Does value leverage pay off?

A model for measuring value-leverage capabilities in automotive large-scale systems integrators

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DOES VALUE LEVERAGE PAY OFF?

A model for measuring value leverage capabilities to compete for automotive large-scale system integrators (LSSI).

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Abstract

Trends in the car and aircraft manufacturing industry showed an evolution in the configuration and management of the production network. For instance the aerospace manufacturing industry tended to be a closed system, competing on scale of production and focussing on maximization own profit. Nowadays the automotive companies are developing open systems under influence of globalisation, outsourcing and co-creation of value. Doing this with suppliers causes a shift of value from the focal firm to the supply chain, creating a value levering position for the so called Large Scale System Integrator (LSSI). The leverage of value on suppliers introduces the value leverage capability of the LSSI company. The capability of the LSSI to balance continuation, conception and configuration is crucial for the (long term) profitability and competitive position. To express the value leverage capabilities the authors propose the variables Turnover per Employee (T/E), Research and Development per Employee (RD/E) and Profit per Employee (P/E) whose (inter) relationship determine the capabilities.

Keywords: Value-leverage, capability, competence-based competition, Large Scale System Integrator (LSSI).

Introduction

Sanchez, Heene, and Thomas introduced the foundations of the theory of competence based competition in 1996. In this competence-based management theory, a company is characterised as an open system of assets stocks and flows. Containing tangible assets like production equipment and intangible assets like capabilities and cognitions. The authors elaborate the dynamic, systematic, cognitive and holistic dimensions of competence theory. Companies can achieve their goals by two interrelated principles of competence dynamics; competence leveraging and competence building.

This paper aims to create further understanding of competence leveraging as proposed by Sanchez et al. (1996). Competence leveraging is a process through which a firm applies its existing competences and capabilities to current or new market opportunities in ways that do not require qualitative changes in the firm's assets or capabilities. In this way a company can increase value by leveraging on assets and resources. They also stated that the strategically significant structural features of an industry may be more accurately reflected by the stocks of knowledge and capabilities held by the companies in an industry than by their stocks of physical assets (Sanchez et al. 1996). This line of reasoning suggests that intangible and firm addressable resources are becoming more important to create value.

Sanchez and Heene (1997) suggested that the competence-based management theory adds an essential "supply side" dimension to the industry dynamics by recognizing that companies also compete to acquire inputs of resources and capabilities for competence leveraging. Sanchez (2002) framed capabilities as repeatable patterns of action in use of assets to create, produce / offer products to a market. Capabilities arise from the coordinated activities of groups of people who pool their individual skills in using assets. For some organisations competences appear to be derived from the use of own firm specific resources, while the competences of other companies are derived from their ability to access and coordinate resources beyond their own organizational boundaries (Heene, Sanchez, 2004).

Industrial companies in the Aerospace and Automotive industry show an ability to access and coordinate resources beyond their focal company boundaries. They manage to leverage on firm addressable resources (Beelaerts van Blokland et al., 2011). These companies are 'producing' a part of the total demand value and lever the remaining value on the supply chain. Levering value on the supply chain includes risk-sharing with suppliers that are involved in the co-development and co-production. Esposito and Raffa (2006) defined the term large-scale systems integrator (LSSI). The LSSI company contributes through its own unique value such as technology development and integration (Petrick, 2007). For the leverage capability, the LSSI company interacts as a 'value flow processor' between demand and supply. Creating profitable value requires a balance between customer needs (demand chain), the focal company unique value contribution (own chain), and the suppliers (supply chain). Figure 1 shows the position in the network (although simplified). As Sanchez and Heene (1996) already stated, a supply side analysis of industry competitive dynamics is likely to reveal important dependence and complementary elements within the competence leveraging.

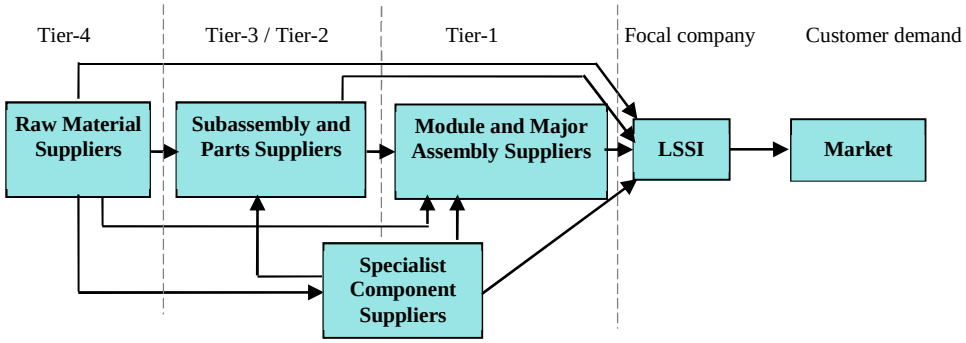

Figure 1: Simplified Large Scale System Integrator chain (adapted from Petrick, 2007)

Value leverage in the context of this paper is defined by the mechanical principle of moments, as shown in figure 2: "Lever principle".

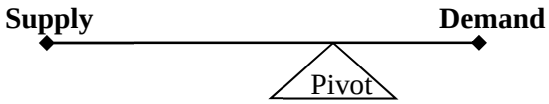

Figure 2: Lever principle

Projecting this metaphor on value leverage in supply networks, it is suggested there is a balance between what is supplied to the LSSI by suppliers and what is delivered to the demand side of the supply chain. The capability of an LSSI to access firm-addressable resources in the chain defines the leverage that is accomplished.
Value leverage is here defined as "the ability of the firm to lever on firm-addressable resources within the supply chain, using its own firm-specific resources to complete the (final) product or services needed by customers of the supply network". As a consequence, the employee and its knowledge base turns out to be an essential value driver characterizing for instance the automotive industry, which can be considered as high tech or knowledge concentrated industry. According to Lovell (2007), the employee represents the value driver to develop and establish relations to build networks and exchange knowledge for continuous value creation. From this reasoning the employee emerges as the factor that influences value-leverage on firm addressable resources by the focal firm. In the perspective of this paper, this effect is called the value leverage capability of a company.
The aim of this paper is to focus on the empirical measures, useful in representing competence leveraging. This research adds to previous research by Sanchez and Heene (1997).

Value leverage in the automotive industry

The car manufacturer market has been evaluated for a considerable period under the umbrella of the International Motor Vehicle Program and published by the IMVP publication from 1995: *Product development performance in the auto industry: 1990s update* by Clark, Ellison, Fujimoto and Hyun (1995). Clark and Ellison et al. (1995) proposed six "project strategy variables" measuring the participation of suppliers with development of cars (product level) from the OEM perspective. This research indicated the shift of value from the car OEM towards the supply chain. It also gave a possible explanation why the USA car manufacturers faced severe competition form the Japanese car manufacturers in the nineties as reported by Womack, Jones, Roos (1990). In their publication it was also mentioned that for instance Toyota de-invested their internal suppliers Nippondenso Aisin Seiki and Toyoda

Gosei, which formed a supply chain for sub systems. By creating a supply chain Toyota was able to introduce the just in time supplies, reduction of working capital (stock) and leverage on co-development and co-production. Toyota became an integrator with own production value of approx. 27% versus the supply chain with 73%.

