INNOVATION MANAGEMENT AND PRODUCTIVITY IN FAST GROWING SMALL AND MEDIUM ENTERPRISES

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Executive Summary

SMEs produce a large part of a modern economy's innovation and in terms of innovativeness they are just as effective as large companies. As a simplified result of the observations made in this paper, it can be said that there is a clear positive correlation between innovativeness and SMEs' economic success. Innovation management and the tools it comprises can help shape the innovative process more effectively. Innovation management thus has a positive effect on the ability to produce innovations and profit from them.

Since a solid database is a basic prerequisite for innovation controlling, which, in turn, forms a vital part of innovation management, the need to act can be deduced both in practice and research.

Summing up, the first analyses and findings made here can be used to state that targeted innovation management plays a significant role in increasing both the performance and efficiency of an SME.

Debating Point:

- Is a discussion of sustainability and the innovation process necessary within the framework of innovation management?

- Should the topic of sustainability under the aspect of innovation output be integrated into the discussion of the definition of innovation in the future?

- What other consideration should be integrated into the discussion of performance – particularly with regards to the topic of sustainability?

Introduction

Small and medium enterprises (SMEs) distinguish themselves as producers of technology, suppliers and exporters of innovation 'made in Europe'. Significant innovators are the 'hidden champions'. What stands out, though, is that sound quantitative data and statistics proving this frequently heard statement can hardly be found in literature.

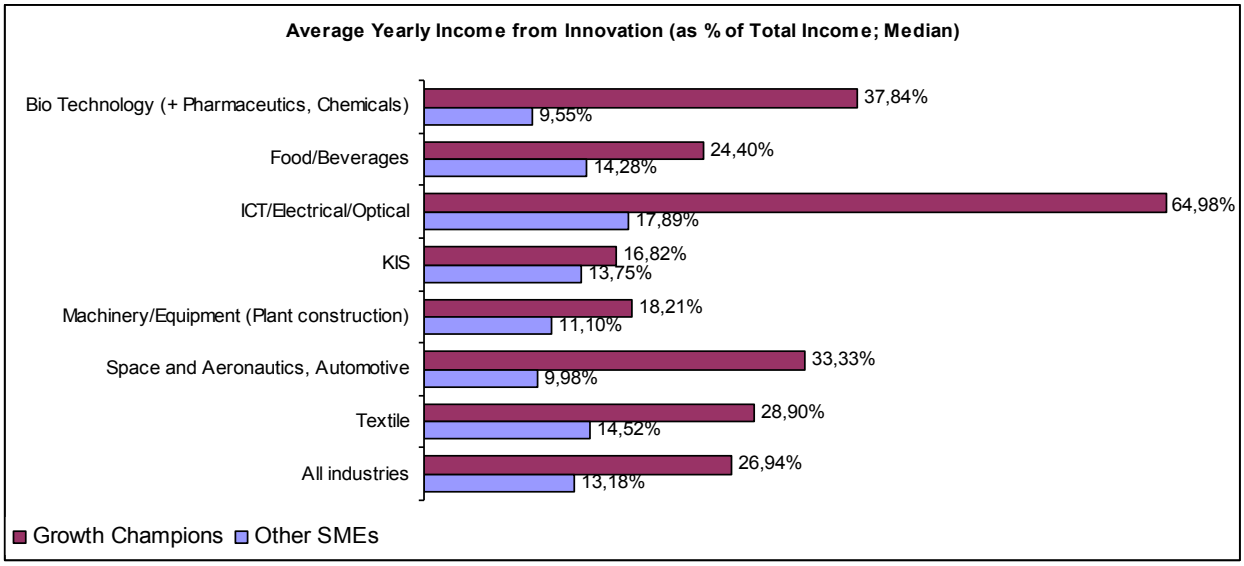
In this context the present text examines a partial aspect, that of the effects of innovation management on SME's economic performance, more closely. The question of how far **innovation management has a part in increasing an SME's performance and efficiency** is focused on in particular. This analysis uses data material which was obtained in the course of the study IMP³rove. Based on said data material the goal is to illustrate how far (certain) SMEs clearly stand out in terms of performance compared to their competitors. The comparison with the competition is supposed to help identify measures and processes that can contribute to an increase in innovation performance.

Significance of innovation management for SMEs

"The increasing complexity of modern technologies and the simultaneously shortened product life cycles increase the requirements on internal company organization in terms of innovation. Especially SMEs do not usually lack in ideas or innovation culture. What they do often lack, however, is the structural anchoring of said innovation culture within the company in the form of systemic internal innovation management" (Heidenreich, 2010). Subsequently, the topic of innovation management in SMEs and its influence on the company's performance will be the focus here. This analysis will be based on existing data material – the IMP³rove database.

IMP³rove is a project that was initiated by the European Commission; its aim is to "sustainably increase small and medium enterprises' (SME) innovative capacities and competitiveness across all of Europe" (Fraunhofer IAO, 2007). Published evaluations from this IMP³rove database form the basis for the analysis of the impact innovation management has on SMEs and their performance (Fraunhofer IAO, 2007). Upon comparison of the SMEs' growth and performance, there are several companies that stand out against the rest, called growth champions.

It becomes obvious that, despite the fact that there are differences between the sectors, the medium annual increase of revenue from sales lies at around 27% with the growth champions while the other SMEs record only a 13% increase (IMP³rove, 2008, pp. 62-63).



