other basic demands are delivery reliability and EDI capability. A prerequisite for the consideration of suppliers is that they exist on the qualified supplier list for the relevant product segment. The PDM affirms that environmental friendliness (ISO 14001) of components and the suppliers' production procedures is the most important criterion when choosing a supplier. The environmental awareness of a supplier is evaluated in the three areas: management, manufacturing process and product. Furthermore, Scania presumes that its component suppliers are, or will become ISO 14001-certified.
Another criterion that the respondent states to be of very high importance is safety. Safety affects both the end user of the truck and the assembler that put together the truck. Safety and environmental awareness of the supplier are two criteria that cannot be neglected under any circumstances. Quality is another basic demand as it is a major part of Scania's brand image. It is therefore of high importance that the supplier provides components of high quality. All components are quality tested before they are put into production. In order to avoid big stocks of components, Scania's suppliers must be able to meet the demands of flexibility and be able to attain the delivery reliability required. This is essential since Scania have a customer order controlled production, which allows the customer to change the product features close to the final assembly. A fast and safe exchange of information between Scania and the supplier is therefore a necessity and Scania require their suppliers to be EDI compatible. Even though an EDI system is a basic demand when selecting potential suppliers, the PDM asserts that a few smaller suppliers are without any system due to the high costs of its implementation. When Scania evaluate the supplier regarding the price criterion, it is the total production cost of a truck that is estimated. The respondent also adds that the price depends on the quantity of the delivery.
Furthermore, the PDM reveals the importance of the after market commitment as a criterion when selecting suppliers. This is since Scania guarantee up to 15 years of service for some trucks. The supplier must therefore be able to provide spare parts during this period of time. Global production (geographical location) is another criteria stated by the respondent. The importance of global production varies depending on the product. In some cases it is a necessity for the supplier to support Scania with locally produced parts. Moreover, the respondent states that the importance of global production varies with the complexity of the component. A very complex component requires global coverage whereas a standardized item is less dependent of the geographical location. Apart from these criteria, Scania consider warranties and claim policies, as well as financial position of the company, to be of less importance.

Volvo has established a list of general requirements when selecting suppliers[212]. These requirements comprise aspects such as quality and precision in the delivery of products. The majority of suppliers have worked with Volvo for a long period of time. In a situation where there is a need to buy a product not previously purchased, the existing 'old' suppliers, included in the list of qualified suppliers, are given the first priority to supply the needed item. The qualified suppliers are evaluated on a regular basis. Additionally and in case of old suppliers' incapability of providing the product to a competitive price, search for new potential suppliers is carried out. In the case of selecting new suppliers with which Volvo has no prior experience, a supplier evaluation model (SEM[213]) is followed in order to determine whether or not a specific company is a suitable supplier. The evaluation is conducted during two days y a cross-functional team led by a person from the purchasing department. The PD adds that these new suppliers not have been identified y coincidence but because of for example competitive pricing.
There are according to the PDM at Volvo two groups of criteria, one of extremely high priority and another of secondary priority. The group of criteria that is most important when selecting

[212] Buying behaviour in the Swedish Truck Industry, Lulea University, 2002; www.volvo.com
[213] This SEM entails: company profile, management, environment, quality, logistics, after-market, competence, product-development, finance, productivity and sourcing. More detail can be found on the website: http://www.volvo.com/Suppliers/global/en-gb/supplierselection/supplierevaluation/

suppliers incorporates price, quality and precision in the delivery as well as EDI capabilities. Volvo allow for no kind of compromise regarding these criteria and suppliers being unable to fulfil any of these three criteria, is no longer considered at all. The second most important criteria comprise performance history, geographical location, warranties and claim policies as well as spare parts. Furthermore, the purchasing department inserts that the financial position of the supplier is of average importance when evaluating suppliers.
Among the criteria in the first group, the price criterion is important from a competitive perspective allowing Volvo to keep profit margins. The purchasing department states that this year the price consideration is the most crucial criteria. Moreover, quality is important due to customers' expectations, reflected in the Volvo image. Quality is even one of the core values within the company. Delivery is an important factor because of the very short lead-times. Any stoppage in the supply of components will lead to production disturbances and efficiency losses. Moreover, the EDI capability is regarded as an extremely important requirement.
In the second group, the performance history is also important when selecting component suppliers as Volvo strives for long-term relationships with its suppliers. Furthermore, if the company once decide to remove an existing supplier from its list of qualified suppliers, there needs to be a significant advantage before any 're-listing' of a supplier may occur. The localisation of the suppliers' production facilities is important for large-sized components as the transportation costs somewhat depend on its size. A second situation in which the localisation of the suppliers is important involves components that are highly influenced by, and vary with, the truck model. The way a supplier handles warranties and claim policies are of importance as well as the commitment of providing spare parts for a long period of time. Remarkably, the environmental-friendliness and safety are stated at Volvo's website as the core values of Volvo, but are not evaluated to be determinant factors in selecting suppliers.

Volvo's sourcing process is presented in the figure below:

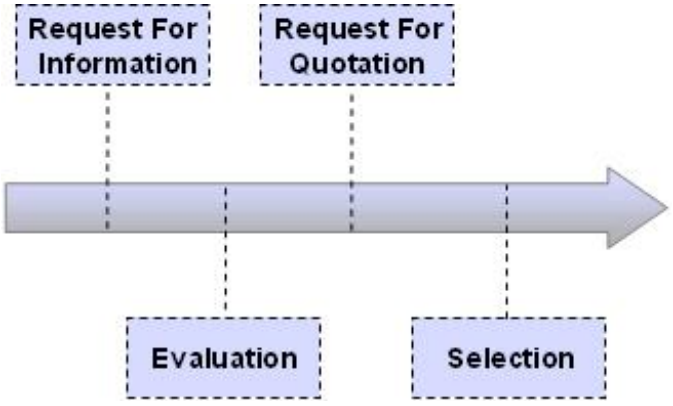

Figure 30: Volvo's sourcing process

Request For Information (RFI)[214]: The Supplier is invited to answer to a Request For Information collecting general data about his company and its products or services.
Evaluation: Volvo evaluates the RFI answers in order to set up a list of potential candidates to receive Request For Quotation.
Request For Quotation (RFQ): Suppliers are invited to quote on Volvo parts based on a package of specifications and drawings.

[214] This RFI-supplier form can be found at: http://www.volvo.com/Suppliers/global/en-gb/supplierselection/supplierform/

Selection: After evaluating the RFQ answers and the supplier's profile (according to Volvo evaluation criteria), Sourcing Committees decide on the Supplier(s) to be awarded.

DAF:	**Mercedes-Benz:**
Extremely important	**Extremely important**
Price	Price
Flexibility	Quality
Quality	Safety
Delivery	Communication system
	Delivery
Less important	**Important**
Communication system	Warranties and claim policies
Price	Performance history
Spare parts	Environmental-friendliness
Geographical location	Spare parts
Warranties and claim policies	
Financial position	**Less important**
Environmental-friendliness	Geographical location
Performance history	Financial position

The purchasing policy of DAF is consistent with the purchasing policy of PACCAR. DAF aims at partnerships within the whole value chain, and bases its business processes on 'total quality'. DAF mentions that (potential) suppliers must be aware that[215]:

- DAF buys products unless in-house development and/or production give DAF a competitive advantage.
- DAF aims at suppliers who are able to deliver world-wide to the companies of the PACCAR concern.
- There is intensive co-operation between DAF and its suppliers, and DAF aims at long-term relationships.
- DAF is selective in choosing its suppliers and wants to achieve more with fewer suppliers.
- DAF involves its suppliers at an early stage (from the definition phase) in new projects and developments.

DAF mentions in their publications that they value the following supplier characteristics as being critical to a successful relation between the supplier and DAF[216]:

- **Quality**
  DAF ensures that goods and services comply with the order specifications in terms of quality and environmental requirements. Furthermore, Purchasing wants the production processes of goods and services to show continuous improvement with regard to quality and environmental impact. Quality procedures must be drawn up in accordance with ISO guidelines, and suppliers are required to co-operate in the 'Six Sigma' philosophy.
- **Logistics**
  The supplier has to show continuity, reliability and flexibility in delivery.
- **Know-how**
  Suppliers must give access to the technology and know-how of new products and systems.

[215] www.daf.com
[216] www.daf.com

- **Competitive position**
  The supplier must have a favourable market position and financial position.
- **Total costs**
  The total costs within the value chain must be competitive.

In practice, VLP is already a preferred supplier to DAF. The experience with DAF is that every product which is supplied by suppliers, can be scored on four most important characteristics, namely: flexibility, reliable delivery, quality and price[217]. The products purchased by DAF can then be classified as high-end or low-end products. A high-end product is either high-end because it is a major part of the truck, or is very much sophisticated in its machining or connection with other parts. Consequently, a crank-shaft is a high-end product, a tube for outside mirrors is low-end. A high-end product indicates that quality is paramount and deliveries must be absolutely reliable. Flexibility, which means for DAF both flexibility in products as in deliveries, can be low and price is less important. For any low-end product this, naturally, is the other way round. Any combination of these four main characteristics is possible, and this means there are dynamics in the list of characteristics. Not only can one hardly generalize about shared characteristics between OEMs, but even within an OEM characteristics are not necessarily always the same.

Information about suppliers, and characteristics required from suppliers, are very difficult to get hold of in the case of Mercedes-Benz. Mercedes-Benz can somewhat be seen as the compromise between Volvo and Scania[218]. Prices are important, but Mercedes-Benz wants to stress its corporate values, namely environmental care and safety, as very much important as well. Safety ranks highest of these two, since Mercedes puts the customer first in its operations. Prices are important, and so is a reliable delivery. Mercedes stresses the importance of quality that suppliers must 'apply methods to perform with zero defects'[219]. Geographical locations is not extremely important since Mercedes-Benz is very much into global sourcing. Naturally, when global sourcing is relevant, an adequate EDI system is paramount and not being capable of linking to the EDI system results in no chance of supplying. Furthermore, Mercedes-Benz Trucks must be seen as a very conservative OEM where the automotive guidelines and principles are key to a good relationship. The supplier selection phase in automotive is a time-consuming phase, and at Mercedes-Benz this phase can be expected to last longer than at its competitors[220].

MAN:

Extremely important
Environmental-friendliness
Safety
Quality
Delivery
Communication system

Important
Price
Spare parts
Geographical location

[217] Mr. L. Keulen, Branchemanager Mechanical Engineering, VLP.
[218] Mr. F. Groeneveld – Quality Assurance VLP
[219] www.daimlerchrysler.com
[220] Mr. H. Grobbenhaar – Director Grand Prix Silencers

Less important
Warranties and claim policies
Financial position

MAN shows a very much identical approach towards supplier selection as Scania[221]. There is a Central Division Purchasing Production Material, which deals with all direct procurement transactions. Purchasing is divided up into specific material groups within the parts family Production Material.
MAN uses a constant evaluation of the performance of its suppliers by means of a supplier assessment system. It aims to develop the partnership with its suppliers with both performance potential and the capability of its suppliers for further development.
The goods and services purchased by the MAN Nutzfahrzeug Group are worth € 3.1 billion. Of this approx. € 2.4 billion goes for production material and approx. € 0.7 billion is spent on general purchases.
The main criteria in the selection of suppliers:

-Optimum cost/benefit ratio
-Competence in engineering and development
-Quality capability and process security
-Reliability of deliveries High flexibility and reaction speed
-Environmental compatibility
-Global presence

MAN is the only OEM that speaks of the benefits and support they offer 'in return' to the very much demanding supplier selection criteria. This shows a social side of the company, aware of the demands they provide suppliers with and giving insight in what a long-term relationship can exist of. The benefits for suppliers, according to MAN, are:

-Motivated, qualified and well-informed employees
-Efficient IT systems which provide the right information at the required time and in the necessary quality
-Measurement of the efficiency of our suppliers and regular communication on the results
-A standardised escalation system and active supplier development

MAN incorporates a few principles that deserve highlighting, because they are valuable for VLP when it can present itself at MAN. MAN is strongly emphasizing continuous improvement as key to suppliers, and mentions: "Accept no mistakes, make no mistakes, pass on no mistakes – with this forward-looking zero-error principle MAN Nutzfahrzeuge AG ensures optimum quality assurance measures."[222] MAN sets standards with suppliers for process variables such as quality, faithfulness to deadlines and stocking costs**.** The continuous improvement process and regularly certified quality management systems form the basis for fast implementation.
Furthermore, 'Lean management' is incorporated to secure short throughput times and tie up only the minimum of funds in stocks of material and finished products. Quality is an obligation, both component and process quality. Price is relevant as part of Total Cost Management (hence the cost/benefit ratio mentioned above), but environmental-friendliness, safety, quality, delivery and communication system are more important characteristics.
The overall performance of a supplier is made up of the following categories at MAN:

-Quality
-Logistics

[221] Mr. H. Wurz – Purchasing department MAN-AG; www.man-ag.com/supplierportal
[222] MAN trucknology delivers – Logistics Guide 2006

-Technology
-Purchasing

This is visualized in the figure below[223]:

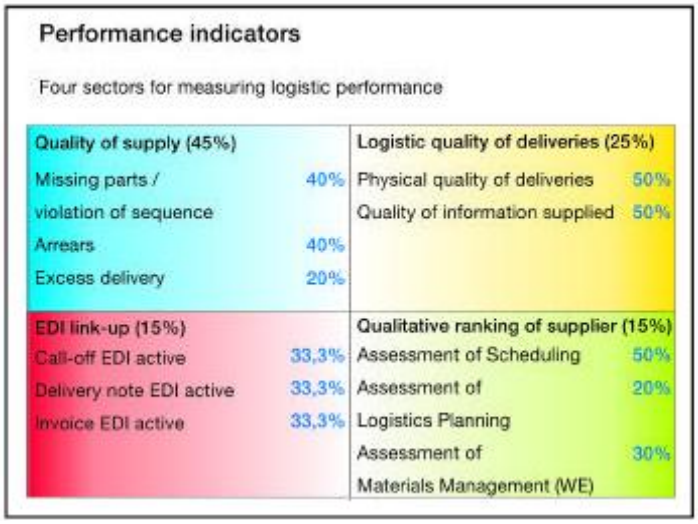

Figure 31: MAN supplier performance indicators

[223] http://www.man-mn.com/datapool/mediapool/105/LeitfadenE_Juni05.pdf

Conclusion

Here I want to present the outcomes of the supplier characteristics evaluation in the HT segment. The Volvo and Scania scores are derived from a Swedish master thesis project at these companies. The DAF scores have been ranked through official DAF documents available at VLP. Although Mercedes Benz is one of the largest OEMs in the HT segment, little information is published. This resulted in assumptions to be made for all characteristics that are not extremely important. The same goes for several characteristics for MAN.
For Iveco I could not make any assumption at all, because information has been very much contradictious. RVI, at last, shares its purchase function with Volvo in the so-called Volvo 3P programme.

Scania:	**Volvo/RVI:**	**DAF:**
Extremely important	**Extremely important**	**Extremely important**
Environmental-friendliness	Price	Price
Safety	Quality	Flexibility
Quality	Delivery	Quality
Delivery	Communication system	Delivery
Communication system	**Important**	**Less important**
Important	Performance history	Communication system
Price	Warranties and claim policies	Price
Spare parts	Geographical location	Spare parts
Geographical location	Spare parts	Geographical location
Less important	**Less important**	Warranties and claim policies
Warranties and claim policies	Environmental-friendliness	Financial position
Financial position	Financial position	Environmental-friendliness
	Safety	Performance history

Mercedes-Benz:	**MAN:**
Extremely important	**Extremely important**
Price	Environmental-friendliness
Quality	Safety
Safety	Quality
Communication system	Delivery
Delivery	Communication system
Important	**Important**
Warranties and claim policies	Price
Performance history	Spare parts
Environmental-friendliness	Geographical location
Spare parts	**Less important**
Less important	Warranties and claim policies
Geographical location	Financial position
Financial position	

Table 4: Supplier characteristics in HT, source: own

Similar to the CE industry, we see that in the HT industry the high-ranking characteristics again have been valued as extremely important for (potential) suppliers. Quality and reliable delivery are paramount, but almost every OEM in the HT industry requires other characteristics to be

incorporated in the supplier's organization. Some OEMs mention the communication system as absolutely necessary, others stress the environmental care which the suppliers must have laid down in an ISO 14001 certificate. Flexibility sometimes is extremely important, in other cases it is not even mentioned. Prices[224] at Volvo and Mercedes-Benz are always key criteria, while Scania and MAN only indirectly mention price as a part of TCM.

5.5. Quality features in CE and HT

Volvo has a complete book for 'purchasing quality procedures' in which all elements of the quality pack below are mentioned. Besides, Volvo offers to download PPAP forms online, and this shows the relevance of this quality pack as it is very much importance. DAF emphasizes ISO and Six Sigma in its supplier evaluation forms, and MAN stresses product and process quality as an obligation. For the automotive industry special (ISO) norms towards quality have been developed throughout the years. These norms indicate that quality is more than just a reliable product. This is the reason why I want to set out the 'quality pack'[225], already mentioned above in the CE conclusion, as it is an absolutely necessary item for VLP to master. Although many items of the 'quality pack' discuss production or assembly of a product, and VLP performs no production or assembly itself, still these items are relevant.
As well, VLP must aim at providing components next to raw material, next to added value in terms of services. Machining operations, in the case of components, can be outsourced to other companies, still VLP can act as the solution-supplier that improves product and process quality in actual production, machining and assembly.
The 'quality pack' can be used for process improvement and in avoiding damages to the products, both in logistics, material handling as well as warehousing. In short, they can improve the quality of the functions and characteristics of an Industrial Distributor.

This 'quality pack' consists of:

<u>Quality plans</u>

(P)FMEA	Failure Mode & Effect Analysis
PPAP	Production Part Approval Process
APQP	Advanced Product Quality Planning
PDCA	The Deming cycle: Plan Do Check and Act
Six Sigma	Quality management system that strives for near perfection

<u>Business philosophies</u>
Lean manufacturing
TQM
JIT
Kaizen
Poka Yoke

[224] Sometimes the impression may be perceived that price is so much important that automotive is only attractive to low-cost fighters and, consequently, mills. However, given the fact that even OEMs (DAF, Caterpillar) and first tier suppliers (DANA) buy from VLP, shows that these automotive parts can sometimes not be supplied by mills because the order quantities are too small. VLP can be competitive in pricing, and there is undoubtedly a market for VLP as a supplier based on price.
[225] This 'quality pack' is the result of analyzing all CE and HT industry OEM supplier registration forms, as well as first-tier supplier's registration forms.

Norms and certificates

Organization quality	ISO norm 9001:2000
Environment	ISO norm 14001/EMAS 2
Automotive quality	QS9000/TS 16949:2002
Automotive quality	VDA6.2
Social Accountability	SA 8000[226]

The importance of this quality pack may not be underestimated, and any organization who aspires the position of a supplier to the CE or HT industry, must become familiar with the meaning of this quality pack. Ideally, the organization incorporates this quality pack in its organization before subscribing to any OEM-supplier selection phase. Because these quality items need to be mentioned, but serve little academic value to the report, I refer to Annex 18 for further detail.

[226] Although CE and HT customers do not oblige VLP to have this certificate, still it is a valuable contribution to the image of VLP.

5.6. SWOT analysis

Measuring
In this paragraph I would like to make an analysis of the strengths, weaknesses, opportunities and threats. The difficulties I will encounter are how to measure these items of any SWOT analysis, and how to decide which aspect of VLP or the external environment is relevant to this analysis.
Although I try to be objective in my judgment concerning something to be a strength or a weakness, I understand that my judgment may prove to be wrong. Therefore I have tried to base my judgment on other VLP employees' experiences, expecting them conclude on their knowledge of VLP as an organization, their knowledge of the competitors' performances, their knowledge of the valuation of VLP by the automotive customers and VLP customer ratings. As well, I had to interpret the demands of the interviewees, and scoring these demanded characteristics on the organization of VLP. The results of this strengths and weaknesses analysis will therefore not always be legitimate, as I have to assume that the information sources are valid and reliable. For further detail I refer to the justification.

Relevance
The relevance of strengths and weaknesses depends very much on the industry VLP is in, or it is willing to join. If "quality" is a strength of VLP because every product supplied has zero defects, it depends on the industry whether this is important or not, and thus whether it is a relevant strength or not. If the industry does not mention "quality" as being important, then "quality" can be a strength of VLP but the relevance of this strength then is arguable.
For this reason, I have first studied the automotive industry and concluded on the high potential segments, and constructed a list of supplier characteristics that are demanded by these segments. These demanded supplier characteristics, namely, now can be matched with the relevant strengths and weaknesses mentioned in the SWOT-analysis.

Objective
The central question in this report is "*What automotive industry segment(s) in Europe ensures the highest potential for sustainable and profitable growth for VLP, and which positioning strategy should VLP follow to target this best potential segment?",* and in terms of the SWOT-analysis this should be captured as the objective of the SWOT-analysis. The objective then can be defined as VLP's efforts in

"targeting the two most attractive automotive segments"

With this objective, strengths, weaknesses, opportunities and threats can be identified and linked to the objective.

5.6.1. Strengths

In any SWOT analysis, the strengths and weaknesses typically refer to internal aspects of the organization. The opportunities and threats are applicable to the external environment of the organization, and can be seen as the trends in the industries, both positive and negative for VLP.

Strengths are attributes of the organization that are helpful to achieving the objective VLP has set. By nature strengths are positive aspects of any company, and reflect the areas the company is very good at. For Van Leeuwen Precision Europe I have selected several strengths, of which I think they should always be emphasized whenever the CE or HT industry is approached.

The attributes of VLP that are helpful to achieving this objective then are:.

1. Few, but solid and convincing automotive references
Although VLP is no match in number of automotive references compared to e.g. Thiel&Hoche, the DAF, JCB and Caterpillar accounts are OEM-accounts to be proud of. These account-names support the image and presentation of VLP as automotive specialist. In addition, supplying first and second tier suppliers as DANA, Manuli and Powerpacker can be used in order to convince potential prospects in the CE and HT industry.

2. Comprehensive international customer track-record – potential network
Not only can the international and profitable activities of VLP be seen as success stories on their own, but customers throughout Europe can become partners in automotive components as well. For the supply of components, VLP can acquire the raw material and then send the material for machining to one of its European customers. By doing so, all kinds of machined material can be offered to the eventual customer. VLP can coordinate the complete process and act towards the customer as a 'one-stop-shop'. Identical to Thiel&Hoche, VLP can select its machining partners for every enquiry based on geographical situation. By doing so, a network can be created within that consists of sufficient technical expertise to meet customer demands. As well, current machining partners become more reliant on VLP, meaning more direct business with them can be expected.

3. Excellence in logistics
Sourcing from the Van Leeuwen Group's knowledge, and using the Group's international offices, warehouses, and contacts, a logistic network with far reaching possibilities towards supply is created. Besides, decennia of experience in routing, just-in-time management, kanBan supply and reliable deliveries make VLP's logistic knowledge a key strength. Additionally, the ability to level with customers when logistics are discussed is a strength[227].

4. Personnel (embedded) automotive knowledge
Although a severe weakness of VLP is the lack of skills towards product-engineering and product-design, few employees of VLP Europe-wide have extensive experience with automotive accounts. In some cases, this has even led to redefining product-specifications stated by the customer but in concurrence with the VLP employee. With success, for both DAF and DANA Axle, VLP employees have redefined the specifications for products these customers need. This knowledge needs to be shared.

5. Knowledge for mastering the 'quality pack'
VLP lacks almost the complete quality pack by means of formal written procedures and certificates, but has the knowledge in-house for a fast reaction. Especially the current QA-manager at VLP is competent in the field of the mentioned quality pack, and capable of acquiring the mentioned items on relatively short notice.

6. Product quality
VLP has made continuous contributions to its product range in order to achieve a higher level of quality for its products. Specials are being offered and own brands are introduced for products that meet significant higher quality standards. In the Netherlands, VLP is conceived by 27% of its customers[228] as supplying better product quality than its competitors. In the UK, France and

[227] Mr. L. Keulen – VLP Branche Manager Mechanical Engineering.
[228] VLP – Customer evaluation survey, 2004

Belgium t average 20% of the customers perceive a higher quality is supplied. Next to the comparison with competitors, the quality itself is perceived as very good as well[229].

7. Price versus product quality
VLP receives good marks for the price/quality rate in The Netherlands, the UK, Belgium and France. At average, half the customers perceives good to very good price/quality rates whenever products are sourced from VLP. Another 43% of the customers rank this rate as average, resulting in a very little group of customers that rank this rate below average. In addition, for automotive this rate can be seen as a distinguishing aspect of VLP[230].

8. Flexibility
VLP scores high marks on flexibility. Flexibility is a comprehensive term, here it must be interpreted as:
-the flexibility in deliveries to different geographical locations, and modifications on short notice
-the ability to provide different products/alternatives for given applications
-the ability to supply customers on very short notice with the required products
For its major Dutch customer DAF, VLP supplies to different locations specified by DAF. These locations are subject to change, sometimes on very short notice,, and it is DAF's perception that VLP anticipates adequate to these changes[231]. VLP's flexibility, with its warehousing, also allows it to respond immediately to changes in schedules by the customer. First tier suppliers and OEMs, especially in the UK, have large variances in their schedules[232]. Reasons for these variances are commonly bad planning and the 'manufacturing to order'.

9. Delivery
Reliable deliveries are, combined with VLP's excellence in logistics, a key selling point to the customer[233]. They are being monitored by VLP on a continuous basis. Since years, VLP manages to achieve 99% of the total deliveries on time. In bad times, this percentage has never dropped below 95%. However, PPM rates for the automotive industry demand VLP to reach higher limits towards reliable deliveries.

10. Capacity
VLP tends to act very fast in times of under-capacity. VLP anticipates by opening new warehousing facilities at a central point towards the growing deliveries[234].

11. Warehousing
Derived from the research for valued functions of an Industrial Distributor, the warehousing function was ranked as very important. VLP has excellent warehousing capacities, systems and efficiencies, that can act as a strength.

12. Part of the Group
Although being part of the Van Leeuwen Buizen Group is sometimes seen as a weakness, because of a certain deviance in mindset between the Group and the Precision division[235], the extraordinary solvability of the Group ensures that VLP can afford itself to invest both money and

[229] VLP - Customer evaluation survey, 2004
[230] Mr. L. Keulen – VLP Branche Manager Mechanical Engineering.
[231] Mr. L. Keulen – VLP Branche Manager Mechanical Engineering.
[232] Mr. N. Atterbury – DANA Axle; Mr. C. Beal – VLW account manager JCB
[233] Mr. B. Van der Worp – VLP European Sales Manager
[234] Mr. B. Van der Worp – VLP European Sales Manager
[235] Mr. B. Van der Worp – VLP European Sales Manager; process and construction are the most interesting business areas for the group, however these are not represented by VLP. As Mr. D. Jenkins, VLW, mentioned:"The Group penetrates new markets by means of Process and Construction, but overlooks the potential that is left after penetration for the Precision division in these markets."

time in projects that do not result in instant results. As well, being part of the Group means loans from financial institutions can be attracted, facing soft conditions.

5.6.2. Weaknesses

Weaknesses are attributes of the organization that are harmful to achieving the objective VLP has set. By nature weaknesses are negative aspects of any company, and reflect the areas the company lacks competences in. For Van Leeuwen Precision Europe I have selected several weaknesses, and they need to be dealt with in order to empower them as strengths.

The attributes of VLP that are harmful to achieving the objective above stated then are:

1. Quality Assurance
VLP has difficulty with supplying a constant quality, when the severe (un)reasonable automotive requirements are in place[236]. The reasons are various, the result is single: a too high PPM-score[237]. VLP cannot afford itself these errors in quality when growth in the HT and CE industry is to be realized, because OEMs and first-tier suppliers will charge for the errors made. In addition, VLP needs to improve itself on process control and quality procedures. Often there is a resistance perceived towards repetitive measurements which are compulsory for complying with the 'quality pack'. At last, it frequently takes too much time to fill out demanded forms and to follow requested procedures.

2. Lack of 'quality pack'
In line with the above, VLP lacks the accreditation for ISO 14001, QS 9000 and TS 16949 certificates. For some customers specific quality plans are written (such as FMEA), but these plans are not incorporated into the daily practices and processes. They remain customer specific, whereas there should at least be a shared/common FMEA basis towards all customers. Business models like Six Sigma are at least not formally implemented at VLP, although all elements of the quality pack must be presented to potential customers in the CE and HT industry.

3. Engineering department
Customers require, and competitors may offer, a higher level of engineering know-how than VLP offers. Not many VLP employees can read a drawing, let alone they can make one of their own to offer the customer. VLP has no specific engineering department, neither does an design department exist. This implies difficulties when VLP wants to level the potential customer in terms of product improvement and advice.

4. EDI
Although a new, state-of-the-art, communication system is to be introduced on short notice, up till now the communication system needed to link with the potential customer is seriously outdated. Some OEMs, and even first-tier suppliers, require a compatible EDI system as a necessity.

[236] Mr. B. Van der Worp – VLP European Sales Manager
[237] Mr. L. Keulen – VLP Branche Manager Mechanical Engineering.

5. Plan of action
Up till now there is no strategy at all in use in any of the European countries that specifies how, and in which automotive segment, VLP wants to grow. This will cause lack of direction among employees[238] and may lead to a very defensive attitude towards automotive. As well, experiences and knowledge about the market may not be shared but remain with the same persons.

6. Human assets
VLP lacks (extensive) social networks and good customer contacts at 'high places' in the automotive industry. Although good references exist, and the opportunity lies ahead to create such networks, it is a weakness compared to (current and new) competitors.

7. Warranties and claim protocol
The automotive industry, specifically the CE and HT industry, demand suppliers to sign reasonable and unreasonable contracts, in which the OEM outlines what errors will be claimed from the supplier. VLP frequently resists signing both of them, mostly frightened by the effects of clauses in the contracts[239]. Although these contracts may seem demanding, and even unreasonable, theyr however are common in these industries.

8. Reaction time
No matter what business you are in, the quicker you respond to enquiries the greater the chance will be you will win the order. VLP's response times must improve, because now orders are not being booked because VLP simply is too late with its reaction[240].

9. Supply base
It is perceived by VLP personnel[241] that, both purchase and sales departments, occasionally do not know where to source material from (requested by potential customers) because they know of no such source and such products. At first sight the requested material seems to be a common alternative, but in the end the appropriate mill cannot be found. The result is VLP fails to quote the enquiries, and a possible connection to the automotive industry is lost.

10. Geographical locations
As we have seen in more detail for the CE and HT industry, still a lot a manufacturing is done in Germany, Sweden, Italy and Spain. Germany is difficult for VLP to enter because one of its partners, Benteler Rohrhandel, is very much active there and starting business in your partner's home market is not part of the 'gentlemen's agreement'. Sweden, Italy and Spain cannot be supplied on a Just-In-Time basis, unless one can make use of an OEM's hub. Still, the geographical situation of VLP warehouses compared to the situation of OEM sites might be causing some friction. Moreover, first-tier suppliers tend to be on-site at the OEM's location causing friction in both VLP-T1 and VLP-OEM deliveries.

[238] Merchant, K., and Van der Steede, A., Accounting, Finance and Management, 2004
[239] Mr. B. Van der Worp – VLP European Sales Manager
[240] Mr. L. Keulen – VLP Branche Manager Mechanical Engineering; Mr. B. Van der Worp – VLP European Sales Manager; Mr. B. Boneschansker – VLP Export
[241] Mr. B. Boneschansker – VLP Export

5.6.3. Opportunities

Opportunities are external conditions that are helpful to achieving the objective. They are positive aspects of the environment of VLP, but are not opportunities for VLP solely. VLP needs to be aware of the fact that these opportunities count for its competition as well, and it is VLP's responsibility to make the most beneficial use of these opportunities.