Recently, (2010) Magna (Canada) contract manufacturer and first tier supplier to GM, was a potential candidate to take-over (2009) the Opel division of GM. GM decided afterwards, when saved by the USA government, not to de-invest Opel. This example shows how the power of first - tier suppliers has emerged during the last years. Another example is the development of a hybrid truck by Paccar – DAF Trucks (2007). The DAF supply chain partners made it possible to reach a time to market of four years for the innovative truck. The power of the supply chain was also demonstrated with the restart of the DAF Trucks company in 1994 after filing for chapter eleven. The main suppliers were the main stakeholders to support DAF with the "resurrection". DAF Trucks became a Phoenix, rising from here ashes.

Value leverage framework

Recent research by Beelaerts van Blokland et al. (2011) confirmed that LSSI's in the aerospace industry were leveraging value on the suppliers over time. The indicators 'turnover per employee' (T/E), 'research and development per employee' (RD/E) and 'profit per employee' (P/E) were found to indicate the capability of leveraging value on the suppliers

Research by Sanchez, et al, (1996) motivated that the supply side was likely to reveal important dependencies and complementary elements among competence leveraging activities of firms that may not be recognisable through a product market focus only. Sanchez (2002) referred to employees in the definition of capabilities as capabilities arise from the coordinated activities of groups of people who pool their individual skills in using firm addressable and firm fixed assets.

According to Lovell (2007), the employee represents the value driver to develop and establish relations to build networks and exchange knowledge for continuous value creation for the customer. Lovell (2007) identified the effectiveness of the people/employee in terms of profit per employee (P/E). In the fourth place from a competence perspective the strategically significant structural features of an industry may be more accurately reflected by the stocks of knowledge and capabilities held by the firms in an industry than by their stocks of physical assets. From this reasoning, the employee emerges as the factor which is a measure for value-leverage on firm addressable resources.

In order to measure the relationship between the indicators, the framework that is described in figure 3 is used. The triangle represents the lever; each of the corners represents the capabilities to lever a certain aspect in the supply network. They are given the generic terms Configuration, Conception and Continuation. Together the capabilities form the competence of value leverage. Below the three corners of the lever are described. The corners of the triangle form the competences of the LSSI.

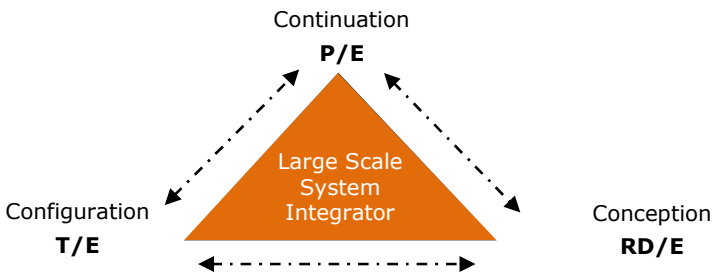

Figure 3: Framework for the competence of value-leverage by LSSI companies

Continuation
The focal OEM company competes on the competence to exchange value outside the own value chain (Hankansson and Snehota, 1989) and to create access to resources beyond the focal OEM-company boundary. According to Lovell (2007), the employee represents the value driver to develop and establish relations to build networks and exchange knowledge for continuous value creation. Lovell (2007) identified the effectiveness of the employee in terms of profit per employee (P/E). The profit per employee is the indicator for the ability of a LSSI to generate market demand for the products or goods. The so called 'pull-mechanism' is introduced into the chain to pull co-development and co-production out of the supplier systems (towards the LSSI company). The P/E gives an outlook on a company's ability for business continuity. A high P/E reflects that a company is capable to add more customer value by leveraging value on the supply network. This secures continuity for the coming time. We call this Continuation.

Conception
Research by Choi (2005) showed the relationship between complexity and supplier innovation. New products can be developed at lower costs through reduced complexity, by involving suppliers early in the development process. The development process should be organized such that (expected) value is optimised the risks, costs and development time are minimised. This can be achieved using early supplier involvement (Zsidisin, Smith, 2004). Because of early supplier involvement a time premium is anticipated (Bossink, 2002, Odenthal, 2004). Pam (2010) reported that IP-intensive industries spent almost 13 times more on R&D expenditure per employee than non-IP-intensive industries. The R&D expenses per employee (R&D/E) provide information about the focus on innovation within an organisation, using the R&D capacity of the supply network (Pam, 2010). We call this capability "conception".

Configuration
Turnover per employee (T/E) indicates the capability of a company to leverage its resources on the supply chain. Because of co-production, Toyota produced in the 1960 only 27% of the total value of the car while Western suppliers (USA and Europe) produced 90% of the value of the car. This confirms the shift of value from Toyota towards suppliers, supported by theories on lean manufacturing and supply chain (Womack, Jones, Roos, 1990, Clark and Ellison, 1995). The effect of re-designing processes with value added focus is mostly the reduction of own manufacturing activities (Arnold, 2000). Murman (2002) confirms the shift of value to the supply network for the aerospace. Through co-production the LSSI reduces cost and increase value-add by elimination of waste (Womack, 1996). Choi (2005) has confirmed that supply chain complexity is positively related to the total transaction costs (Williamson, 1989), implying that if the complexity decreases the transaction costs will decrease as well. The capability to share development and operation processes reflects how well the value network is configured. Turnover per employee is used to measure the configuration of the supply chain (Beelaerts van Blokland et al., 2010). In the research of the Delft Centre for Aviation this capability is called Configuration.

Research question and method
It seems large scale system integrators are balancing the value potential of the total chain (through selling the end products) and the co-development and co-production of the products such as aircrafts and cars is the role of the LSSI. The main research question of this paper is:

Are Large Scale System Integrators in the automotive industry making use of their competence to leverage value on the supply chain?

This research question leads to following sub research questions:

1. Can empirically be demonstrated that the variables T/E, RD/E and P/E (Beelaerts van Blokland et al., 2011) express value-leverage for automotive integrators?

   Sub 1-a: Are the proposed variables applicable for automotive integrators?
   Sub 1-b: Are the proposed variables related, through time?
   Sub 1-c: Can automotive integrators be compared on value leverage capabilities?

2. Can Large Scale Automotive System Integrators be assessed on their value leverage competence to know the benefit?

This paper reports on comparative research and builds on the work of Beelaerts van Blokland et al., (2011). Based on literature research the above described variables (figure 3) were proposed and it was showed that these were applicable to the aerospace industry. In this study the authors focus on the automotive LSSI industry in order to make the conclusion more generic. A time study was performed to analyse whether the variables showed an 'over time' effect, indicating that the LSSI is leveraging on its supply chain. Furthermore, an in-depth analysis in the automotive industry is performed to learn about the value leverage of these LSSI's (and compare the findings with Beelaerts van Blokland et al., (2011). The authors propose the following steps to research value leverage in the automotive LSSI industry:

First step was to research the sample (see table 1) for automotive LSSIs. The sample consists of 30 companies (N=30) and consists of US, European and Asian motor vehicle manufacturers (OICA, 2008), including the world's tractor and earth moving vehicle manufacturers, John Deere and Caterpillar. Companies like Brillance Automobile, GAZ, TATA, BYD Auto and Suzuki are left out of this research as it was not possible to found sufficient data from the public domain.