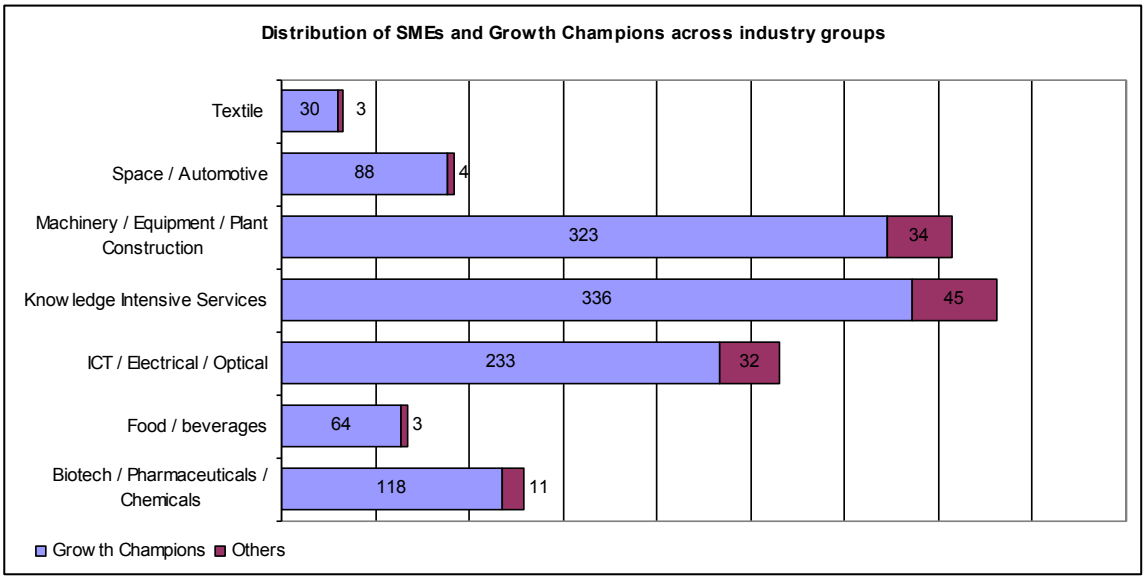
KIS= Knowledge Intensive Services; ICT= Information and Communication Technologies
Source: IMP³rove ; July, 2010; N=1137 (SMEs Age 7 and Older); www.improve-innovation.eu

Figure 1: Income from Innovation (as % of Total Income; Median): Growth Champions versus Other SMEs Quelle: IMP³rove II 2010)

By means of the studies carried out within the framework of IMP³rove in the years 2008-2010, the differences in performance of SMEs and the possible causes will now be analysed.

Statistical data for this analysis comes from 1,486 and 1,515 European SMEs, respectively, that took part in an assessment through IMP³rove (IMP³rove, 2008, IMP³rove II, 2012).

Growth champions are those companies that distinguish themselves through strong and sustainable growth when it comes to EBIT margin, turnover and staff numbers. Since there are different growth mechanisms at work in young and long-standing companies, only companies older than 7 years were added to the list of growth champions (IMP³rove, 2008, p. 61). The following graph illustrates the fact that growth champions are spread across all sectors and do not just come from a single sector. It also becomes clear that a sizable portion of the companies that took part in the assessment came from knowledge-based sectors.

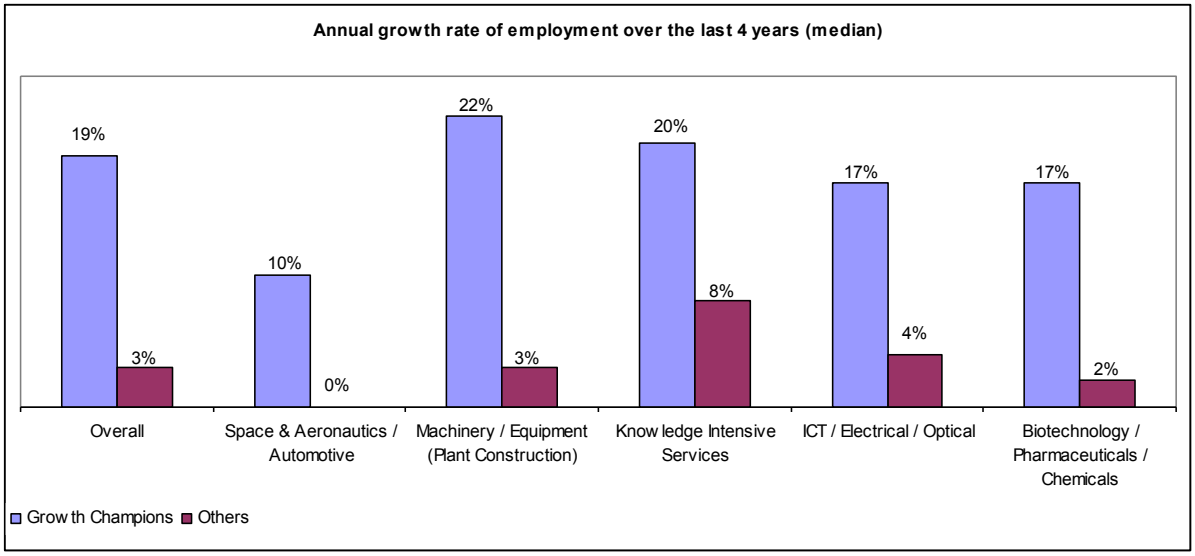


Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 2: Distribution of SMEs and Growth Champions across (IMP³rove, 2008, p.62)

In terms of sales growth, the growth champions reached up to 25% whereas the other competitors only register 7% growth.