The external conditions that are helpful to achieving the objective above stated then are:

1. Outsourcing
Although the CE industry tends to manufacture more components in-house, they have recently started outsourcing many of their in-house manufactured components because of excessive demand. In the HT industry typically around 70% of a truck's value is purchased[242], thus outsourced, and with continuous growth in the demand for heavy trucks this guarantees more business for current (potential) suppliers. In addition, the general automotive trend towards assembly performed by the OEM is applicable to both industries of interest here as well. This means there is a growing business potential for both the 'raw material' as the 'component' suppliers. VLP must present itself as a supplier of both. In both the CE and HT industry, the demanded functions of an Industrial Distributor have been studied and can now be used in practice. These high valued functions need to be stressed in acquisitions of potential customers. In addition, a 'tailored' approach is needed to present VLP to the customer according to its specific requirements.

2. Component supplier
With its extensive list of international customers, active in all kinds of machining of tubes, bar steel and components, VLP can create strategic located networks of subcontractors located in the vicinity of OEMs and first-tier suppliers in Europe. By coordinating the complete process, VLP can act as a one-stop-shop for customers of both raw material and components. Offering components means supplying more added value, and consequently higher margins and a more dependent customer. As well, by creating a network from existing customers, new business opportunities arise. VLP customers normally buy raw material from VLP, machine the material and sell it to their own customers. With the creation of a network, orders acquired by VLP flow to the subcontractors and back to VLP; VLP becomes both supplier and customer to this subcontractor. In return, VLP may expect the subcontractor will buy all its raw material for non-automotive applications at VLP.
In all automotive industries the OEM is almost always well informed about the prices of raw material. However, the more machining you can add to the product, the less clear the price becomes to the customer[243]. Benchmarking can be used to copy the success of organizations, both in the same business as in other comparable businesses, to allow a quick start in the component industry.

3. Strategic alliances
VLP can form strategic alliances with competitors, suppliers and subcontractors, to cover up VLP's weaknesses with the other firm's strengths. For these strategic alliances, partners are especially valuable to VLP when they can provide the 'human assets' strengths: creating openings in the CE and HT industry is important, since it is widely understood that 'you have to be active in automotive before you can grow in automotive[244]'.

[242] EMCC case studies, Trends and drivers of change in the European automotive industry: Volvo Truck Corporation, 2003; DAF purchasing presentation 2005.
[243] Mr. H. Grobbenhaar – Director GP Silencers: the highest margins are those levied on the added value.
[244] Mr. R. Loohuis – Purchasing manager Corus Tubes

4. Enlarging current accounts
Ever since the DAF account was booked for the first time, this OEM has requested more and more products, for different applications, from VLP. At JCB in the UK, the purchase manager clearly indicates there is a growth area of several million pounds of steel VLP could supply, but what is now supplied by competitors. The enlarging of the accounts is extremely important because it directly relates to the dependence of the customer on VLP, it generates more turnover, and it makes VLP more known with and in the CE and HT industries.

5. Copy success
Several successful attempts have been made throughout the years to enter the HT and CE industry. These successes can be copied, and are excellent references that need attention when potential new customers are met.

5.6.4. Threats

Threats are external conditions that are harmful to achieving the objective. They are negative aspects of the environment of VLP, and if not dealt with accordingly their impact can be harmful to VLP's business.

The external conditions that are harmful to achieving the objective above stated then are:

1. Low cost countries
Both industries have invested in subsidiaries in low-cost European countries, but these countries are not the most promising for the CE and HT industries[245]. There is a shift towards Asian countries that cannot be neglected. Apart from Hitachi and Komatsu, who are localizing production in Europe, other OEMs in the CE industry, as well as OEMs in the HT industry[246], are opening manufacturing plants in Asian countries. Not only to anticipate growth in total numbers on a worldwide scale, but to provide low-cost alternatives to the products they manufacture in Europe as well. Should large OEMs decide to move (part of) their manufacturing to these Asian countries, they will look for local material sources as well. The first-tier suppliers can be expected to move with them and suppliers with who the OEMs have developed long-term relationships, resulting in that both depend on each other, will be part of the movement process. If VLP is not valued as such a supplier, it will lose its business.

2. Regulations and law
Governments in Europe have influence on business in both industries, as they demand the product to meet specific quality, safety and environmental standards. Construction equipment faces far less standards to comply with as the manufacturers of heavy trucks[247], because of the presence of trucks on public roads. Trends in the HT industry are the increasing demand for *safety of both truck driver and the environment, cleaner diesel engine technology, fewer vehicles and better traffic flow*[248]*.* VLP must keep in mind that these trends demand a clever way of mechanical engineering to meet governmental demands as well as to minimize extra costs, or if possible, even lowering costs.

[245] Mr. P. Mussert – Purchasing Director Hitachi; Mr. P. Hennessy – Purchasing manager JCB
[246] EMCC case studies, Trends and drivers of change in the European automotive industry: Volvo Truck Corporation, 2003; DAF purchasing presentation 2005.
[247] www.eu.org/environmental/traffic
[248] EMCC case studies, Trends and drivers of change in the European automotive industry: Volvo Truck Corporation, 2003; DAF purchasing presentation 2005.

3. Mergers

The supply chains in the CE and HT industry develop themselves towards the business model used in the passenger car supply chain. Although both industries fall behind the passenger car industry in size and aggressiveness, they still have a lot in common. As I pointed out already, first-tier suppliers have started centralizing their forces through mergers and acquisitions. Although this might seem remarkable in a growing business where more and more production is being outsourced rather than in a saturated business where everybody has settled themselves, it can become a threat to 'smaller' suppliers as VLP. When the HT and CE industry move towards solely assembly activities, they will outsource large parts to first-tier suppliers. These first-tier suppliers, because they become less in number, gain a greater bargaining power over their component suppliers. Even raw material may in future not be supplied to the OEM directly, but to the first-tier supplier. This may levy high pressure on VLP as being a 'raw material' and 'component' supplier to the CE and HT industry.

4. Competition

Competition is tremendous in this business, with new entrants and withdraws on a frequent basis[249]. A few statements why the competitive position of VLP is threatened:

- boundaries in the supply chain are diminishing as automotive moves from the tier-model to the new business model of direct and indirect material and knowledge suppliers
- the fact that automotive is a market where business is commonly stolen from competitors[250]
- the product that is offered by VLP can be seen as a commodity, since VLP supplies its major automotive customers with raw material. The product is easy to copy, and cannot be protected by intellectual property rights. Although VLP has increased the dependency of e.g. DAF by rephrasing material specifications, VLP has a weak competitive position that is threatened. The most appealing solution for VLP is to move towards the supply of components and become the 'one-stop-shop', in order to offer less commodity products and more tailored solutions.

Competition, as set out before, comes from both Industrial Distributors and mills. Although mills only produce high volumes, cannot supply a customer with low volumes of different products, and do not offer fixed lengths, a threat is identified in the UK. Here, Corus Tubes is building a brand new mill from scratch with the possibility of cutting and thus supplying fixed lengths. Cutting is a major distinguishing aspect of an Industrial Distributor when compared with mills. When high volumes are required, customers still buy from VLP because of the cutting possibility[251] instead of buying from the mill directly. When mills can combine several orders on their cutting machines without having to keep stock, they can even threaten VLP's business on medium-size volumes. It deserves the attention from VLP's employees that they inform where new mills are build and what additional service they provide.
This SWOT-Analysis is visualized below.

[249] EMCC case studies, Trends and drivers of change in the European automotive industry: Volvo Truck Corporation, 2003; DAF purchasing presentation 2005.
[250] Mr. H. Grobbenhaar – Director GP Silencers; the Dutch translation is: "automotive is een snoepmarkt".
[251] At every visit I have made, and every conversation I have had with customers and Corus, it is clear that cutting is a major key selling point to steal orders from mills when volumes are large enough.

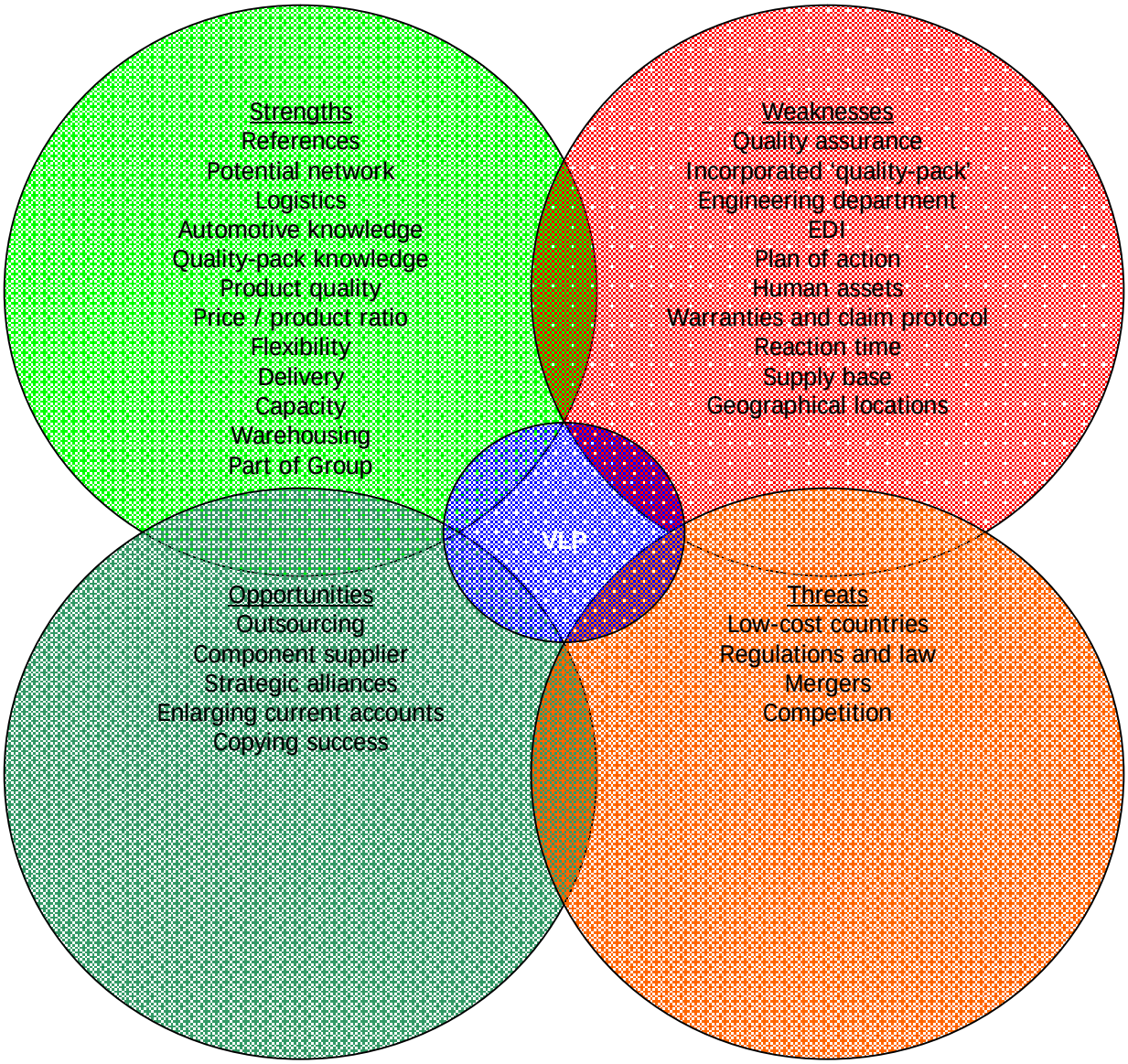

Figure 32: SWOT-Analysis

5.7. SWOT-analysis results

Normally after a SWOT analysis one starts first with focusing on the combination of strengths and opportunities, because they refer to a 'direct' fit between the internal and external environment of the organization.

S-O: both industries are outsourcing many components to their suppliers. In its acquisition of new customers VLP must present current references in both industries whenever possible. Copying successes to new customers strengthens the image of VLP as a supplier, supports difficult processes to become routines, can result in efficiencies of scale and generates new turnover.
Becoming a component supplier is interesting because of higher margins and because a certain dependence on VLP from the customer is created. VLP must use its international customer record to create several geographical networks of subcontractors per country. As well, new subcontractors that are not yet customers of VLP can be selected and find their place in the networks. By creating these networks beforehand, VLP is capable of supplying components and can anticipate on customer orders on short notice.
The functions of VLP as an Industrial Distributor must be emphasized in its effort to acquire new accounts and to enlarge current accounts. This enlargement has positive side effects next to the generated turnover. The automotive knowledge base within VLP is enlarged, the reference is strengthened, the customer dependency on VLP is becoming greater, and a severe weakness of VLP is decreased: the engineering department and skills.
At last, VLP has aimed for high product quality and should continue this philosophy by offering more exotic materials. These materials, e.g. titanium and inconnell for engines, may in future provide VLP with a competitive advantage as the CE and HT industry is solving emission and combustion related problems.

W-O: the weaknesses of VLP are currently limiting its potential as a supplier, and can mostly be overcome. At first the Quality Assurance needs to be improved. Glancing at the demands in the CE and HT (or automotive) industry, these are perceived as 'killing the company'. However, these demands should be discussed at management level to create a shared attitude towards automotive. The mindset towards reasonable and unreasonable demands might be discussed, resulting in a more cooperative attitude. QA is time consuming and this calls for rethinking. The 'quality-pack' needs to be mastered before VLP presents itself to new customers. The fact that both industries are occupied with outsourcing demands a fast adaptation from VLP.
VLP presents itself as both component and raw material supplier, the one-stop-shop, but before doing so the communication system must be installed and working. This new EDI can link VLP with its customers for exchange of data. Presenting VLP without it VLP means VLP faces a tough battle of convincing the customer the EDI is not needed.
VLP lacks the 'human assets' in both competitive engineering skills as well as in 'friends in high places'. To overcome this, the opportunity of strategic alliances (SA) can be interesting. Although it can affect VLP's business negatively by becoming dependent on the partner in the SA, the partner can greatly improve the image of VLP as a competitive supplier with outstanding knowledge. The alliance must be designed as to that it consists of common interest, investment and dependence.
The weakness 'geographical location' can become lesser negative for VLP when it enters the market as a component supplier, because networks of subcontractors are designed at strategic locations near the customers. This improves the lead time towards the customer and supports the logistic strength because JIT deliveries are now possible over larger distances.

VLP must improve its supply base in order to start business as a component supplier. It would not make sense to create networks if VLP looses too much time in acquiring the raw material, if it acquires it at all.

S-T: if the move to low-cost countries is limited to Eastern European countries, than VLP should make sure the strengths of the organization are equally available there[252]. Eastern Europe, namely, has only recently been developed by VLP.
Identifying regulations and law as vulnerable threats to VLP as a supplier, it must be aware of these aspects of doing business and remain up to date. By means of the (in future maybe exotic) products supplied, improved product quality, the automotive knowledge and the continuous improvement, VLP can anticipate upcoming regulations and law in an early stage without losing business. However, it is trivial to what extent this can be seen as a competitive advantage over competitors, since CE and HT OEMs inform their suppliers in an early stage about upcoming events and the appropriate action needed[253].
The potential for creating a network of subcontractors is beneficial in the light of upcoming mergers amongst first-tier and second-tier suppliers. The more VLP improves the added value, the more bargaining power it has regarding its customers.
Competition is heavy, due to mergers, Western European competitors who are expanding in Eastern Europe, new market entrants from Russia and Eastern Europe and mills that takeover gradually some of the ID's functions. Again, product quality and the creation of a network are paramount to protect business against competition. The automotive knowledge, which results in redefining product and material specifications in concurrence with the OEM/first-tier supplier, holds a protection-function here as well.

W-T: calculating the impact of the combination of weaknesses and threats usually saddens perspectives for any organization. If the weaknesses are not covered by appropriate action, competition will outperform VLP as the industries become more and more demanding. Lacking the contacts needed and a sufficient engineering department/partner, VLP will become a small player with little bargaining power if suppliers and OEMs keep merging.
Competition must be levelled by a competitive 'quality pack', reaction times need to be improved dramatically since they can be order winners, and quality assurance performed by VLP must result in, if not just competitive, best-in-class PPM scores. This PPM ranking highly affects your reliable deliveries and decreases the impact of a 'warranties and claim protocol' because lesser errors are being made.

S-W: within short notice, major weaknesses need to be improved and transformed in either a neutral status or become part of VLP's strengths. In any consecutive SWOT-analysis performed, other weaknesses that now have been overlooked, have not reached the surface because automotive is too little developed in VLP at the moment, or that have been kept outside this list of weaknesses because they are limiting VLP's potential in a lesser respect, can be stated and be given the proper attention.
VLP needs to improve its reaction time to enquiries because it affects the eventual success of a potential network. The 'quality pack' is a major weakness of VLP, but VLP can be assured that the required knowledge to obtain this pack is in-house.

[252] Mr. P. Hennessy from JCB: "if VLP would be a bigger supplier to us, a supplier that is closer to us in our evaluation (named a Joint Process Improvement supplier), we would develop plans together if movement then is still an option."
[253] Mr. L. Keulen – VLP Branche manager Mechanical Engineering

Conclusion

Market information from outside the VLP organization is brought into the report in this chapter. To come to a better understanding of the external environment, I have presented a short introduction to Industrial Buying Behaviour (IBB). It describes the buying process, and comes with three buyphases: The new task buying situation, the straight rebuy situation, and the modified rebuy situation. For this report, the new task buying situation is assumed to be most frequently used, because potential customers are to be approached by VLP to achieve growth in both segments, and successes at comparable companies are to be copied to these potential customers.

For all relevant players in the HT and the CE industry I have gathered their ratings for the functions they value most when doing business with Industrial Distributors. These functions are part of the distinguishing package Industrial Distributors have over competitors such as mills. Both Rosenbloom's and Kotler's approaches towards functions have been combined, and these functions need to be stressed when convincing a (potential) customer of the added value VLP can offer.

- Make customer dedicated inventory (CDI), including fixed-lengths, available for call-off to support flexibility and timely deliveries.
- Provide warehousing to offer the customer the possibility to outsource space-consuming operations at the customer's site to VLP. Decreasing the floor space used results in both financial and operational advantages for the customer.
- Offer extensive logistical solutions to the customer to support the call-off of material and the warehousing function and to result in smooth and reliable logistical operations.
- Offer total cost management (TCM) to support long-term relationships and to lower total costs.
- Offer total quality management to assure zero defects, and to anticipate early on bad deliveries (PPM=0).
- Offer reliable deliveries at all time through the independence of mills, the stocking facilities and quality assurance efforts.
- Offer management/monitoring to support continuous improvement of existing and future projects in terms of material quality, efficiencies and costs.

Next to the functions VLP should offer as it is an Industrial Distributor, it should empower general supplier characteristics which are valued by their (potential) customer base. The ten most important characteristics when suppliers are selected, derived from the work of Dickson, have been tested in both the CE and HT industry, and I have made segment specific modifications to the list of characteristics.

Quality, reliable deliveries and prices are the most important characteristics of a supplier in this industry. VLP must be able to offer perfect logistic solutions and references to fit the expectations of the OEM, and price-levels can be met as long as volumes are not that large that direct competition from mills must be dealt with. Besides functions and characteristics, there is a huge (exaggerated) demand in the automotive industry towards quality in product and process. This demand is captured by the construction of a quality pack which needs to be incorporated in the company of any automotive supplier. It lifts the company to a higher level of perfection, from which the company will benefit when supplying other industries. In short, they can improve the quality of the functions and characteristics of an Industrial Distributor.

In this chapter as well the SWOT-analysis has been carried out, and the objective of this analysis has been defined. Appropriate strengths, weaknesses, opportunities and threats then have been stated that link to this objective. Conclusions have been drawn by linking the aspects of the SWOT-analysis, and they will be highlighted in the next chapter.

5.8. VLP Benchmark – The Thiel&Hoche for CE and HT

Introduction

Thiel&Hoche, a German based company, has acquired its ever growing market share as a trade company by offering more than just a product; they offer a complete solution. They employ numerous engineers to fulfil custom-made, and according to drawing, demands from passenger car manufacturers, and have them Just-In-Time delivered at the site of the customer. They match the application-needs with the most suitable quality of raw material in their designs, buy the raw material, have it machined by their selected subcontractors, and supply continuous product improvements for both actual and future orders.

Description[254]

Thiel&Hoche itself is a trade company without being a stockist. Thiel&Hoche buys directly from the mill and must be seen as a major third-tier/second-tier supplier to the automotive industry. Although Thiel&Hoche says it uses no segmentation for the automotive industry, Thiel&Hoche supplies almost solely to the passenger car segment. Occasionally they supply directly to the OEM, an example of that is the fixed-length tube for Mercedes Benz passenger car automatic gearboxes. Thiel&Hoche has centralized itself in Germany, where by far the most business is generated. They have only recently opened up an office in the UK and Czech Republic (near Brno; Veseli nad Moravou), but there actually is no limit to their supplies as some customers are in the USA.

Thiel&Hoche is ISO (DIN EN) 9001:2000 certified, but finds the VDA 6.2 certificate a real key selling point. They acknowledge there is heavy competition, but manage to keep growing because of continuous improvement and in-time deliveries. Continuous improvement is supported by the strong engineering department they have formed in-house, and results in new product ideas they offer the customer and reduction in costs for new and existing projects. In-time delivery is guaranteed because they have created several strong networks of subcontractors around the OEMs. This setup is quite unique in the business, and gives them an advantage over competitors.

Their advice function is very much important. Typically, a first or second-tier supplier approaches Thiel&Hoche accompanied with drawings, material specifications and other requirements. Thiel&Hoche then passes this package on to its engineering department who eventually propose their results to the customer.

Supplying more than 100 million parts to the automotive industry in 2005, this is by far their biggest market. Other markets are the ‘metal working industry’, the ‘tool and die industry’ and the ‘hydraulics and pneumatics’ sector. Thiel&Hoche is large enough to put tremendous pressure on mills in order to obtain the lowest price, since they combine their (independent) ‘broker’ status with tremendous orders and global procurement.

Not only does Thiel&Hoche offer steel, but it provides customers with aluminium as well. Both steel and aluminium have (fully machined) tubes and profiles in their product-range, but aluminium adds strips, plates and components to the total offerings of Thiel&Hoche.

Thiel&Hoche informs its customers when they have acquired new mills as their suppliers. These mills need approval from Thiel&Hoche customers, therefore prototypes are sent and approval is either granted or denied. New enquiries follow the same path, however now Thiel&Hoche takes care of the prototyping and awaits approval, before series production can eventually be scheduled.

[254] Mr. P. Herms – Representative of Thiel&Hoche, Tube 2006.

6. Conclusions and recommendations

The conclusions and recommendations answers the question 'how VLP must present itself in the CE and HT industry', and therefore consists of:

6.1.: Giving meaning to the Industrial Distributor analysis, the supplier characteristics, and the SWOT results. Recommendations are drawn given the information in chapters 4 and 5.
6.2.: Learning from "Thiel und Hoche"
6.3.: Key Selling Points
6.4.: Future outlook

When the HT industry suppliers were discussed, differences between the CE and HT industries were pointed out. This was done from a first-tier supplier's point of view, supplying the OEM with components. Here, in the positioning proposal phase of VLP products, I wish to regard the CE and HT industry as similar to each other, because:

- I lack a sufficient technical background in order to position VLP's products based on material characteristics and specifications.
- Differences in material requirements between both industries may well differ as much as intra-industry requirements. Even within either the CE industry or the HT industry, applications of tubes and bar steel vary from air-conditioning tubes to cylinder hoses, and from seating or exhaust tubes to crankshafts. The limitation of the two industries itself is a sufficiently narrowed scope, because VLP must not forget it is active in trade where volumes are important when products are relative commodities. Besides, intra-industry presentations must be tailored to the customer since we have seen that Volvo Trucks and Scania Trucks differ a great deal in their expectations towards suppliers. Furthermore, the fact that different applications, e.g. a greater hydraulics demand in CE, are used in both industries does not necessarily mean VLP must alter its strategy for both industries.
- Correlating to the above: for both industries a common high standard needs to be developed and incorporated within VLP's organization that comprises all demands. This high standard might be more based on demands in the HT industry since this industry has developed higher standards for its suppliers than the CE industry has[255]. However, the CE industry can be expected to start 'closing the gap' with the HT industry since no industry will downgrade its requirements. With this common high standard, the customer needs to receive a VLP presentation that is tailored to the required supplier characteristics.
- VLP does not supply high-tech products. The customer must be convinced by our supplier-characteristics and the added value (Industrial Distributor functions) VLP can offer. As mentioned before, a tube is simply 'nothing with something surround it'.
- The CE industry has recently closed the gap with the HT industry when it comes to outsourcing. Although arguments for outsourcing in both industries differ (HT is outsourcing because of the volumes and sophistication of the products needed; CE is outsourcing to create more room for assembly on short notice, and thus efficiencies of scale are not the prime reason), they both outsource a majority of their components needed.

[255] Mr. K. Ludwig, Gummi International; supplier to both CE and HT industry.

6.1. Conclusions and recommendations

Research questions have been answered throughout the chapters, it is in this chapter that I want to answer the central question:

What automotive industry segment(s) in Europe ensures the highest potential for sustainable and profitable growth for VLP, and which positioning strategy should VLP follow to target this best potential segment?

In this study for the European automotive industry I have tried to identify segments that fit the central question best. After creating the segments, and a rough study of these segments, I have filtered out the two segments that match the Van Leeuwen Precision Europe division best. This match is based on criteria I have selected carefully, and with which I have constructed a "preferred profile" for VLP. The two segments selected are the Construction Equipment segment and the Heavy Trucks segment.
For both segments I have identified the market shares of the relevant players in both segments, and I have analyzed their European establishments. As well, large suppliers to these segments as well as preferred suppliers to several relevant players in these two segments have been identified.
After this descriptive analysis of these two segments, I have focused on meaningful and relevant theories, given my lack of technical knowledge. It was my purpose to focus on the typical nature of the organization at hand, identifying it as an Industrial Distributor. Because an Industrial Distributor faces several distinguishing characteristics that make it different from other organizations such as warehousing companies, trading companies and distributors, I wanted to empower these different characteristics in such a way that VLP could use them to position itself in the two segments chosen. Therefore I have analyzed the functions of Industrial Distributors, by first combining theories concerning these functions to come up with a list of possible functions. Second, I have used this list to test its relevance at several OEMs in, and first tier suppliers to, the two segments. As well, VLP employees' experiences have been used as valuable input in this analysis.
After this focus on functions of Industrial Distributors, I have used a theory concerning supplier characteristics to identify possible characteristics of any supplier to the two segments chosen, without zooming in on the nature of the organization at hand. This list of characteristics as well has been tested externally at OEMs and first tier suppliers. Again, employees' experiences in both segments have been taken into account in drawing up the conclusions.
Finally, I have performed a SWOT-analysis that identifies the strengths, weaknesses, opportunities and threats for VLP. These attributes and external conditions of the SWOT-analysis have been related to the objective of VLP, namely "targeting the two most attractive automotive segments".

The results of this three-way analysis are now used in answering the central question of this study, and in drawing up the recommendations for VLP.

6.1.1. Industrial Distributor recommendations

If VLP manages to take on the functions rated as valuable by the customer, it could gain a competitive advantage over other Industrial Distributors and other competitors. The functions that are crucial for VLP to stress are:

VLP must make customer dedicated inventory (CDI), including cut fixed-lengths, available for call-off to support flexibility and timely deliveries. In practice, budgets and plans from VLP customers in both segments differ on a day to day basis. Ups and downs, although the two segments show more ups than downs currently, can be covered with short delivery lead times if VLP manages to keep a customer dedicated inventory. Sometimes referred to as "our customer cannot plan its demand for resources", it is VLP's task to act flexible and supply the demand needed at the time needed.

VLP must provide warehousing to its customers to offer the customer outsourcing opportunities of space-consuming operations. Decreasing the floor space used for stocks results in both financial and operational advantages for the customer. VLP could assist the customer in two ways. First, the customer can outsource space-consuming stocks, of products supplied by VLP, to VLP, resulting in floor space that can be used by the customer for other operations than stocking material. Second, by shifting the stocks to VLP, the customer can use the generated floor space for valuable operations such as assembly units or manufacturing units.

VLP must offer extensive logistical solutions to the customer to support the call-off of material and the warehousing function and to result in smooth and reliable logistical operations. Supporting the first two functions mentioned above, the customer must be able to rely on VLP's deliveries and VLP's logistical excellence. Because logistical operations are not part of the core-business of the customer, VLP must be able to introduce Just-in-Time deliveries at the customer's site given its flexible warehousing function. As well, its independency of mills must be used to support the function of reliable partner.

VLP should increase its efforts, and pool its experiences throughout Europe, in offering total cost management (TCM) to support long-term relationships and to lower total costs. In history VLP has been able throughout Europe to establish lower total costs for its customers in the two segments of interest. These experiences must be shared, in a way that future TCM-activities are more easily performed and more effective for the customer.

VLP must incorporate and empower total quality management control in its products and processes, to assure zero defects, and to anticipate early on bad deliveries (PPM[256]=0). Although price always is an issue for customers, having a supplier that supplies zero defects saves money in the end; prevention of defects will cost less than a total recall of products after production. In both segments focus is on quality of both product and process, VLP should incorporate both in its business.

VLP must offer management and monitoring to of existing and future projects in terms of product and process quality, efficiencies and costs. Continuous improvement of these items is obligatory in both segments, and this calls for a long term orientation between supplier and customer. Given all these functions mentioned above, VLP must share an open-minded, long term orientation with its customers in both segments. Knowing that products and processes can always be improved, VLP must be 'ahead of the crowd' and embed this mindset in its daily operations. International cooperation within the European division of VLP is crucial to come up with strategies and tactics that support the 'continuous improvement' demanded by the customers.

[256] PPM = Parts Per Million disapproved.

6.1.2. Supplier characteristics recommendations

The OEMs in the CE and HT industry share similarities when it comes to supplier characteristics. Quality, reliable deliveries and prices are the most important characteristics of a supplier in this industry. VLP must be able to adapt these three characteristics, and offer perfect logistic solutions and references to fit the expectations of the OEM.
Price-levels can be met as long as volumes are not that large that direct competition from mills must be dealt with. This is mainly because of the great supplier-base VLP has for its products, in order to achieve both good quality and low pricing. Quality is what VLP already focuses on by providing better qualities of steel products that distinguish VLP from its competitors.
However, I have learned that in this industry, and in the automotive industry in general, it is not only extremely important to supply perfect quality, but *the process of achieving and maintaining this quality of both product and process* at an outstanding level is as much of importance to the OEM. As a supplier in this industry you have to be able to supply products on an ongoing basis at the same high quality, over and over again. Once you have reached a higher level of quality, you are not allowed to ever fall behind on this high level of quality offered.

Besides these three basic characteristics that are standard for all OEMs in both segments, VLP must use a tailored introduction that applies to the other demanded suppliers' standards set out by the OEM at hand. As it has become clear in the paragraph that reviews supplier characteristics, every OEM is different and can be approached using OEM-specific approaches. The profiles below can help VLP in its introduction at the OEM's site.

Next to their use for tailored approaches, these characteristics described serve another goal. VLP must strengthen itself and, if needed, improve itself at certain characteristics. Customer reviews in the automotive industry can help in providing specific information about VLP's strengths and weaknesses as an automotive supplier in the two segments. As well, VLP must review itself using an international benchmark for its European division members to identify strong and weak characteristics within the European division. Competition, at last, can also be reviewed along the line of these characteristics. The characteristics can be used in a way that they clarify success stories among competitors, and allow for a quick benchmark-analysis; VLP can learn from its competitors on shorter notice.

I want to add that some characteristics have been added to the original top ten characteristics published by Dickson, because the list turned out to be insufficient for 2006, and therefore I do not claim that this presentation of characteristics valued by OEMs is complete. There is always room for additions, and this demands VLP to have an open mindset and a close 'listening to, and learning from the customer'.

6.1.3. SWOT results

Given the fact that both segments are outsourcing many components to their suppliers, VLP must present potential customers its current references, where it functions as a component supplier, in both segments whenever possible. Copying successes to new customers strengthens the image of VLP as a supplier, supports difficult processes to become routines, can result in efficiencies of scale and generates new turnover.