Automotive Industry	
LSSI Company	**Region**
1.Caterpillar (1997-2008)	North America
2.Chrysler (1999-2008)	
3.Ford (2002-2008)	
4.GM (2001-2008)	
5.John Deere (1996-2008)	
6.Navistar (1996-2008)	
7.PACCAR (2000-2008)	
8.Audi (1996-2008)	Europe
9.BMW (2000-2008)	
10.Daimler (1996-2008)	
11.Fiat (1996-2008)	
12.MAN (1996-2008)	
13.Porsche (2003-2008)	
14.PSA (Citroen-Peugeot) (2004-2008)	
15.Renault (2002-2008)	
16.Scania (1996-2008)	
17.Skoda (1996-2008)	
18.Volvo (1996-2008)	

19.VW (1998-2008)	
20.Daihatsu (1996-2008)	Japan
21.Fuji HI (1996-2008)	
22.Hino (2000-2008)	
23.Honda (1996-2008)	
24.Isuzu (2004-2008)	
25.Mazda (1996-2008)	
26.Mitsubishi (2000-2008)	
27.Nissan (1996-2008)	
28.Toyota (1999-2008)	
29.Ashok Leyland (1996-2008)	India
30.Great Wall (2002-2008)	China

Table 1: The Study Sample

The second step was to find the relevant financial and company data. We collected those from the annual reports of these companies spanning a period of twelve years, from 1996 to 2008 (N=13). For each year and per company the variables (P/E), (RD/E) and (T/E) and the relations (see figure 3) were calculated. Subsequently, for each year, the mean for each variable was calculated for the automotive industry. The variables are normalized based on the number of employees per company. The unit of measure is that of the United States Dollars (US$) per employee. Financial figures in the company's annual reports not listed in US$ were converted using the US$ conversion rate at the end of each respective year.

The third step was to statistically analyse the collected data by means of a linear regression model for each time series. This analysis answers sub research question 1-a. In order to assess the validity of this study, the statistical significance of the identified linear trends has been tested through a two-tailed test at a level of significance of 0.01 (Field, 2009). The trends showed a correlation coefficient (R) greater than the critical value (tables 2 and 3) and are statistically significant.

Industry	N (company)	df = N-2	Significance Level	Critical Value
Automotive	30	28	0.01	0.4790

Table 2: Industries Critical Value

Industry	N (year)	df = N-2	Significance Level	Critical Value
Automotive	13	11	0.01	0.7350

Table 3: Historical Correlation of Critical Values

In the fourth step we looked for effects over time, answering research question 1-b. We took the relations between the variables (figure 4,5,6,7,8,9) added time and analysed the effects. The slope of the trend lines given by the regression model indicates the increase or decrease of the relation over the measured period. In the fifth step we analysed the automotive industry in depth (figure 10,11,12), using the same analysis as Beelaerts van Blokland et al. (2011) used for the aerospace industry. This analysis answers sub research question 1-c.

The sixth step showed the value leverage performance assessment of car companies based upon the value leverage correlation analysis. The case composed by 18 car companies

leaving out the truck companies. The research period covers the period 1996-2008 up to the financial crises which emerged in 2009. This period is chosen to measure if value leverage effects have predictive qualities regarding the benefits of it in relation with the economic crises of 2009, which hit the car industry world-wide. The value leverage correlation value determines the position in the ranking. Car companies scoring high are able to use their value leverage competence to balance the value system better compared to car companies scoring low on value leverage competence. By putting the ranking in the perspective of the crises in the economy world-wide it can be reasoned if value leverage pays off. The seventh step was to conclude and answer the research question.
This paper is structured according the steps, followed by implications and limitations of the study.

Analysis of automotive LSSIs
In this section we report on the analysis of the three variables, described above.

Profit per employee
The trend line shows statistical significance and is found to be positive (see Table 4, figure 4). As such, the automotive industry is increasing value-leverage with respect to the value driver *'continuation"*. The slope of the trend line of the automotive industry shows a positive rate of increase. Reason for this can be found in the increase of product variation with development of high end luxury cars and development of the leasing market, which stimulated the use of cars.

Industry	r^2	r	Significant	Slope
Automotive	0.6447	0.8029	Yes	3049.1

Table 4: Industry's Statistical Significance for P/E

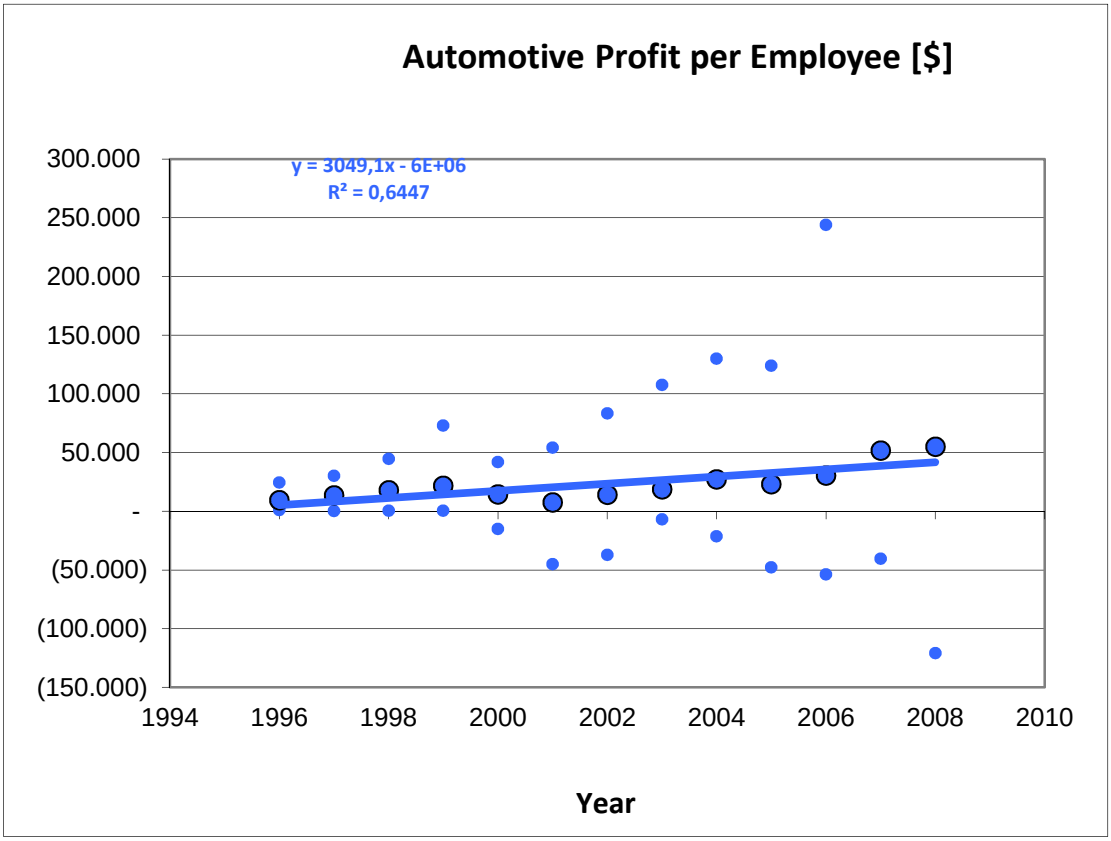

Figure 4: The P/E for the Automotive Industry

R&D per employee

The variable RD/E shows to be statistical significant (table 5, figure 5). The slope of the trend line shows a positive rate of increase suggesting the value leverage regarding R&D have increased. This can be explained by the increase of co-development with suppliers to develop sub systems for cars and shorter design cycles for cars. Toyota, started in the sixties with a design cycle of four years, whilst car companies in the USA and Europe had a design cycle of 9 years. Time to market of new models is crucial to stay in competition (Clark, Ellison (1995).