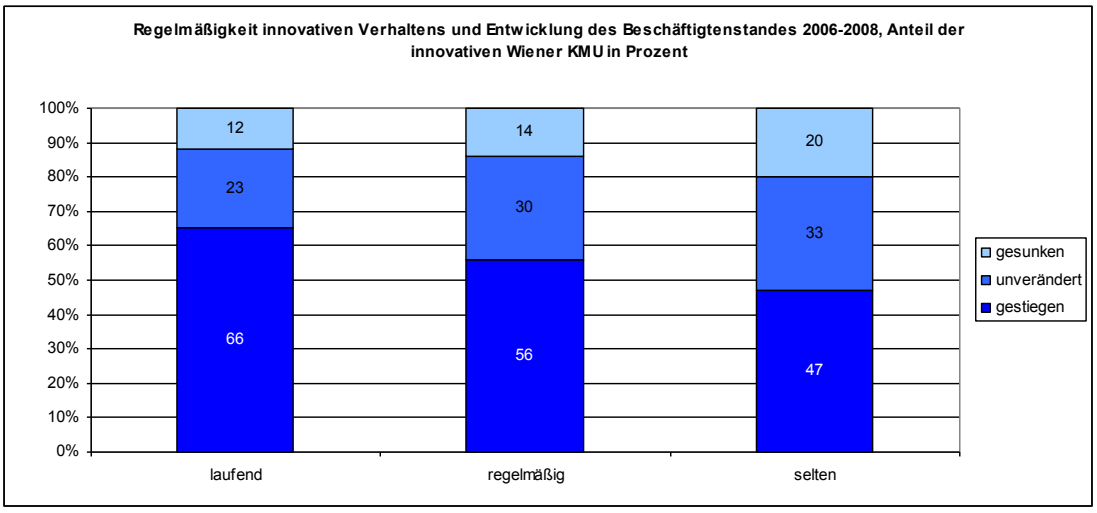
An additional enhancing factor is the fact that the champions were able to increase their returns on turnover by an average of 5%, in contrast to the others. A similar development could be observed as far as staff numbers are concerned, with an average increase of 19% per year, the growth champions' staff numbers increased substantially more (IMP³rove, 2008, p. 64).



Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 3: Annual growth rate of employment (IMP³rove, 2008, p.64

In view of these impressive results, the question arises: "What is it the growth champions do differently and why can or do the others not do the same?"

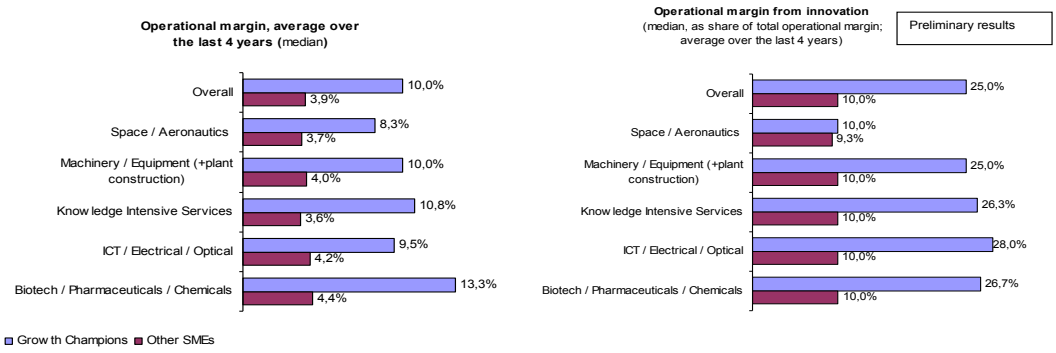


Quelle: KMU FORSCHUNG AUSTRIA, eigene Erhebung 2009; n=535

Figure 4: Employment trend (Austrian Institute for SME Research, 2009, p. 20)

Figure 4 clearly illustrates that ongoing innovation work has a positive influence on employment growth. The study comes to the conclusion that "those SMEs that constantly innovate develop better than non-innovative ones" (Austrian Institute for SME Research, 2009, p. 20).

The data provided by the IMP³rove study proves that the analysed SMEs earn more with incremental than with radical innovations and that the growth champions profit more strongly from their innovations than their competitors (IMP³rove, 2008, p. 65).