VLP must use its international customer record to create several geographical networks of subcontractors per country. As well, new subcontractors that are not yet customers of VLP can be selected and find their place in the networks. By creating these networks beforehand, VLP is capable of supplying components and can anticipate on customer orders on short notice.

The functions of VLP as an Industrial Distributor must be emphasized in its effort to acquire new accounts and to enlarge current accounts. This enlargement has positive side effects next to the generated turnover. The automotive knowledge base within VLP is enlarged, the reference is strengthened, the customer dependency on VLP is becoming greater, and a severe weakness of VLP is acquired externally: the engineering department and skills.

VLP must improve its Quality Assurance. Glancing at the demands in the CE and HT (or automotive) industry, these are perceived as 'killing the company'. However, the 'quality-pack' needs to be mastered before VLP presents itself to new customers. The fact that both industries are occupied with outsourcing needs, demands VLP to adopt this 'quality pack' on short notice.

VLP must present itself as both component and raw material supplier, the one-stop-shop, but before doing so the communication system must be installed and working. This new EDI can link VLP with its customers for exchange of data.

VLP lacks the 'human assets' in both competitive engineering skills as well as in 'friends in high places'. To overcome this, the opportunity of strategic alliances (SA) can be advantageous. Although it can affect VLP's business negatively by becoming dependent on the partner in the SA, the partner can greatly improve the image of VLP as a competitive supplier with outstanding knowledge. The alliance must be designed as to that it consists of common interest, investment and dependence.

Finally, VLP must anticipate on upcoming regulations and law in an early stage without losing business. However, it is trivial to what extent this can be seen as a competitive advantage over competitors, since CE and HT OEMs inform their suppliers in an early stage about upcoming events and the appropriate action needed.

6.2. Learning from Thiel&Hoche

VLP needs to enter the component market, it would be best to use Thiel&Hoche as a guideline. Although VLP lacks the strong engineering department and still has to select subcontractors for the potential networks, the engineering partner can be sourced by means of a strategic partner, by training of current personnel or by acquiring new skilled personnel.
Thiel&Hoche focuses itself almost purely on passenger car automotive. For VLP this is a change to apply the same market entrance strategy as Thiel&Hoche, however concentrating on the CE and HT industry. Although these two industries do not order the same number of products as the passenger car industry, in return less competition is perceived in CE and HT and VLP has the opportunity to introduce itself as a supplier with a new strategic concept. This concept will help VLP building an image as the “one-stop-shop” for heavy duty and construction equipment.
As already pointed out in the SWOT analysis, VLP should offer high-end quality products and VLP must expand its product range on the high-end side with exotic materials. Whether or not aluminium must be introduced, must be discussed at management level in order to anticipate fast on customer demands.
VLP must acquire the required ‘quality pack’ in order to position itself as capable of delivering the exact customer quality, or better. The business models as Lean manufacturing and Six Sigma are not mentioned in the Thiel&Hoche case, but must not be perceived as redundant. They are of considerable value to the core customers of VLP.

6.3. The Key Selling Points (KSP)

I have chosen to mention several current weaknesses as KSP's as well because these have to become strengths of VLP on short notice.

Our characteristics
Excellent references in both industries
Outstanding quality of product and process
Excellence in complete logistical solutions: JIT, Kanban, off-the-shelf
Flexibility: support manufacture to sales order
Reliable delivery
EDI: compatible to all customers' electronic data interchange (EDI) systems
Safety and environmental care

Our functions
Warehousing: customer dedicated inventory
Safety stock and call-off
Total Cost Management
Total Quality Management
Continuous improvement

The quality we have incorporated in our products and processes
(P)FMEA
PPAP
APQP
PDCA
Six Sigma

Business philosophies we conduct to achieve high efficiencies
TQM
JIT
Kaizen – Continuous improvement

Certificates that reflect our perception of quality
ISO 9001:2000
ISO 14001
VDA 6.2/ QS9000/TS 16949

What we expect from ourselves as well as from our suppliers
ISO 9001:2000
ISO 14001
VDA6.1/QS9000/TS 16949:2002 (operating standards)

6.4. Future outlook

Now the strengths, weaknesses, opportunities and threats have been described, and the recommendations and key selling points are stated for both industries, I would like to have a short look at the nearby future and the action needed, to develop these two industries as potential customers for VLP.

1. Major weaknesses are being transformed into strengths of VLP. This means that:
    a. The 'quality pack' is acquired and incorporated, and all the appropriate action needed to support this is carried out.
    b. Quality Assurance is restructured to improve activities that are time consuming, and to create a shared automotive mindset.
    c. Reaction time, the time between enquiry and offer, must be improved.
    d. The new EDI system must be installed and working.
    e. While awaiting the accreditation and implementation of the 'quality pack', and the implementation of the new EDI system is being carried out, brochures are being designed that present VLP. Besides, accompanying VLP documents in which the quality of products and processes is formally laid down and references (with applications) are listed, are constructed.
    f. Creation of potential networks in countries where VLP holds offices.
    g. Deciding if, and how, engineering knowledge and 'human assets' are introduced within VLP. If needed, selecting partner for strategic alliance or select new (/ train current) personnel, to gain engineering knowledge.
2. VLP is registered at all OEMs in both CE and HT industries, and at several first-tier suppliers that aim their products at these two industries, as a supplier.
3. Meetings are scheduled with the OEMs and first-tier suppliers for which VLP has registered itself as a supplier. The reason for the meeting is to discuss the registration and both parties' expectations.
    a. VLP must introduce itself with its new Key Selling Points.
    b. VLP must inform the customer about its experiences and know-how considering products in the CE and HT industry.
    c. VLP must inform how the customer has organized the production of these products, and if there are (or have been) any problems considering these product groups.
    d. VLP must inform whether it can supply the customer with any other raw material or component.

Once these steps have been carefully carried out, and VLP has performed well in presenting itself (3), it may become a new supplier to an OEM or first-tier supplier. If VLP and the customer have agreed upon accreditation, a very time consuming process has to be started. In short this entails:

1. Request on prices.
2. Audit by the OEM or first-tier supplier, focusing at performance history, quality, reliable deliveries, etc.
3. Trial delivery
4. Approval process
5. Series delivery[257]

[257] In Annex 17 a detailed example of a flowchart is presented, to identify all the steps an accreditation process consists of. Source: DANA Driveshaft.

7. Annexes

Annex 1 – Passenger car production in Europe
Annex 2 – Light commercial vehicle production
Annex 3 – Buses and coaches production
Annex 4 – Heavy trucks production
Annex 5 – OEM Bus and coach manufacturers
Annex 6 – Heavy Truck manufacturers worldwide
Annex 7 – Construction Equipment OEMs in Europe per category
Annex 8 – Construction Equipment production sites in Europe
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Annex 1 – Passenger car production in Europe[258]

TABLE 2 **MOTOR VEHICLE PRODUCTION IN EUROPE BY COUNTRY**

IN UNITS ACEA correspondents survey

PASSENGER CARS	2003					2004					2005					% CHANGE 05/04				
	Q1	Q2	Q3	Q4	FY 2003	Q1	Q2	Q3	Q4	FY 2004	Q1	Q2	Q3	Q4	FY 2005	Q1	Q2	Q3	Q4	FY 2005
EUROPE	4.020.956	4.059.016	3.420.004	3.940.514	15.440.490	4.136.714	4.295.415	3.601.994	3.974.368	16.008.491	3.974.378	4.283.421	3.492.225	3.973.925	15.723.949	-4%	0%	-3%	0%	-1,8%
- EUROPEAN UNION	3.842.177	3.858.636	3.237.584	3.756.471	14.694.868	3.813.431	3.957.810	3.320.250	3.656.698	14.748.189	3.649.054	3.931.140	3.182.979	3.508.872	14.272.045	-4%	-1%	-4%	-4%	-3,2%
Double Countings Germany / Austria	*5.079*	*6.266*	*5.796*	*6.489*	*23.630*	*6.997*	*6.837*	*5.846*	*6.240*	*25.920*	*4.962*	*6.000*	*6.000*	*6.000*	*22.962*	*-29%*	*-12%*	*3%*	*-4%*	*-11,4%*
Double Countings Germany / Belgium	*65.526*	*66.328*	*55.409*	*66.616*	*253.879*	*49.370*	*82.484*	*50.000*	*49.649*	*231.503*	*74.055*	*75.945*	*50.000*	*53.000*	*253.000*	*50%*	*-8%*	*0%*	*7%*	*9,3%*
Double Countings Spain/ Portugal	*3.369*	*4.000*	*3.000*	*5.000*	*15.369*	*3.948*	*4.484*	*4.922*	*6.656*	*20.010*	*5.500*	*6.000*	*6.536*	*6.000*	*24.036*	*39%*	*34%*	*33%*	*-10%*	*20,1%*
AUSTRIA	28.532	26.498	26.991	36.629	118.650	51.109	65.188	57.535	53.412	227.244	47.682	61.604	56.035	65.184	230.505	-7%	-5%	-3%	22%	1,4%
BELGIUM	216.658	215.910	160.470	198.665	791.703	201.697	235.169	189.466	230.787	857.119	255.014	241.392	190.000	209.382	895.788	26%	3%	0%	-9%	4,5%
FINLAND	9.968	4.741	2.347	2.170	19.226	2.245	2.350	1.496	3.960	10.051	4.657	5.109	4.160	7.307	21.233	++	++	++	85%	111,3%
FRANCE (1)	867.504	872.013	700.005	780.806	3.220.328	809.468	887.503	694.371	836.074	3.227.416	800.452	923.738	656.386	732.380	3.112.956	-1%	4%	-5%	-12%	-3,5%
GERMANY(2)	1.327.566	1.261.978	1.187.415	1.368.444	5.145.403	1.334.842	1.371.365	1.197.543	1.288.351	5.192.101	1.317.607	1.418.396	1.264.091	1.350.093	5.350.187	-1%	3%	6%	5%	3,0%
ITALY	260.298	294.589	212.362	259.205	1.026.454	229.832	218.736	189.416	195.594	833.578	185.919	172.550	147.381	219.678	725.528	-19%	-21%	-22%	12%	-13,0%
NETHERLANDS(1)	41.858	40.861	35.472	44.889	163.080	39.333	52.375	54.024	41.868	187.600	36.903	33.803	21.902	22.513	115.121	-6%	-35%	-59%	-46%	-38,6%
PORTUGAL	44.981	44.508	33.695	42.392	165.576	40.230	36.524	32.950	41.077	150.781	37.439	37.956	29.690	32.517	137.602	-7%	4%	-10%	-21%	-8,7%
SPAIN	626.877	664.526	491.419	616.552	2.399.374	637.608	684.769	519.969	559.757	2.402.103	540.461	632.054	438.521	487.132	2.098.168	-15%	-8%	-16%	-13%	-12,7%
SWEDEN (3)	67.584	76.326	60.400	76.084	280.394	81.958	69.315	65.000	74.110	290.383	74.662	76.173	60.015	77.809	288.659	-9%	10%	-8%	5%	-0,6%
UNITED KINGDOM (1)	424.325	433.280	391.213	408.740	1.657.558	445.424	428.321	379.248	394.253	1.647.246	432.775	416.310	377.334	369.877	1.596.296	-3%	-3%	-1%	-6%	-3,1%
- EAST AND CENTRAL EUROPE	178.779	200.380	182.420	184.043	745.622	323.283	337.605	281.744	317.670	1.260.302	325.324	352.281	309.246	465.053	1.451.904	1%	4%	10%	46%	15,2%
Double Countings Slovakia / Germany	*15.000*	*26.000*	*26.000*	*27.353*	*94.353*	*16.758*	*13.000*	*10.000*	*7.784*	*47.542*	*10.071*	*12.000*	*10.000*	*10.000*	*42.071*	*-40%*	*-8%*	*0%*	*28%*	*-11,5%*
CZECH REPUBLIC	112.365	117.018	92.631	114.283	436.297	109.824	122.022	94.495	116.471	442.812	122.270	135.118	108.031	234.053	599.472	11%	11%	14%	++	35,4%
HUNGARY	35.008	31.000	37.535	18.975	122.518	38.558	22.225	31.732	26.075	118.590	28.450	37.770	38.910	31.000	136.130	-26%	70%	23%	19%	14,8%
POLAND						132.600	145.300	115.000	130.000	522.900	134.200	132.000	120.000	154.000	540.200	1%	-9%	4%	18%	3,3%
SLOVAK REPUBLIC	46.406	78.362	78.254	78.138	281.160	59.059	61.058	50.517	52.908	223.542	50.475	59.393	52.305	56.000	218.173	-15%	-3%	4%	6%	-2,4%

[258] Source: www.OICA.net

Annex 2 – Light commercial vehicle production

Light Commercial Vehicles[259]

			1999	2000	2001	2002	2003	2004
EUROPE			1,929,993	2,194,797	2,055,080	1,997,984	2,143,540	2,296,076
European Union - 25 countries			1,682,460	1,911,921	1,778,267	1,665,033	1,706,247	1,729,189
European Union - 15 countries			1,631,742	1,869,194	1,765,922	1,642,712	1,684,401	1,637,404
Double Counting Germany/Austria								
Double Counting Germany/Belgium								
Double Counting Portugal/Spain						-3,700	-2,064	-2,000
Austria			213	28				
Belgium			71,923	89,063	98,591	88,828	81,125	11,161
Denmark								
Finland								
France			346,117	409,966	395,342	358,989	391,295	385,439
Germany			188,755	238,593	207,299	178,190	187,469	174,095
Italy			245,255	270,250	265,085	259,641	255,875	267,643
Netherlands								
Portugal			60,826	63,690	59,466	65,095	71,323	73,218
Spain			548,852	642,422	564,115	520,252	566,423	535,480
Sweden								
United Kingdom			169,801	155,182	176,024	175,426	172,955	192,368
Switzerland								
European Union - New Members			50,718	42,727	12,345	22,312	21,846	91,785
Double Counting Slovakia/Germany								
Double Counting Slovakia/Czech Republic								
Czech Republic			23,506	22,771	4,070	1,195	1,308	1,112
Hungary								
Poland			27,160	19,956	8,275	21,117	12,936	75,636
Slovak Republic			52					
Slovenia							7,602	15,037
East & Central Europe			197,088	193,472	193,655	209,940	228,063	237,163
Romania			17,638	13,192	11,614	13,726	19,303	22,916
Serbia			975	953	706	868	326	1,033
CIS			178,475	179,327	181,335	195,346	208,434	213,214
Double Counting Ukraine/Russia			-7,762	-10,696	-4,061	-1,294	-1,910	-3,113

[259] Source: www.OICA.net

Double Counting Ukraine/South Korea								
Double Counting Ukraine/Italy			-223					
Double Counting Ukraine/Romania								
Double Counting Ukraine/Japan								
Russia			178,475	179,327	172,755	188,497	201,113	199,001
Belarus								
Ukraine			7,985	10,696	4,061	1,294	1,953	3,493
Uzbekistan					8,580	6,849	7,278	13,833
Turkey			50,445	89,404	83,158	123,011	209,230	329,724

Annex 3 – Buses and coaches production

Buses and Coaches[260]

	1997	1998	1999	2000	2001	2002	2003	2004
EUROPE	58,174	64,608	51,438	59,709	59,618	57,119	69,293	71,576
European Union - 25 countries	43,667	47,818	37,064	40,017	39,085	37,167	38,385	35,243
European Union - 15 countries	37,034	42,124	34,779	35,376	34,321	32,633	34,098	30,310
Double Counting Germany/Austria								
Double Counting Germany/Belgium								
Double Counting Portugal/Spain						-169	-139	
Austria	116	71	71	31	48	117	138	60
Belgium	2,146	2,396	2,270	1,499	3,767	4,358	5,458	2,304
Denmark				18				
Finland								
France	2,884	2,666	3,206	3,473	3,572	2,589	2,393	2,992
Germany	11,569	12,985	11,825	13,518	11,940	9,745	10,423	9,984
Italy	1,736	3,982	3,070	3,163	2,212	2,597	2,850	2,915
Netherlands	1,365	1,601	1,743	1,632	1,254	1,423	1,547	1,461
Portugal			146	178	227	169	139	126
Spain	1,353	1,245	1,588	1,507	1,408	1,428	1,502	1,435
Sweden	13,514	14,742	7,057	7,779	7,942	8,287	8,050	7,733
United Kingdom	2,351	2,436	3,803	2,578	1,951	2,089	1,737	1,300
Switzerland			60	141				
European Union - New Members	6,633	5,694	2,285	4,641	4,764	4,534	4,287	4,933
Double Counting Slovakia/Germany								
Double Counting Slovakia/Czech Republic								
Czech Republic	1,043	1,244	1,269	1,424	1,552	1,812	1,785	1,983
Hungary	2,315	1,636	990	1,748	1,804	1,117	1,123	901
Poland	3,265	2,800		1,283	1,372	1,588	1,373	2,049
Slovak Republic	10	14	26	186	36	17	6	
Slovenia								
East & Central Europe	11,058	13,750	11,987	15,338	18,032	17,268	19,941	21,591
Romania	215	267	78	33	40	13	1	
Serbia	142	114	60	141	224	233	162	238
CIS	10,701	13,369	11,849	15,164	17,768	17,022	19,778	21,353
Double Counting								

[260] Source: www.OICA.net

Ukraine/Russia								
Double Counting Ukraine/South Korea								
Double Counting Ukraine/Italy								
Double Counting Ukraine/Romania								
Double Counting Ukraine/Japan				-50	-50			
Russia	9,411	12,410	11,226	13,696	16,633	15,829	17,224	18,760
Belarus			380	500	429	446	480	577
Ukraine	1,290	959	243	1,018	756	747	2,074	2,016
Uzbekistan								
Turkey	3,449	3,040	2,327	4,213	2,501	2,684	10,967	14,742

Annex 4 – Heavy trucks production

Heavy Trucks[261]

	1997	1998	1999	2000	2001	2002	2003	2004
EUROPE	450,985	506,604	498,383	528,962	555,498	530,243	550,847	640,417
European Union - 25 countries	352,227	441,121	424,111	428,920	487,302	460,387	463,412	528,145
European Union - 15 countries	339,391	431,740	418,719	422,083	480,085	454,309	457,344	522,455
Double Counting Germany/Austria								
Double Counting Germany/Belgium								
Double Counting Portugal/Spain						-275	-159	
Austria	9,825	11,603	15,461	24,988	24,257	19,734	20,868	21,414
Belgium			25,355	30,499	26,243	27,100	26,097	26,689
Denmark								
Finland	373	452	472	458	404	393	432	450
France	38,001	36,893	46,401	55,112	47,955	47,495	46,049	50,143
Germany	117,598	174,535	177,588	142,586	171,249	158,136	163,334	193,774
Italy	28,092	44,273	42,472	42,618	40,619	39,074	36,452	37,808
Netherlands	19,063	25,870	43,235	50,602	48,428	47,500	50,654	58,442
Portugal	3,150	3,680	4,322	4,347	2,669	2,995	2,323	2,603
Spain	16,012	20,220	20,332	22,586	73,193	66,657	62,527	71,992
Sweden	90,520	99,714	29,790	33,605	30,170	29,931	34,588	40,640
United Kingdom	16,757	14,500	13,291	14,682	14,898	15,569	14,176	15,500
Switzerland								
European Union - New Members	12,836	9,381	5,392	6,837	7,217	6,078	6,068	5,690
Double Counting Slovakia/Germany				-93	-93			
Double Counting Slovakia/Czech Republic				-72	-72			
Czech Republic	8,764	5,414	3,004	3,073	2,719	2,769	2,327	2,200
Hungary	1,177	1,561	1,307	1,621	2,108	2,157	2,655	3,175
Poland	2,793	2,000	831	2,044	2,232	893	905	315
Slovak Republic	102	406	250	264	323	259	181	
Slovenia								
East & Central Europe	46,653	23,385	51,223	60,188	58,513	53,184	68,394	80,482
Romania	1,658	1,214	868	759	333	451	237	242
Serbia	1,291	1,105	418	555	560	600	416	568
CIS	43,704	21,066	49,937	58,874	57,620	52,133	67,738	79,672
Double Counting Ukraine/Russia								

[261] Source: www.OICA.net

Double Counting Ukraine/South Korea								
Double Counting Ukraine/Italy								
Double Counting Ukraine/Romania								
Double Counting Ukraine/Japan								
Russia	**42,042**	**19,874**	**36,275**	**43,323**	**39,612**	**35,363**	**50,019**	**57,715**
Belarus			**12,846**	**14,134**	**15,996**	**15,431**	**16,856**	**19,713**
Ukraine	**1,662**	**1,192**	**816**	**1,417**	**2,012**	**1,339**	**863**	**2,244**
Uzbekistan								
Turkey	**52,105**	**42,098**	**23,049**	**39,854**	**9,683**	**16,672**	**19,041**	**31,790**

Annex 5 - OEM Bus and coach manufacturers

Alexander Dennis
Autosan
Berkhof Jonckheere
Beulas
Bova
Cacciamali
Carrus
Salvador Caetano
Castrosua
Dallavia
De Simon
ELC
EL Car
EvoBus
Heuliez Bus
Hispano
Ikarbus
Indcar
Irisbus
Irizar
Jelcz
Lahden Autokori
LAZ
MAN
MAZ
Mercedes-Benz
Neobus
Neoplan
Noge
Optare
Pavlovo Bus
Russian Buses
Sanos
Scania
Setra
Solaris
Sitcar
Tedom
UNVI
Van Hool
VDL
Volvo
Wright

Annex 6 - Heavy trucks market worldwide[262]

Pos.	Make	Main makes
1	DaimlerChrysler	Mercedes-Benz, Unimog, Freightliner, Western Star, Sterling
2	Volvo	Volvo, Renault, Mack
3	PACCAR	Kenworth, Peterbilt, DAF, Foden, Leyland
4	Scania	Scania
5	MAN	MAN
6	Iveco	Iveco, Astra, Seddon Atkinson
7	Navistar	International
8	Hino Motors	Hino
9	Isuzu	Isuzu
10	Mitsubishi-Fuso	Fuso

[262] http://www.sweden.se/upload/Sweden_se/english/factsheets/SI/SI_FS127a_Motor_Vehicle_Industry_in_Sweden/FS127B.pdf

Annex 7 – Construction Equipment OEMs in Europe per category

Road equipment

- Acmar (FR)
- AMMANN Asphalt GmbH (DE)
- AMMANN Verdichtung GmbH (DE)
- ANTEC SpA (IT - Ucomesa)
- AXECO SpA (IT - Ucomesa)
- BERNARDI IMPIANTI INTERNATIONAL SpA (IT - Ucomesa)
- BETICO (ES)
- BOMAG GmbH (DE)
- Caterpillar Belgium, SA (BE)
- Caterpillar Matériels Routiers (FR)
- CATERPILLAR PRODOTTI STRADALI Srl (IT - Ucomesa)
- CONTROLS Srl (IT - Ucomesa)
- ENARCO (ES)
- F. Weyhausen AG & Co. KG (DE)
- Famaro Ermont (FR)
- Famaro Rincheval (FR)
- Fayat (FR)
- GCM Ltd / Uniturn Engineering Co Ltd (UK)
- Gerhard Zorn Mechanische Werkstätten (DE)
- Gomaco International Ltd (UK)
- Grün GmbH (DE)
- HAMM AG (DE)
- HOFMANN GMBH (DE)
- INTRAME (ES)
- IR-ABG Allgemeine Baumaschinen-Gesellschaft mbH (DE)
- JCB Sales Ltd (UK)
- JOSEPH VÖGELE AG (DE)
- Junttan Oy (FI)
- LEBRERO (ES)
- Lännen Tractors Oy (FI)
- Mauguin (FR)
- MAUS GmbH (DE)
- NEUMAC (ES)
- Patria Vammas Oy (FI)
- Phoenix Engineering Co Ltd (UK)
- RAMMAX Maschinenbau GmbH (DE)
- RESPECTA Maschinenbau GmbH (DE)
- ROBEL Bahnbaumaschinen GmbH (DE)
- ROQUET (ES)
- SAE Famatec (FR)
- Secmair (FR)
- SIMA (ES)
- VIBROMAX Bodenverdichtungsmaschinen GmbH (DE)
- Vilakone Oy (FI)
- Volvo Compact Equipment Sas (FR)
- Wacker Construction Equipment AG (DE)
- WEBER Maschinentechnik GmbH (DE)
- WEISIG Maschinenbau GmbH (DE)
- Wirtgen GmbH (DE)

Concrete equipment

- ALBA (ES)
- ALSINA (ES)
- ANPIMAQ (ES)
- ARNABAT (ES)
- AXECO SpA (IT - Ucomesa)
- AYERBE (ES)
- BARYVAL-SERVIPLEM (ES)
- Betonma International, NV (BE)
- BHS-Sonthofen GmbH (DE)
- C & B DUE srl (IT - Ucomesa)
- CAMAC (ES)
- CAROD (ES)
- CIFA SpA (IT - Ucomesa)
- CONTROLS Srl (IT - Ucomesa)
- Couvrot S.A (FR)
- DACAME (ES)
- DIECI Srl (IT - Ucomesa)
- DURHER (ES)
- ELBA-WERK Maschinen-Gesellschaft mbH (DE)
- Emil Laier GmbH & Co. KG (DE)
- ENARCO (ES)
- ENCOMAT (ES)
- FERMAR (ES)
- FIORI SpA (IT - Ucomesa)
- Fratelli MESSERSI' SpA (IT - Ucomesa)
- GALAGAR (ES)
- GCM Ltd / Uniturn Engineering Co Ltd (UK)
- GECO Gesellschaft für Gerätekonstruktionen mbH (DE)
- GESAN (ES)
- Gomaco International Ltd (UK)
- HIJANSA (ES)
- Hymix Ltd (UK)
- IMER INTERNATIONAL SpA (IT - Ucomesa)
- INTRAME (ES)
- KARRENA Betonanlagen und Fahrmischer GmbH (DE)
- Knauer Engineering GmbH Industrieanlagen & Co. (DE)
- LANA (ES)
- Lancy Mixjet (FR)
- LE OFFICINE RIUNITE UDINE SpA (ORU) (IT - Ucomesa)
- LEBLAN (ES)
- LECA (ES)
- Liebherr Malaxage et Techniques (FR)
- Liebherr-Export AG (DE)
- LIEBHERR-MISCHTECHNIK GMBH (DE)
- LORENZANA (ES)
- m-tec mathis technik gmbh (DE)
- MACRO (ES)
- MAQUIOBRAS (ES)
- Masa AG (DE)
- Merlo UK Ltd (UK)
- METALGALANTE Srl (IT - Ucomesa)
- MZ IMER (ES)
- NEUMAC (ES)
- O.M.G. OFFICINE MECCANICHE GALLETTI Srl (IT - Ucomesa)
- O.M.V. OFFICINE MECCANICHE VICARIO SpA (IT - Ucomesa)
- OCMER COMPANY Srl (IT - Ucomesa)
- OESA (ES)
- OFFICINE PICCINI Srl (IT - Ucomesa)
- Pemat Mischtechnik GmbH (DE)
- Pfister GmbH (DE)
- POYATOS (ES)
- PRENSOLAND (ES)
- PTC (FR)
- PUTZMEISTER (ES)
- PUTZMEISTER AG (DE)
- Reich Baumaschinen GmbH (DE)
- ROTHENBERGER (ES)
- RUBI (ES)
- SALTEC (ES)
- SCHLOSSER-PFEIFFER GmbH (DE)
- Schwing GmbH (DE)
- SERMAC SpA (IT - Ucomesa)
- SIMA (ES)
- SIPE Srl (IT - Ucomesa)
- SISTEMAS FORZA (ES)
- Somero Enterprises Ltd (UK)
- STEN (ES)
- Stetter GmbH (DE)
- TALLERES ROMAN GOMEZ (ES)
- TECNOSPAN (ES)
- TEK.SP.ED. Tecnologia Speciale per Edilizia Srl (IT - Ucomesa)
- Teka-Maschinenbau GmbH (DE)
- TELSCHIG-Verfahrenstechnik GmbH (DE)
- Terex Compact Equipment (UK)
- TEREXLIFT Srl (IT - Ucomesa)
- Theam (FR)
- TMC HERGI (ES)
- Toni Technik Baustoffprüfsysteme GmbH (DE)
- TRACTEL (ES)
- ULMA (ES)
- UMACON (ES)
- UTIFORM (ES)
- VALERO (ES)
- VIFESA (ES)
- Wacker Construction Equipment AG (DE)
- Wacker France Sa (FR)
- Wiggert + Co. GmbH (DE)
- Winget Ltd (UK)
- WISKEHR'S (ES)

- Maschinenfabrik Gustav Eirich GmbH & Co. KG (DE)
- MERLO SpA (IT - Ucomesa)
- WÜRSCHUM GMBH Abfüll- und Dosiermaschinen (DE)

Tower cranes

- AKS GmbH (DE)
- ALBA (ES)
- Arcomet, NV (BE)
- BENAZZATO GRU SpA (IT - Ucomesa)
- Bronto Skylift Oy Ab (FI)
- Carlo RAIMONDI fu R. SpA (IT - Ucomesa)
- COMANSA (ES)
- EDILGRU TOSCANA Srl (IT - Ucomesa)
- FMGRU Srl (IT - Ucomesa)
- GH (ES)
- GOSAN (ES)
- GRU COMEDIL Srl (IT - Ucomesa)
- HKS Dreh-Antriebe GmbH (DE)
- IKUSI (ES)
- INDUSTRIAS GALARZA (ES)
- ITOWA (ES)
- JASO (ES)
- KSD Kransysteme GmbH (DE)
- König Baumaschinen Vertrieb GmbH (DE)
- LIEBHERR (ES)
- Liebherr Grues à tour (FR)
- Liebherr-Werk Biberach GmbH (DE)
- Luigi CATTANEO SpA (IT - Ucomesa)
- LUNA (ES)
- O.M.V. OFFICINE MECCANICHE VICARIO SpA (IT - Ucomesa)
- OFFICINE FARI Srl (IT - Ucomesa)
- OGEI (ES)
- Potain (FR)
- SISTEMAS FORZA (ES)
- Terex Cranes France (FR)
- Terex Peiner GmbH (DE)
- WOLFFKRAN GmbH (DE)

Crushing and screening

- AGRYMIN (ES)
- Ammann Aufbereitung GmbH (DE)
- ARJA (ES)
- Aubema Crushing Technology GmbH (DE)
- AViTEQ Vibrationstechnik GmbH (DE)
- BAT Bohr- und Anlagentechnik GmbH (DE)
- Beyer GmbH (DE)
- BHS-Sonthofen GmbH (DE)
- BRÄUER Aufbereitungsmaschinen GmbH & Co. Förderanlagen KG (DE)
- C & B DUE srl (IT - Ucomesa)
- CAPOTEX (ES)
- CEMAG Anlagenbau GmbH (DE)
- Christian Pfeiffer Maschinenfabrik GmbH (DE)
- CINTASA (ES)
- Claudius Peters Projects GmbH (DE)
- CST GmbH (DE)
- Cyrus GmbH Schwingtechnik (DE)
- DBT Mineral Processing GmbH (DE)
- Dorr-Oliver Eimco Germany GmbH (DE)
- DRAGO (ES)
- KÖPPERN GmbH & Co. KG (DE)
- LEBLAN (ES)
- LOESCHE GmbH (DE)
- MAN TAKRAF Fördertechnik GmbH (DE)
- MAQUIARIDOS (ES)
- MATO Maschinen- und Metallwarenfabrik Curt Matthaei GmbH & Co. KG (DE)
- Metso Minerals France (FR)
- Metso Minerals Oy (FI)
- Mooser Schwingungstechnik GmbH (DE)
- MTU Friedrichshafen GmbH (DE)
- OFFICINE MECCANICHE DI PONZANO VENETO SpA (IT - Ucomesa)
- PFREUNDT GmbH (DE)
- Polysius AG (DE)
- Posch mobile GmbH (DE)
- Py Frères (FR)
- Rbl/Rei (FR)
- ROTRANS (ES)
- S + S Separation and Sorting Technology GmbH (DE)
- Sandvik Mining and Construction Breakers Lahti (FI)