Industry	r^2	r	Significant	Slope
Automotive	0.6755	0.8219	Yes	797.43

Table 5: Industry's Statistical Significance for R&D/E

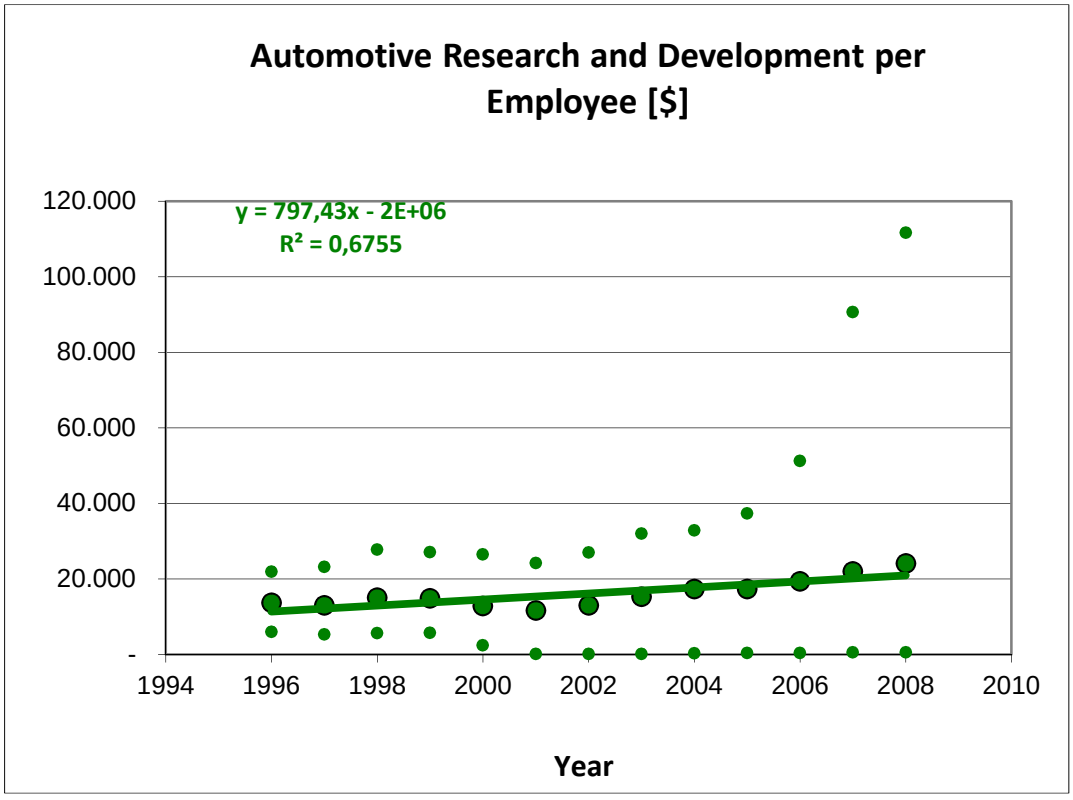

Figure 5: The R&D/E for the Automotive Industry

Turnover per Employee

The automotive industry trend shows statistical significance and is found to be positive (see table 6, figure 6). The industry is becoming more leveraged with respect to the value driver

'configuration'. An explanation for this trend can be reasoned through the adoption of lean manufacturing and supply chain involvement starting in the early 1990s. Development of supply chains and rationalizing the supply chains into a "tier" approach effectuates in an increase of the turnover per employee.

Industry	r^2	r	Significant	Slope
Automotive	0.8550	0.9247	Yes	21191

Table 6: Industry's Statistical Significance for T/E

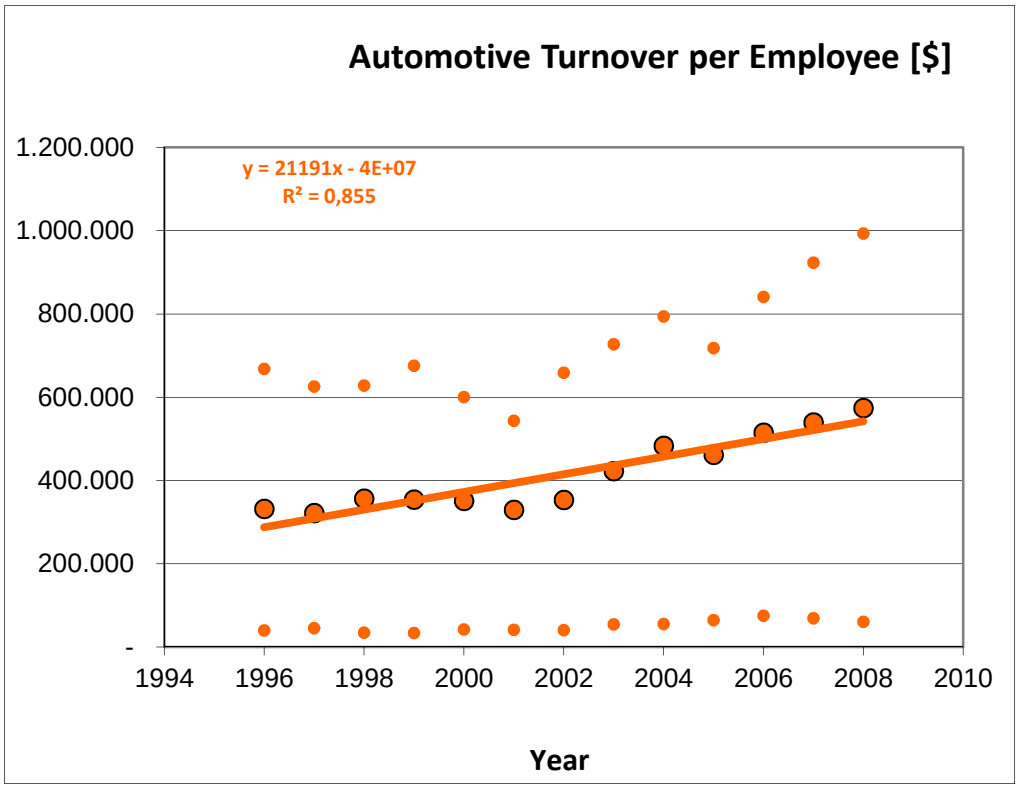

Figure 6: The T/E for the Automotive Industry

Sub conclusion (1-a)
The variables P/E, RD/E and T/E are applicable to the automotive industry and statistically significant, which makes it possible to compare companies on their value-leverage capabilities, competence and performance, using these variables.

Now the question rises how the relations between variables evolve over time. The time effects on the relations P/E-T/E, T/E-RD/E and P/E-RD/E, are shown in the next section.

Value-leverage relations over time
The statistical analysis of the historical correlation of the value-leverage performance indices has resulted for all three relations in a strong historical correlation with respect to the

statistical significance interval chosen, together with a positive trend for the automotive industry, for T/E versus P/E and P/E versus RD/E. The relevant statistical data are shown in tables (table 7, 8, 9) as well as in graphs (figures 7, 8, 9).

