

THE RELEVANCE OF KNOWLEDGE- AND INNOVATION MANAGEMENT FOR THE EUROPEAN AUTOMOTIVE SUPPLY INDUSTRY: A CASE STUDY

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The automotive industry in Europe belongs to the fastest growing industries. The area around Slovakia is called “the Detroit of the East”. Several companies are investing in that area – especially companies from Japan, Germany and Austria. In this region the automotive supply industry employs more than 350.000 people. However, since a few years the whole segment is changing dramatically. Shorter development cycles for cars and permanent cost pressure require high flexibility on global markets. Some experts (Becker 2005) predict that only half of today’s global automotive suppliers will survive the next decade due to increased global competition for example from a rising industry in India and China (Balakrishnan et al 2007). The goal of this empirical study is to identify how top performers of the automotive supply industry can be distinguished from followers. The complete branch still believes that market position and productivity are of utmost importance. However, a deeper analysis shows that top performers distinguish themselves from followers mainly in two key success factors – flexibility and the ability to manage knowledge flows so that innovation can prosper. A strong positive correlation between knowledge management and innovation has been discovered.

1. Survey Method

We distinguish six business lines* in the automotive supply industry. From 240 companies in Austria, which are also active abroad we randomly selected 8 companies from each of the six business lines. From the randomly selected 48 international companies 19 companies were prepared to cooperate with us since we needed detailed data not only for a balance sheet analysis but also for subsequent deeper investigations.

We analyzed the 19 companies and present them in a portfolio. One dimension of the portfolio is profitability represented by the ROI[†]; the other is turnover development

1. * motion, body, interior, electronic, motor, track

2. † Return on Investment

during the last two years. In addition we identified equity ratio, cash flow ratio and duration of dept redemption. The portfolio is shown in figure-1. It consists of four quadrants. The origin of the coordinates is calculated on one hand side as the average of all ROI's and on the other as the average of all turnover changes. The top performers with high turnover growth and high ROI's are located in the right upper quadrant and the followers[‡] are located in the left lower quadrant. According to the wishes of the companies they are presented anonymously.

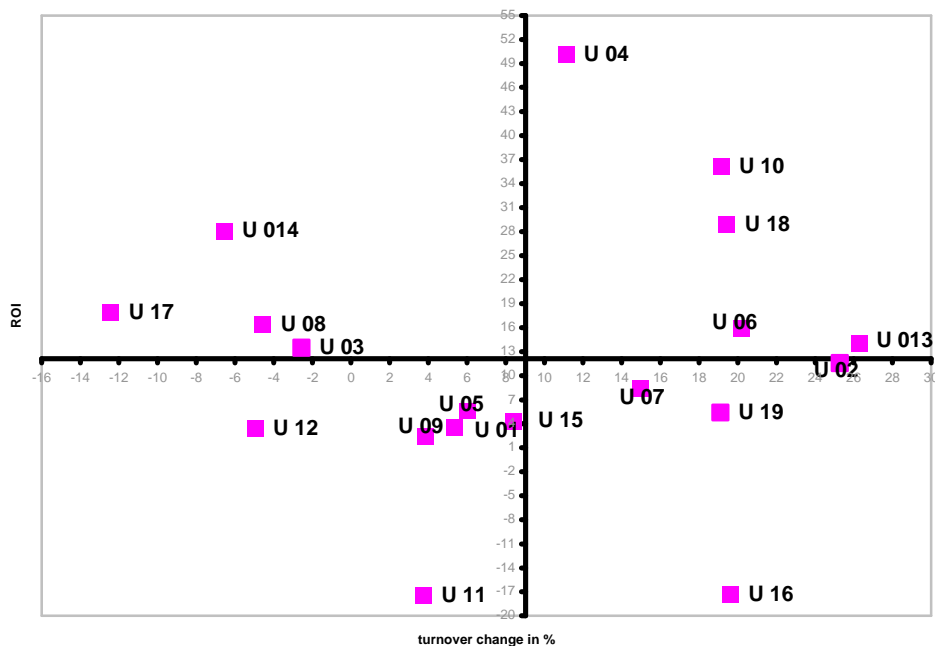


figure-1: performance portfolio of suppliers

The ROI as a representative for financial wealth and turnover growth as a market indicator characterize the performance of our companies. We selected these two indicators because we know that in general the financial situation in the automotive supply industry is not the best and the profitability is suffering as well.