- ELOCOM (ES)
- Extec Screens & Crushers Ltd (UK)
- F. E. Schulte Strathaus GmbH & Co. KG (DE)
- FAM Magdeburger Förderanlagen und Baumaschinen GmbH (DE)
- Gebr. Pfeiffer AG (DE)
- GFT mbH (DE)
- Giron (FR)
- HAVER & BOECKER Drahtweberei und Maschinenfabrik (DE)
- Hazemag & EPR GmbH (DE)
- Heinrich Döpke GmbH (DE)
- HR International Crushing & Screening Ltd (UK)
- INDUSTRIAS MOREO (ES)
- JÖST GmbH + Co. KG (DE)
- KHD Humboldt Wedag GmbH (DE)
- Kleemann GmbH (DE)
- Komptech GmbH (DE)
- Krupp Hazemag (FR)
- Sandvik Mining and Construction TAMROCK (FI)
- Sandvik Mining and Construction TORO (FI)
- Skako Comessa (FR)
- Somdel Ingénierie (FR)
- STEINERT Elektromagnetbau GmbH (DE)
- TAIM-TFG (ES)
- TALLERES ZB (ES)
- Tana Oy (FI)
- Taylor Construction Plant Ltd (UK)
- TELSCHIG-Verfahrenstechnik GmbH (DE)
- Terex Pegson (UK)
- ThyssenKrupp Fördertechnik GmbH (DE)
- TRIMAN (ES)
- TURBO (ES)
- TUSA (ES)
- Werner Doppstadt Umwelttechnik GmbH & Co. KG (DE)
- Weser Engineering GmbH (DE)

Earthmoving equipment

- 3B6 Sistemi Elettronici Industriali SpA (IT - Comamoter)
- A.M. di ARGNANI & MONTI Srl (IT - Comamoter)
- ABI Maschinenfabrik und Vertriebsgesellschaft mbH (DE)
- AGRIA (ES)
- Ahlmann Baumaschinen GmbH (DE)
- Ammann Yanmar (FR)
- Arden Equipement (FR)
- ARIES Srl (Tiberina Group) (IT - Comamoter)
- Ateliers de construction du Beaujolais (FR)
- Atlas Copco Construction Tools (DE)
- Atlas Copco Holding GmbH (DE)
- ATLAS-Terex GmbH (DE)
- AUSA (ES)
- Bauer Maschinen GmbH (DE)
- Bell Equipment UK Ltd (UK)
- Bobcat France (FR)
- BONDIOLI & PAVESI SpA (IT - Comamoter)
- BYG (ES)
- CAB PLUS Srl (Tiberina group) (IT - Comamoter)
- CAMS MACCHINE Srl (IT - Comamoter)
- CANGINIBENNE Srl (IT - Comamoter)
- CASAGRANDE SpA (IT - Ucomesa)
- Caterpillar (UK) Ltd (UK)
- Caterpillar Belgium, SA (BE)
- Caterpillar France (FR)
- CNH Baumaschinen GmbH (DE)
- CNH ITALIA - NEW HOLLAND KOBELCO (IT - Comamoter)
- CNH UK Ltd (UK)
- COMACCHIO Srl (IT - Ucomesa)
- COMER INDUSTRIES SpA (IT - Comamoter)
- CORAZZA Srl (IT - Comamoter)
- DANA ITALIA SpA (IT - Comamoter)
- Doosan Infracore Europe, SA (BE)
- Eickhoff Bergbautechnik GmbH (DE)
- Esco (FR)
- ETESA (ES)
- EUROMACH Srl (IT - Comamoter)
- F. Weyhausen AG & Co. KG (DE)
- FAE GROUP SpA (IT - Comamoter)
- FARESIN AGRI DIVISION SpA (IT - Comamoter)
- FERRI Srl (IT - Comamoter)
- FIORI SpA (IT - Comamoter)
- Flötzinger Gerätetechnik GmbH (DE)
- G P C Sas di Patarini V. & C. (IT - Comamoter)
- KOMATSU UTILITY EUROPE SpA (IT - Comamoter)
- KOROTA (ES)
- Kramer-Werke GmbH (DE)
- KUBOTA Baumaschinen GmbH (DE)
- LAMETER Srl (IT - Comamoter)
- Lehnhoff Hartstahl GmbH & Co. (DE)
- Liebherr France (FR)
- Liebherr Pelles à cables (FR)
- LIEBHERR-HYDRAULIKBAGGERGMBH (DE)
- LLAMADA (ES)
- LOMBARDINI Srl (IT - Comamoter)
- MACMOTER SpA (IT - Comamoter)
- MAIT SpA (IT - Ucomesa)
- MAN TAKRAF Fördertechnik GmbH (DE)
- Manitou (FR)
- MANITOU COSTRUZIONI INDUSTRIALI Srl (IT - Comamoter)
- MANTOVANIBENNE Srl (IT - Comamoter)
- Maschinenfabrik Heinrich Döpke GmbH (DE)
- Mecalac (FR)
- MERLO SpA INDUSTRIA METALMECCANICA (IT - Comamoter)
- MICHELIN ITALIANA SpA (IT - Comamoter)
- MIRALBUENO (ES)
- Morin (FR)
- MTG (ES)
- MZ IMER (ES)
- NEGRISOLO COSTRUZIONI Snc (IT - Comamoter)
- Neuson Baumaschinen GmbH (DE)
- NORDMEYER GmbH & Co. KG (DE)
- Normet Oy (FI)
- OGNIBENE SpA (IT - Comamoter)
- OMA di Amadori Srl (IT - Comamoter)
- OSINTXU (ES)
- OVERMEK Srl (Tiberina Group) (IT - Comamoter)
- PIQUERSA (ES)
- PUTZMEISTER AG (DE)
- Rabaud (FR)
- ROQUET (ES)
- ROTIS Srl (IT - Comamoter)
- SAFIM SpA (IT - Comamoter)
- SAMPIERANA SpA (IT - Comamoter)
- Sandvik/Cfbk (FR)
- Schaeff-Terex GmbH & Co. KG (DE)
- SENNEBOGEN Maschinenfabrik GmbH (DE)
- SIMEX Srl (IT - Comamoter)
- SO.GE.M.A. – Gruppo NARDI SpA (IT -

- G.B. RICAMBI SpA (IT - Comamoter)
- GHERARDI Srl (IT - Comamoter)
- GHH Fahrzeuge GmbH (DE)
- GONTRAILER (ES)
- GP Günter Papenburg AG (DE)
- Haulotte Group (FR)
- Herrenknecht AG (DE)
- HINOWA SpA (IT - Comamoter)
- Hitachi Construction Machinery France (FR)
- Hyundai Heavy Industries Europe, NV (BE)
- INDECO Ind SpA (IT - Comamoter)
- Ingersoll Rand Montabert (FR)
- ISIBOND Sas di Navire Ing.CARLO (IT - Comamoter)
- ITALTRACTOR ITM SpA - PASSINI GROUP (IT - Comamoter)
- JCB Sales Ltd (UK)
- Klac Industrie (FR)
- Komatsu Europe International, NV (BE)
- Komatsu Hanomag GmbH (DE)
- Komatsu Mining GmbH (DE)
- Komatsu UK Ltd (UK)
- SOCOMEC SpA (IT - Comamoter)
- SOILMEC SpA (IT - Ucomesa)
- TABE (ES)
- TALLERES ROMAN GOMEZ (ES)
- TECNOAGRI Srl di Malpassi Graziano & C. (IT - Comamoter)
- TECOINSA (ES)
- Terex Compact Equipment (UK)
- Terex Construction Division (UK)
- TEREXLIFT Srl (IT - Comamoter)
- TITAN ITALIA SpA (IT - Comamoter)
- Universal Augers Ltd (UK)
- V.M. MOTORI SpA (IT - Comamoter)
- VAIA CAR SpA (IT - Comamoter)
- VF VENIERI SpA (IT - Comamoter)
- Volvo Compact Equipment Sas (FR)
- Volvo Construction Equipment (DE)
- Volvo Construction Equipment Ltd (UK)
- Winget Ltd (UK)
- WIRTH Maschinen- und Bohrgeräte-Fabrik GmbH (DE)

Annex 8 – Construction Equipment production sites in Europe

OEM	Country	Product	Residence
Caterpillar	The Netherlands	Work Tools	Den Bosch
		Forklift trucks	Almere
	Belgium	Manufacture	Gosselies
	Germany	Engines	Rostock
		Engines	Kiel
	France	Transmissions	Monchy le Preux
		Manufacture	Rantigny
		Manufacture	Grenoble
	Switzerland	Overseas	Geneva
	United Kingdom	Remanufacturing	Rushden
		Remanufacturing	Shrewsbury
		Manufacture	Nottingham
		Manufacture	Leicester
		Manufacture	Peterlee
		Manufacture	Stockton-on-Tees
	Poland	Manufacture	Janow Lubelski
	Hungary	Manufacture	Godollo
Deere	Finland	Forestry	Joensuu
		Forestry	Tampere
	Sweden	Forestry	Marsta
	Norway	Forestry	Kongsvinger
	Ireland	Forestry	Co Wicklow
Komatsu	Germany	Manufacture	Hannover
	Germany	Mining	Dusseldorf
	United Kingdom	Manufacture	Birtley
	Italy	Manufacture	Este
	Sweden	Forestry	Umeo
	Norway	Teeth, Edges	Kverneland
	Netherlands	Forestry equipment	Amsterdam
Hitachi	Netherlands	Manufacture	Amsterdam
		Manufacture	Oosterhout
	France	Manufacture	Genas Cedex
		Manufacture	Issy-les-Moulineaux Cedex
	Germany	Manufacture	Stockstadt / Rhein
	Spain	Manufacture	Madrid
	United Kingdom	Manufacture	Bath
Terex	Germany	Schaeff	Langenburg
		Atlas	Ganderkesse
		Demag	Zweibrucken
		Manufacture	Dortmund
		Peiner tower cranes	Zweibrucken
		PPM Cranes	Dortmund
		Atlas	Delmenhorst
		Genie	Achim
	France	Genie	Gallardon
	United Kingdom	Cranes (JV Demag)	Bicester
		Manufacture	Motherwell
		Halco drilling	Halifax
		Compact Equip.	Coventry

		Pegson	Coalville
		Manufacture	Northampton
		Atlas	Hamilton
		Telescopic handlers	Coventry
		Demag	Brentford
		Manufacture	Coventry
		Genie	Grantham
	Spain	Manufacture	Madrid
		Genie	Barcelona
	Italy	Manufacture	Crespellano
	Belgium	Roadbuilding	Opglabbeek
	Poland	Manufacture	Srem
	Sweden	Genie	Hisings Karra
Volvo	Germany	Manufacture	Konz
	France	Manufacture	Belley
		HQ	Trappes
	United Kingdom	HQ	Duxford
	Sweden	Manufacture	Eskilstuna
		Manufacture	Arvika
		Manufacture	Vaxjo
		HQ	Eslov
		Manufacture	Braas
		Cabins	Hallsberg
	Poland	Manufacture	Wroclaw
CNH	Belgium	Components	Antwerp
	France	Components	Croix
		Components	Tracy-le-Mont
	Germany	Manufacture	Berlin
	Italy	Manufacture	Imola
		Manufacture	Lecce
		Components	Modena
		NH Kobelco CE	San Mauro
	United Kingdom	Engines	High Wycombe
		Kobelco CE	Farnborough
		Kobelco Cranes	East Grinstead
Liebherr	Austria	Cranes	Nenzing
		Wheel loaders	Bischofshofen
		Dozers, crawler	Telfs
	France	Crawler, excavator	Colmar
	Germany	Tower cranes	Biberach
		Cranes	Ehingen
		Shaping, cutting, handling	Kempten
		Excavators, components	Kirchdorf
		Maritime cranes	Rostock
	United Kingdom	Special purpose cranes	Sunderland
	Spain	Tower cranes	Pamplona
	Switzerland	Engines CE, driveline	Bulle
IR	Germany	Parts Bobcat	Mannheim
	France	Manufacturing Bobcat	Pont Chateau
	Czech Republic	Manufacturing Bobcat	Dobris
JCB	United Kingdom	Earthmovers	Staffordshire

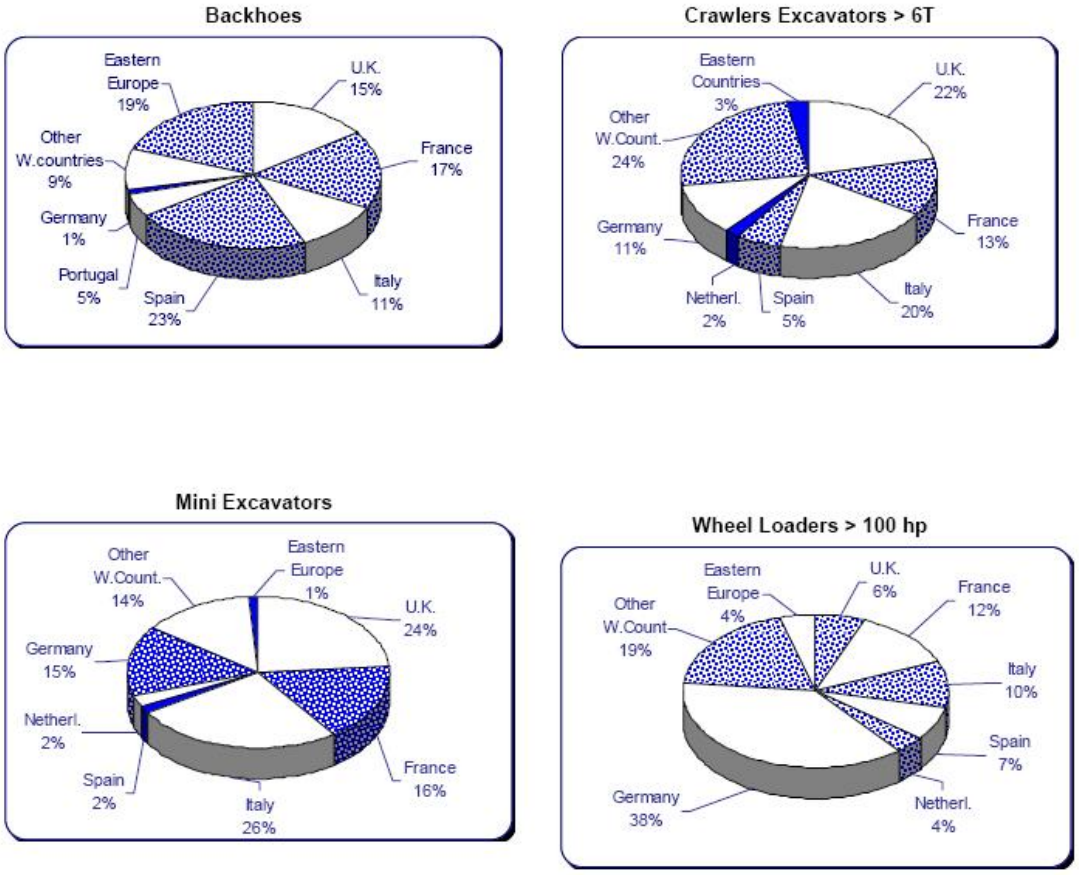
		Compact Products	Staffordshire
		Landpower	Staffordshire
		Heavy Products	Staffordshire
		Cab Systems	Staffordshire
		Transmissions	Clwyd
		Parts Centre	Staffordshire
		Powersystems	Derby
Yanmar	France	Manufacture	Saint Dizier
Kubota	France	European Headq.	Argenteuil
	Germany	Kubota Germany	Rodgau/Nieder-Roden
		Manufacture	Zweibrucken
	United Kingdom	Kubota UK	Thame
		Membrame Europe	London
	Spain	Kubota Spain	Madrid

Annex 9 – Heavy Truck industry production sites in Europe

Brand	Country	Residence	Product
MB	Turkey	Aksaray	Trucks + Unimog
		Davutpasa-Istanbul	Trucks + Unimog
	Spain	Barcelona	Axles
	Portugal	Tramagal	Mitsubishi Fuso 7,5t
	France	Molsheim	Conversions of CV
	Germany	Gaggenau	Transmissions, Axles, other components
		Kassel	Front+rear axles, propshaft, trailer axlesystem
		Mannheim	Diesel engines, crankcases, cylinder heads, rear axle housir flywheels
		Rastatt	Transmissions
		Worth	Trucks
MAN	Poland	Starachovice	Components
	Austria	Vienna	Special purpose vehicles
		Steyr	Trucks 6t<16t
	Germany	Munich	Trucks, cabs, transfer cases, axes
		Penzberg	Assemblies and welded parts
		Salzgitter	Trucks, non-driven axes
		Nurnberg	Engines
		Gustavsburg	Chassis longeron, pressings, thin plate components
		Special vehicles	Pilsting
PACCAR	Netherlands	Eindhoven	Trucks, engines, components
	Belgium	Westerlo	Cabs, axle assemblies
	United Kingdom	Lancashire	Trucks, components
Scania	Sweden	Sibbhult	Gearboxes
		Oskarshamn	Cabs
		Sodertalje	Components, chassis, engines, trucks chassis
		Falun	Axles
		Lulea	Frame members, rear axle housings
	Poland	Stupsk	Bus bodies
	Netherlands	Zwolle	Trucks
	France	Angers	Trucks
Volvo	Sweden	Flen	Trucks
		Goteborg	Trucks
		Umea	Trucks
		Koping	Powertrain
		Skovde	Powertrain
	Belgium	Gent	Trucks
RVI	France	Blainville	Trucks
		Bourg-en-Bresse	Trucks
		Venissieux	Trucks
		Limoges	Trucks
	Spain	Villa Verde	Trucks
Iveco	Italy	Bolzano	Trucks
		Brescia	Trucks
		Madrid	Trucks
		Mantova	Trucks

	Torino	Engines
	Torino	Trucks
	Torino	Trailers
Spain	Valladolid	Trucks
Germany	Ulm	Trucks
	Weisweil	Firetrucks

Annex 10 – Distribution of the European Earthmoving Equipment Market by machine

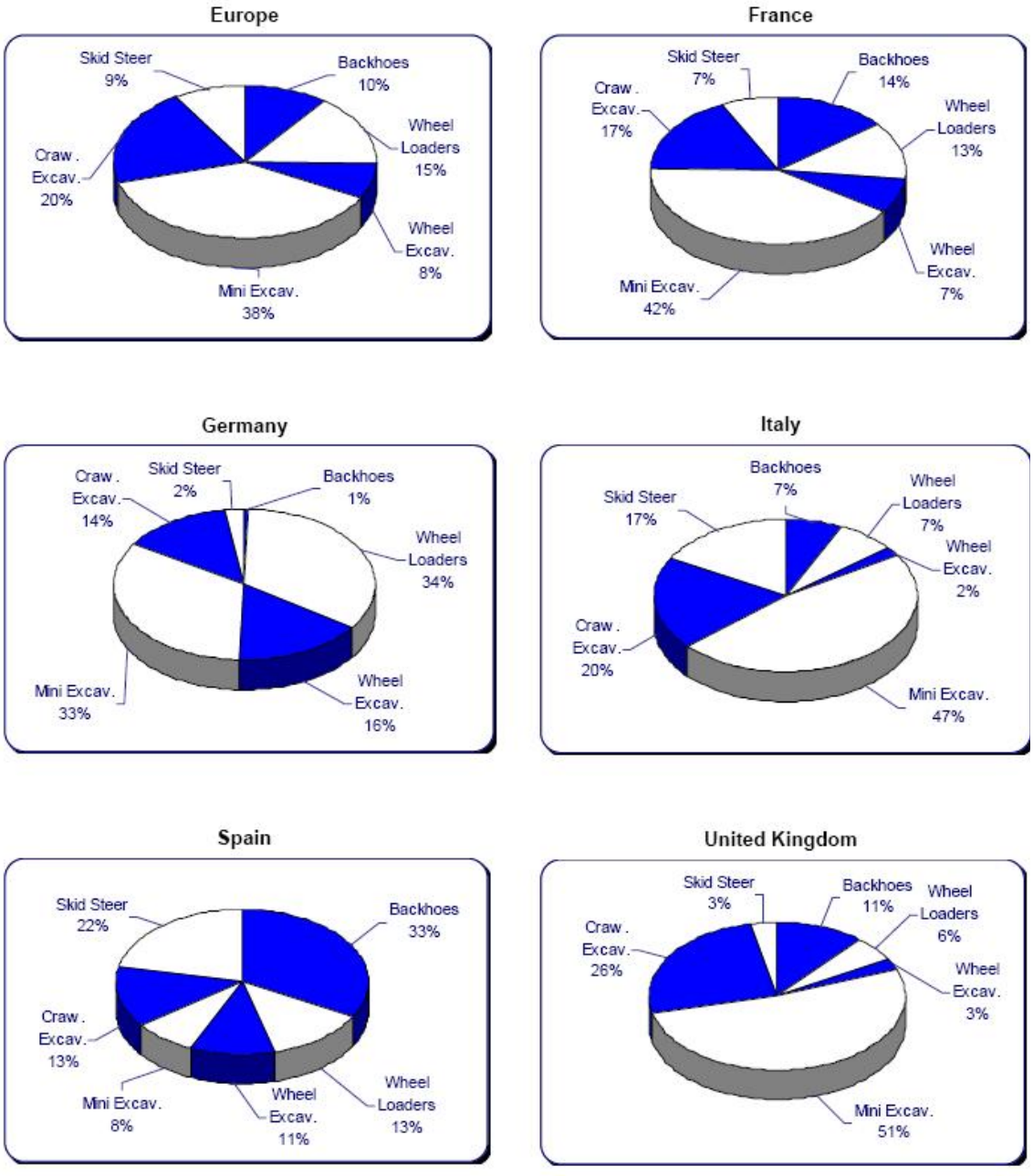


Note: Other countries include: Austria, Czech Republic, Denmark, Finland, Greece, Hungary, Iceland, Norway, Poland, Portugal, Slovakia, Sweden and Switzerland.

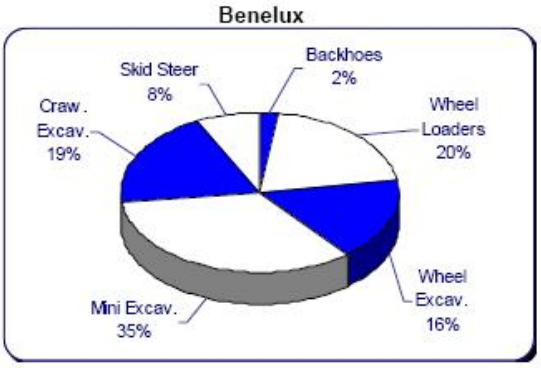
Annex 11 – Distribution of the European Earthmoving Equipment market by country

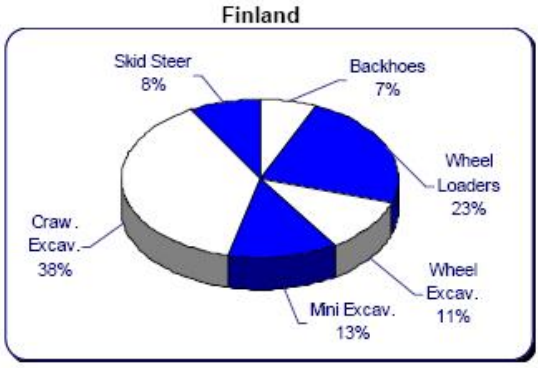
Distribution of the European Earthmoving Equipment Market

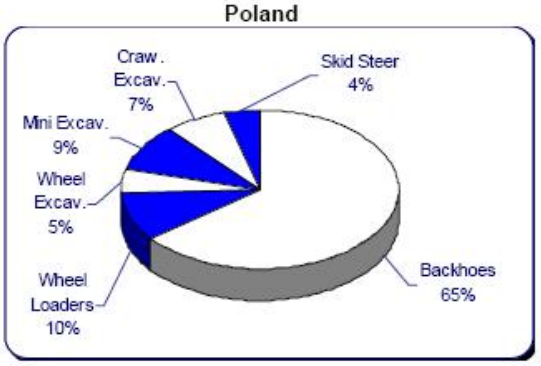
By countries - 2004

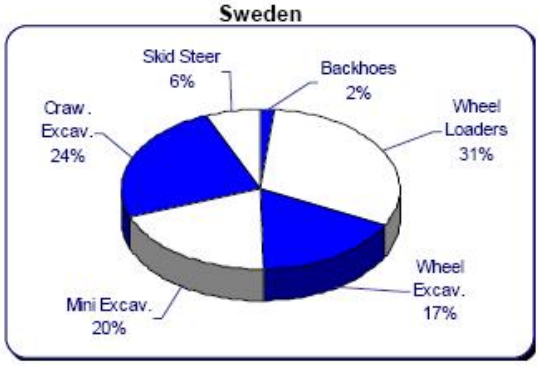


Others : Crawler Loaders, Crawler Dozers, Graders, Dumpers


Benelux
Skid Steer 8%
Backhoes 2%
Craw. Excav. 19%
Wheel Loaders 20%
Wheel Excav. 16%
Mini Excav. 35%


Finland
Skid Steer 8%
Backhoes 7%
Wheel Loaders 23%
Craw. Excav. 38%
Wheel Excav. 11%
Mini Excav. 13%


Poland
Craw. Excav. 7%
Skid Steer 4%
Mini Excav. 9%
Wheel Excav. 5%
Wheel Loaders 10%
Backhoes 65%


Sweden
Skid Steer 6%
Backhoes 2%
Craw. Excav. 24%
Wheel Loaders 31%
Wheel Excav. 17%
Mini Excav. 20%

Annex 12 – Construction Equipment manufacturers worldwide

A. M. SNOWBLAST	EAGLE IRON WORKS	KRAMER-ALLRAD	RIGGER LIFT
ABCO	EAGLE PICHER	KROLL	RIGO
ABG	EARTHFORCE	KRUPP	RILEY
ADVANCE	EASI-POUR	KUBOTA	RINGOMATIC
AEI	EAVES	KUE-KEN	RIVINIUS
AEM	ECOAIR	L B SMITH	RO
AEROIL	ECONOMY	L&T	RO STINGER
AES	EDCO	LANE	ROADTEC
AESCO MADSON	EDER	LANG	ROANOKE
AGGREGATE	EFFER	LANNEN	ROBBINS
FABRICATION	EFFICIENCY	LAPLANTE-CHOATE	ROCK SYSTEMS
AHLMANN	EIMCO	LAY-MOR	ROGERS
AIR BURNERS	EL JAY	LAYTON	ROL-LIFT
AIRMAN	ELBE STROM	LEBRERO	ROL-MOL
AKERMAN	ELGIN	LEEBOY	ROME
AL-JON	ELKIN	LEON	ROSCO
ALITEC	ELLIOTT	LEROI	ROSS
ALLATT	ELPHINSTONE	LEROY SOMER	ROTAIR
ALLEN CONCRETE	ELWELL PARKER	LETOURNEAU	ROTEC
PAVERS	ENGLISH ELECTRIC	LIBRA	ROTO GRIND
ALLEN ENG	ERIE	LIEBHERR	ROTOBEC
ALLIS-CHALMERS	ERIE STRAYER	LIFT-A-LOFT	ROTOCHOPPER
ALLMAND BROS	ERIEZ	LIFT-ALL	ROTTNE
ALMIX	ERIN	LIMA	ROWSE
ALTEC	ESSICK	LINCOLN	ROYAL
AM GENERAL	ESSTEE	LINDE	ROYER
AMERICAN	ETEC	LINDSAY	RR
AMERICAN AUGER	ETNYRE	LINK-BELT	RSP
AMERICAN EAGLE	EUCLID	LION LIFTALL	RUBBLE MASTER
AMERICAN LINCOLN	EUCLID/HITACHI	LIPPMANN	RUSTON-BUCYRUS
AMERIQUIP	EVENSMAN	LITTLE GIANT	RUSTY IRON
AMIDA	EVERSMAN	LJUNGBY	SACMA
AMLAT	EXCEL	LOAD LIFTER	SAFE-T-SHORE
AMMANN	EXTEC	LOCATELLI	SAKAI
AMOCO	EZ SCREEN	LOG HOG	SALSCO
AMS	F G WILSON	LORAIN	SAMBRON
AMZ	FAB TEC INC	LULL	SAMSUNG
ANDERS	FABTEK	LYON	SANDERSON
ANGEL	FAI	M-B COMPANY	SANDMASTER
ANI	FAIR	MAC	SANDVIK
AQUADYNE	FANTUZZI	MACK	SBM WAGENEDER
AQUATECH	FASSI	MACMOTER	SCANCLIMBER
ARBED	FASTWAY	MACO MEUDON	SCATTRAK
ARBRAA	FAUN	MAD VAC	SCHAEFF
ARDCO	FAUNFRISCH	MADILL	SCHMIDT
ARMADILLO	FECON	MAEDA	SCHRAMM
ARMLIFT	FECON WILLIBALD	MAGNA MAX	SCHWARZE
ARROW MASTER	FEDERAL	MAGNUM	SCHWING
ASHLAND	FELCO	MAGUE	SCOOP ALL
ASPLUNDH	FENWICK	MAHTO	SCREEN MACHINE
ASTEC	FERGUSON	MAN	SCREEN USA
ASTENCOOK	FERMEC	MANITEX	SCREENKING
ASTRA	FERMONT	MANITOU	SCREENMASTER
ASV	FIAT HITACHI	MANITOWOC	SDMO
ATHENS	FIAT KOBELCO	MANNESMAN	SEAL MASTER
ATHEY	FIATALLIS	MANTIS	SEBHSA
ATHEY MOBIL	FIMAG	MARATHON	SECO

ATLAS	FINLAY	MARCO	SELLICK
ATLAS COPCO	FINN	MARCY	SELMA
AUGHEY	FINTEC	MARINI	SENNEBOGEN
AUSA	FISHER	MARION	SEPPI
AUSTIN-WESTERN	FITCBURG	MARKLIFT	SERCO
AUTOCRANE	FLAHERTY	MASABA	SHANGHAI SHANGLI
AUTOLIFT	FMC	MASCO	SHOP MADE
AVELING BARFORD	FORANO	MASSEY-FERGUSON	SHOVEL SUPPLY
AVK	FORD	MASTENBROEK	SHUTTLELIFT
B L - PEGSON	FOX	MASTER CRAFT	SICARD
BABBITLESS	FRAMBS &	MASTER SKREEN	SIIRIO
BADGER	REUDENBERG	MASTERSCREEN	SILENT HOIST
BAIONI	FRANKLIN	MATBRO	SIMON
BAKER	FRASTE	MAULDIN	SIMON-RO
BALDAN	FREIGHTLINER	MAXIGRIND	SIMPLICITY
BALDOR	FRUTIGER	MAYCOMAYVILLE	SIOUX
BALZER	FUCHS	MBU	SISU
BANDIT	FURUKAWA	MC CABE	SKODA
BANNER	FWD	McCLANAHAN	SKY TRAK
BANTAM	GALION	MCCLOSKEY	SKYHOOK
BARBER-GREENE	GALLMAC	MCDONALD	SKYJACK
BARKO	GAMMA GOAT	MCLANAHAN	SMICO
BARMAC	GAR-BRO	MCLAUGHLIN	SMITH
BARRETO	GARDNER-DENVER	MCNALLY-PITTSBURG	SMV
BART MILL	GARFIELD	McPHERSON	SNORKEL
BARTH HOLLAND	GARLAND	MDI/YUTANI	SOBEMAI
BAUER	GARLOCK	MEC	SOILMOVER
BAY CITY	GATOR	MECALAC	SOMERO
BEAR CAT	GAZ	MECBO	SOOSAN
BEAR CLAW	GEFFS MFG INC	MECC ALTE	SPACEMAKER
BEDFORD	GEHL	MEGA	SPECIALTY
BELL	GENERAC	MELROE	SPECO
BENATI	GENIE	MERCEDES-BENZ	SPEEDCRAFTS LTD
BENAZZATO	GILCREST	MERCURY	SPOKANE
BENDINI	GMC	MERLO	STALLION
BENFORD	GME	MESSERSI	STAMFORD
BENFRA	GODWIN	METROTRAK	STAVOSTROJ
BENMAC	GOMACO	MEYERS	STEDMAN
BERGEAUD	GOOD ROADS	MGL	STEINBOCK BOSS
BEUTHLING	GOODFELLOW	MICHIGAN	STEPHENS
BIDWELL	GOODWIN BARSBY	MIDLAND	STEPP
BIG JOHN	GORMAN-RUPP	MIDMARK	STERLING
BIL-JAX	GOTTWALD	MIKASA	STETTER
BIRDSBORO	GRACE	MILLER	STEWART &
BITELLI	GRADALL	MILLER FORMLESS	STEVENSON
BIZZOCCHI	GRADEMASTER	MISKIN	STILL
BJD	GRASAN	MISSOURI-ROGERS	STONE
BLADEMOR	GRAVELY	MITSUBISHI	STOTHERT & PITT
BLAW-KNOX	GREAT LAKES	MMD	STOW
BOBCAT	GREYSTONE	MOBILE	STRAIGHTLINE
BOEING	GRIMMERSCHMIDT	MODERN MACHINERY	STRATO-LIFT
BOHRINGER	GRINDMASTER	CO	STROBEL
BOLIDEN ALLIS	GROVE	MOFFETT	STRUCK
BOMAG	GRUENDLER	MOGENSEN	SULLAIR
BOMBARDIER	GUNDLACH	MOOG	SULLIVAN
BONDED	GUZZLER	MORBARK	SUMITOMO
BOR-IT	GYRO TRAC	MORGAN	SUNWARD
BORAMTEC	H & B	MORGEN	SUPERIOR
BOSS	HAGAN	MOROOKA	SUPERPAC
BOWIE	HALLA	MORRISON	SUPERTRAK
BRISTOWES	HAMM	MOSA	SVEDALA