Relation between T/E and P/E (table 7 and figure 7)

The TE-PE analysis shows the relation between the increase of leverage on the supply chain on one side and the benefit of it on the other side in figure 7. It seems value leverage on the supply chain expressed by the T/E increases through time. The benefit of value leverage is expressed by the P/E. A possible explanation is the reduction of complexity of the supply chain by implementing the tier supply structure.

Industry	r^2	r	Significant	Slope
Automotive	0.7282	0.8533	Yes	5.51

Table 7: Industry's Statistical Significance over time for T/E versus P/E

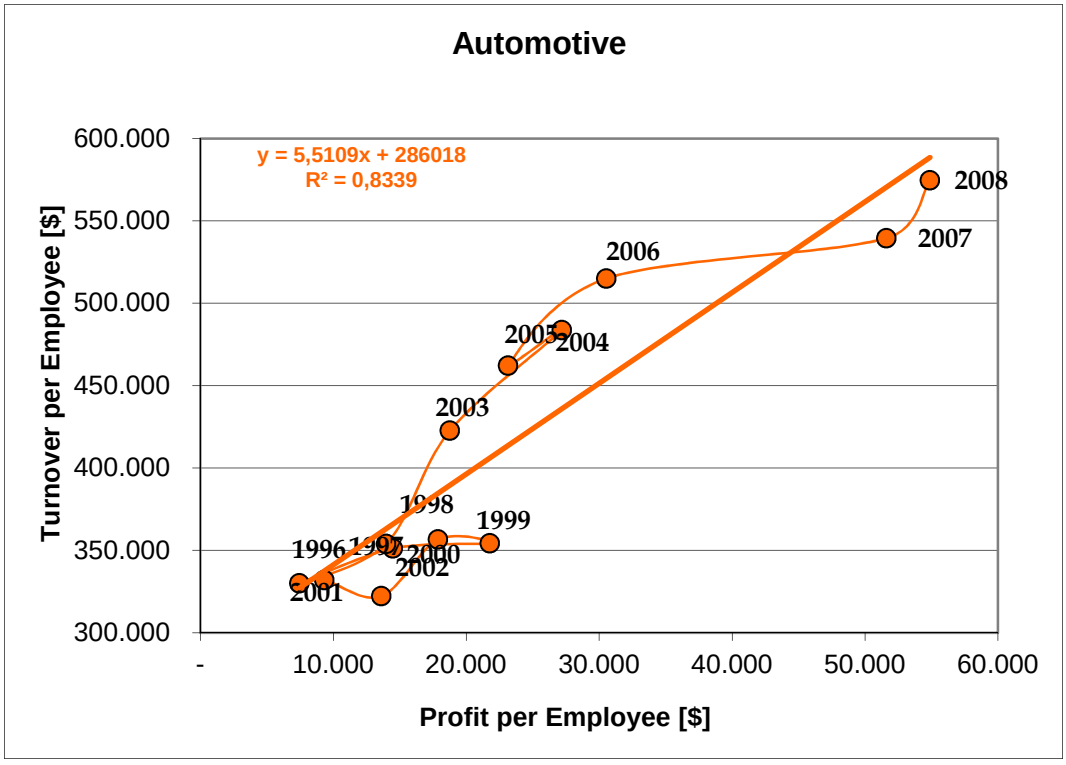

Figure 7: T/E versus P/E over time

Reason for the extreme high value-leverage P/E-T/E in the year 2007 and 2008 can be explained by the performance of Porsche regarding the capability of configuration. This is supported by figures 10 and 12. Strong growth in the graph may be caused by Porsche, which launched new models of the highly successful model Cayenne that time. The production of this model was outsourced to the VW production line in Bratislava (Czech Republic) and built on the same production line as the VW Touareg. Porsche benefited largely from low production cost, however the numbers were far lower and the sales price

much higher compared to the production numbers of the VW Touareg. Not only the Porsche Cayenne was outsourced, the Porsche Boxer is entirely produced by Velmet in Finland (Arnold, 2000).

Relation between T/E and RD/E (table 8 and figure 8)
Regarding the T/E-RD/E analysis it is of interest to notice that the correlation is strong. The automotive companies are presented in figure 8. The T/E ranges from US$ 320.000 to US$ 600.000.

Industry	r^2	r	Significant	Slope
Automotive	0.9055	0.9516	Yes	22.631

Table 8: Industry's Statistical Significance over time for T/E versus RD/E

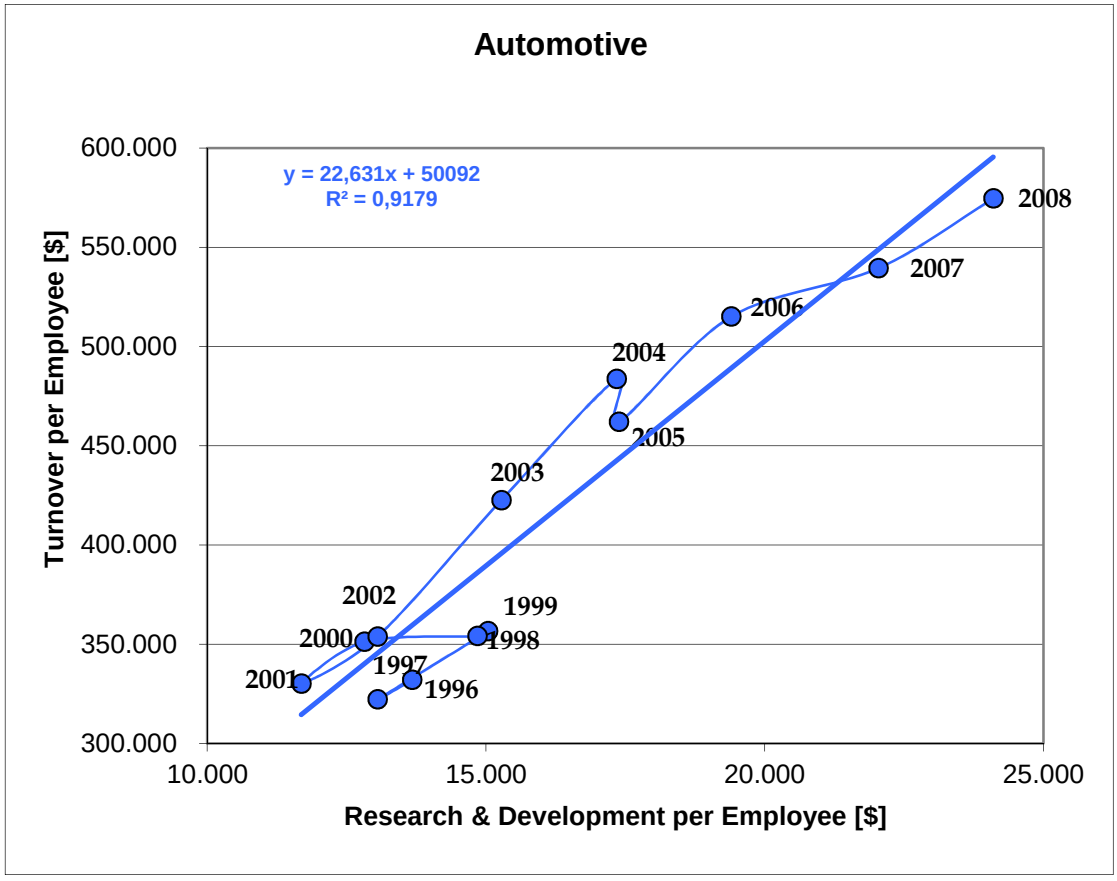

Figure 8: T/E versus RD/E over time

Relation between P/E and RD/E (table 9 and figure 9)
The P/E-RD/E analysis shows an interesting development. The trend for the automotive industry shows a steep increase of value-leverage on P/E-RD/E. The automotive companies are ranging from P/E= US$ 8.000 to US $55.000.