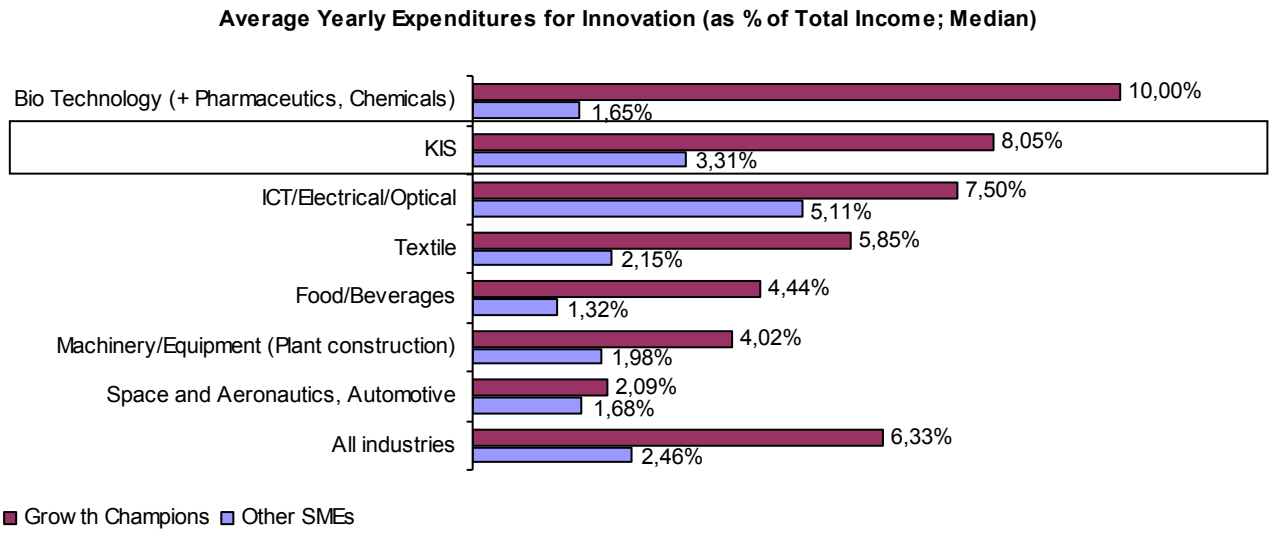


Source: IMP³rove, March, 2008, results from Field-test, www.improve-innovation.eu

Figure 5: Operating margins and profits from innovation (IMP³rove, 2008, p.65)

Companies that perform better in this analysis have a long-term oriented innovation strategy that is usually based on a systematic analysis of future markets and business fields. They also dedicate a far greater share of their budget to long-term innovation projects (IMP³rove, 2008, pp. 65-66).

Measured by turnover across all sectors, the growth champions invest more in innovation in relative terms than their competitors. This becomes especially obvious in sectors that are R&D intensive, such as pharmacy, chemistry, biotechnology or information and communication technology (IMP³rove, 2008, p. 66).



KIS= Knowledge Intensive Services; ICT= Information and Communication Technologies

Source: IMP³rove Core Team; July, 2010; N=1131 (SMEs Age 7 and Older); www.improve-innovation.eu

Figure 6: Expenditures for Innovation (as % of Total Income): Growth Champions versus Others (Quelle: IMP³rove II 2010)

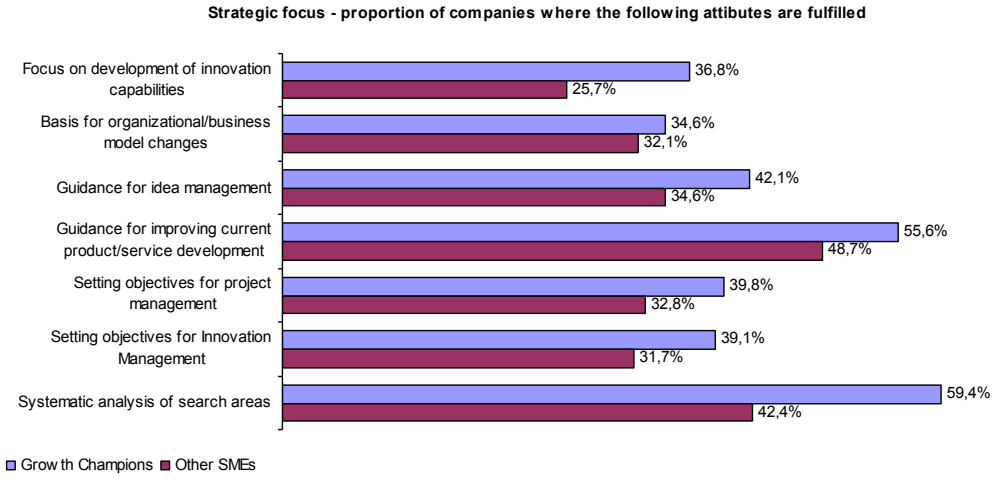
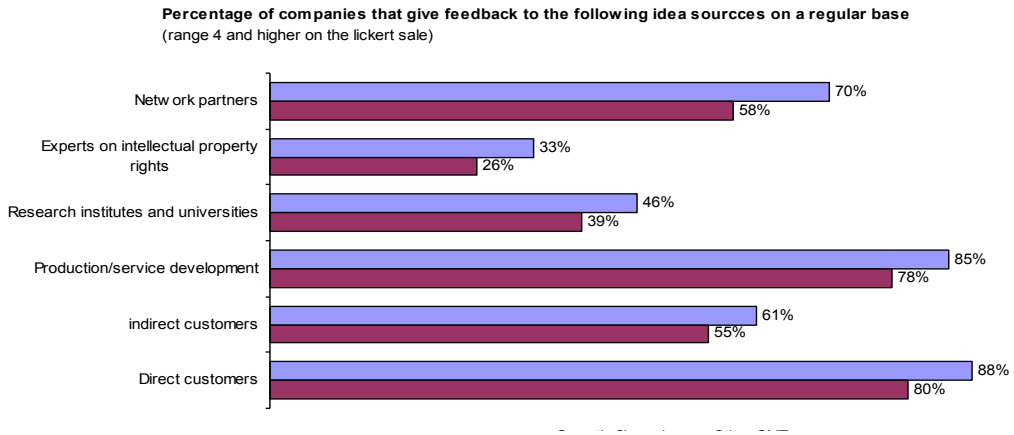


Figure 7: Strategic focus of SMEs (IMP³rove, 2008, p.66)

Furthermore, it becomes clear that the integration of innovativeness into corporate culture and the use of external as well as internal networks is clearly pronounced in the faster growing SMEs; by doing this, new innovations can more easily be discovered or invented and later transformed. As an example, the study showed that network partners are more important for the growth champions than for other SMEs (IMP³rove, 2008, p. 66).