BROCE	HANCOCK	MOXY	SVETRUCK
BRODERSON	HANIX	MSE INC	SWEEPSTER
BRON	HANOMAG	MULLER	SWIFT
BROS	HANTA	MULTIONE	SYMONS
BROUWER	HARLO	MULTIPAC	SYMONS/NORDBERG
BROWN BOVERI	HARNISCHFEGER	MULTIQUIP	SYNTRON
BROWN LENNOX	HARTL	MULTITRAC	T & T
BUCCANEER	HARVEY	MUSTANG	TABOR
BUCYRUS-ERIE	HAUCK	MYERS-SETH	TADANO
BUFFALO SPRFLD	HAYBUSTER	MYLER-APACHE	TAILIFT
BULLDOG	HAZEMAG	NAGANO	TAKEUCHI
BURKEEN	HBM	NATIONAL	TAMPO
C S JOHNSON	HEIN-WERNER	NCK	TAMROCK
C&M	HEM	NEAL	TARGET
CALAVAR	HERCULES	NEUSON	TAYLOR
CAMECO	HERKULES	NEW HOLLAND	TCI
CANGARU	HESCO	NIFTYLIFT	TCM
CANICA	HETHERINGTON	NIGHTBUSTER	TELEDYNE
CAPITOL	BERNER	NIIGATA	TELELECT
CARELIFT	HEWITT-ROBINS	NIPPON/SHARYO	TELESCOPELLE
CARLTON	HI RANGER	NISSAN	TELESCREEN
CARTAWAY	HIAB	NISSHA	TELSMITH
CARTER	HILL ACME	NOBAS	TELSTA
CASAGRANDE	HIMOINSA	NOBLE	TENNANT
CASE	HITACHI	NORAM	TEREX
CASE POCLAIN	HOIST	NORDBERG	TEREX CMI
CATERPILLAR	HOLCOMB	NORDBERG SCREEN-	TEREX PEGSON
CBI	HOLLAND	ALL	TERRAMITE
CEC	HOLMES	NORDBERG/SYMONS	TESAB
CEDARAPIDS	HOLMES WELDING &	NORDVERK	TESMEC
CELLA	FABRICATION	NORKOT	TEXAS
CEMCO	HONDA	NORTHSHORE	THERMO-LAY
CENTURY	HOOD	NORTHWEST	THOMAS
CEPCO	HOOVER	O & K	THOMPSON
CHAMP	HOUGH	OHIO CENTRAL STEEL	THOR
CHAMPION	HUANGHE	OLATHE	THUNDERBIRD
CHEVROLET	HUBER	OLIN	THUNDERBIRD II
CHI PNEUMATIC	HUMBOLDT WEDAG	OLIVER	THURMAN
CHIEF	HUNTER	OLIVER-WHITE	THWAITES
CHIEFTAIN	HURON MFG CORP	OLYMPIAN	THYSSEN KRUPP
CHIKUSUI CANYCOM	HURRICANE	OM	TIGER
CHRYSLER	HUSKY	ONAN	TIGERCAT
CIFA	HUSTLER	ORMIG	TIMBCO
CIMLINE	HUTTE	OSHKOSH	TIMBER KING
CKC	HY-DYNAMIC	OVERLAND	TIMBERJACK
CLAAS	HY-HOE	OWATONNA	TIMBERLAND
CLARCO	HYDRA PLATFORMS	P & H	TIMBERLINE
CLARK	HYDRA TECH	PACECO-MOHR	TIMBERPRO
CLEMRO	HYDRA-MAC	PACIFIC	TIRRE
CLETRAC	HYDRA-UNIT	PACKER	TITAN
CLEVELAND	HYDRATEC	PAGE	TKD
CMI	HYDREMA	PALFINGER	TOKYO RYKI
CMV	HYDRO MITE	PARAMOUNT	TOREQ
COASTAL	HYDRO-AX	PARKER	TORGERSON
COIME	HYDROMEC	PARMANCO	TORO
COLEMAN	HYPAC	PARNABY	TOWMOTOR
COLES	HYSTER	PARSONS	TOYOTA
COLMAR	HYTEC	PATCHMAN	TRAIL KING
COMPAC	HYUNDAI	PATRIA VAMMAS	TRANSCRETE
COMPACT TRUCK	IBAG	PATRICK	TRAVERSE LIFT
COMPAIR	ICC	PAURAT	TREE BANDIT

COMPAIR HOLMAN	ICON	PAV-SAVER	TREE FARMER
CON-E-CO	IDAHO NORLAND	PAXTON MITCHELL	TRENCOR
CONCEPT PRODUCTS	IFE	PAYHAULER	TRIO
CONDOR	IGEA	PECCO	TRIVESOIL
CONJET	IHI	PEERLESS	TROJAN
CONTINENTAL	IMC	PEL JOB	TSURUMI
CONVAULT	IMT	PENCORE	TVER
COOPER SUPERIOR	INGERSOLL-RAND	PENN	TYLER
COPMA	INGRAM	PENNSYLVANIA	TYLER-TYROCK
CORINSA	INNOVATOR	PEP	TYMCO
CORMACH	INROCK	PERKINS	TYROCK
CORNELL	INSLEY	PERLINI	U SCREEN
COYOTE	INTENSUS	PETERBILT	UNIC
CPM	INTERCON	PETERSON PACIFIC	UNILIFT
CRAFCO	INTERNATIONAL	PETTIBONE	UNIVERSAL
CRC-EVANS	INTERPIPE	PHILLIPS	UNIVERSAL REFINER
CROWN	IPS	PHOENIX	UP-RIGHT
CRUSHKING	IRMAOS TAVARES	PILOT CRUSHTEC	USTC
CRUSHTEK	IRMER & ELZE	PINGUELY	UTC
CSI	IROCK	PIONEER	VAC TRON
CTR	IRON MULE	PIPEHUNTER	VAC-ALL
CTS	ISC	PITMAN	VACMASTER
CUMMINS	ISUZU	PLM	VACTOR
CURBMASTER	ITALMACHINE	PM	VALMET
CURBMATE	IVECO	POCLAIN	VAXCAVATOR
CUSTOM	JABCO	PONSSE	VENIERI
CUSTOM BUILT	JCB	PORTEC	VERMEER
DAEWOO	JCI	PORTERS WELDING	VERSALIFT
DAHMER	JEFFREY	POTAIN	VERSATILE
DANDY DIGGER	JENNBACHER	POWER BOX	VIBROMAX
DARBY	JENZ GERMANY	POWER CURBERS	VIKING
DART	JERSEY	POWER PAK	VINCE HAGAN
DATSUN	JET-N-VAC	POWER PAVERS	VIPER
DAVIS	JETCO	POWERSCREEN	VME
DAYTON	JLG	PPM	VOGELE
DCI	JOHNSON	PRECISION	VOLVO
DDT	JOHNSON RANGER	PRENTICE	WABCO
DEERE	JOHNSON ROSS	PRIESTMAN	WACKER
DEISTER	JOHNSTON	PRIMAX	WAGNER
DELCO	JONES	PRIME-MOVER	WALDON
DELMACH	JOY	PRINCETON	WALES
DELTA	JSW	PROTEC	WALTECH
DEMAG	JUMBO	PSI	WARNER-SWASEY
DENYO	JUNGHEINRICH	PUCKETT BROS	WARREN
DETROIT	K-TEC	PUCKETT MFG	WATANABE
DEUTZ	KAESER	PUTZMEISTER	WAUKESHA
DFH	KAFKA	PYLE	WEBER
DIAMOND	KAISER	QMC	WEIMAR
DIAMOND Z	KALMAR	R B INDUSTRIES	WELFAB
DIECI	KATO	RAMMAX	WELLCO
DIEDRICH	KATOLIGHT	RAMROD	WERKLUST
DIESTER	KAWASAKI	RANDON	WESERHUTTE
DIG-IT	KENDALL	RANGER	WESTERN STAR
DINGS	KENWORTH	RAPIER	WESTINGHOUSE
DITCH WITCH	KIPPUR	RAVO	WH
DIXIE	KLEEMANN & REINER	RAWSON	WHEELABRATOR
DIXON INDUSTRIES	KLEIN	RAYCO	WHITEMAN
DJB	KOBELCO	RAYGO	WHO
DMC	KOCKS	RAYMOND	WIGGINS
DMI	KOCKUM	RE-TECH	WILDCAT
DOEPKER	KODIAK	REACHMASTER	WILLIAMS

DOOSAN DAEWOO	KOEHRING	READ	WILSON
DOPPSTADT	KOHLER	REED	WINCO
DOVER	KOKUDO	REEDRILL	WINSLOW
DREDGING SUPPLY CO	KOLBERG	REICH	WIRTGEN
INC	KOLLER	REICHDRILL	WIRTH
DRESSER	KOLMAN	REIMER	WOODCHUCK
DRESSTA	KOMATSU	REINCO	WOODSMAN
DRILTECH	KOTRAK	REMAX	WORK FORCE
DROTT	KPI	REMCO	WORTHINGTON
DSB MASCHINENBAU		REX	XIAMEN
GMBH		REXWORKS INC	YALE
DUO-PACT		REYNOLDS	YANMAR
DURA TECH		RICHMOND	YUCHAI
DURALIFT			YUTANI
DYNAHOE			ZEPPELIN
DYNALIFT			ZETTELMEYER
DYNAPAC			ZIMMERMAN
DYNAPAC HOES			
EAGER BEAVER			
EAGLE			

Annex 13 – United Kingdom CEA members

ABNORMAL LOAD SERVICES (INTERNATIONAL) LTD
ACCESS INTERNATIONAL
ATP INDUSTRIAL TRANSMISSIONS LTD
AXLETECH INTERNATIONAL
BECOOL RADIATORS
BELL EQUIPMENT UK LTD
BERGSTROM (EUROPE) LTD
BOBCAT COMPANY
BOULTON LTD
BRENDON POWERWASHERS
BSP INTERNATIONAL FOUNDATIONS LTD
CALDERVALE FORGE CO LTD
CATERPILLAR (UK) LTD
CNH UK LTD
COMESYS EUROPE LTD
CONSTRUCTION EUROPE
CONSTRUCTION NEWS
CONTRACT JOURNAL/REED CONSTRUCTION
CRANES TODAY MAGAZINE
CUMMINS ENGINE COMPANY LTD
DANA CORPORATION - DRIVE SHAFT
DANA CORPORATION - SPICER DRIVE SHAFT
DAVID BROWN HYDRAULICS
DAWSON CONSTRUCTION PLANT LTD
DEMOLITION & RECYCLING INTERNATIONAL
EDWIN LOWE LTD
EUROPEAN RENTAL NEWS
EXTEC SCREENS & CRUSHERS LTD
FAIRPORT CONSTRUCTION EQUIPMENT LTD
GATE 7 LTD
GCM LTD
GKD TECHNIK
GOMACO INTERNATIONAL LTD
GROVE WORLDWIDE
HAMMERTECH LTD
HANIX EUROPE LTD
HARFORD MANUFACTURING LTD
HENRY COOCH AND SON LTD
HESKINS LTD
HIDROMEK
HITACHI CONSTUCTION MACHINERY (EUROPE) NV
HR INTERNATIONAL CRUSHING & SCREENING LTD
HUSCO INTERNATIONAL LTD
HYDREMA DENMARK A/S
HYMIX LTD

INDUSTRIAL VEHICLE TECHNOLOGY (IVT)
INTERNATIONAL CONSTRUCTION
INTERNATIONAL CRANES
INTERNATIONAL TRANSMISSIONS LTD
JCB SALES LTD
JOHN DEERE CONSTRUCTION EQUIPMENT CO
KAB SEATING LTD
KATMEX LTD
KAY-DEE ENGINEERING PLASTICS LTD
KNOTT LTD
KOCUREK EXCAVATORS LTD
KOMATSU UK LTD
LEMAC ENGINEERING
LINECROSS THERMOPLASTICS LTD
LOADWISE INTERNATIONAL LTD
MACHINERY OUTLOOK EUROPE
MERLO UK LTD
METSEC PLC
MILLER UK LTD
MILSCO MANUFACTURING LTD
MOXY ENGINEERING AS
NEWAGE TRANSMISSIONS
NYLACAST LTD
OFF-HIGHWAY RESEARCH LTD
PERKINS ENGINES COMPANY LTD
PHOENIX ENGINEERING CO LTD
PIONEER PUMP LTD
PLANT WORLD
PROLEC LTD
R B RESEARCH
RDS TECHNOLOGY LTD
RESALE WEEKLY
ROBALLO ENGINEERING CO LTD
SELWOOD
SKF (UK) LTD
SOMERO ENTERPRISES LTD
SPILLARD SAFETY SYSTEMS LTD
SPP PUMPS
TAYLOR CONSTRUCTION PLANT LTD
TEREX CONSTRUCTION DIVISION
TEREX PEGSON
THERMO ELECTRON CORP - MEI LOAD INDICATION SYSTEMS
THOMPSON TECHNIK (BRIDGEND) LTD
THOMPSON TECHNIK (HESSLE) LTD
THOMPSON TECHNIK (LUDLOW) LTD
THOMPSON TECHNIK (NEWCASTLE) LTD
TOWERLIGHT PLC
TRELLEBORG INDUSTRIAL AVS
TRIMARK EUROPE LTD

Annex 14 – Hydrauto business profile

Hydrauto: Profile

PRODUCTS
Hydrauto works with customized valve and cylinder components for mobile hydraulics. The company's products are used mainly in mobile cranes and construction machinery.

MARKETS
Hydrauto's largest customer is the Hiab Group, which accounted for 57 percent of sales in 1996. Hiab, the world's largest manufacturer of mobile cranes, purchases most of its valves and cylinders from Hydrauto.

COMPETITORS
The main competitors in Sweden for cylinders are Voac and Dacke
Hydraulik, while for valves the primary competitors are Voac and Nordhydraulik. Foreign competitors include the German companies Pacoma, Montan and Weber, and the British companies Cascade and Edbro. Most of the major machine manufacturers in Europe make their own cylinders, although several have shown interest in alternative supplies.

DEVELOPMENT POTENTIAL
In an effort to broaden its customer base, Hydrauto is focusing on the new construction cylinder product area. This work is being conducted through a cooperation agreement with the Japanese company Kayaba, one of the world's leading manufacturers of hydraulic cylinders. The agreement gives Hydrauto access to a design and production technique developed by Kayaba. During the year Hydrauto signed a delivery contract for construction cylinders with a yearly volume of approximately SEK 65 M.

MANUFACTURING
Manufacturing takes place at Hydrauto's plant in Skellefteå, Sweden.

Annex 15 – Dickson's Vendor selection criteria

Dickson's Vendor Selection Criteria

Rank	Factor	Mean Rating	Evaluation
1	Quality	3.508	Extreme importance
2	Delivery	3.417	
3	Performance history	2.998	
4	Warranties and claim policies	2.849	
5	Production facilities and capacity	2.775	Considerable importance
6	Price	2.758	
7	Technical capability	2.545	
8	Financial position	2.514	
9	Procedural compliance	2.488	
10	Communication system	2.426	
11	Reputation and position in industry	2.412	
12	Desire for business	2.256	
13	Management and organisation	2.216	
14	Operating controls	2.211	
15	Repair service	2.187	Average importance
16	Attitude	2.120	
17	Impression	2.054	
18	Packaging ability	2.009	
19	Labour relations record	2.003	
20	Geographical location	1.872	
21	Amount of past business	1.597	
22	Training aids	1.537	
23	Reciprocal arrangements	0.610	Slight importance

Source: Adapted from Dickson, (1966, p. 38)

Annex 16 – Volvo SEM: Supplier Evaluation Manual

LIST OF CONTENTS

1. FOREWORD

In this booklet the principles and values for evaluation of suppliers adopted by the Volvo companies are described. The model can be applied for all suppliers. The purpose is to achieve a good basis for selection of suppliers, structuring the supplier base and for the continuous development of competence and communication as well as results and progress. The supplier evaluation within Volvo is named "Supplier Evaluation Model" (SEM). Within the framework of supplier evaluation various forms for quality awards can be included, which is adopted by some Volvo companies and also the view on Total Quality Management (TQM) and the associated basic values.

2. SUPPLIER EVALUATION

2.1 Principles

The supplier evaluation shall comprise all aspects that are important for a well working co-operation between the Volvo Company and the supplier.

The SEM shall be used in all cases where the standard of a supplier for production material is to be defined. It can be used both for existing and potential suppliers. Existing suppliers shall be "coached" with the SEM used as a monitoring and corrective action tool.

2.2 Co-operation between the Volvo companies

Supplier Evaluation Model has been accepted and will be applied by:

- Volvo Trucks
- Renault Trucks
- Mack Trucks
- Volvo Powertrain
- Volvo Parts
- Volvo Aero
- Volvo Buses
- Volvo Penta
- Volvo Construction Equipment

The evaluation model is common for the companies as well as the criteria set up for the evaluation. In principle evaluation is carried out by the company having the biggest business or in case of potential supplier by the company planning a future business.

2.3 Evaluation model - SEM

Within the framework for SEM, 11 criteria's together with subquestions – parameters are evaluated. Each question will be given evaluation result 0, 1, 2 or 3 points. For criteria, the result is calculated as a percentage ratio of the total sum. Some parameters may deal with activities that are not relevant for all suppliers, in such cases it is marked *"not applicable" (N/A)* and the question is deleted from total calculation.

2.4 Description of SEM

The purpose with the model is to:

- make available a basis for evaluation of potential and existing suppliers.
- provide a unified procedure for all Volvo companies to allow full exploitation of the results within Volvo.
- provide a supplier data set within various component, functional and technological areas.
- deepen the knowledge about each supplier.
- act as an improvement tool for developing suppliers and the supplier structure.
- assist in fact-based decision making.
- give basic data for running supplier award programmes.
- share information about a supplier to the Volvo Group organisations.

Volvo personnel carry out evaluations in cross-functional teams (Supplier Quality Assurance, Design, Logistics, After-market etc.). A SEM-lead auditor normally located in the purchasing organisation manages the team.
Evaluations can be performed for existing as well as new suppliers. As to potential suppliers there are some "stopping parameters" which must be evaluated as approved (min. 1 pt) in order to be selected as a Volvo supplier. These parameters are to be found in the criteria Company Profile, Management, Environment, Quality, Logistics, Competence, and Finance.

2.4.1 Preparations and collection of facts

In connection with the planning of an evaluation the supplier company can be asked beforehand to present fact based data and presentation material in order to carry out the evaluation as effective as possible. Likewise internally in Volvo available data are collected to make the evaluation as objective as possible.

2.4.2 Short description of evaluation criteria

In this item is described which criteria and parameters are evaluated and short comments concerning what characterises a good evaluation result

a) Company profile

Evaluation parameter	Comments
- Ownership	A stability in ownership and willingness to invest in long-term view. Volvo evaluates co-operations and joint ventures from a risk point of view.
- Global ability	The supplier´s possibility to support Volvo within all the geographical areas where Volvo is operating. The supplier´s activities can contain e.g. product engineering, industrial engineering, production or delivery and distribution.
- Dependency	The business volume in relation to customers and the size and importance of the Volvo business, large dependency as well as small is being considered. The supplier´s customer structure.

b) Management

Evaluation parameter	Comments
- Management	The application of modern work procedures, e.g. cross-functional teams, long-term business plan a.o.
- Customer satisfaction	The application of effective procedures to monitor customer satisfaction.
- TQM *work* procedures	The use of criteria for quality awards in the own quality development. Examples are Swedish Quality Award, Malcolm Baldrige National Quality Award and European Quality Award, QUALImètre etc.
- Risk management	Knowledge and procedures in this field. Can incorporate risks in production processes, e.g. Contingency plans, fire protection but also environmental risks and administrative hazards, e.g. computer systems and communication

c) Environment

Evaluation parameter	Comments
- Environmental management system	Application and certification of environmental management system acc to ISO 14001
- Environmental assessment - company level	Is evaluated with regard to results at self assessment, ref PQP 7 (Environmental Care)
- Environmental assessment - products and services	Is evaluated with regard to results at self assessment, ref PQP 7 (Environmental Care)

d) Quality

Evaluation parameter	Comments
- Quality system	Application and certification of a quality management system acc to norms adopted within automotive industry, QS-9000, ISO 9001:2000, VDA 6.1, EAQF, AVSQ, ISO/TS 16949
- Quality Planning, Part quality assurance	Well organised and applied procedure for quality planning including the use of quality methods like FMEA, capability testing etc.
- Quality performance of deliveries	The quality work shall result in fault-free deliveries. Evaluation is made partly how set targets are met and the supplier´s output related to best branch practice.
- Reliability	Shall be seen as the quality performance of the vehicle (or product) in use by the end customer. Reliability is determined by warranty cost, failure frequencies, customer complaints, service ability.
- Problem solving	Formalised problem solving process with forecasting and evidence of process efficiency.

e) Logistics

Evaluation parameter	Comments
- Logistic system	The application of a system for logistic management of incoming material, production control and distribution Results from 2nd part audits or self-assessments (OLE=Odette Logistic Evaluation). Ref also to PQP 12 (Logistics).
- Delivery precision/ Service level	Evaluation of the supplier´s proved ability to meet requirements for on-time deliveries and quantities.

f) After-market

Evaluation parameter	Comments
- Documentation (after market)	The supplier´s ability and willingness to support Volvo with technical product documentation, aims at suppliers with design responsibility.
- Service literature	The supplier´s ability to support concerning service and repair manuals etc. for suppliers with design responsibility.
- Co-operation and support (after market)	Evaluation of the supplier´s ability to give spare part provision over set time frames, keep good price stability and otherwise support the after-market work.
- Warranty	The length (general) of warranty that the supplier has with his major customer and to Volvo.

g) Competence

Evaluation parameter	Comments
- Product and industrial technology	Evaluation concerning supplier's total product knowledge, functional systems, research and development and the industrial processes. Takes also the internal competence development into consideration.
- Industrial engineering	Evaluation concerning supplier's standard concerning production means, production sites, equipment, machines, tooling and production control.
- Customer support and communication	Evaluation of supplier´s ability to provide service and support and working relations, presence and speed of response.
- Electronic communication	The suppliers' ability to use (send & receive) according to EDI-standard and implementation.

h) Product Development

Evaluation parameter	Comments
- Product development process and project support	Evaluation concerning the structure of product development including resources for research, product engineering, verification (testing) and validation. The resources for project organisation incl. availability.
- Engineering experience	The supplier's documented experience within the branch, in the automotive industry, towards various customers etc.
- Product engineering technology	The application of modern technology, computer support (CAE/CAD) and developed communication lines.
- Prototypes	The ability to furnish with prototypes according to desired time schedule and with trustworthy relation to mass production standard.
- Research & development	Evaluation of the resources for R & D in relation to total turnover
- Design changes	The application of controlled procedures including all necessary activities connected to design changes.

i) Economy

Evaluation parameter	Comments
- Financial evaluation	Evaluation aided by annual reports and financial rating.
- Payment terms	Evaluation of the supplier's payments terms.

j) Productivity

Evaluation parameter	Comments
- Process of internal cost reduction	The ability to drive an efficient rationalisation of products as well as manufacturing and using methodology such as measuring of overall equipment efficiency, value analysis production process improvement tools etc.
- Cost targets	The ability of cooperation concerning setting up and monitoring of targets for cost effectiveness.

k) Purchasing

Evaluation parameter	Comments
- Sourcing process	The ability to conduct an effective process at evaluation, selection, setting of requirements and developing sub-suppliers.
- Subcontractor performance	The application of systematic follow-up and evaluation of sub-suppliers concerning quality output, delivery precision, co-operation and rate of improvement.

2.4.3 Summary of results and follow-up

After the evaluation a summary of the results is made where the result of each criterion and the total summarised output is calculated by percentages. The result of the evaluation is rated in grades A, B or C. In the final report the total calculated average value and the value of the lowest criterion and the point result for stopping parameters. The result is informed to the supplier who is asked to submit a plan for improvement actions (if requested).

Evaluation result

* Grading is determined by total average and stop parameters

Grade*	total average	average of lowest criteria
B	71%	56%

** Requirement for entrance level (B level) is minimum 1 pt in stop parameters and min. 50% total average.

Achieved points of stopping parameters**	
Parameter 1.1 Ownership	2
Parameter 2.4 Risk Management	2
Parameter 3.1 Environmental Management	3
Parameter 4.1 Quality system	2
Parameter 4.3 Quality perfmance	1
Parameter 5.2 Delivery performance	2
Parameter 7.1 Industrial engineering	2
Parameter 9.1 Financial evaluation	2

Grading:		
A	excellent	> 80%
B	good	50-80%
C	not acceptable	< 50% or stop parameter with 0 pt

3 QUALITY AWARD FOR SUPPLIERS

The Volvo companies can as per decision within each company implement a system with awards to suppliers to give prominence to supplier companies who have shown excellence in performance and / or improvements in their co-operation with Volvo. Such systems with awards for suppliers are adapted individually by the companies. There may also be possibilities to implement awards on a regional basis. Each company is responsible for the information to its suppliers about which routines are used.

4 TOTAL QUALITY MANAGEMENT - TQM

4.1 The concept of TQM

TQM is a conception, which stretches wider than the traditional quality view of inspection and control. TQM means an organisation working with a quality view in all levels from top management through the whole structure and where a continual focus on improvement involves all employees. TQM implies largely a new way of thinking which affects the culture, the strategy and technology in the company.

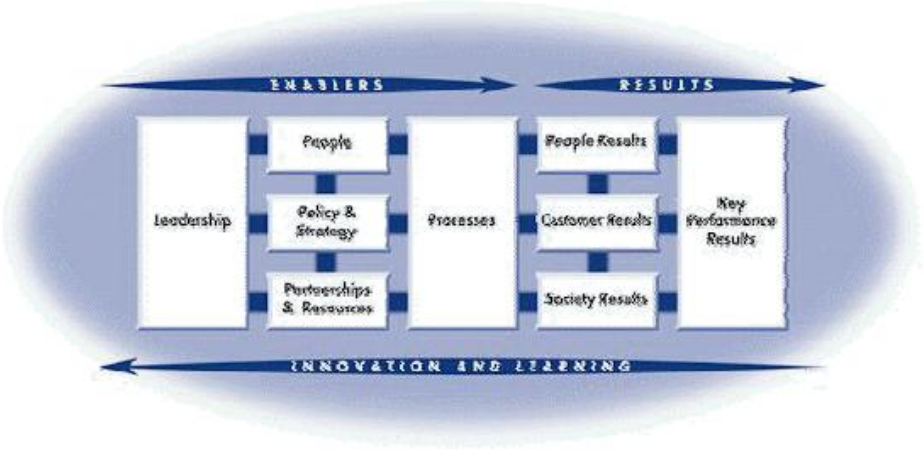
> "Quality, in traditional meaning product quality, comprises all the functions and merits of the Volvo products and services which create satisfaction and pride for the end consumer. In today´s competitive environment the quality commitment extends further than industrial knowledge and engineering excellence to embrace caring for the customer and his or her needs throughout the whole life cycle of the product. "

4.2 Quality awards and evaluation criteria

In various countries, regions and branches systems have been developed for the pre sentation of quality awards.
Examples of such awards are

Europe European Quality Award	USA Malcolm Baldrige National Quality Award
Japan Deming Application Prize	Sweden "The Swedish Quality Award"

The quality awards and the criteria for these give a concrete form for the ideas of TQM. The defined criteria as basis for evaluation within the award systems have become a driving factor for quality development in broad terms as well as the pronounced thinking about the correlation between the total management in an organisation and the results. As an example the model for the European awards is shown:



source: European Foundation for Quality Management, 2002

Volvo sees it as a natural and important part of the supplier´s improvement work to acquire knowledge and to implement the widened meaning of quality in these criteria as well as conduct own evaluations as applicable.

4.3 Basic values

Example of basic values can be used in the Total Quality Management award criteria's. SIQ is an independent foundation. Its task is to stimulate and contribute to positive development of quality in all aspects of Swedish society. SIQ is responsible for the Swedish Quality Award and the SIQ Model for Performance Excellence, which is based on the following 13 core values and concepts, which are characteristics of the activities of successful organisations.

Core Values

Customer Orientation
The long-term success of an organisation depends on its ability to create value for the people it exists to serve - customers. The stated or implied needs, demands, requests and expectations of internal and external customers should guide the organisation, its staff and its operations.

Committed Leadership
Personal, active and visible commitment is required from every manager to create a culture, which puts the customer first. The leaders' most important tasks are to give the organisation direction, take advantage of the potential in individuals' experience and differences and to define and follow up the goals in dialogue with them.

Participation by Everyone
One requirement for a successful organisation is that every employee feels that he/she is trusted by the organisation to perform and develop his or her tasks. Consequently, everyone must understand how they fit into the whole, must have clear goals, have the means to attain them and be aware of the results achieved.

Competence Development
An organisation's collective competence is decisive for its success and competitiveness. Competence development must therefore be viewed in both an organisational and an individual perspective, so that competence can be developed and added in such a way as to strengthen both the individual and the organisation as a whole.

Long-Range Perspective
The activities of the organisation must be viewed from the perspective of long-term development and competitiveness. Sustainable development leads to increased productivity and efficiency, better environment, more satisfied customers and enduring profitability.

Public Responsibility
Every organisation has a duty to society, which goes further than observance of laws and regulations. The organisation and its employees must see their processes, goods and services in a wider perspective, and should actively promote improvements in both society and in the environment.

Process Orientation
The activities of the organisation should be seen as processes, which create value for customers. Process orientation stimulates analysis of, and improvement to work flows and work organisation, and paves the way for customer-oriented organisational development.

Prevention
It is profitable to prevent faults from occurring and to remove risks in processes, goods and services. Foresight, forethought and planning are keywords for improvement activities in which customers and suppliers will also be involved.

Continuous Improvement
Competitiveness requires continuous improvement and renewal of all facets of operations. This requires methodical improvement work throughout the organisation and a culture, which stimulates continuous learning, creativity and new ideas.