Industry	r^2	r	Significant	Slope
Automotive	0.8760	0.9359	Yes	3.8

Table 9: Industry's Statistical Significance over time for P/E versus RD/E

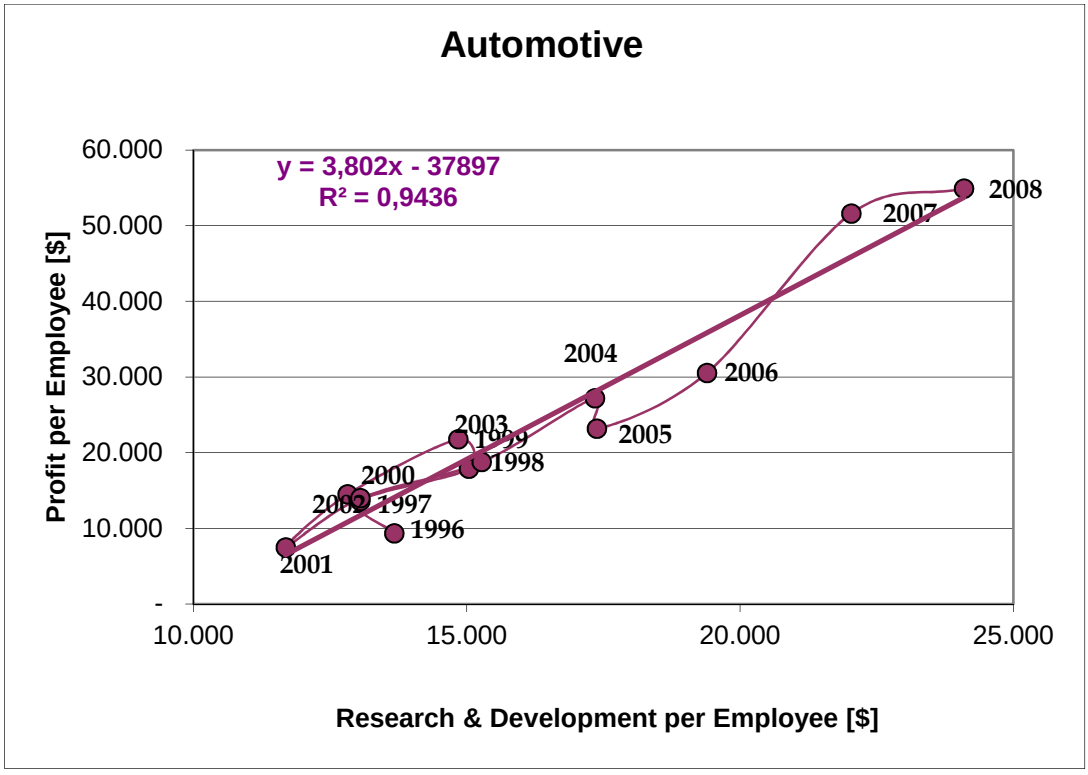

Figure 9: P/E versus RD/E over time

Sub conclusion (1-b)
The statistical analysis of the historical correlation of relations between the variables has shown for all three relations a strong correlation with respect to the statistical significance interval chosen. The automotive industry, show a positive trend regarding the capabilities continuation, conception and configuration.

Value leverage indicators per company

The analysis is continued on automotive LSSI (individual company) level showing the value leverage regarding P/E, RD/E and T/E over time (1996-2008). In figures 10, 11 and 12 the results for the specific automotive LSSI are aggregated in graphs.

Continuation

From a continuation perspective expressed by the performance on P/E (figure 10) it is observed that Japanese car companies such as Nissan, Toyota and Honda are able to benefit more from value leverage in comparison with USA car manufacturers. European car companies, such as Audi, BMW and Porsche seems to be able to benefit from value leverage suggesting these companies are able to balance value leverage through time while staying profitable. The low performance of GM, Ford and Chrysler indicate that the companies were vulnerable regarding continuation.

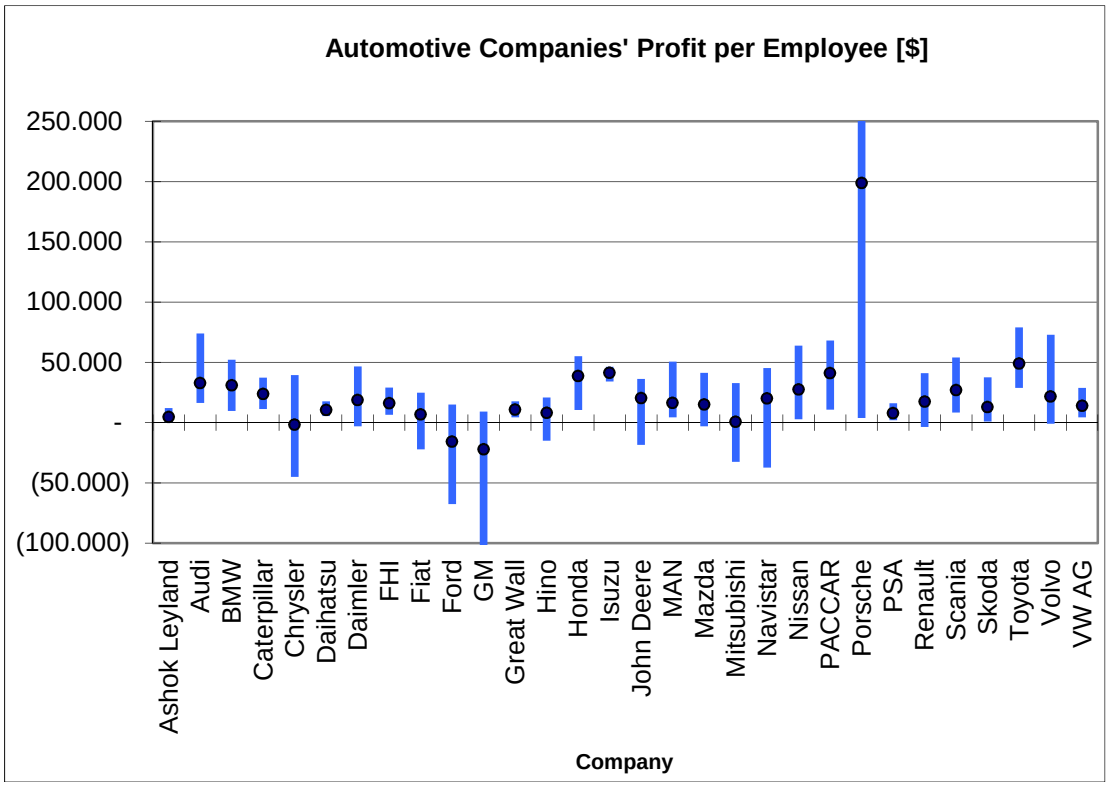

Figure 10: Automotive LSSIs performance on P/E

Conception

From a conception perspective expressed by the performance on R&D/E (figure 11) the same effects as in figure 10 are observed, although the exact positions are somewhat different. Audi, BMW, Ford, Porsche and Toyota are the outperformers.