Key sources for new ideas (percentage of companies that give feedback



Based on a Lickert scale; 1 – feedback not provided at all, 7 – feedback provided highly regularly

Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 8: Key sources for new ideas (IMP³rove, 2008, p.66)

Intense communication with customers and their feedback are factors that are considered particularly valuable by the faster growing companies, since this information can be integrated into all of the innovation cycle's phases. This way not only the understanding of the customers is improved, but also existing innovations can be expanded or completely new possibilities for innovation can become visible. (IMP³rove, 2008, pp. 66-67).

Due to the fact that SMEs often have limited resources and that innovations often bear risks, cooperation is a necessary instrument to be able to successfully outline some innovation projects. At the same time, synergy and learning effects can be made possible and put to use. It was proven that 52% of all innovations inside SMEs are connected to cooperation projects (Austrian Institute for SME Research, 2009, p. 28).

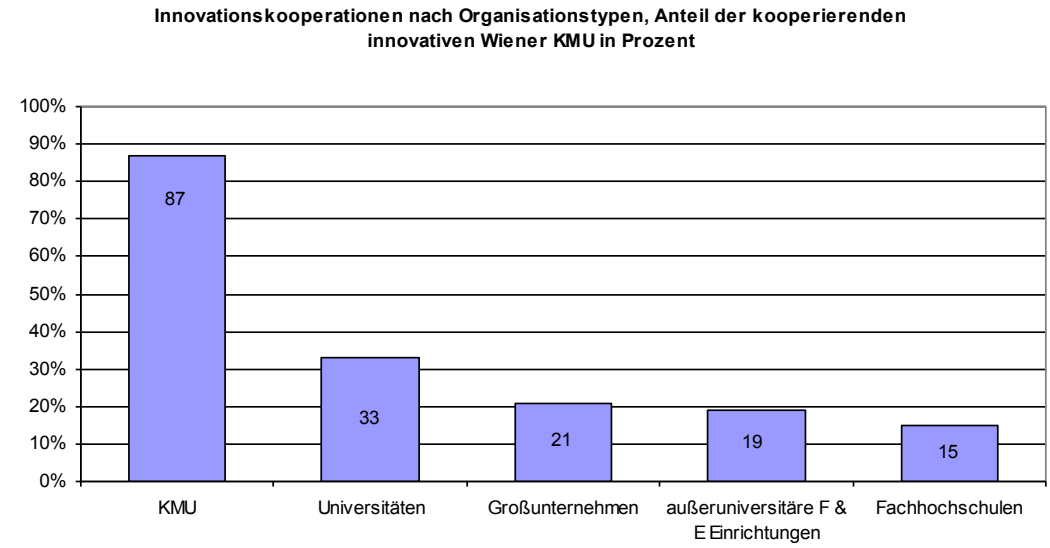
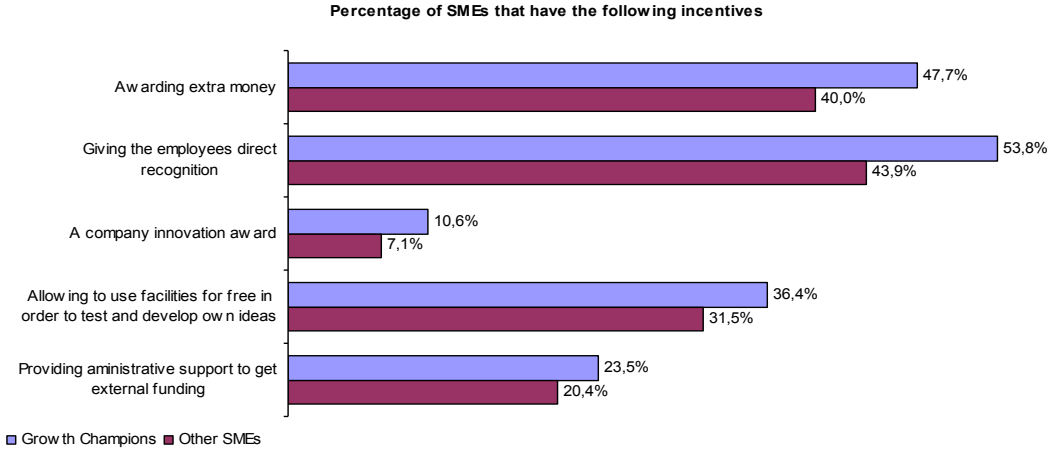


Figure 9: Innovation cooperation (Austrian Institute for SME Research, 2009, p. 29)

It can also be proven that a company's members of staff make vital contributions to its innovative performance. Hence, appropriate incentive systems should be used to increase staff motivation. Many of the companies that were studied do have such systems in place; once more, the growth champions are more strongly represented (IMP³rove, 2008, p. 68).

Aside from appropriate motivation the staff's specialized knowledge is also of vital importance. About 56% of the innovative SMEs state they continuously or at least regularly train their staff (Austrian Institute for SME Research, 2009, p. 26). What stands out here is that the SME's size (number of employees) does not play a role.