We are interested why the companies in the right upper quadrant are doing so much better than those of the left lower one. We performed a deeper investigation to identify reasons for high performance.

Similar as in the PIMS program (Buzzel /Gale, 1987) but simpler, we developed the following hypothesis: the success of a company is dependent on the factors market strength, the ability to manage knowledge flows and innovation, company attractiveness,

3. [‡] Companies below the average

productivity and flexibility. Each of these factors is contributing to the overall performance and we would have to identify their weights.

Market strength is primarily characterized by market shares and reputation. Attractiveness is characterized by education programs, salary and fluctuation rates. Productivity is characterized by value added per employee. Flexibility is characterized by the ability to quickly anticipate environmental changes and external impacts.

Knowledge flow management and innovation is characterized by internal tools, behaviors and culture, organizational precautions and innovation ratios. The motivation to put knowledge management into the same category as innovation management is twofold. First, innovation management can be regarded as a subset of knowledge management because knowledge management is the prompt establishment of resources in order to pursue objectives (Barachini, 2003). Thus without proper knowledge management innovation cannot prosper. Secondly our statistical investigation shows, that when adding innovation as separate predictor variable this variable doesn't contribute substantially to the coverage of the total variance of the overall distribution of the dependant variable[§] when applying e.g. a partial least square method (Peters & Waterman,1982). Due to collinearity, both subjects therefore are presented in one category and expressed as one predictor variable. In other words we detected a strong dependency** between knowledge management and innovation – both predictor variables depend on each other. Thus our conjecture, formulated as multiple linear regression model, in theory looks as follows:

$Performance = w1 * market\ strength + w2 * KM \ \& \ innovation + w3 * attractiveness + w4 * productivity + w5 * flexibility + delta^{\dagger\dagger}$. Thus performance is a function of those 5 success factors plus others factors we cannot measure, denoted as *delta*.

In order to estimate the weights w1, w2, w3, w4, w5 of the success factors we decided to start an online survey^{‡‡} across the complete automotive supply industry including all clusters. We asked all the 240 companies, except those 19 of the portfolio in figure-1, about the estimated relevance of the 5 business success factors. Figure-2 shows the very simple questionnaire consisting of 3 parts. We analyzed the resulting weight factors and the variance of the answers (see figure-3, figure-4).

4. § Performance

5. ** Strong positive correlated

6. †† Delta is a correction term. We impose a linear relationship.

7. ‡‡ Instead of calculating the multiple linear regression!

<i>Success Factors</i>	Explanation	Points
Market strength	➤ relative market share, reputation, customer satisfaction	[]
Knowledge Management & Innovation	➤ support for know-how exchange, knowledge circles, knowledge driven philosophy, R&D efforts, percentage of products not older than 3 years	[]
Attractiveness	➤ internal education, fluctuation, excellent human and infrastructure resources	[]
Productivity	➤ value added per head, quality, run time of internal processes, productivity of money, margins	[]
Flexibility	➤ ability to change and adapt in permanently changing supply chains	[]
Total		100

Costs dropped	[]	[]	[]
Costs stayed equal	[]	[]	[]
Costs have risen	[]	[]	[]
	Prices dropped	Prices stayed equal	Prices have risen

<i>Biggest operative challenge</i>	Biggest strategic challenge
➤ []	➤ []

figure-2: questionnaire

Subsequently we performed a deeper company analysis in order to show that the resulting hypothesis might be correct. We developed additional questionnaires for each of the 5 success factors^{§§} and performed interviews.

8. ^{§§} Dependent variables

In summary 150 questions were generated for all 5 success factors. We then compared the top performers of the upper right quadrant with the followers of the left lower quadrant of figure-1 by applying all questionnaires. We wanted to find commonalities and differences in order to prove or to reject the hypothesis.

2. RESULTS

The weights for the five success factors (predictor variables) have been determined by the automotive suppliers themselves. CEOs of 221 companies have been asked via mail to fill out the simple online questionnaire. We used closed questions to determine the weights, the cost and price situations. One open question asking for the most important strategic and operational issue was used (see figure-2). From overall 221^{***} companies 38 companies returned the questionnaire, that is 17,1%^{†††}.

The evaluation of the survey shows that three quarters of the companies are confronted with higher costs and only 21% of them could compensate this situation with higher prices. 31,6% are suffering on higher costs and lower prices.

Concerning the open question on operational level most of them want to exploit human potential more efficiently; they want to reduce costs whilst keeping the quality. The biggest strategic issues are enhancing market shares and improving products.