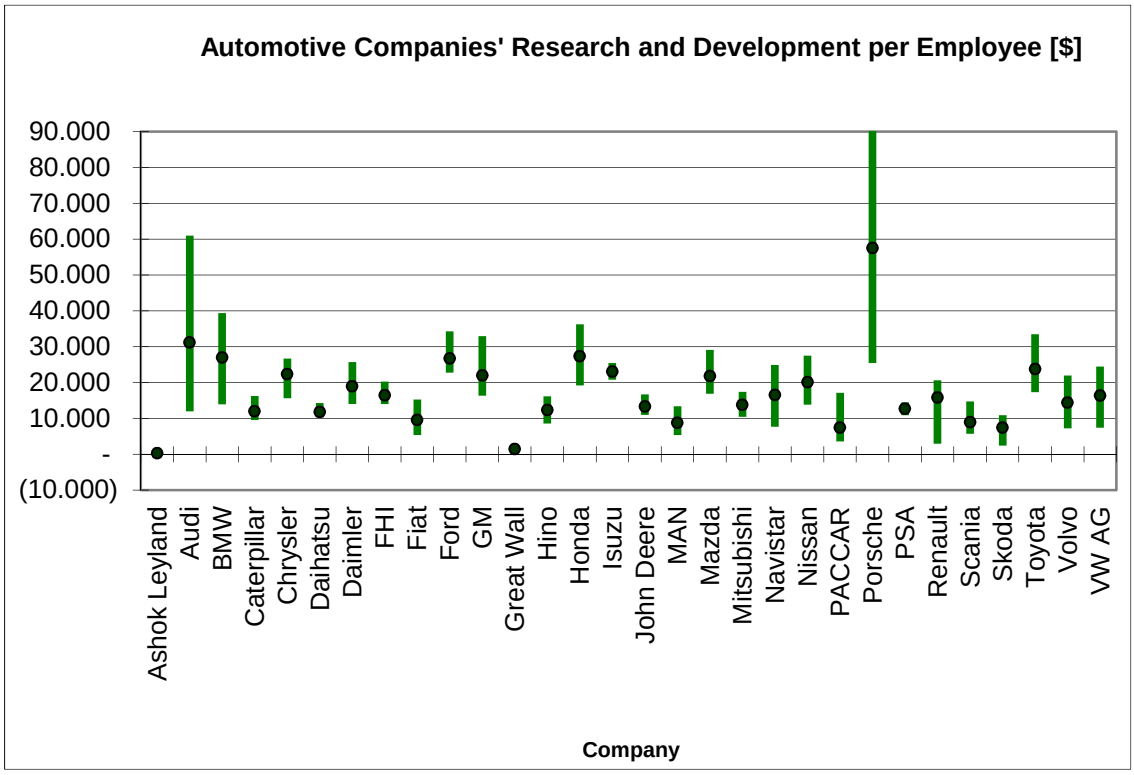

Figure 11: Automotive LSSIs performance on RD/E

Configuration

From a configuration perspective we see that the 'highs' rank around US$ 600.000 and the 'lows' around US$ 350.000. Also in the configuration perspective, Porsche has a wide spread as can be seen in the length of the line.

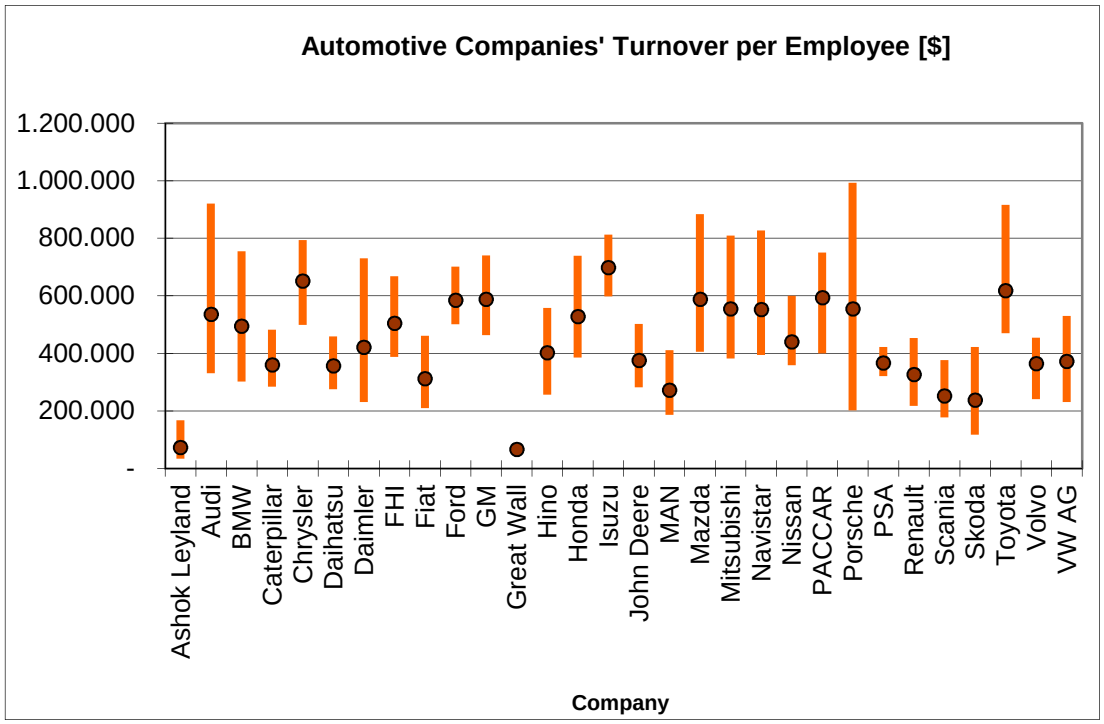

Figure 12: Automotive LSSIs performance on T/E

Sub question 1-c: The analysis shows that is possible to compare automotive integrators on an individual basis regarding their value leverage capabilities, competence and performance.

Sub question 1

By answering sub research questions 1-a, 1-b and 1-c, it is empirically demonstrated that the variables P/E, RD/E and T/E express value leverage for large scale automotive system integrators, which makes it possible to compare companies on their value-leverage capabilities, competence and performance. The variables and their relationship form the value-leverage model for automotive LSSIs. The relationship between the capabilities continuation, conception and configuration, is positive for the automotive LSSI industry. The analysis of the data shows the statistical significance of the capabilities continuation, conception and configuration. Based on figure 3, the relationship between the three capabilities is shown in figure 13.

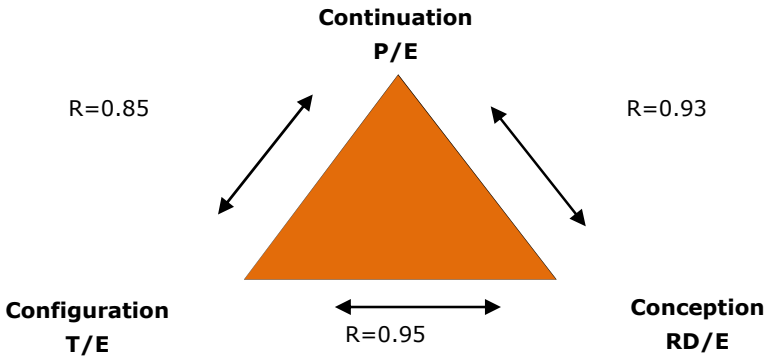

Figure 13: Value-leverage for the automotive industry

Case of the car industry; assessment of value leverage performance

The second research question is answered by the assessment of car companies on value leverage performance. The value leverage model is proposed for the assessment of value leverage performance by the car companies to know if these companies benefit from it. In total 18 car companies are selected from the original sample (table 1), which focus on car production, leaving out the sub group trucks, tractor and earth moving vehicles. The value leverage capability of these car companies is measured over the period 1996-2008 (table 10). In order to assess the validity of this assessment by ranking, the statistical significance level of 0.01 (Field, 2009) through a two-tailed test is applied. The average of correlation values (AVL) regarding the value leverage capabilities continuation, conception and configuration, expressed by the variables P/E, RD/E and T/E, is used for ranking the car companies.