Incentives and awards (percentage of companies)



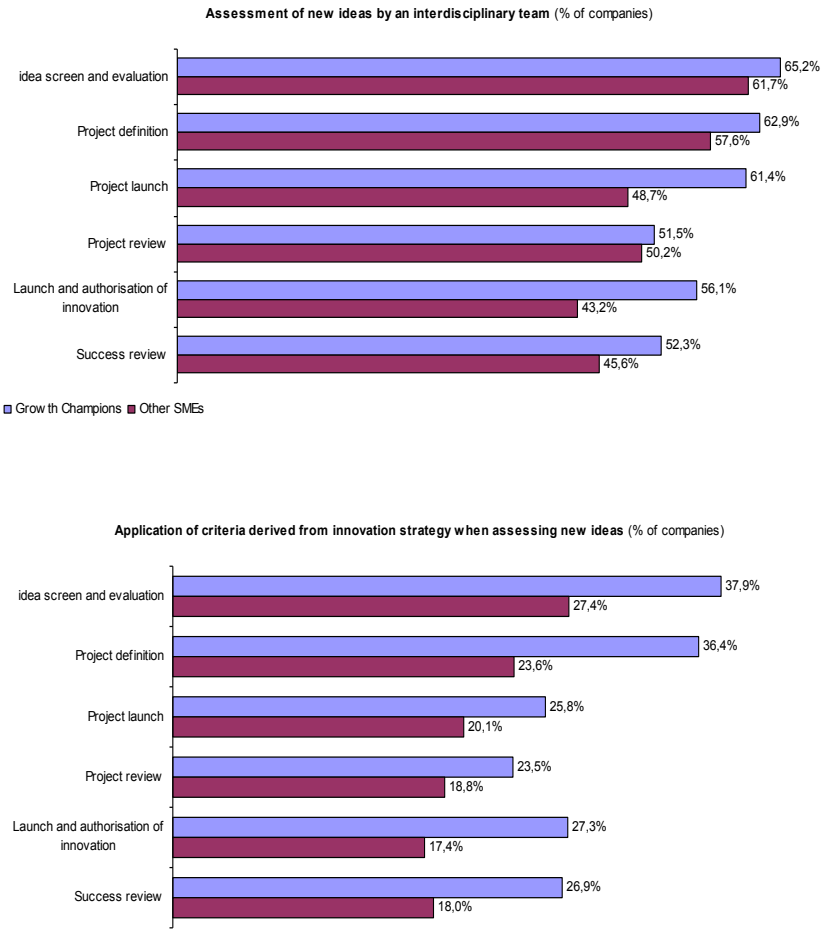
Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 10 : Incentives and awards (IMP³rove, 2008, p.68)

When it comes to finding new ideas, the growth champions follow a systematic approach, the same goes for the development of innovative projects. Interdisciplinary cooperation and team-building ensure the innovative cycle that starts with idea gathering and goes all the way to product launch can be better integrated in the company. Innovation projects are also managed in a more orderly fashion and with the help of key performance indicators they can be controlled better as well (IMP³rove, 2008, pp. 67-68).

Systematic assessment of new ideas and innovation projects

Preliminary results



Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 11: Systematic assessment of new ideas and innovation projects (IMP³rove, 2008, p.68)

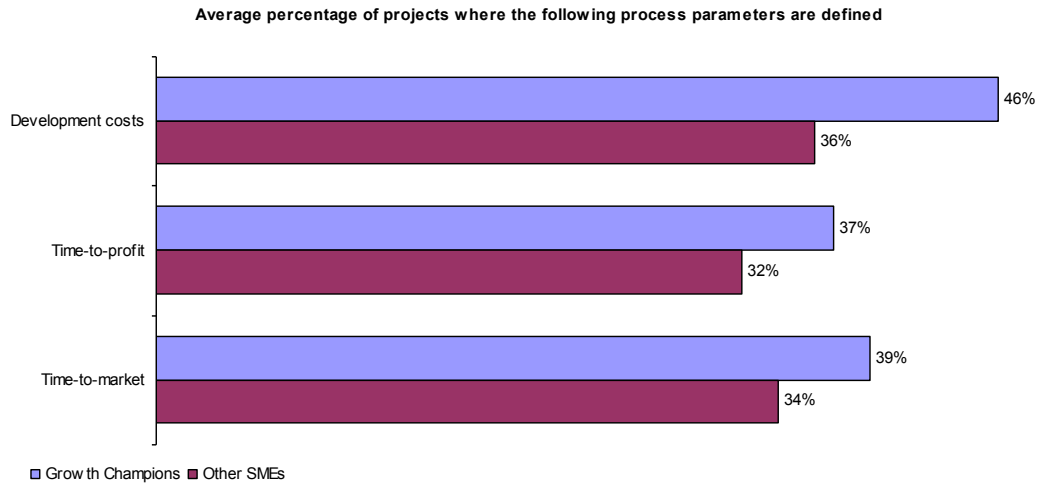
When analysing the data provided by IMP³rove, one realizes that a large number of the SMEs does not evaluate the performance of their innovation management and that no clear

indicators are defined as to how successful the innovation projects are (IMP³rove, 2008, p. 69). Growth champions, on the other hand, often do this in a comprehensive way.

Simple indicators with regards to the success of innovation projects, and thus the innovation management, would be the time to profit and time to market, the frequency of the gathering and evaluation of such figures is illustrated in Figure 12.