Figure-3 shows the weights and the variances for the 5 success factors which have been extracted from the online questionnaire. It shows that the productivity is most important. From possibly 100 points 28,42 points were given to productivity on average. Less important is attractiveness and flexibility. Both factors got approximately 15 points on average. Interesting to see that the latter both factors show significantly lower variances ($s = ca. 7,0$) than the rest of them (s between 10,3 and 13,4).

The results in figure-3 and figure-4 show that most of the companies rated productivity, market strength, knowledge management and innovation much higher than attractiveness and flexibility. However, the variances for knowledge management and innovation, attractiveness and flexibility are much smaller. Consequently the respondents were more confident about these 3 factors than about productivity and market strength. Figure-4 shows the results which are typically Pearson chi-squared.

9.^{***} 240 – 19

10.^{†††} Thanks to the support of the Vienna Automotive Cluster Manager

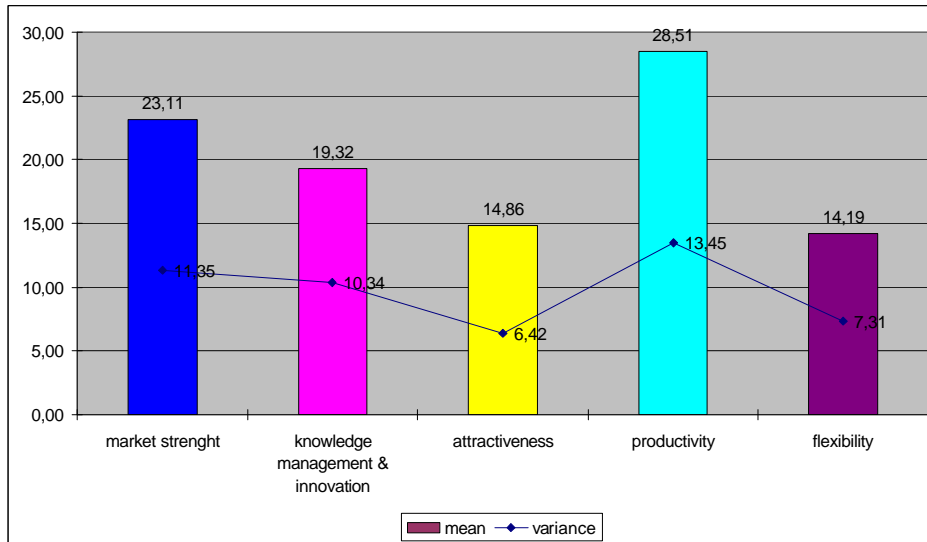


figure-3: weights and variances

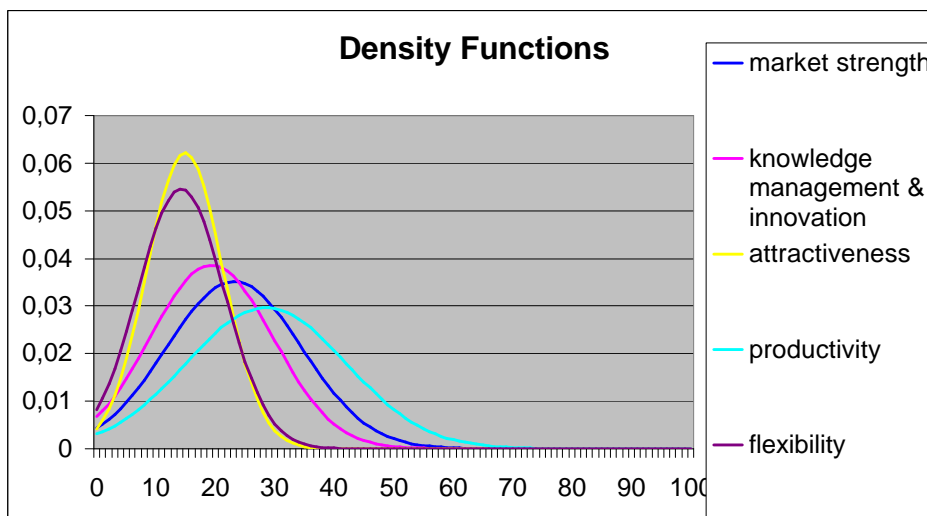


figure-4: the corresponding density functions

Subsequently we performed a deeper analysis of the companies located in the right upper quadrant and those located in the left lower quadrant of figure-1. The goal of the analysis was twofold. First we wanted to discover in which of the success factors top performers

are distinguishing themselves from followers. Secondly we wanted to prove the correctness of the hypothesis. According to the hypothesis top performers distinguish themselves from followers mainly in productivity and market strength.