Learning from Others
In order to develop further, the organisation and its staff must acquire new knowledge about what can be achieved and how it should be achieved. This requires comparison with those who are best at doing a specific process, irrespective of the industry or sector to which they belong.

Faster Response
In all business, shorter response times, shorter cycle times and faster response to customer requirements are of decisive importance. This applies to development, production and supply of goods and services, and to administrative processes.

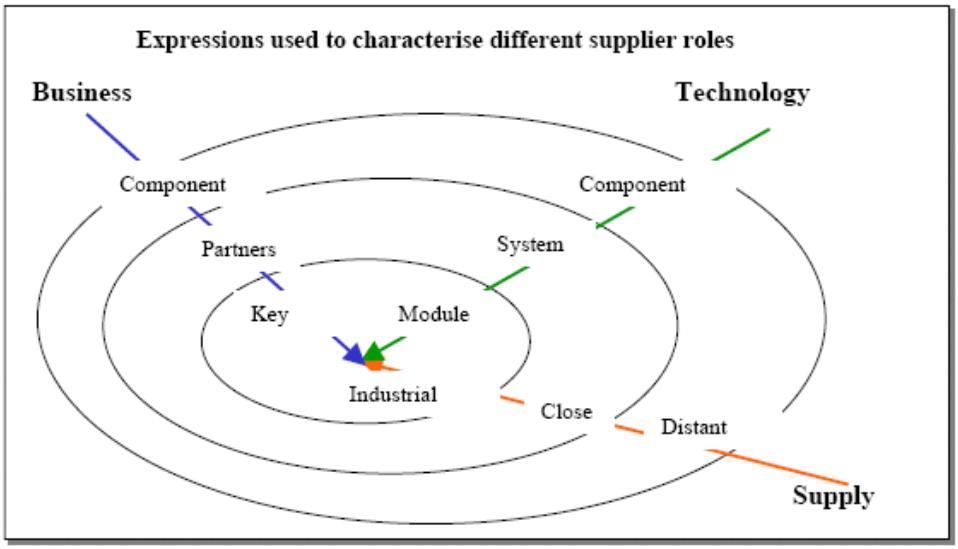
Management by Facts
Decisions must be based on documented and reliable facts. Each employee must be able to measure and analyze the relevant variables for customer satisfaction and productivity in the area concerned.

Interaction
Interaction permeates every successful organisation. It is essential that interaction should operate on several levels and in different respects involve the competencies and experience of employees, customers, suppliers, partners, owners and principals.

Source: SIQ, Swedish Quality Award 2002.

4.4 TQM in supplier relations

Gradually, as suppliers play an ever more important part in the product and process engineering process and in improvement of efficiency the TQM concept can be applied as a guideline in the co-operative work.



The different roles played by suppliers are shown in the schematic above. Some expressions are used for suppliers depending on these supplier roles and consequently such expressions may differ slightly with regard to

- business roles
- technical content of the product
- roles in the supply chain

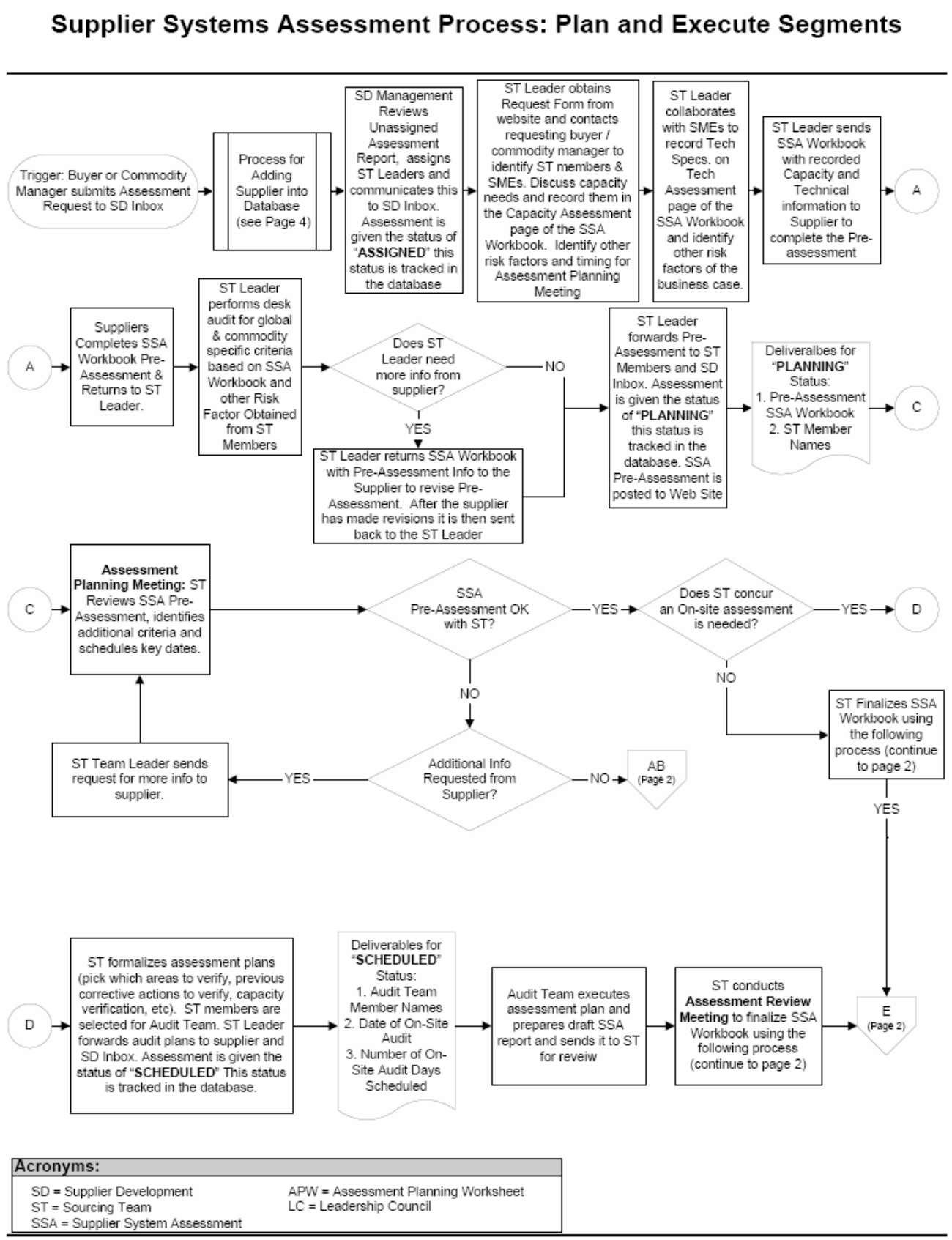
Examples of possibilities for co-operation in the "TQM"- spirit may be:

- co-operation by regular meetings between the top management of suppliers and the Volvo company purchasing organisation
- development and follow-up of common metrics for performance
- driving improvement process by benchmarking
- creation of pre-requisites for a common knowledge of customer needs, expectations and experiences - Voice of the customer.

4.5 Volvos view on suppliers' development

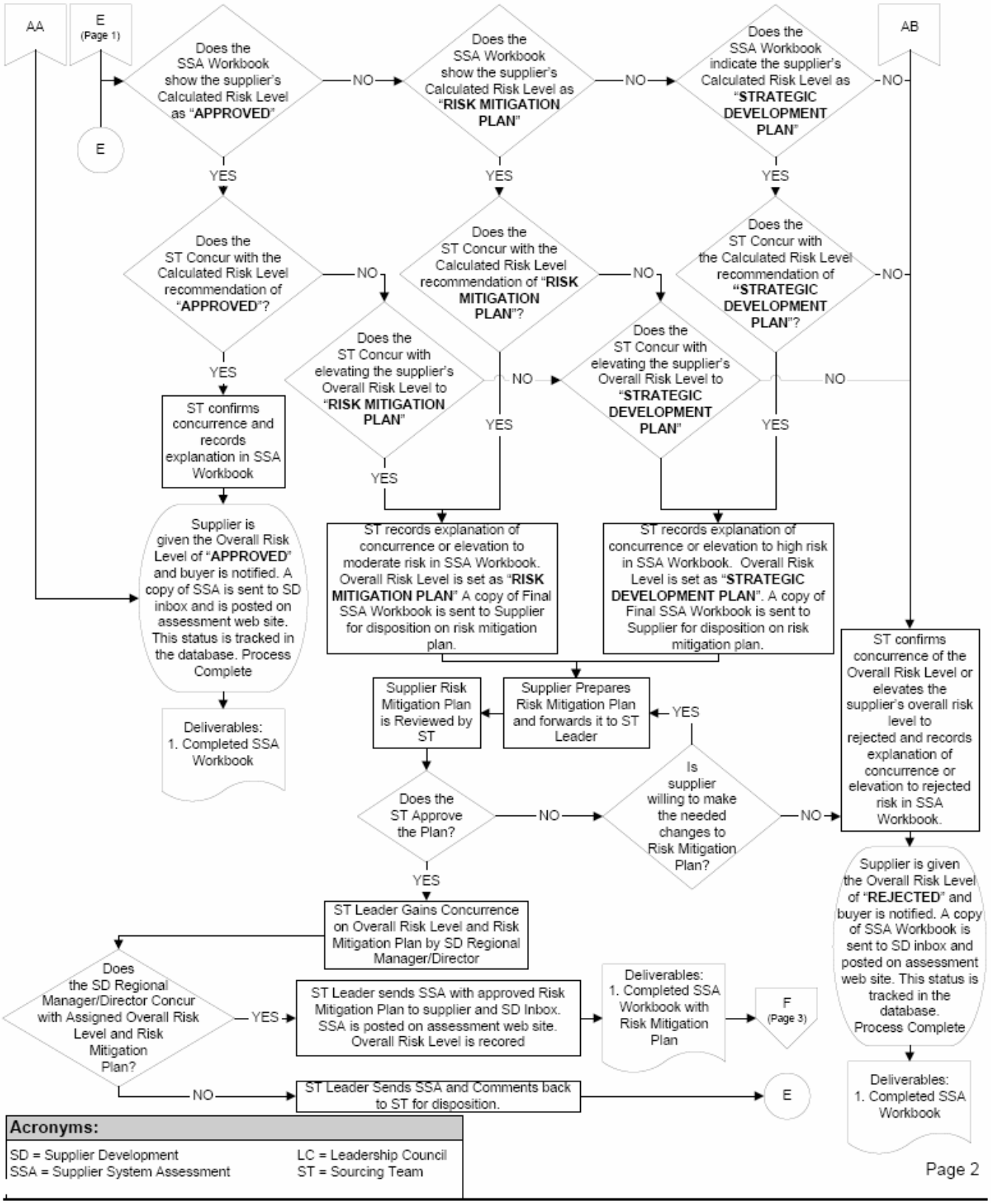
It is of utmost importance that the co-operation between Volvo and suppliers is based on common values and that the improvement work is focused at all times. SEM – Supplier Evaluation Model – is a way for Volvo to point at the requirements and values, which are put on the suppliers development. By a close co-operation and common processes for target setting (quality, delivery, productivity etc.) and suited measuring systems our common competitive strength will be enhanced. Volvo also wants to give attention to the positive effect of networks between Volvo and suppliers as well as between suppliers or between 1st and 2nd tier suppliers.

Annex 17 – Supplier Approval Process[263]

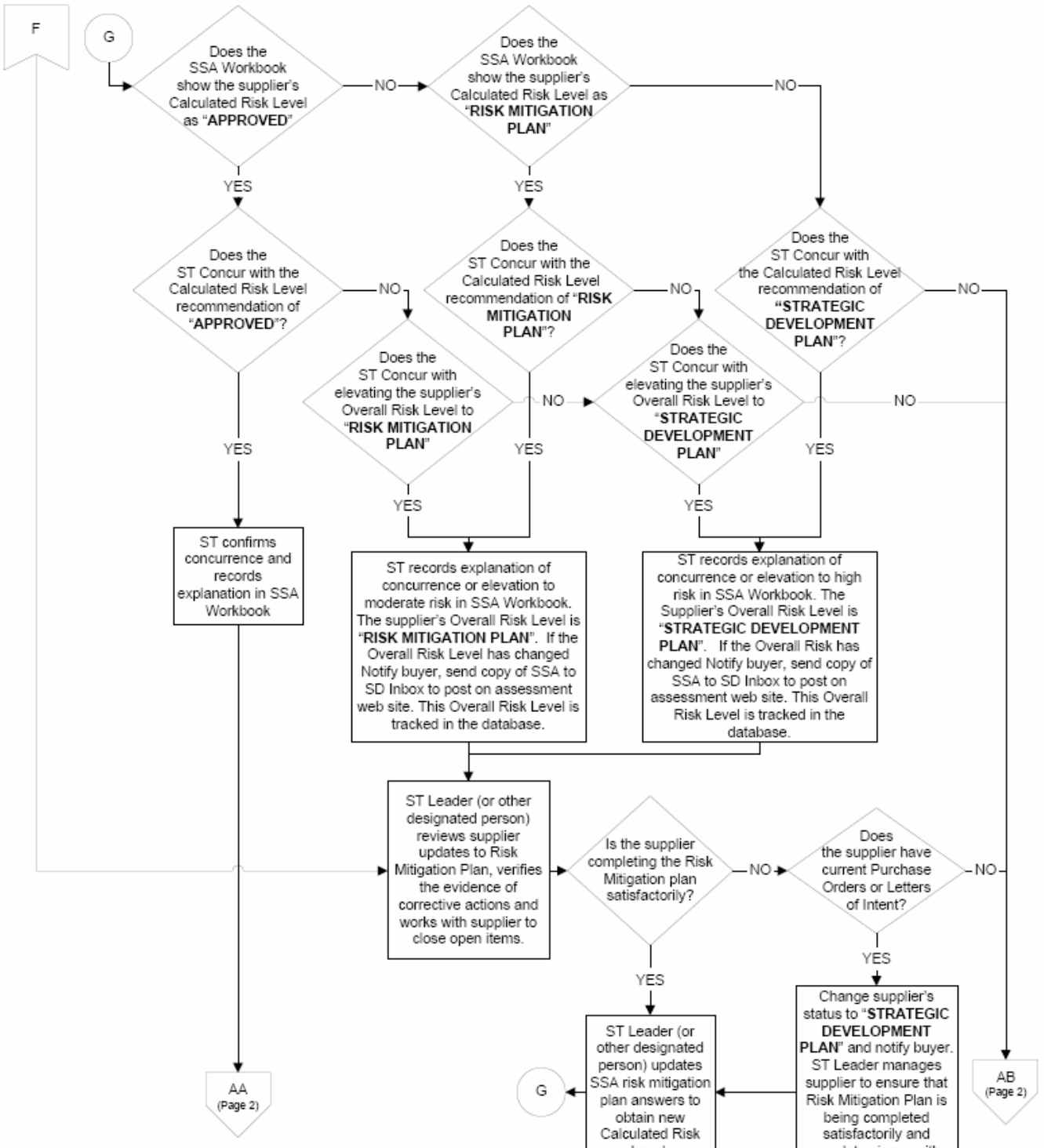


[263] Source: DANA Driveshaft, United Kingdom – Mr. N. Atterbury, Purchasing manager DANA Driveshaft

Supplier Systems Assessment Process: Review Segment



Supplier Systems Assessment Process: Improve (Risk Mitigation)



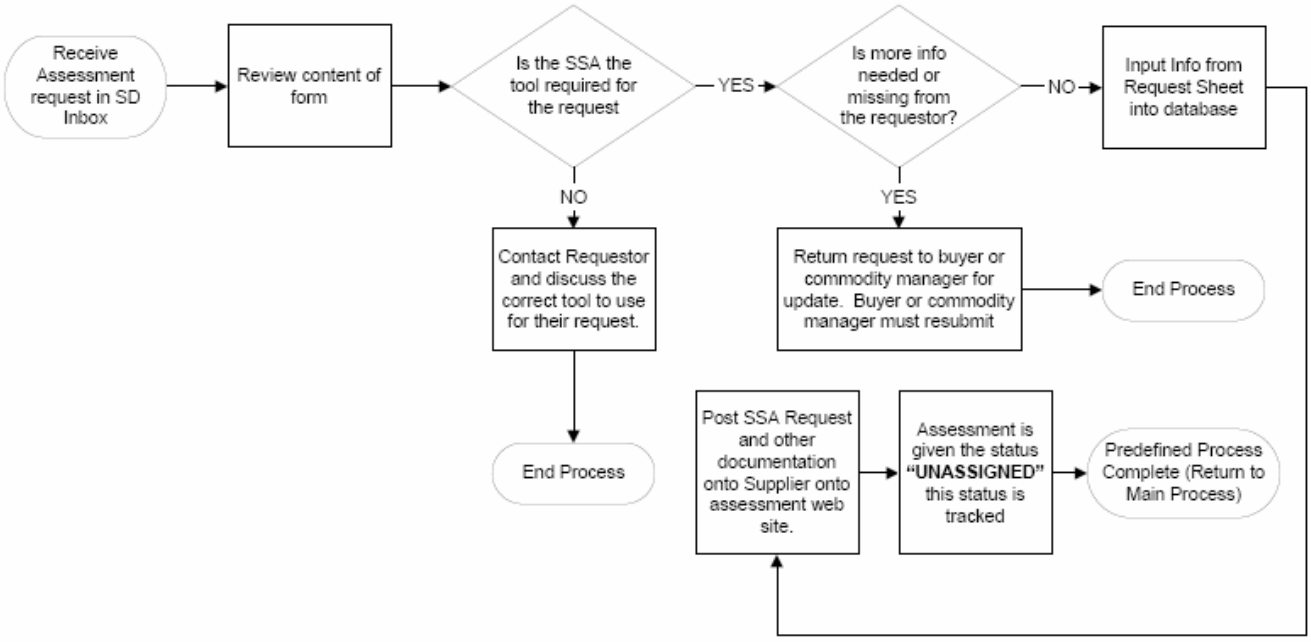
Acronyms:

SD = Supplier Development
ST = Sourcing Team
SSA = Supplier System Assessment
LC = Leadership Council

Page 3

Supplier Assessment Process Flow: Pre-defined Processes

Pre-defined Process: Add SSA Request to Tracking Database



Acronyms:	
SD = Supplier Development	LC = Leadership Council
ST = Sourcing Team	
SSA = Supplier System Assessment	

Annex 18 - Quality pack

In order to reach constant and outstanding quality, VLP needs to strengthen itself by mastering several approaches towards quality. VLP needs to present itself as an organization that has incorporated these quality approaches in all its organizational functions. Besides, VLP must be able to draw both standard and customer specific (in cooperation with the customer) quality plans, whenever automotive customers mention these requirements, and whatever quality plan is required.
Here I would like to outline the most commonly required quality plans that represent full coverage of the quality requirements of any automotive customer. As well, in Annex 16 the Volvo Supplier Evaluation Manual (SEM) is added, which is a reflection found in practice of the theory described here.

18.1. FMEA – Failure Mode and Effect Analysis

FMEA[264] is a methodology for analyzing potential reliability problems early in the development cycle where it is easier to take actions to overcome these issues, thereby enhancing reliability through design. FMEA is used to identify potential failure modes, determine their effect on the operation of the product, and identify actions to mitigate the failures. A crucial step is anticipating what might go wrong with a product. While anticipating every failure mode is not possible, the development team should formulate a list of potential failure modes as extensive as possible.
The early and consistent use of FMEA in the design process allows VLP to design out failures and produce reliable, safe, and customer pleasing products. FMEA also capture historical information for use in future product improvement.

Types of FMEA

There are several types of FMEA, some are used much more often than others. FMEA should always be done whenever failures would mean potential harm or injury to the user of the end item being designed. The types of FMEA are written below, of which the automotive types are written in bold:

- System - focuses on global system functions
- **Design - focuses on components and subsystems (DFMEA)**
- **Process - focuses on manufacturing and assembly processes (PFMEA)**
- Service - focuses on service functions
- Software - focuses on software functions

FMEA in practice

FMEA's provide VLP with a tool that can assist in providing reliable, safe, and customer pleasing products and processes. Since FMEA help identify potential product or process failures, VLP can use it to:

- Develop product or process requirements that minimize the likelihood of those failures.
- Evaluate the requirements obtained from the customer or other participants in the design process to ensure that those requirements do not introduce potential failures.
- Identify design characteristics that contribute to failures and design them out of the system or at least minimize the resulting effects.
- Develop methods and procedures to develop and test the product/process to ensure that the failures have been successfully eliminated.
- Track and manage potential risks in the design. Tracking the risks contributes to the development of corporate memory and the success of future products as well.
- Ensure that any failures that could occur will not injure or seriously impact the customer of the product/process.

[264] http://www.npd-solutions.com/fmea.html

FMEA benefits

FMEA is designed to assist improve the quality and reliability of design. Properly used the FMEA provides VLP several benefits. Among others, these benefits include:

- Improve product/process reliability and quality
- Increase customer satisfaction
- Early identification and elimination of potential product/process failure modes
- Prioritize product/process deficiencies
- Capture engineering/organization knowledge
- Emphasizes problem prevention
- Documents risk and actions taken to reduce risk
- Provide focus for improved testing and development
- Minimizes late changes and associated cost
- Catalyst for teamwork and idea exchange between functions

FMEA timing

The FMEA is a living document. Throughout the product development cycle change and updates are made to the product and process. These changes can and often do introduce new failure modes. It is therefore important to review and/or update the FMEA when:

- A new product or process is being initiated (at the beginning of the cycle).
- Changes are made to the operating conditions the product or process is expected to function in.
- A change is made to either the product or process design. The product and process are inter-related. When the product design is changed the process is impacted and vice-versa.
- New regulations are instituted.
- Customer feedback indicates problems in the product or process.

FMEA procedure

The process for conducting an FMEA is straightforward. The basic steps are outlined below[265].

1. Describe the product/process and its function. An understanding of the product or process under consideration is important to have clearly articulated. This understanding simplifies the process of analysis by helping the engineer identify those product/process uses that fall within the intended function and which ones fall outside. It is important to consider both intentional and unintentional uses since product failure often ends in litigation, which can be costly and time consuming.

2. Create a Block Diagram of the product or process. A block diagram of the product/process should be developed. This diagram shows major components or process steps as blocks connected together by lines that indicate how the components or steps are related. The diagram shows the logical relationships of components and establishes a structure around which the FMEA can be developed. Establish a Coding System to identify system elements. The block diagram should always be included with the FMEA form.

3. Complete the header on the FMEA Form worksheet: Product/System, Subsys./Assy., Component, Design Lead, Prepared By, Date, Revision (letter or number), and Revision Date. Modify these headings as needed.

[265] http://www.npd-solutions.com/fmea.html

System	LTN2001 GPS SSU	Potential Failure Mode and Effects Analysis (Design FMEA)									Revision	B			
Subsystem	Receiver Card										Prepared By	Robert Crow			
Part Number	468230-100										FMEA Date	8/18/1992			
Design Lead	J. Davies										Revision Date				
												Action Results			
Item / Function	Potential Failure Mode(s)	Potential Effect(s) of Failure	Sev	Potential Cause(s)/ Mechanism(s) of Failure	Prob	Current Design Controls	Det	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Actions Taken	New Sev	New Occ	New Det	New RPN
Circuit Block 4.1.1	Output loss from pre-amp	Receiver & output data loss; track loss; GPS shut-down	5	C1 short	1	PR-20 & HW-5	2	10	QA Proc 20-6	R. Jones, 11/30/92	Added to control plan	2	1	1	2
			5	C88 short	2		2	20	QA Proc 20-6	R. Jones, 11/30/92	Added to control plan	2	1	1	2
			5	L1 open/short	3		2	30	QA Proc 20-3	R. Jones, 11/30/92	Added to control plan	2	2	1	4
			5	U21 function	4		2	40	Test 147	R. Jones, 11/30/92	Added to control plan	2	3	1	6
								0							0
Circuit Block 4.1.2	Undetected & insignificant component failure mode	No noticeable system effect	1	C1open/chg val.	2	None	8	16	None						0
			1	C88open/chg val	2		8	16	None						0
								0							0
Circuit Block 4.2.1	Loss of signal from 2nd RF amplifier & 1st down converter	Loss of position, velocity & time output data; track loss; GPS shut-down	4	C2 short	1	PR-20 & HW-5	2	8	QA Proc 20-6	B. Howell 10/15/92	Added to control plan				0
			4	C3 short	1	PR-20 & HW-5	2	8	QA Proc 20-6	B. Howell 10/15/92	Added to control plan	2	1	1	2
			4	C4 open/short	2	PR-20 & HW-5	2	16	QA Proc 20-6	B. Howell 10/15/92	Added to control plan	2	1	1	2
			4	C5 short	2	PR-20 & HW-5	2	16	QA Proc 20-6	B. Howell 10/15/92	Added to control plan	2	1	1	2
			4	C66 open/short	2	PR-20 & HW-5	2	16	QA Proc 20-6	B. Howell 10/15/92	Added to control plan	2	1	1	2
			4	C99 short	3	PR-20 & HW-5	2	24	QA Proc 20-6	B. Howell 10/15/92	Added to control plan	2	2	1	4
			4	FL1 short/open	5	None	2	40	100% Insp.	B. Howell 10/15/92	Added to control plan	2	2	2	8
			4	FL2 short/open	5	None	2	40	100% Insp.	B. Howell 10/15/92	Added to control plan	2	2	2	8
			4	R2open/chg val	2		2	16	None						0
			4	R18 open/chg val	2		2	16	None						0

Figure 33: Design FMEA

4. Use the diagram[266] prepared above to begin listing items or functions. If items are components, list them in a logical manner under their subsystem/assembly based on the block diagram.

5. Identify Failure Modes. A failure mode is defined as the manner in which a component, subsystem, system, process, etc. could potentially fail to meet the design intent. Examples of potential failure modes include:
   - § Corrosion
   - § Hydrogen embrittlement
   - § Electrical Short or Open
   - § Torque Fatigue
   - § Deformation
   - § Cracking

6. A failure mode in one component can serve as the cause of a failure mode in another component. Each failure should be listed in technical terms. Failure modes should be listed for function of each component or process step. At this point the failure mode should be identified whether or not the failure is likely to occur. Looking at similar products or processes and the failures that have been documented for them is an excellent starting point.

7. Describe the effects of those failure modes. For each failure mode identified the engineer should determine what the ultimate effect will be. A failure effect is defined as the result of a failure mode on the function of the product/process as perceived by the customer. They should be described in terms of what the customer might see or experience should the

[266] http://www.npd-solutions.com/fmea.html

identified failure mode occur. Keep in mind the internal as well as the external customer. Examples of failure effects include:

- Injury to the user
- Inoperability of the product or process
- Improper appearance of the product or process
- Degraded performance
- Noise

Establish a numerical ranking for the severity of the effect. A common industry standard scale uses 1 to represent no effect and 10 to indicate very severe with failure affecting system operation and safety without warning. The intent of the ranking is to help the analyst determine whether a failure would be a minor nuisance or a catastrophic occurrence to the customer. This enables the engineer to prioritize the failures and address the real big issues first.

8. Identify the causes for each failure mode. A failure cause is defined as a design weakness that may result in a failure. The potential causes for each failure mode should be identified and documented. The causes should be listed in technical terms and not in terms of symptoms. Examples of potential causes include:
   - Improper torque applied
   - Improper operating conditions
   - Contamination
   - Erroneous algorithms
   - Improper alignment
   - Excessive loading
   - Excessive voltage

9. Enter the probability factor. A numerical weight should be assigned to each cause that indicates how likely that cause is (probability of the cause occuring). A common industry standard scale uses 1 to represent not likely and 10 to indicate inevitable.

10. Identify current controls (design or process). Current controls (design or process) are the mechanisms that prevent the cause of the failure mode from occurring or which detect the failure before it reaches the customer. The engineer should now identify testing, analysis, monitoring, and other techniques that can or have been used on the same or similar products/processes to detect failures. Each of these controls should be assessed to determine how well it is expected to identify or detect failure modes. After a new product or process has been in use previously undetected or unidentified failure modes may appear. The FMEA should then be updated and plans made to address those failures to eliminate them from the product/process.

11. Determine the likelihood of Detection. Detection is an assessment of the likelihood that the Current Controls (design and process) will detect the Cause of the Failure Mode or the Failure Mode itself, thus preventing it from reaching the Customer. Based on the Current Controls, consider the likelihood of Detection using the following table for guidance.

12. Review Risk Priority Numbers (RPN). The Risk Priority Number is a mathematical product of the numerical Severity, Probability, and Detection ratings:
    RPN = (Severity) x (Probability) x (Detection)
    The RPN is used to prioritize items than require additional quality planning or action.

13. Determine recommended action(s) to address potential failures that have a high RPN. These actions could include specific inspection, testing or quality procedures; selection of different components or materials; de-rating; limiting environmental stresses or operating range; redesign of the item to avoid the failure mode; monitoring mechanisms; performing preventative maintenance; and inclusion of back-up systems or redundancy.

14. Assign responsibility and a target completion date for these actions. This makes responsibility clear-cut and facilitates tracking.

15. Indicate actions taken. After these actions have been taken, re-assess the severity, probability and detection and review the revised RPN's. Are any further actions required?

16. Update the FMEA as the design or process changes, the assessment changes or new information becomes known.

18.2. PPAP – Production Part Approval Process

PPAP[267] is a set of specific requirements from the manufacturer, that must be met before any work can begin. The complex process must be strictly followed before approval will be given. The Production Part Approval Process (PPAP) outlines the methods used for approval of production and service commodities, including bulk materials, up to and including part submission warrant in the Advanced Quality Planning process which will be outlined next. The purpose of the PPAP process is to ensure that suppliers of components comply with the design specification and can run consistently without affecting the customer line and improving the quality systems. PPAP ensures that VLP will achieve the first time quality and will lower down the cost of quality. Typically, PPAP is used as a procedure for first QS 9000 samples approval.

The PPAP approval process covers several stages, which are presented below. These chronological stages outline the materials and information required[268]:

- Technical documentation
- Technical changes documentation
- Technical approval by customer
- FMEA design (DFMEA)
- Process development flow chart (Flow chart) including measurement points
- FMEA process (PFMEA)
- Dimensional results (3D)
- Results of material and properties test (certificate verification)
- Preliminary process capability research
- Measurement system analysis (MSA)
- Competent laboratory documentation (accreditation certificate)
- Tests plan
- Dispatch note of part presentation
- Part outside approval record
- Product samples
- Comparative sample
- Tests tools
- Conformance record of special customer requirements

[267] http://www.isixsigma.com/dictionary/PPAP-368.htm
[268] http://www.qc-pisek.cz/index_en.php?site=faq_en

18.3. APQP – Advanced Product Quality Planning

Up to 85% of the final product quality is made in the stage of design[269]. Therefore APQP planning is used for development and design. It consists of the following parts:
-Plan and programme definition
-Product design and development
-Process design and development
-Conformity verification (validation) of product and process
-Feedback and corrective actions.

Input in an early stage is required to confirm with specific customer requirements, strategies and prerequisites[270][271].

- **Plan and programme definition**
  Determining customer needs, requirements and expectations using tools such as quality function deployment (QFD) review the entire quality planning process to enable the implementation of a quality programme how to define and set the inputs and outputs.
  Outputs: Design, reliability and quality objectives, Preliminary material specification card, development flow chart, list of special signs, management support
- **Product design and development**
  Review the inputs and execute the outputs, which include FMEA, DFMA, design verification, design reviews, material and engineering specifications.
  Outputs: Drawings, DFMEA, material specification, prototype, design verification
- **Process design and development**
  Addressing features for developing manufacturing systems and related control plans, these tasks are dependent on the successful completion of phases 1 and 2 execute the outputs.
  Outputs: Regulation on packing, Development flow chart, workshop arrangement, PFMEA, Production instructions, Tests plan
- **Product and process validation (conformance verification)**
  Validation of the selected manufacturing process and its control mechanisms through production run evaluation outlining mandatory production conditions and requirements identifying the required outputs.
  Outputs: Process capability study, part approval, process of verification series, measurement evaluation
- **Feedback and corrective actions**
  Focuses on reduced variation and continuous improvement identifying outputs and links to customer expectations and future product programmes.
  Outputs: Customer satisfaction, control flow chart, delivery and service

Before starting the process of APQP a 'control plan methodology' is drawn. This discusses the parameters required in the control plan to support the continuous improvement cycle. This control plan is being carried out throughout the process of APQP and must be seen as a reciprocal task.