Average percentage of projects where the key performance indicators defined

Preliminary results



Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure12: Average percentage of projects where the key performance indicators defined (IMP³rove, 2008, p.69)

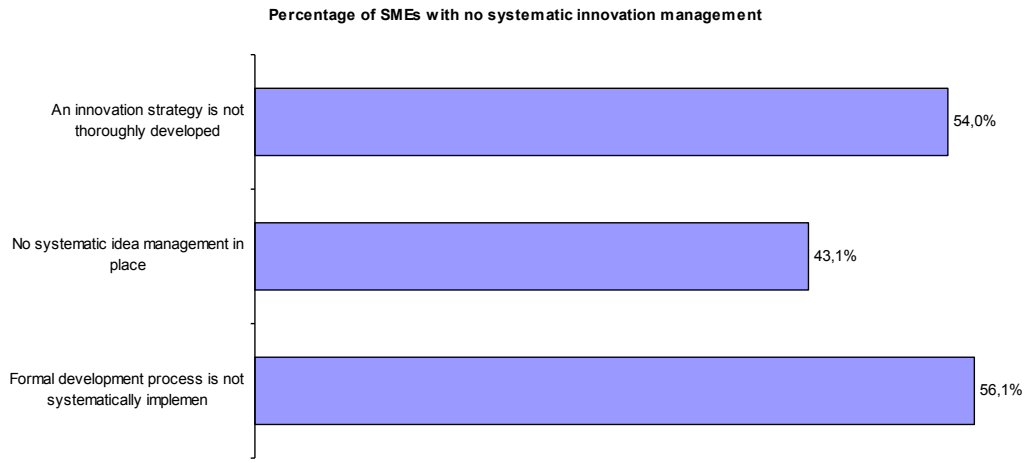
The smaller the companies are, the more likely they are to have an intuitive approach towards innovation management. Formal innovation management in terms of IMP³rove does not exist in small companies. Innovation is usually left to the boss and is usually only one person's responsibility. In the course of consulting projects in France, it became apparent that companies with fewer than 50 employees usually had a CEO who was also innovation manager. The decision-maker does not always have a clear picture of an innovation's financial contribution. As a consequence, the decisions are usually made based on intuition rather than a systematic approach. Hence, the existing data shows that companies can be innovative without formal innovation management, too (IMP³rove, 2008, p. 70).

To sum up, one can draw the conclusion from the findings that a large number of SMEs do not follow an organised approach for innovation management. Looking at the comparison

between growth champions and the other SMEs, it does become clear, however, that this approach would be vital for the long term survival and growth of the company. There is even room for improvement with the growth champions.

Percentage of SMEs lacking a systematic approach towards Innovation Management

Preliminary results



SME = Small and medium sized enterprise

Source: IMP³rove, March, 2008, results from Field-test; N= 1324; www.improve-innovation.eu

Figure 13: SMEs lacking a systematic approach towards Innovation Management (IMP³rove, 2008, p.70)

Empirical analysis of performance and innovation

The number of empirical studies on the topic of innovation and performance has increased substantially in the past 15 years. Most studies postulate a positive correlation between innovation and performance.

In the following, the results of a working paper will be presented, which contains a meta-analysis of 25 such studies on the topic of innovation and performance.

The working paper by Hall from 2011 is titled “Innovation and Productivity” and provides an overview of 25 studies (see Figure 14) from the past 10-15 years. All these studies use data collected through a community innovation survey (CIS) study or a CIS imitator in another

country. 18 out of 25 studies used the CDM (Crepon, Duguet and Mairesse) model which describes the relationship between R&D and the innovation output as well as the relation between innovation output and productivity.