It is interesting to see that companies are performing differently on the competence of value leverage. The Average Value Leverage of the total automotive car sub group is AVG=0.9136. Car companies scoring below the critical value 0.479 (table 2) are less able to deploy their competence to leverage value. This group is composed by; Great Wall, PSA, Fiat, Renault and Chrysler.

From this value leverage perspective it seems Audi, Toyota, Porsche and Mazda are the best scoring companies and above the Average Value leverage (AVG) of the group. These companies are well able to benefit from the competence on value leverage.

Average Value leverage (AVL) Assessment	
Company	**AVL**
Audi	0,9435
Toyota	0,9296
Porsche	0,9273
Mazda	0,9271
AVG	0,9136
Skoda	0,8842
Honda	0,8649
Nissan	0,8345
Ford	0,8070
Volkswagen	0,7867
Daihatsu	0,7029
GM	0,6726
BMW	0,6462
Mitsubishi	0,6204
Great Wall	0,4870
PSA	0,4782
Fiat	0,4094
Renault	0,3989
Chrysler	0,3766

Table 10 : Assessment on value leverage performance of car companies

The group with VW and Ford still fit within the critical value of 0.4790, however they score below the average value leverage of the group.

Companies scoring below the critical value 0.4790 such as Chrysler, Fiat and the French car companies were not able to deploy their competence on value leverage and were out of balance. These car companies were vulnerable for discontinuity before the economic crises of 2009. The merger between Chrysler and Fiat in 2010 can be reasoned from the outcome of this analysis. The French car makers were saved by the French government. From the USA car companies Ford scored higher on the capability to deploy value leverage (0.8070) in comparison with GM. GM scored lower (0.6726) and had to face bankruptcy.

This assessment on Average Value Leverage values shows the competence of automotive car companies to balance value leverage resulting from the capabilities continuation, conception and configuration to leverage on demand and supply.

Sub conclusion (2)

By expressing the capabilities of value leverage, car LSSI's can be assessed on the competence of value leverage to compete, by using the correlation values. Companies with strong correlation seems to be able to balance the capabilities continuation, conception and configuration and generate a stable value flow though time to compete with. For some companies such as Audi, Toyota, Porsche and Mazda it pays off. Companies with a weak correlation are less in balance regarding the value leverage capabilities and weaker regarding competition. Fiat and Chrysler merged in 2010.

Overall conclusion

The main research question was: *Are Large Scale System Integrators in the automotive industry making use of their competence to leverage value on the supply chain?*

The answer to this question is positive, however some of the car companies benefit more from value leverage than others. Based on the results of our empirically based research the authors have shown that the capabilities, which were found in the study of Beelaerts van Blokland et al. (2011) have broader application than the Aerospace industry only. The authors studied the automotive industry and found that value leverage performance can be assessed for the automotive industry. The preliminary model in figure 3 is validated by empirical research towards automotive companies.

Therefore, our overall conclusion is that companies in the automotive industry can develop a capability to leverage value on the supply chain. Using the value leverage model can help them to develop the value leverage capability to compete on. The capabilities can be measured by the correlation coefficients to assess the car companies on their value leverage capabilities, competence and performance.

Implications for theory, research and managerial practice

Theory

This research builds on the work of Sanchez, Heene and Thomas (1996) and adds the measurement of the dynamics between firm addressable and firm specific resources by adding the value-leverage capability perspective. The employee emerges as a basis for the metrics to compare automotive LSSI companies on their capability to lever value on the supply chain. This adds new perspective on the theories on Competence Based Competition.

Research

Current metrics such as cash-flow are probably not expressing what actually happens inside the LSSI companies. Investments in production machines are more and more replaced by investments in technology, which is more knowledge focussed (intangible). Further research is necessary to compare the classic financial metrics and the new value-leverage variables. Further development of a benchmark tool to assess automotive (and other) LSSI companies on their value-leverage capability is the next step. This research is from an automotive LSSI perspective, it is of interest to measure with these variables the performance of first and second tier suppliers as well, to know how these companies perform on the capability to leverage value.

Managerial practice

With the new model, the value leverage capabilities of LSSIs, continuation, conception and configuration can be a new perspective on how to manage leverage on firm addressable resources by Large Scale System Integrators. The variables also help management of LSSI's to improve their value leverage on the supply chain and thus improve the profitability and continuation of their own company and competitive advantage.

Limitations of the study

The study is in its basics empirical. Researchers had to come up with solutions for available data and the limitations of an industry with only a limited number of companies. The following limitations are to be mentioned:

- Available data.
- Automotive industry.

Available data

However, the data cover the period 1996-2008, the data series of some automotive LSSI companies cover only a part of the period and need further completion (references). For five automotive LSSIs it was not possible to obtain complete data sets. This should be investigated by further research. The authors are the opinion that the influence on the outcome of this research is negligible. The research used secondary data, which does not allow to refer to specific products to have further explanation for differences in value leverage by the OEM and LSSI companies. As the finances were in different currencies, translations into dollars had to be made. The authors made a sensitivity analysis on currencies and exchange rates (within the year of reporting) and found no differences in the conclusions. Furthermore, researchers did flexibility analysis and found no different conclusion with small variations in the input. Large errors are not foreseen, but could influence the outcomes

Automotive industry

This research is focussing on the automotive industry subsequent on previous research on aerospace LSSI companies. This is a 'one industry' extension of the research, which could be strengthened through research in more industries like health care and construction industry. Results from these other industries should enrich the benchmark and also the learning perspective for the industry. Follow up research in other industries is anticipated.

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Automotive data

1.Caterpillar (1997-2008)
2.Chrysler (1999-2008)
3.Ford (2002-2008)
4.GM (2001-2008)
5.John Deere (1996-2008)
6.Navistar (1996-2008)
7.PACCAR (2000-2008)
8.Audi (1996-2008)
9.BMW (2000-2008)
10.Daimler (1996-2008)
11.Fiat (1996-2008)
12.MAN (1996-2008)
13.Porsche (2003-2008)
14.PSA (Citroen-Peugeot) (2004-2008)
15.Renault (2002-2008)
16.Scania (1996-2008)
17.Skoda (1996-2008)
18.Volvo (1996-2008)
19.VW (1998-2008)
20.Daihatsu (1996-2008)
21.FHI (1996-2008)
22.Hino (2000-2008)
23.Honda (1996-2008)
24.Isuzu (2004-2008)
25.Mazda (1996-2008)
26.Mitsubishi (2000-2008)
27.Nissan (1996-2008)
28.Toyota (1999-2008)
29.Ashok Leyland (1996-2008)
30.Great Wall (2002-2008)