We had to investigate the top performers and the followers more deeply in order to prove or disprove the conjecture. For each of the 5 success factors we developed questionnaires. These questionnaires were used for our interviews with the companies. The questionnaires mixed yes/no answers with answers given on a scale between 0 and 100, and different other scales respectively. Therefore we had to normalize each answer to a scale between 0 and 100. The questions for knowledge management and innovation are presented in figure-5 as an example, including cross check questions.

To which extend does your management support knowledge exchange circles?	Indication between 0 & 100
In my company we have a systematic way to develop, store and disseminate knowledge (knowledge flow management)	Indication between 0 & 100
In my working environment there are colleagues with a dedicated time budget for knowledge based tasks	Indication between 0 & 100
Knowledge is shared in our company via meetings, networks, databases etc.	Indication between 0 & 100
knowledge sharing could influence my career in a positive way	Yes/more or less/no
My colleagues do not exploit the potentials available in different knowledge sources (cross check)	Indication between 0 & 100
In my department we have knowledge goals which are also implemented and chased	Very strong/strong/less strong/little/not at all
Important internal and external partners are known to our staff	To most/to some/to nobody
Transferring knowledge to people and databases is encouraged in our company	Indication between 0 & 100
Information is not disseminated in a systematic way (cross check)	Indication between 0 & 100
Is the term knowledge management mentioned in the company strategy	yes/no
Did your company define knowledge goals on individual level	yes/no
Are documentation and knowledge sharing defined as a goals for employees	yes/no
Are there any business processes supported by knowledge management	All of them/some/none

Is somebody responsible for knowledge management initiatives	yes/no
Do you reward innovative ideas	yes/no
Is there a systematic innovation process which is continuously improved	yes/no
Do you follow a defined innovation and knowledge management strategy	yes/no
R&D in percentage of turnover	Indication between 0 & 100%
We have indicators for knowledge- and innovation management and we update them on a regular basis	Indication between 0 & 100%
What is the ratio new products/old products (last 3 years)	Indication between 0 & 100%
What is the ratio new ideas/products approaching the market (per year)	Indication between 0 & 100%

figure-5: questionnaire for KM & innovation (interviews)

Figure-6 shows the average calculated points between top performers and followers. Note that these are comparisons of averages. Top performers perform better in all 5 success factors.

However, there is a significant statistical difference what the factors KM & innovation and flexibility concerns. In the area knowledge management and innovation top performers show 27% better results than followers. The difference in flexibility was 20% on the average. The productivity was 4% better. The other two factors (attractiveness, market strength) showed no significant deviations between top performers and followers.

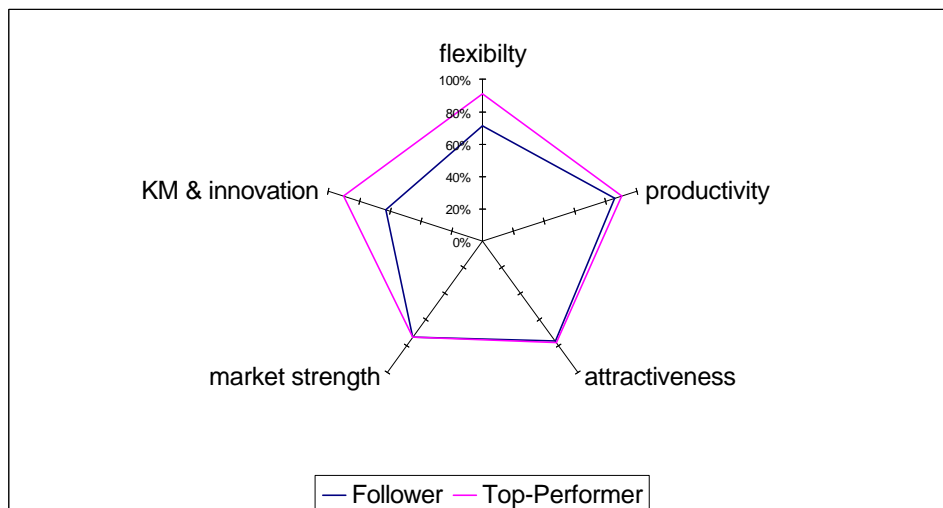


figure-6: a comparison of top performers and followers

3. DISCUSSION

The results of the online survey (see figure-2) show that the automotive supply industry regards productivity and market strength as the most important factors for business success. Flexibility and attractiveness are considered less important. During the subsequent interviews it turned out that the branch has to be flexible anyway. Therefore in the online survey the true meaning of flexibility was maybe underestimated. Knowledge management & innovation was exactly in between both groups what the variances and the means are concerned. The abilities to innovate and to enhance market shares were considered as biggest strategic issues in the online survey.