[269] http://www.qc-pisek.cz/index_en.php?site=faq_en
[270] http://www.qc-pisek.cz/index_en.php?site=faq_en
[271] http://www.isixsigma.com/dictionary/APQP-125.htm

18.4. DFMA – Design For Manufacturing and Assembly

DFMA[272] is a methodology and tool set used to determine how to simplify a current or future product design and/or manufacturing process to achieve cost savings. DFMA allows for improved supply chain cost management, product quality and manufacturing, and communication between Design, Manufacturing, Purchasing and Management.

DFMA consists of several sequential steps that allow for actions and improvements. Below, the stages are presented for a current product supplied to an OEM[273].

1. Disassemble product; create bill of material
2. Analyze each part
3. Determine candidates for elimination
4. Calculate current cost
5. Identify high-costing-per-function parts
6. Identify high labor cost
7. Redesign product
    a. Brainstorm new ideas
    b. Competitive benchmarking
    c. Review DFMA ideas
    d. Select/implement best ideas
8. Reanalyze new product
9. Quantify results/cost savings

[272] http://www.isixsigma.com/dictionary/APQP-125.htm
[273] http://www.competitivechange.com/pdfs/DFMA&Its_Role.pdf#search=%22dfma%20definition%22

18.5. PDCA – Plan-Do-Check-Act cycle

The PDCA (or PDSA) cycle[274] was originally conceived by Walter Shewhart in 1930's, and later adopted by W. Edwards Deming. The model provides a framework for the improvement of a process or system. It can be used to guide the entire improvement project, or to develop specific projects once target improvement areas have been identified.
The PDCA cycle is designed to be used as a dynamic model. The completion of one turn of the cycle flows into the beginning of the next. Following continuous quality improvement, the process can always be reanalyzed and a new test of change can begin. Using the items learned in one PDCA trial, one can begin another, more complex trial. The complete trial can be visualized in the figure below.
A small note is in place here. The PDCA cycle is designed as an ongoing cycle of improvement, however the model overlooks the actual anchoring of the improvements. In the field of automotive often a fifth stage is added to the cycle, which refers in any way to this anchoring by 'rewriting operational procedures to comply with the new improved standards for production/process'[275]. This ensures the company that every improvement will not be lost over time, but will be formalized in the book for operational procedures. New employees in the company learn to operate at the highest efficiency, instead of being influenced by routines from other employees. The anchoring is visualized by the red triangle and vertical line, meaning the cycle will only go up to improve the organization's product and process quality.

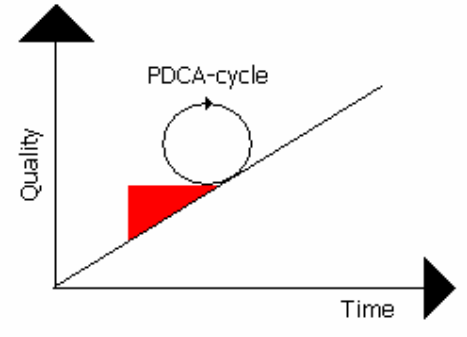


Figure 34: Anchoring the PDCA-cycle

[274] http://www.dartmouth.edu/~ogehome/CQI/PDCA.html
[275] Mr. B. van de Worp – VLP European head of sales; Mr. A. van Zalk – Zerust Project Manager; Mr. R. Loohuis – Corus Tubes purchase manager.

Plan - a change or a test, aimed at improvement.
In this phase one analyzes what one intends to improve, looking for areas that hold opportunities for change. The first step is to choose areas that offer the most return for the effort you put in. To identify these areas for change, a flow chart or Pareto[276] chart is often used.

Do - Carry out the change or test (preferably on a small scale).
Implement the change you decided on in the plan phase.

Check or study the results. What was learned? What went wrong?
This is a crucial step in the PDCA cycle. After the implementation for a short period of time, you must determine how well it is working. Is it really leading to improvement in the way you had hoped? You must decide on several measures with which you can monitor the level of improvement.

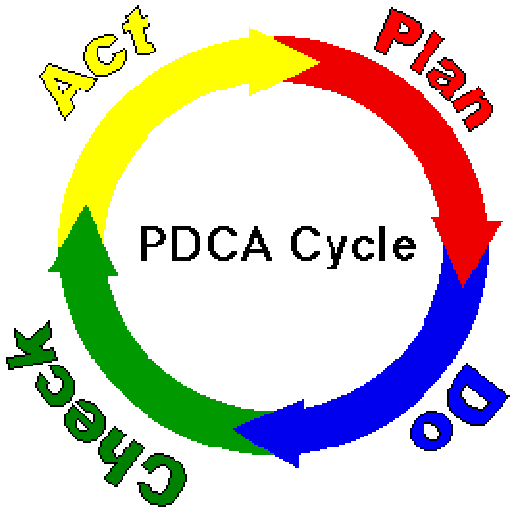


Figure 35: PDCA-cycle

Act - Adopt the change, abandon it, or run through the cycle again.
After planning a change, implementing and then monitoring it, you must decide whether it is worth continuing that particular change. If it consumed too much of your time, was difficult to adhere to, or even led to no improvement, you may consider aborting the change and planning a new one. However, if the change led to a desirable improvement or outcome, you may consider expanding the trial to a different area, or slightly increasing your complexity. This sends you back into the Plan phase.

[276] See http://www.isixsigma.com/library/content/c010527a.asp

18.6. Six Sigma

Six Sigma at many organizations simply means a measure of quality that strives for near perfection277. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process; from manufacturing to transactional and from product to service.
The statistical representation of Six Sigma describes quantitatively how a process is performing. To achieve Six Sigma, a process must not produce more than 3.4 defects per million opportunities. A Six Sigma defect is defined as anything outside of customer specifications. A Six Sigma opportunity is then the total quantity of chances for a defect. Process sigma can easily be calculated using a Six Sigma calculator.
The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects. This is accomplished through the use of two Six Sigma sub-methodologies: DMAIC and DMADV. The Six Sigma DMAIC process (define, measure, analyze, improve, control) is an improvement system for existing processes falling below specification and looking for incremental improvement. The Six Sigma DMADV process (define, measure, analyze, design, verify) is an improvement system used to develop new processes or products at Six Sigma quality levels. It can also be employed if a current process requires more than just incremental improvement. Both Six Sigma processes are executed by Six Sigma Green Belts and Six Sigma Black Belts, and are overseen by Six Sigma Master Black Belts.
According to the Six Sigma Academy, Black Belts save companies approximately $230,000 per project and can complete four to 6 projects per year. General Electric, one of the most successful companies implementing Six Sigma, has estimated benefits on the order of $10 billion during the first five years of implementation. GE first began Six Sigma in 1995 after Motorola and Allied Signal blazed the Six Sigma trail. Since then, thousands of companies around the world have discovered the far reaching benefits of Six Sigma.
Many quality problems are related to (statistical) distribution278. Namely, if an aspect (e.g. strength of a tube) of a product shows high variances around its normal position, chances are that the product will be denied in quality tests because the variance causes the tolerance-limits are being exceeded. The number of times a standard deviation can be fit between the normal average and the tolerance-limits, indicates the sigma-level of a process. The higher this level, the fewer outbursts will incur. Six sigma, then, is a measurement for process quality. Many organization processes function at three sigma-level, meaning a 6.7% outburst. Four sigma means 0.62% outburst, and the ideal six sigma-level means 0.00034% or 3.4 parts per million (PPM) outburst.
A recently developed type of Six Sigma is “Lean Six Sigma”, which will be clear after outlining the next quality aspect, namely ‘Lean Manufacturing’.

277 http://www.isixsigma.com/sixsigma/six_sigma.asp
278 http://www.ibisuva.nl/nl/sixsigma.htm

18.7. Lean manufacturing

Lean manufacturing is a management philosophy focusing on reduction of the seven wastes[279]

- Waiting time
- Transportation
- Processing
- Inventory
- Motion
- Scrap in manufactured products or any type of business.
- Over-production

By eliminating waste (muda), quality is improved, production time is reduced and cost is reduced. Lean "tools" include constant process analysis (kaizen), "pull" production (by means of kanban) and mistake-proofing (poka-yoke). Lean, as a management philosophy, is also very focused on creating a better workplace through the Toyota principle of "respect for humanity."[280]
Although VLP does not manufacture products itself, 'lean thinking' can help eliminating these seven wastes in any kind of organization where value is added. In addition, if VLP wants to become a component supplier via subcontractors, VLP must be able to coordinate, support and improve the production of these components. 'Lean thinking' then as well can be very helpful.

While some believe that Lean Manufacturing is a set of problem solving tools, most experts now agree that Lean Manufacturing is a holistic, comprehensive, enterprise-wide program designed to be integrated into the organization's core strategy. In addition, experts in this field believe that philosophy-based Lean Manufacturing strategy is the most effective way to launch and sustain lean activities. The so called "Toyota Way," emphasizes the creation of the right kind of environment in which to grow and support Lean Thinking.

Key lean manufacturing principles include:

- Perfect first-time quality - quest for zero defects, revealing & solving problems at the source
- Waste minimization – eliminating all activities that do not add value & safety nets, maximize use of scarce resources (capital, people and land)
- Continuous improvement – reducing costs, improving quality, increasing productivity and information sharing
- Pull processing: products are pulled from the consumer end, not pushed from the production end
- Flexibility – producing different mixes or greater diversity of products quickly, without sacrificing efficiency at lower volumes of production
- Building and maintaining a long term relationship with suppliers through collaborative risk sharing, cost sharing and information sharing arrangements.

Lean is basically all about getting the right things, to the right place, at the right time, in the right quantity while minimizing waste and being flexible and open to change.

"Lean Thinking", as Womack and Jones[281] describe in their book, introduced five core concepts:

1. Specify value in the eyes of the customer
2. Identify the value stream and eliminate waste
3. Make value flow at the pull of the customer

[279] Hirano, Hiroyuki and Furuya, Makuto (2006), "JIT Is Flow: Practice and Principles of Lean Manufacturing", PCS, Inc.
[280] Imai, Masaaki (1997), *Gemba Kaizen*, McGraw-Hill.
[281] Womack, J., and Jones, D., Lean thinking: Banish Waste and Create Wealth in Your Corporation, Revised and Updated, Free Press, 2003

4. Involve and empower employees
5. Continuously improve in the pursuit of perfection.

18.8. TQM – Total Quality Management

Total Quality Management is defined by the International Organization for Standardization (ISO) as[282]

"...a management approach of an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society."

In Japanese, TQM comprises four process steps, namely[283]:

1. *Kaizen* – Focuses on Continuous Process Improvement, to make processes *visible*, *repeatable* and *measureable*.
2. *Atarimae Hinshitsu* – Focuses on intangible effects on processes and ways to optimize and reduce their effects.
3. *Kansei* – Examining the way the user applies the product leads to improvement in the product itself.
4. *Miryokuteki Hinshitsu* – Broadens management concern beyond the immediate product.

TQM requires that the company maintain this quality standard in all aspects of its business. This requires ensuring that things are done right the first time and that defects and waste are eliminated from operations.
Quality assurance through statistical methods is a key component in a manufacturing organization, where TQM generally starts by sampling a random selection of the product[284]. The sample can then be tested for things that matter most to the end users. The causes of any failures are isolated, secondary measures of the production process are designed, and then the causes of the failure are corrected. The statistical distributions of important measurements are tracked. When parts' measures drift into a defined "error band", the process is fixed. The error band is usually a tighter distribution than the "failure band", so that the production process is fixed before failing parts can be produced.

[282] www.iso.org
[283] Chenhall, RH (2003) Management control systems design within its organizational context: findings from contingency-based research and directions for the future, Accounting, Organizations and Society 28, pp. 127-168.
[284] www.isixsigma.com/me/tqm/

18.9. JIT – Just In Time

Just In Time (JIT) is an inventory strategy implemented to improve the return on investment of a business by reducing in-process inventory and its associated costs[285]. The process is driven by a series of signals, or Kanban, that tell production processes to make the next part. Kanban are usually simple visual signals, such as the presence or absence of a part on a shelf. JIT can lead to dramatic improvements in a manufacturing organization's return on investment, quality, and efficiency when implemented correctly.
New stock is ordered when stock reaches the re-order level. This saves warehouse space and costs. However, one drawback of the JIT system is that the re-order level is determined by historical demand. If demand rises above the historical average planning duration demand, the firm could deplete inventory and cause customer service issues. To meet a 95% service rate a firm must carry about 2 standard deviations of demand in safety stock. Forecasted shifts in demand should be planned for around the Kanban until trends can be established to reset the appropriate Kanban level. In recent years manufacturers have touted a trailing 13 week average is a better predictor than most forecastors could provide.

The following are the chronological steps towards JIT production[286]:

1. Awareness, knowing what can be achieved with JIT
2. Value stream mapping and 5S (workplace organisation and standardisation)
3. Line integration
4. One-piece flow
5. Pull system, KANBAN ('pull' in stead of 'push')
6. Line balancing
7. Standardisation

1. What can VLP achieve with JIT
The following benchmark figures are available:
Reduction of Work in Progress.
Reduction of throughput time (lead time).
Reduction of floor space.
Additionally, JIT results into significantly improved delivery performance.

2. Value Stream Mapping and 5S
Value stream mapping is a way to map the material and information flow, which facilitates to determine improvement opportunities.
The 5S program ensures a well-organised, efficient and safe workplace. The program consists of ‘Sort’, ‘Straighten’, ‘Shine’, ‘Systemise’ and ‘Sustain’" and "Safety" as a 6th optional S.

3. Line integration
This step realises the flow concept, which is very important to spot problems instantly. It also eliminates or reduces intermediate stock.

4. One piece flow
A crucial step to reach the goal is to produce on customer demand, the right quantity at the right moment at minimal cost. This also means that changes over time are attacked and eliminated. Once this is realised, batch size does not matter anymore, since it does not reduce production efficiency, and therefore a small quantity does not mean extra cost. This already has been achieved in automotive manufacturing, where batch size now is equal to "one".

5. Pull system (KANBAN)
The next important step is to achieve that products are not pushed into production anymore (hoping some day they will come out at the other end), but 'pulled' the moment the customer asks for it.

[285] http://www.tpfeurope.com/NL_JITinfo.html
[286] Shingo, S., Zero Quality Control: Source Inspection and the Poka-Yoke system, 1991.

6. Line balancing:
The TAKT[287] time (or: 'pulse rate' or 'heartbeat') from the production steps are now balanced.

7. Standardisation
To hold the gains, and to continue on the continuous improvement path.

[287] www.isixsigma.com: the German word for the baton that an orchestra conductor uses to regulate the speed, beat or timing at which musicians play. Lean Production uses Takt Time as the rate or time that a completed product is finished.

18.10. Kaizen

Kaizen (Japanese for "change for the better" or "improvement") is an approach to productivity improvement originating in applications of the work of American experts such as Frederick Winslow Taylor, Frank Bunker Gilbreth, Walter Shewhart, and of the War Department's Training Within Industry program by Japanese manufacturers after World War II[288]. The development of Kaizen went hand-in-hand with that of quality control circles, but it was not limited to quality assurance.
The goals of kaizen include the elimination of waste (defined as "activities that add cost but do not add value"), just-in-time delivery, production load leveling of amount and types, standardized work, paced moving lines, right-sized equipment, and so on. A closer definition of the Japanese usage of Kaizen is "to take it apart and put back together in a better way." What is taken apart is usually a process, system, product, or service. Kaizen may, then, well include benchmarking or copying products or processes from your competitors.
Kaizen is a daily activity whose purpose goes beyond improvement. It is also a process that, when done correctly, humanizes the workplace, eliminates hard work (both mental and physical), and teaches people how to do rapid experiments using the scientific method and how to learn to see and eliminate waste in business processes.
Kaizen is often misunderstood and applied incorrectly, resulting in bad outcomes including, for example, layoffs. This is called "kaiaku" - literally, "change for the worse." Layoffs are not the intent of kaizen. Instead, kaizen must be practiced in tandem with the "Respect for People" principle. Without "Respect for People," there can be no continuous improvement. Instead, the usual result is one-time gains that quickly fade. Importantly, Kaizen must operate with three principles in place: process and results (not results-only); systemic thinking (i.e. big picture, not solely the narrow view); and non-judgmental, non-blaming (because blaming is wasteful).

18.11. Poka Yoke

Poka-yoke (means "fail-safing" or "mistake-proofing" — avoiding (*yokeru*) inadvertent errors (*poka*)) is a behavior-shaping constraint, or a method of preventing errors by putting limits on how an operation can be performed in order to force the correct completion of the operation[289]. The concept was originated by Shigeo Shingo as part of the Toyota Production System.
Originally described as *Baka-yoke*, but as this means "idiot-proofing" the name was changed to the milder *Poka-yoke*. One example is the inability to remove a car key from the ignition switch of an automobile if the automatic transmission is not first put in the "Park" position, so that the driver cannot leave the car in an unsafe parking condition where the wheels are not locked against movement. Another example can be found in a normal 3.5" floppy disk: the top-right corner is shaped in a certain way so that the disk cannot be inserted upside-down.

[288] Imai, Masaaki (1986), *Kaizen: The Key to Japan's Competitive Success*, McGraw-Hill/Irwin
[289] Shingo, S. Zero quality control: source inspection and the poka-yoke system. trans. A.P. Dillion. Portland, Oregon: Productivity Press, 1986.

18.12. ISO 9001:2000

The ISO 9001:2000 norm outlines the demands towards an organization's quality system and the way the organization handles its quality policy[290]. The quality-policy needs to be formally written and communicated to all employees. The organization must meet customer satisfaction levels by applying to the specific requirements of the customer and the legal requirements levied by the law. In addition, organizational processes need to be laid down formally in a quality-manual and actual practice must reflect this guiding book of principles. When an external audit has taken place, the organization can receive a certificate of approval clarifying that the organization meets the standards the norm requires. This proves the organization and its customers that the company fulfils its quality-management task in a structured and formally defined way. VLP has already been accredited for ISO 9001.

ISO 9000 is a generic name given to a family of standards developed to provide a framework around which a quality management system can effectively be implemented.
The ISO 9000 family of standards was revised in December 2000. (These pages refer to ISO 9000:2000 series, as opposed to ISO 9000:1994 series - the previous version).

ISO 9001:2000, the requirement standard, includes the following main sections:

1. Quality Management System
2. Management Responsibility
3. Resource Management
4. Product Realization
5. Measurement Analysis and Improvement

To gain the maximum benefit from ISO 9000:2000 there are a number of steps to take:

1. Define why your organization is in business.
2. Determine the key processes that state 'what' you do.
3. Establish how these processes work within your business.
4. Determine who owns these processes.
5. Agree these processes throughout the organization.

[290] www.iso.org; http://www.bsi-emea.com/Quality/Overview/WhatisISO9000.xalter

18.13. QS-9000

QS-9000 is a quality system standard that focuses on helping automotive suppliers ensure that they are meeting/exceeding automotive customer requirements. Developed by Daimler-Chrysler, Ford and General Motors, QS-9000 was first published in 1994, and later re-issued in March 1998. It is based on ISO 9001:1994 and incorporates additional quality requirements expected by the Big Three.
When the Automotive Industry Action Group (AIAG) published their Fourth Annual QS-9000 Survey in March 1999, they reported an average of more than six percent cost savings. This equates to an average of 8 million dollars per company in the first year.

QS-9000 saves companies money through:

-continuous improvement
-defect prevention
-reduction of waste
-variation in the supply chain

QS-9000 is now being replaced by a newer related standard called ISO/TS 16949. TS 16949 contains all of ISO 9000, QS-9000, and many European standards.
TS is much more process-oriented than QS or ISO. It defines the business as a set of processes with inputs and outputs that need to be defined, controlled, improved amd optimized. My point of view is that TS looks like someone who knew QS and took Six Sigma training and incorporated many of the Six Sigma ideas.
The influence of QS-9000 is being seen throughout the automotive industry as it has virtually eliminated varying demands and waste associated with redundant systems.

Proof of conformance to QS-9000 is certification by an accredited third party. Companies that become registered under QS-9000 will be considered to have higher standards and better quality products. Because QS 9000 is fundamental for a supplier's success in the automotive industry, and thus influences the success of VLP in a great deal, I would like to discuss this norm in a comprehensive way.

Drive for QS-9000

QS-9000 will help companies to stay ahead of their competition. It will do this by filling gaps in the business and quality systems that can cause problems. QS-9000 eliminates redundant and unnecessary work practices. QS-9000 tells current and potential customers that the product has consistent quality and is manufactured under controlled conditions. This system is globally accepted as proof of quality in the automotive industry and is also a major customer requirement. QS 9000 has come to the point whereas a company is not very much distinguishing itself as a supplier when it has a QS 9000 certificate, but companies that do not have it are not to be considered by the OEM.

Differences QS-9000 and ISO-9000

QS-9000 is sometimes seen as being identical to ISO 9000, but this is not true. Even though each element of ISO 9000 is an element of QS-9000, QS-9000 adds clauses to the majority of the ISO 9000 elements. For example, QS-9000 adds requirements for a business plan, tracking customer satisfaction and benchmarking to element 4.1 of ISO 9000, Management Responsibility. QS-9000 also uses sector-specific requirements. The following requirements are not based on ISO 9000:

- production part approval process
- the requirements for gaining approval from the customer to run a new or altered part or process
- continuous improvement

- automotive suppliers are required to have systems in place to ensure that organized, measurable improvement activities take place for a variety of business aspects
- manufacturing capabilities
- requirements for planning and effectiveness for equipment, facilities and processes
- requirements for mistake proofing, and tooling management.

Associate responsibilities

In order to become QS-9000 certified, a company must first prepare its staff for the challenge that awaits them. Each employee will have responsibilities under QS-9000. Once time-studies, machine and operator layout and production rates have been set by the industrial engineer, then some of these responsibilities include:

- performing all work in compliance with all documented procedures and work instructions that may apply;
- to have access to all procedures and/or work instructions that are applicable to the job;
- to know the company's QS-9000 quality policy statement;
- to cooperate with internal and external auditors;
- to attend and complete all required training sessions;
- to attend all meetings that are applicable to the job function. (i.e., management reviews, problem solving meetings);
- respect the document control and quality record procedures:
- comply with corrective actions;
- to complete all forms, logs and other records which are called for by the procedures and work instructions in a consistent, timely manner;
- to notify appropriate personnel of non-conformances which could cause a quality problem or finding during an audit.

QS-9000 Audits

When the employees are prepared for the responsibilities that await them, they will be randomly audited by two types of auditors:

-Internal auditor: a team of people who are employed by your company.
-External auditor: a customer representative of the QS-9000 certification auditor.

QS-9000 Quality Statement

The QS-9000 Quality Statement tells of the company's objectives for quality and commitment to quality, and is relevant to company goals and customer needs and expectations. The Quality Statement will be given to all associates in the form of a laminated card that they must keep with them at all times. The Quality Statement should be posted in all areas of the facility. Though it is not necessary for each associate to memorize the quality policy statement, they should be able to read it from the card or wall and tell what it means to them. All management personnel must know the quality policy statement.

QS-9000 Definitions

- Internal Auditor: an employee of the company who has been trained to perform audits of certain elements of the quality system. An internal auditor must be independent of the elements he is auditing (e.g. he can not audit himself).
- Quality Policy Statement: a documented statement defined by management which tells of the company's commitment to quality and the customer. The quality policy statement is intended to strengthen the daily focus on quality and must be known by all plant and office personnel.
- Work Instructions: written methods and visual aids which detail how a particular job is performed. Work instructions are supposed to be available at the work area and followed consistently by all shifts.
- Internal audit: questions about QS-9000 asked by audit teams which are made up by the company's own employees.
- Audit finding/Non-conformance (Also Non-compliance): if during an audit, something is not documented, or something is not being followed, the auditor reports this as a non-conformance and corrective action must be taken.
- Corrective action: Once an audit finding or occurrence had been reported to personnel responsible for that area, those personnel must agree on a cure for the non-conformance and a date in which the plan will be completed. This is usually handled through a Corrective Action Report (CAR) form.
- Preventative action: an action taken to prevent the occurrence of a non-conformance or quality problem that has not yet occurred.
- External audit: (also third party audit) an audit of the QS-9000 quality system elements by personnel which are not members of the company.
- Certification Audit: (also registration audit) the formal audit by personnel empowered to issue QS-9000 certification. Upon passing this audit, the company is

18.14. SA 8000 – Social accountability 8000 standard

Social Accountability 8000, or SA 8000, is a code of conduct verification and a factory certification program that began in October 1997, in an effort to bring Social Accountability to the workplace[291]. While primarily based on the ISO 9000 Series of Standards, SA 8000 imposes its own specific performance standards.
The concept of social accountability is not a new one, the goal being to improve global working conditions. SA 8000 is designed to enforce existing international agreements, including International Labour Organization conventions, the Universal Declaration on Human Rights, and the UN Convention on the Rights of the Child.
Often, it is difficult for many companies that are manufacturing, producing or purchasing goods world-wide to ensure that the staff employed in other countries are provided with, not only a safe working environment, but an environment free from discrimination and abuse, such as unethical disciplinary measures and unreasonable working hours/compensation.

SA Elements:

The SA 8000 code of practice is broken down into nine essential areas:

Child Labour
The company shall not hire workers under the age of 15. Companies shall not employ "young workers" during school hours.

Forced Labour
The company shall not support the use of forced labour.

Health and Safety
The company shall provide a safe and healthy work environment and take adequate steps to prevent accidents and injuries. The company shall provide regular health and safety worker training, establish systems to detect threats to health and safety, and provide access to clean and sanitary facilities and drinkable water.

Freedom of Association and Right to Collective Bargaining
The company shall respect the right to form and join trade unions and bargain collectively.

Discrimination
The company shall not permit discrimination whether based on age, race, class, origin, religion, disability, gender, sexual orientation, union or political association. The company will not tolerate sexual harassment.

Discipline
The company shall not engage in, or support the use of, physical punishment, mental, or verbal abuse. The company shall not support arbitrary pay deductions or threats of dismissal or personal harm.

Working hours
The company shall act in accordance with the applicable law with employees required to work no more than 48 hours per week. Overtime work should not exceed 12 hours per week. Overtime work should be voluntary and should be paid at a premium rate. The company will provide at least one day off per week for all employees.

Compensation
The company shall ensure that wages paid for a standard work week must meet the legal and

[291] http://www.quality-one.com/services/iso_social_accountability_8000_standard.cfm

industry standards and be sufficient to meet the basic needs of workers and their families. Deductions from wages must not be made for disciplinary purposes.

Management Systems
Facilities seeking certification must go beyond simple compliance to integrate the standard into their management systems;

- The company shall ensure that its policy for social accountability complies with SA 8000 and other applicable law and international requirements;
- The company should appoint a representative to ensure the requirements of SA 8000 are in place, and periodically review operations to ensure requirements are met;
- The company shall ensure the requirements of SA 8000 are implemented and understood at all levels within the organization;
- The company shall put in place appropriate policies and procedures to meet the requirements of SA 8000 and maintain appropriate records;

The company shall investigate and respond to concerns of employees or interested parties and take necessary action to correct any non-compliance with the requirements.

18.15. ISO/TS 16949:2002 - Standard for the automotive supply chain

Background
Beginning in 1994 with the successful launch of QS 9000 by DaimlerChrysler, Ford and GM, the Automotive OEM's recognized the increased value that could be derived from an independent quality system registration scheme and the efficiencies that could be realized in the supply chain by harmonizing system requirements. In 1996, the success of these efforts led to a move towards the development of a globally accepted and harmonized quality management system requirements document. From this, the International Automotive Task Force (IATF) was formed to lead the development effort.

Definition
The result of the IATF's effort is the ISO/TS 16949 specification. ISO/TS 16949 forms the requirements or the application of ISO 9001 for automotive production and relevant service part organizations.
ISO/TS 16949 used the ISO 9001 Standard as the basis for their development and included the requirements from these Standards with specific 'adders' for the automotive supply chain. The 2002 revision of TS builds off the ISO9001:2000 document. The basis for certification includes the standard itself, customer specific requirements and the organization's quality system.

Compliance to other norms
ISO/TS 16949 does not replace QS 9000 or VDA 6.2. ISO/TS 16949 provides an option for the automotive supply chain. Some organizations may elect to continue with registration to their current Standard, while others may see the benefit in updating to the ISO/TS Standard because of the increased value that can be gained from its process-approach based methodology or to satisfy Customer requirements that may require registration to multiple standards (e.g. In situation where the organization has a customer requiring QS 9000 and another requiring VDA 6.2 it may be possible to satisfy both via ISO/TS 16949, with customer concurrence). As well, this norm is often demanded in addition to other norms mentioned and therefore is a ‘must-have’ for VLP in order to participate in the CE and HT industry supply chain.

Apply to certification
There are 3 criteria, any one of which must be met in order for an organization to apply for ISO/TS 16949 registration. They are:

1. The organization supplies a TS 16949 subscribing customer.
2. The organization is in the automotive supply chain (any tier).
3. The organization is a potential supplier to a customer described in either 1 or 2 above and has a documented RFQ or is being documented on the bid list.

Additionally, organizations that do not perform value-added manufacturing processes (e.g. design centres or industrial distributors) cannot apply for TS 16949 registration. They may, however, be included as a remote location in the registration of another site that performs manufacturing functions. This note may look not very promising, but VLP is modifying the product by cutting (fixed-) lengths and thus adding value. As well, in the light of supplying components through machining-subcontractors, VLP must acquire a comprehension of TS 16949 to assist, support, inspect and control the compliance of subcontractors to TS 16949.

Certification process
The process is much different from QS 9000. The IATF has mandated a more process-based approach to auditing, with a firmer emphasis on meeting the customer's needs. Organizations must meet the requirements to important elements of Customer Oriented Processes (COP's), including:

- Process ownership
- Process definition and linkages
- Process monitoring and feedback loops for process improvement

- Process effectiveness in meeting customer requirements, process efficiency and key performance indicators for the business

Process effectiveness and efficiency for product realization and support processes must be reviewed by top management. While this is normally in place for production processes, it is the addition of the requirement for monitoring support processes that adds a new twist to the requirement.

18.16. ISO 14001 – Environmental management

ISO 14001 is an internationally accepted specification for an Environmnental management System. ISO 14001 is the specifications standard used for auditing. Companies successfully completing the registration process are considered "registered." ISO 14001 consists of six sections:

- General Requirements
- Environmental Policy
- Planning
- Implementation and Operation
- Checking and Corrective Action

These six sections support organizations to:

-minimize their operations that negatively affect the environment (i.e. cause adverse changes to air, water, or land)
-comply with applicable laws, regulations, and other environmentally oriented requirements
-continually improve the above.

ISO 14000 is similar to ISO 9000 quality management in that both pertain to the process of how a product is produced, rather than to the product itself. As with ISO 9000, certification is performed by third-party organisations rather than being awarded by ISO directly. The ISO 19011 audit standard applies when auditing for both 9000 and 14000 compliance at once. ISO 14001 is generic and flexible enough to apply to any organization producing any product or service anywhere in the world.
An ISO 14001 audit is not a regulatory or compliance audit. It is a conformance audit. During the audit, the registrar will seek objective evidence that the organization has a system in place for identifying and accessing regulatory and other requirements, and which reflects your commitment to comply with them.

Benefits of certification

The three most common reasons cited for ISO 14001 registration are:

- customer requirement,
- competitive market advantage and
- cost or risk reduction through improved resource management.

18.17. VDA 6.2 – Verband der Automobilindustrie

VDA 6.2 is the German Quality Management System for the automotive industry. Verband der Automobilindustrie e. V. (VDA) issued the 4th edition in December 1998 and it became mandatory for all German car manufacturers on April 1, 1999[292]. Now, it applies to all organizations in the complete supply chain in all automotive industries and is a very much respected norm. Based on ISO 9001:1994, it includes all elements of QS-9000, with an additional four requirements specific to VDA 6.2 as follows:

-Element 06.3 Recognition of product risks - These are the risks of the product fulfilling its own function and its effect on the whole assembly.
-Element Z1.5 Employee satisfaction - The perception of the employees of the company, as well as the needs and expectations of the employees that will be met through the company's quality approach.
-Element 07.3 Quotation structure - A customer or market is offered products for purchase or made available to own or to use.
-Element 12.4 Quality history - The system describes the quality history of customer supplied product and gives an overview of the situation during a particular period.

VDA 6.2 may seem similar to the TS 16949, still both certifications differ slightly and the one does not replace the other[293]. The VDA standard is broken into two parts, with the first classed as management and the second focusing on Products and Processes. Any company who goes through an audit must achieve at least a 90% score to achieve certification.

[292] http://www.vda-qmc.de
[293] In practice, OEMs and first-tier suppliers typically demand one of QS9000, TS 16949 or VDA 6.2.

Annex 19 – List of interviewees

To gain insight in the supplier selection phases in The CE and HT industry, I have spoken to a variety of persons in these businesses. Using a tailored questionnaire, I have spoken about the CE and HT industry trends and developments, the backgrounds of the organizations which are represented by the person spoken with, the important supplier characteristics and the industrial distributor functions, all important for the two segments chosen.
Although this test group is too small to serve as empirical evidence for conclusions that I have to make, I assume the group to be a reliable source of information. I assume that external parties spoken with, who are not part of the European VLP organization, must be seen as reliable sources of information, since I think that identical results will be found when the field study is rehearsed.
However, since I have not rehearsed the field study, I keep in mind the possibility of using 'coloured' opinions from external persons, meaning a subjective set of data is supplied by the interviewee. As well, the interviewees will answer the questionnaire's questions by using their experiences in the field of study. These experiences, however, may be based on their successes in only part of the business, and therefore be only partly applicable to the two segments studied.
Internal parties spoken with, meaning the members of the European VLP organization, have supplied me with data which has been used as well. I have tried to filter out the subjectivity of this data by asking questions and by giving critical reflections to the data supplied.
Here I will set out who I have spoken with, the subject of the conversation, and my comment whether it has been an useful contribution or not.

External persons spoken with

Mr. Raymond Loohuis – Sales manager Corus Tubes, Arnhem, The Netherlands

Subject: questionnaire – supplier selection and ID functions
Comment: introducing myself as an UT student, Mr. Loohuis mentioned several successes of Corus in the automotive industry, and his view why Corus has acquired and maintained several supplier positions in the automotive industry.

Mr. Peter Mussert – Procurement manager Hitachi Construction Machinery Equipment (HCME), Amsterdam, The Netherlands

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Mussert set out the path of supplier selection for HCME and the expectations towards the suppliers' development when chosen for by HCME. This resulted in two enquiries for two products he would like to be supplied with by a Dutch supplier rather than a Japanese supplier.

Mr. Nigel Atterbury – DANA Driveline European procurement manager, Birmingham, United Kingdom

Subject: questionnaire – supplier selection and ID functions
Comment: Although DANA Driveline is already being supplied by VLP in the UK, it was a very open minded conversation in which he set out in detail his and DANA's vision on the profile of a suitable supplier, supplied me with the (normally strictly) internally used supplier selection flowchart, and provided insights in future actions for VLP to become a more European-wide supplier to DANA.

Mrs. Jackie Ormond – DANA Axle procurement manager, Birmingham, United Kingdom

Subject: questionnaire – supplier selection and ID functions
Comment: Mrs. Ormond clearly gave her view on good supplier relations and typical issues in supplier selections at DANA. Her view mentioned was a perfect resemblance of the DANA view provided by Mr. Atterbury.

Mr. Hendrik Stubbe – DANA Spicer Off-Highway Senior Buyer, Brugge, Belgium

Subject: questionnaire – supplier selection and ID functions
Comment: Although Mr. Stubbe was a lower-level manager than his UK colleagues spoken to, he provided a detailed tour through the pant and provided critical reflections towards suppliers (both VLP and other). However, part of his reasoning stroke me as very much naïve and consisting of a certain degree of tunnel-vision.

Mr. Steve Verbist – Komatsu Construction Equipment Purchasing Department, Vilvoorde, Belgium

Subject: questionnaire – supplier selection and ID functions
Comment: Completely the wrong person to speak with concerning the items in the questionnaire, Mr. Verbist was responsible for the procurement of supportive products, products that are not directly related to parts of the actual production of machinery. Although he has contacted the more appropriate person prior to this meeting, the outcome of this meeting had very little relevance to the report. Contacts after this meeting compensated this failure only partly.

Mr. Xavier Joly – Volvo Construction Equipment Supply Chain Manager, Brussels, Belgium

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Joly gave a comprehensive Volvo supplier presentation in which all steps in the supplier selection process have been mentioned, detailing the suppliers' appropriate actions in this selection process and zooming in on the decision phases in this selection. A Swedish Bachelor's thesis study at Volvo and Scania in 2004 outlined a Volvo supplier-profile prior to this meeting, and which was confirmed during this meeting. As well, Mr. Joly opened the door to two commodity managers VLP can contact in the future.

Mr. Paul Hennesy – JCB Purchasing manager, Uttoxeter, United Kingdom

Subject: questionnaire – supplier selection and ID functions
Comment: Although this meeting was a little limited in time, Mr. Hennesy presented JCB and its competitors and supplied me with several CE Industry facts and figures, indicated future (outsourcing) developments for JCB and its suppliers, critically reviewed VLP's status in the JCB supply chain, and indicated possible future actions for VLP as being a supplier to JCB.

Mr. John Miller – Laystall General Manager, Wolverhampton, United Kingdom

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Miller is very much reliant on JCB since this account reflects the vast majority of Laystall's annual sales. Mr. Miller outlined the supplier-role he fulfilled in serving JCB very well, but more general questions could not be answered by him. Although I highly appreciate his support, the data collected was very subjective and not too much relevant for the study.

Mr. K. Ludwig – Gummi Metall Technik (GMT) International, Sales Representative, Hannover (Messe), Germany

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Ludwig provided me with general CE and HT industry developments, concerning first-tier suppliers such as GMT and its competitors. Next to this, he was able to give some global insights in GMT's supplier selection process. It was my opinion that Mr. Ludwig himself had not been into any selection process himself, therefore I doubt the relevance of his data.

Mr. Peter Herms – Thiel&Hoche Sales Representative, Hannover (Messe), Germany

Subject: questionnaire – supplier selection and ID functions
Comment: Thiel&Hoche is not only a major competitor for VLP, but can as well be a benchmark to VLP. I spoke to Mr. Herms without mentioning VLP, and Mr. Herms was very much interested in the UT research I carried out. Next to the questionnaire items, we discussed Thiel&Hoche's successes, delivery programme, and unique network of machining and warehousing partners.

Mr. Herman Grobbenhaar – Grand Prix Silencers Managing Director, Deventer, The Netherlands

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Grobbenhaar has an extensive track-record in the automotive industry, and possesses a comprehensive network of contacts in this industry. As a possible machining partner to VLP, we discussed the questionnaire and Mr. Grobbenhaar mentioned his experiences with e.g. product margins in this industry, reliability of deliveries, and machining tricks. Although his story was very much one-sided and subjective, relevant data has been derived from his story which lasted an entire afternoon, and during the evaluation with Mr. Ton Hoeijenbosch (Branch Manager Special Welded Products – VLP) afterwards.

Mr. Leendert Remmelink – Nederlandse Vereniging van Algemene Toeleveranciers (NEVAT), Branchemanager Holland Automotive en Groot Verspaners, Zoetermeer, The Netherlands.

Subject: questionnaire – supplier selection and ID functions
Comment: Mr. Remmelink has made his contribution to this report by means of an interview at VLP in Deventer. Next to answering the questionnaire, he assisted in supplying valuable data about current and future developments in the automotive industry. Although NEVAT is a community with an extensive technical knowledge and an attractive networking opportunity for VLP, the experiences with CE is low.

Internal persons spoken with

Mr. Joop Sassen – Managing Director European Precision Division, Deventer, The Netherlands

Subjects: positioning opportunities and issues for VLP, critical reflections to my research methods, critical reflections to my data collected and used, strengths and weaknesses of VLP, strategic networking opportunities, supporting in pragmatic thinking.

Mr. Benno van der Worp – Sales Manager VLP The Netherlands, Deventer, The Netherlands

Subjects: positioning opportunities and issues for VLP, strengths and weaknesses both of VLP, past experiences in automotive industry.

Mr. Elko Smid – European Business Development Manager VLP, Deventer, The Netherlands

Subjects: positioning opportunities and issues for VLP, strengths and weaknesses both of VLP, past experiences in automotive industry.

Mr. Thierry Martinez – Branch Manager VLP France Special Welded Products, Meyzieu, France

Subjects: automotive industry structure in France, developments of the French automotive industry, developments of VLP in the French automotive industry, experiences of VLP France in this industry

Mr. Christian Piotto – Managing Director Division Precision, Meyzieu, France,

Subjects: automotive industry structure in France, developments of the French automotive industry, developments of VLP in the French automotive industry, experiences of VLP France in this industry

Mr. Collin Beal - ……., Birmingham, United Kingdom

Subjects: discussing questionnaire items, strengths, weaknesses, opportunities and threats for VLP in the United Kingdom, experiences in the UK automotive industry, possibilities of copying successes to other countries

Mr. Geoff Fox - ……., West Midlands, United Kingdom

Subjects: discussing questionnaire items, strengths, weaknesses, opportunities and threats for VLP in the United Kingdom, experiences in the UK automotive industry, possibilities of copying successes to other countries

Mr. Guy Cariat – Manager Division Precision Belgium, Vilvoorde, Belgium

Subjects: discussing questionnaire items, experiences in the Belgium automotive industry

Mr. Christophe Dupont – Sales Precision Belgium, Vilvoorde, Belgium

Subjects: discussing questionnaire items, experiences in the Belgium automotive industry

Mr. Lennard Keulen – Branch Manager Precision Mechanical Engineering The Netherlands, Deventer, The Netherlands

Subjects: strengths and weaknesses of VLP in the HT industry, positioning issues in the automotive industry, discussing questionnaire items, discussing possibilities of copying DAF success to other OEMs, discussing items for positioning VLP in HT industry

Mr. Ton Hoeijenbosch - Branch Manager Precision Special Welded Products The Netherlands, Deventer, The Netherlands

Subjects: strengths and weaknesses of VLP in the automotive industry, positioning issues in the automotive industry, discussing questionnaire items, discussing opportunities for machining partners

Mr. Frank Groeneveld – Quality Assurance Manager Precision The Netherlands, Deventer, The Netherlands

Subjects: product and process quality issues in the automotive industry

8. Literature references

Printed literature

Aaker, D.A., Kumar, V. and Day G.S. (1998) *Marketing Research,* Wiley

Anderson, J.C., and Narus, J.A., “Capturing the value of supplementary services”, pp. 75, 1995

Ball et al.; International Business, the challenge of global competition, 9th edition, McGraw-Hill,

Baptista, Cristina; Forsberg, Lars-Ole: Industrial buying behavior in the Swedish and Polish mining industries: a comparative study, 1997

Best, R.J., Market-Based Management, Prentice Hall, 2000

Bradford, R.W., Duncan, P.J., Tarcy, B., Simplified Strategic Planning: A No-Nonsense Guide for Busy People Who Want Results Fast, Chandler House Press, 1999

Chenhall, RH (2003) Management control systems design within its organizational context: findings from contingency-based research and directions for the future, Accounting, Organizations and Society 28

Cooper, R., Chew, B., “Control Tomorrow’s costs through today designs” *Harvard Business Review,* Jan.-Feb. 1996

Daft, R.L., Organization theory and design, South-Western College Pub, 2002.

Dickson, G. (1966). An analysis of vendor selection systems and decisions. *Journal of Purchasing,* 2(1): 5-17.

Gadde, J., and Hakansson, W., The changing role of purchasing: reconsidering three strategic issues. European Journal of Purchasing and Supply Management. v1 i1, 1994

Hirano, H. and Furuya, M. (2006), "JIT Is Flow: Practice and Principles of Lean Manufacturing", PCS

Imai, M. (1997), *Gemba Kaizen*, McGraw-Hill

Imai, M. (1986), *Kaizen: The Key to Japan's Competitive Success*, McGraw-Hill/Irwin

Kotler, P., Marketing Management, Prentice Hall, 2000.

Keller, K. L.,: Strategic Brand Management, Prentice Hall, 1998.

Merchant, K., and Van der Steede, A., Accounting, Finance and Management, Prentice Hall, 2004

Ratnasingam. P. “The Influence of Power on Trading Partner Trust in Electronic Commerce,” *Internet Research: Electronic Networking Applications and Policy*, v. 10, no.1, 2000

Robinson, P.J., Faris, C.W. and Wind, Y., (1967) *Industrial Buying and Creative Marketing*, Boston: Allyn & Bacon

Rosenbloom, B.,Marketing functions and the wholesaler-distributor: achieving excellence in distribution, 1987

Sheth, J.: Organizational Buying Behavior - Past Performance and Future Expectations. *The* Journal of Business and Industrial Marketing, 11, No. 3, 7–24, 1996

Shingo, S., Zero Quality Control: Source Inspection and the Poka-Yoke system, 1991

Swift, C.O., and Gruben, K.H., “Gender Differences in Weighting of Supplier Selection Criteria,” Journal of Managerial Issues, Volume 12 (4), 2001

Weber, C., Current, J.R., and Benton, W.C., "Vendor Selection Criteria and Methods," *European Journal of Operational Research*, 50, 1991

Womack, J., and Jones, D., Lean thinking: Banish Waste and Create Wealth in Your Corporation, Revised and Updated, Free Press, 2003

Webster, F.E. Jr. and Wind, Y.: A General Model for Understanding Organizational Buying Behavior, Journal of Marketing, 1972a.

Wind, Y., Thomas, R.J., Conceptual and Methodological Issues in Organisational Buying Behaviour, European Journal of Marketing, 1980

Publications

99-1 Planning Report, Interoperability Cost Analysis of the U.S. Automotive Supply Chain, Research Triangle Institute, Brunnermeier S.B., Martin S.A., March 1999 U.S Department of Commerce and Technology Administration.

ABN-AMRO *European Auto Components: Driven by Technology*. London: ABN-AMRO, 2000.

Accenture, Preparing for the Future Today: Auto 2010 in the United Kingdom, 2002

Aken van, J.E., Strategievorming en organisatiestructurering : organisatiekunde vanuit de ontwerpbenadering, Kluwer, 2002.

Amit, R., and Zott, C., Business Strategy and Business Model: Extending the Strategy-Structure-Performance Paradigm, Wharton Alliance Center for Global Research and Development, 2004.

Auramo, J., Kauremaa, J., Tanskanen, K., Benefits of IT in supply chain management – an explorative study of progressive companies, Jaana; Jouni Kauremaa; Kari Tanskanen, Helsinki University of Technology, Department of Industrial Engineering and Management, 2003.

Automotive Supply Chain: Global Trends and Asian Perspectives, Economics and Research Department, Asian Development Bank, and the International Motor Vehicle Program, Massachusetts Institute of Technology, January 2002

Brenkers, R., and Verboven, F., Liberalizing a Distribution System: The European Car Market, K.U. Leuven, 2002.

Buying behaviour in the Swedish Truck Industry, Lulea University, 2002

CapGemini, Cars Online 05/06: Creating Opportunities for Revenue Growth and Cost Reduction, Automotive – The way we see it, 2005.

COMMISSION OF THE EUROPEAN COMMUNITIES, DG Enterprise, Innovation, Networking and Services, A U T O C H A IN: The Automotive Supply Chain Project, Final Report, 2001.

COMMISSION OF THE EUROPEAN COMMUNITIES, COMMISSION STAFF WORKING DOCUMENT: European Competitiveness Report, 2004.

COMMISSION OF THE EUROPEAN COMMUNITIES, DG Enterprise, Innovation, Networking and Services, A U T O C H A IN - The Automotive Supply Chain Project, FINAL REPORT, 2001.

Czaban, L. and Henderson, J. 'Globalization, institutional legacies and industrial transformation in Eastern Europe,' *Economy and Society,1998.*

Dannenberg, J., and Kleinhans, C., The Coming Age of Collaboration in the Automotive Industry: *For automakers, it's all about brand management,* Mercer Management Journal 17, 2005.

Destroying Boundaries: Integration and Collaboration in the Automotive Value Chain, 2002

Deloitte Research and Stanford Global Supply Chain Management Forum, INTEGRATING DEMAND AND SUPPLY CHAINS IN THE GLOBAL AUTOMOTIVE INDUSTRY, 2003.

Dicken, P. 'Europe 1992 and strategic change in the international automobile industry', *Environment and Planning A*, 1992.

Dicken, P. *Global Shift: Reshaping the Global Economic Map in the 21st century*. Fourth Edition. London: Sage Publications, 2003a.

Dicken, P. '"Placing' firms: grounding the debate on the 'global' corporation', in J. Peck and H. W-c. Yeung (eds) *Remaking the Global Economy: Economic-Geographical Perspectives*. London: Sage Publications, 2003b.

Economic Report, Facts and Figures about the European Construction Equipment Industry, CECE ECONOMIC REPORT, April 2006 issue.

EIU, *World Automotive Components: Market Prospects to 2005*. London: The Economist Intelligence Unit, 2000.

Europe Auto Parts, "Report on the sector of car components in the European Union" 2005.

European Foundation for the Improvement of Living and Working Conditions, Trends and drivers of change in the European automotive industry: TRW Automotive, European Monitoring Centre on Change, 2002.

European Foundation for the Improvement of Living and Working Conditions, Trends and drivers of change in the European automotive industry: The Volvo Truck Corporation, European Monitoring Centre on Change, 2002.

European Foundation for the Improvement of Living and Working Conditions, Trends and drivers of change in the European automotive industry: Mapping report, European Monitoring Centre on Change, 2003.

Follis, M., and Enrietti, A., IMPROVING PERFORMANCES AT THE SECOND TIER OF THE AUTOMOTIVE SUPPLY CHAIN - A DRAFT CASE STUDY OF AN INNOVATIVE INITIATIVE IN THE ITALIAN CAR INDUSTRY, University of Torino, 2002.

Freyssenet, M. and Lung, Y., 'Between globalisation and regionalisation: what is the future of the motor industry?' in J. Humphrey, Y. Lecler and M. S. Salerno (eds) *Global Strategies and Local Realities: The Auto Industry in Emerging Markets*. London: Macmillan, 2000.

Global Auto Industry: Stepping Onto a New Stage, 2003 Q4 Executive Briefing; and Autofacts Monthly Executive Perspectives, PriceWaterhouseCoopers/AUTOFACTS, January 2004

Global Exchange Services – Trading Grid, IMPROVING SUPPLY CHAIN PERFORMANCE FOR THE GLOBAL AUTOMOTIVE INDUSTRY, 2004

Grant, J., 'Parts companies feel knock-on effect', *Financial Times,* 4 March*, 2003.*

Havas, A., 'Changing patterns of inter- and intra-regional division of labour: Central Europe's long and winding road', in J. Humphrey, Y. Lecler and M. S. Salerno (eds) *Global Strategies and Local Realities: The Auto Industry in Emerging Markets*. London: Macmillan, 2000.

Hellingrath, B, Witthaut, M, Stone, G. Miemczyk J. (2005) ICT support systems for supply chain management , Strengthening Competitiveness through Production Networks – Results from ICT for Business Projects, EC Brussels

Howard, M., Powell, P., Vidgen, R., INTER-ORGANIZATIONAL COLLABORATION AND VALUECREATION IN THE AUTOMOTIVE INDUSTRY, Journal of Information Technology, 16, 2002.

Howard, M., Powell, P., Vidgen, R., Overcoming stakeholder barriers in the automotive industry: building to order with extra-organizational systems. Journal of Information Technology, 18, 2002.

Howard, M., Vidgen, R. and Powell, P. 2003. *Overcoming Stakeholder Barriers in the Automotive Industry:* Building-to-order with Extra-Organizational Systems. Journal of Information Technology.

Howard, M. and Graves, A. 2003. *Thinking Lean Vehicles: an Informational Perspective. 5th Materials for Lean Weight Vehicles conference.* (Best Paper Award – Session 4) Warwick University.

Hudson, R., 'Changing industrial production systems and regional development in the New Europe,' *Transactions of the Institute of British Geographers*, 2001.

Hudson, R. and Schamp, E., *Towards a New Map of Automobile Manufacturing in Europe? New Production Concepts and Spatial Restructuring*. Berlin: Springer, 1995.

Humphrey, J., 'Assembler-supplier relations in the auto industry: globalization and national development', *Competition and Change*, 2001

Humphrey, J. and Oeter, A., 'Motor industry policies in emerging markets: globalization and the promotion of domestic industry', in J. Humphrey, Lecler and M. S. Salerno (eds) *Global Strategies and Local Realities: The Auto Industry in Emerging Markets*. London: Macmillan, 2000.

International Labour Office Geneva, Automotive industry trends affecting component suppliers - Report for discussion at the Tripartite Meeting on Employment, Social Dialogue, Rights at Work and Industrial Relations in Transport Equipment Manufacturing, 2005.

ISB, Economic Development Rheinland-Pfalz, We keep moving: the Automotive industry in rheinland-Pfalz, Germany, 2004.

Jackson, B., Singh, B.P., Hallman, P., and Sehgal, V., Building Advantaged Positions – The First Tier Suppliers, Booz Allen Hamilton, 2002.

Jürgens, U., Characteristics of the European Automotive System: Is There a Distinctive European Approach?, 2003.

Key Account Management in an International Context, Goteborg University, 2002

Larsson, A., Design and Selection of Industrial Marketing Channels, Lulea University of Technology, 2005.

Martinez, V., and Kennerley, M., IMPACT OF PERFORMANCE MANAGEMENT REVIEWS: EVIDENCE FROM AN ENERGY SUPPLIER, Operations and Supply Chain Performance Management, 2001.

Miemczyk, J & Holweg, M (2004) *Building Cars to Order - What does it mean for inbound logistics*, Journal of Business Logistics vol.25 No.2.

Miemczyk, J (2004) *A car in three days! Environmental impacts of the automotive supply chain, Chapter in Towards an environment research agenda, International Centre for the Environment,* Macmillan Press

Miemczyk, J. and Howard, M. 2004. *Supplier Parks in the European Auto Industry: Agents for Change*. Proceedings of 11th European Operations Management Association International Annual Conference. Paris, France.

Miemczyk, J., Howard, M, and Graves, A. 2004. *Partners for life? The role of collaborative relationships at the 'end-of-life'*. Proceedings of 13th conference of International Purchasing & Supply Education and Research Association. Catania, Italy.

Miemczyk, J & Holweg, M (2003) T*he challenge of measuring world class logistics, Annual Survey of The European Car Transportation Group,* Brussels.

Miemczyk J, & Holweg M., (2001), Build-to-Order: *Rethinking the Automotive Supply Chain, Survey on Vehicle Logistics*, European Car Transport Group of Interest (ECG), Brussels.

Nitschke, C., Outsourcing vs. Insourcing in the Automotive Industry: The Role and Concepts of Suppliers, University of Stellenbosch, 2000.

OEM Parts Purchasing: Shifting Strategies, Office for the Study of Automotive Transportation, Univ. of Michigan, January 2001

Office for the Study of Automotive Transportation, Univ. of Michigan, and Oracle Corporation, Automotive Industry Practice, July 2003

Pfaffmann, E. and Stephan, M., 'How Germany wins out in the battle for foreign direct investment: strategies of multinational suppliers in the car industry', *Long Range Planning. 2001.*

Posthuma, A., "INDUSTRIAL RENEWAL AND INTER-FIRM RELATIONS IN THE BRAZILIAN AUTOMOTIVE INDUSTRY", University of Michigan, 2000.

PriceWaterhouseCoopers, Global Automotive Financial Review, An overview of industry data, trends and financial reporting practices, 2003.

PriceWaterhouseCoopers, The Sustainability Yearbook 2006: Insights from SAM's Sustainability Research and PWC's Approach to Governance, Risk and Compliance, 2006.

Proff, H., 'Hybrid strategies as a strategic challenge – the case of the German automotive industry', *Omega*, 2000.

Rozin R.S., Processes and Methodologies for Creating a Global Business-to-Business Brand, Dow Corning Corporation, 2002.

Sadler, D., Internationalization and specialization in the European automotive components sector: implications for the hollowing-out thesis, *Regional Studies*, 1999.

Sadler, D. and Swain, A., 'State and market in eastern Europe: regional development and workplace implications of direct foreign investment in the automobile industry in Hungary', *Transactions of the Institute of British Geographers*, 1994.

Sako, M., Supplier Development at Honda, Nissan and Toyota: Comparative Case Studies of Organizational Capability Enhancement, University of Oxford, 2003

Schonberger, R. J., *Japanese Manufacturing Techniques: Nine Hidden Lessons in Simplicity*. New York: The Free Press, 1982.

Schmitz, J., and Platts, K., Supplier Logistics Performance Measurement in the Automotive Industry, University of Cambridge, 2001.

Shimokawa, K., 'Reorganization of the global automobile industry and structural change of the automobile component industry' *mimeo*, 2000.

Sturgeon, T. J., 'What really goes on in Silicon Valley? Spatial clustering and dispersal in modular production networks', *Journal of Economic Geography*, 2003.

Tassey, G., Brunnermeier, S.B., and Martin, S.A., Interoperability Cost Analysis of the U.S. Automotive Supply Chain, Research Triangle Institute, 1999.

Transfer of Export Process from Customer to Supplier, Volvo Trucks, Goteborg University, 2003

UNCTAD, *The Competitiveness Challenge: Transnational Corporations and Industrial Restructuring in Developing Countries*. New York: United Nations, 2000.

Vaan de, Prof. Ir. M.J.M., ONDERZOEK STRATEGIE AUTOMOTIVE-INDUSTRIE, Berenschot, Utrecht, 2000.

Van Bruggen, G.H., Kacker, M., Nieuwlaat, C., The Impact of Channel Function Performance on Buyer-Seller Relationships in Marketing Channels, International Journal of Research in Marketing, June, 2004.

Veloso, F., Henry, C., Roth, R., Clark, J.P., Global Strategies for the Development of the European Autoparts Industry, Global Autoparts, 2003.

Veloso, F., The automotive supply chain organization: Global Trends and Perspectives, Cambridge, 2000.

Verband der Automobilindustrie e.V.(VDA), Annual Report: 2003-2004-2005-2006, Frankfurt am Main.

Verband der Automobilindustrie e.V.(VDA). Kooperationsmodelle und SE-Checkliste zur Abstimmung der Datenlogistik in SE-Projekten, VDA 4961-2. 2001.

Vitali, G.,, COMPANY RELATIONSHIPS IN A TECHNOLOGICAL DISTRICT: THE CASE OF THE TURIN AUTOMOTIVE INDUSTRY, Ceris-Cnr, Turin, Italy, 2001.

Williams, K., Haslam, C., Williams, J. and Cutler, T., 'Against lean production', *Economy and Society*, 1992.

Womack, J. R., Jones, D. T., and Roos, D., *The Machine that Changed the World*. New York: Rawson Associates, 1990.

Associations

www.acea.be - Association des Constructeurs Européens d'Automobiles (ACEA)
www.agoria.be – Federation of the Technological Industry
www.aima.pt - Associação dos Industriais de Montagem de Automóveis (AIMA)
www.amvir.gr - Association of Motor Vehicle Importers Representatives (AMVIR/SEAA)
www.anfac.com - Asociacion Española de Fabricantes de Automoviles y Camiones (ANFAC)
www.anfia.it - Associazione Nazionale Fra Industrie Automobilistiche (ANFIA)
www.auto-schweiz.ch - Auto-Suisse - Association Importateurs Suisses d'Automobiles
www.autosap.cz - Automotive Industry Association (AIA)
www.autotuojat.fi - Autotuojat r.y.
www.b-i-l.no - Bilimportørenes Landsforening (BIL)
www.bilimp.dk - De Danske Bilimportører (DBI)
www.bilsweden.se - BIL Sweden
www.ccfa.fr - Comité des Constructeurs Français d'Automobiles (CCFA)
www.cece-eu.org - COMMITTEE FOR EUROPEAN CONSTRUCTION EQUIPMENT
www.coneq.org.uk – The Construction Equipment Association (CEA)
www.clepa.com – European Association of Automotive Suppliers
www.febiac.be - Fédération Belge de l'Industrie de l'Automobile et du Cycle (FEBIAC)
www.nevat.nl – Nederlandse Vereniging Algemene Toelevering
www.oica.net - INTERNATIONAL ORGANIZATION OF MOTOR VEHICLE MANUFACTURERS
www.raivereniging.nl - Nederlandse Vereniging de Rijwiel-En-Automobiel Indusrie (RAI)
www.seaa.gr - Association of Motor Vehicle Importers Representatives (AMVIR/SEAA)
www.smmt.co.uk - Society of Motor Manufacturers and Traders Ltd. (SMMT)
www.vda.de - Verband Der Automobilindustrie e.V. (VDA)
http://wko.at/fahrzeuge - *Fachverband der Fahrzeugindustrie Österreichs*

First tier suppliers

www.aisinseiki.co.jp
www.arvinmeritor.com
www.autoliv.com
www.collinsalkman.com
www.continental.com
www.dana.com
www.delphi.com
www.denso.com
www.dupont.com
www.faurecia.fr
www.johnsoncontrols.com
www.learcorporation.com
www.magnainternational.com
www.michelin.com
www.robertbosch.com
www.siemensvdo.com
www.thyssenkrupp.com
www.trw.com
www.valeo.com
www.visteon.com
www.zf.com

OEMs in CE – relevant for this study

www.cat.com – Caterpillar
www.cnh.com – Case New Holland
www.deere.com – John Deere
www.hitachi.com – Hitachi
www.ingersollrand.com – Ingersoll Rand
www.kobelco-kenki.co.jp - Kobelco
www.komatsu.com – Komatsu
www.liebherr.com – Liebherr
www.terex.com – Terex
www.volvoce.com – Volvo

Subsequent OEM annual reports and purchasing presentations

OEMs in HT – relevant for this study

www.daimlerchrysler.com – Mercedes Benz
www.daf.com – DAF
www.renault.com – Renault Vehicle Industrielle
www.iveco.com – Iveco
www.man-ag.com – MAN
www.volvo.com – Volvo
www.scania.com - Scania

Subsequent OEM annual reports and purchasing presentations

Websites

www.aea.com
www.aem.org
www.ammann-yanmar.com
www.autoparts.com
www.autoindustry.co.uk
www.benteler.com
www.bergstrominc.com
www.blonnet.com
www.bsi-emea.com
www.business.com
www.buyusa.gov
www.caw.ca
www.cea.com
www.cema-agri.org
www.cepal.org
www.competitivechange.com
www.conexpoconagg.com
www.dartmouth.edu
www.eu.org
www.farmequip.org
www.finowautomotive.de
www.gkndriveline.com
www.globalspec.com
www.gruppofontana.it
www.ibisuva.nl
www.ilo.org

www.intermat.fr
www.isixsigma.com
www.iso.org
www.ita.doc.gov
www.kendrion.com
www.marketresearch.com
www.ncsu.edu
www.npd-solutions.com
www.paccar.com
www.perkins.com
www.pmlights.com
www.principlesofmarketing.com
www.qc-pisek.cz
www.quality-one.com
www.rothrist.de
www.smc-alliance.com
www.sweden.se
www.terex-schaeff.com
www.terex-atlas.com
www.thiel-hoche.de
www.tpfeurope.com
www.truckindustry.com
www.vda.de
www.vda-qmc.de

http://buyusainfo.net
http://europa.eu.int
http://msl1.mit.edu/msl
http://strategis.ic.gc.ca