Based on our deeper analysis on company level we hoped to prove the hypothesis that productivity and market strength both do represent special and exclusive success factors. Indeed both factors do better for top performers but the differences to followers are not significant. The results of the deeper analysis in figure-5 shows that top performers are distinguishing themselves from followers in knowledge management & innovation and flexibility rather than in productivity, attractiveness and market strength.

If we now consider both results, the online survey and the interviews, than we can see that beneath the factors productivity and market strength the factor knowledge management and innovation is playing an important role. The former was already discovered by Volpato (Volpato, Stocchetti, 2007) on smaller samples. Considering the online survey knowledge management & innovation is only on third position but it has a much better variance^{†††} and in our company analysis it yields the biggest average difference between top performers and followers. Therefore knowledge management and innovation management seems to be important for the whole automotive supply industry. To our surprise the factors flexibility, knowledge management and innovation are distinguishing top performers from followers – it is not productivity as originally assumed by CEOs!

Our study shows that the factors productivity, attractiveness and market strength are necessary for economic success but they are not sufficient enough. In order to be sufficiently successful management of knowledge flows, innovation and flexibility should get much more attention, especially what followers concerns. However, we don't want to overestimate measurable performance indicators since an empirical study shows (Bailom F et al, 2005) that for economic success also other indicators as e.g. joining the right person at the right time are important as well^{§§§}.

After normalizing the relevant success factors and calculating the variances and co-variances^{****} we discovered that innovation and knowledge management strongly depend on each other. Therefore both factors are represented as one predicting variable.

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11. ^{†††} Confidence in the answer
 12. ^{§§§} Expressed as delta in our multiple regression thought model
 13. ^{****} We calculated R²

However, this perception cannot be generalized and needs to be investigated also for other industries.

Managing knowledge flows actively means establishment of appropriate cultures, knowledge management tools and knowledge managers. During the interviews we detected that most of the top performers employ process owners. They are not explicitly called knowledge managers but their task is not only process optimization but also competition analysis, group motivation and organization of meetings and processes so that new ideas could emerge and eventually result in innovative products. Proper management of this cycle seems to be the cornerstone for successful companies of the automotive industry.

However, management of innovation cycles, support and maintenance for frequently asked databases and handling of social ware, requires additional efforts and capacities. For proper and conscious management of knowledge flows and for systematic innovation management additional cash is needed. If we compare top performers with followers (see figure-7) we can see that the duration of dept redemption for top performers is 8 times shorter, the equity ratio is about 43,5% higher and the cash flow ratio is nearly double as high.

	dept redemption duration	equity ratio	cash flow ratio
<i>TOP-Performer</i>	1,7	39,1	19
Followers	13,6	22,1	10,3

Figure-7: Comparison of key financial indicators between top performers and followers in Europe

Obviously top performers can afford knowledge and innovation management in contrast to followers, which are struggling to get capital from the market. Though we cannot derive causal relationships between financial problems and lack of innovation it is evident that those belonging to followers also seem to have problems with innovation. But exactly those companies which cannot afford extra investments have the greatest need to put additional money into knowledge- and innovation management. We had the impression that this fact is known by their management but since they are struggling for survival they concentrate on cost reduction programs primarily. This is especially true for limited liability companies. The only source for them to get money is from banks and private venture capitalists. These species invest money by strictly following the Basel-2 rules. Because of strict solvency rules the followers don't get cheap money. This situation forces them into a negative spiral and only the fittest will survive.

Outsourcing into cheaper countries with lower labor costs guarantees only short term success. On the long run knowledge and innovation management should be regarded as key investments. However, this can only be performed if enough cash is generated out of the daily businesses. For the automotive supply industry in Europe we recommend to

follow a double strategy – rationalization and in parallel more efforts towards knowledge- and innovation management. Only if both techniques are mastered equally well followers will catch up and maybe more than a half of them could survive.

4. ACKNOWLEDGEMENT

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