Authors	Country	Observations	Method*	Output measure	Innov measure	Estimated impact of innovation	Comments
Benavente (2006)	Chile	1995-98 438 mfg plants	CDM model: ALS	Log VA per emp	Log innov sales share	0.18 (0.11)*	SR prod not related to innovation or R&D, but related to engineers & admin (higher salaries); innovation due to capital, not in produktivity
Crepon, Duguet, & Mairesse (1998)	France	SESSI 1986-90 ~5000 innov mfg firms	CDM model: ALS	Log VA per emp	Log innov sales share	0.065 (0.015)***	Positive impact of innovation sales share on productivity, as well as positive association of productivity with human capital in labor force
Griffith, Huergo, Harrison, & Mairesse (2006)	France, Germany, Spain, UK	CIS3 1998-2000 FR 3625 mfg firms DE 1123 mfg firms ES 3588 mfg firms UK 1904 mfg firms	CDM model: sequential with IV	Log sales per emp	Product and process dummies	FR: 0.07 (0.03)** proc 0.06 (0.02)*** prod DE: 0.02 (0.05) proc -0.05 (0.03) prod ES: -0.04 (0.04) proc 0.18 (0.03)***prod. UK: 0.03 (0.04) proc 0.06 (0.02)*** prod	Estimation in 3 steps, no bivariate probit. Process innovation adds 0.07 in France, nothing in other countries; Product innovation positive except in Germany.
Hall, Lotti & Mairesse (2011)	Italy	MCC 1992-2003 14294 mfg firms	CDM with 4 types of innovation: FIML for selction; quadrivariate probit; IV	Log sales per emp	4 innov dummies	Prod: 0.69 (0.15)**** Proc: -0.43 (0.13***	Innovation variables not separately well-identified in productivity equation; process appears to be negative and product positive for TFP.
Janz, Loof & Peters (2003)	Germany Sweden	CIS3 1998-2000 1000 K-intensive mfg firms	CDM model: sequential with IV	Log sales per emp	Log innov sales per emp, process dummy	DE: 0.27 (0.10)***prod -0.14 (0.07)** proc SE: 0.29 (0.08)*** prod -0.03 (0.12) proc	Allowed for feedback from productivity to innovation output. Elasticity of productivity wrt innov sales similar in both countries
Jefferson, Bai, et al (2006)	China	1995-99 5500 R&D-doing Large/medium Sized firms	CDM model: sequential with IV	Log sales per emp	Log innov sales share	0.035 (0.002)***	No correction for innovation selection bias
Loof & Heshmati (2006)	Sweden	CIS3 1996-98 1071 mfg firms 718 service firms 92 utility firms	CDM variation: FIML on selection submodel; 3SLS; sensitivity analysis	Log VA per emp	Log innov sales per emp, process dummy	Prod: 0.12 (0.04)*** mfg 0.09 (0.05)** service Proc: -0.07 (0.03)*** mfg -0.07 (0.05) service	Survey data less reliable than register data; sales not as good as VA productivity eq
Loof, Heshmati, Asplund & Naas (2001)	Finland, Norway, Sweden	CIS2 1994-96 (95-97 in Norway) NO: 485 mfg firms FL: 323 mfg firms SE: 407 mfg firms	CDM variation: sequential with 3 SLS	Log sales per emp	Log innov sales per emp, process dummy	FL: 0.090 (0.58) prod -0.029 (0.060) proc NO: 0.257 (0.062)*** prod 0.008 (0.044) proc SE: 0.148 (0.044)*** prod -0.148 (0.043)*** proc	Allows for simultaneity btwn innovation & output – feedback in NO but not FL und SE. Elasticity slightly higher for radical innovations.
Mairesse & Robin (2010)	**France**	CIS3 1998-2000 3500 mfg firms CIS4 2002-2004 5000 mfg firms 3600 service firms	CDM model: FIML for selection eqs; bivariate probit; IV	Log VA per emp	Product and process dummies	mfg 98-00 0.41 (0.12)*** proc 0.05 (0.09) prod mfg 02-04 0.45 (0.16)*** proc -0.08 (0.13) prod Service: 0.27 (0.45) proc 0.27 (0.52)*** process	Estimation is in 3 steps, but also in 2 steps, with innov & labor productivity equations combined. Process innovation enters productivity, but not product. Explores using a single innovation indicator, which works just as well.

Authors	Country	Observations	Method*	Output measure	Innov measure	Estimated impact of innovation	Comments
Mairesse, Mohnen & Kremp (2005)	France	CIS3 1998-2000 2200 mfg firms	CDM & variations	Log VA per emp	Logit transform of innov sales share, process dummy, other dummies – all separately	HAT: 0.23 (0.15)* 0.07 (0.03)*** radical 0.06 (0.02)*** process LT: 0.05 (0.02)*** -0.08 (0.05)* radical 0.10 (0.04)*** process	TFP using output; going trough innovation does not add much to estimates of return to R&D after correcting for selectivity and endogeneity; endogeneity correction impt for innov variables
Masso & Vahter (2008)	Estonia	CIS3 1998-2000 1467 mfg firms CIS4 2002-2004 992 mfg firms	CDM variation: sequential with bivariate probit for innov	Log VA per emp	Product and process dummies (org dummies in 2nd period)	prod 98-00: 0.21 (0.08)*** 02-04: 0.00 (0.05) proc 98-00: -0.06 (0.10) 02-04: 0.15 (0.06)***	Uses innov expenditure rather than R&D; proc & prod dummies; prod innovation increases productivity in recession; proc innovation in growth period. One and two year lag effects are roughly the same (cross sectional)
Masso & Vahter (2008)	Estonia	CIS3 1998-2000 1467 mfg firms CIS4 2002-2004 992 mfg firms	CDM variation: sequential with bivariate probit for innov	Log sales per emp	Product and process dummies (org dummies in 2nd period)	prod 98-00: 0.17 (0.08)** 02-04: 0.03 (0.04) proc 98-00: -0.03 (0.09) 02-04: 0.18 (0.05)***	Uses innov expenditure rather than R&D; proc & prod dummies; prod innovation increases productivity in recession; proc innovation in growth period. One and two year lag effects are roughly the same (cross sectional)
Polder, Van Leuwen et al (2009)	Netherlands	CIS3 3.5-4.5 2002-2006 ~1200 mfg & service firms	augmented CDM	Log VA per emp	3 innov dummies (proc prod org) in combo	mfg: 1.7 (0.4)***org alone 1.0 (0.5)** org & proc 0.9 (0.2)*** all serv: 4.3 (0.5)*** org alone 17.1 (2.2)*** org & proc -8.3 (1.3)*** proc & prod 3.9 (05.)*** all	Org innovation has strongest TFP effects. Process and product only when combined with org innovation. However, signs of coefficient instability due to correlation of 8 combinations when predicted
Raffo, Lhuillery & Miotti (2008)	France, Spain, Switzerland, Argentina, Brazil, Mexico	CIS3 1998-2001 mfg AR 1308 firms BR 9452 firms MX 1515 firms FR 4618 firms CH 925 firms ES 3559 firms (2002-04)	CDM model: sequential with IV	Log sales per emp	Product & organizational innov dummies	AR: -0.22 (0.15) BR: 0.22 (0.04)*** MX: 0.31 (0.09)*** FR: 0.08 (0.03)** ES: 0.16 (0.05)*** CH: 0.10 (0.06)*	Interaction of innovative activities with national systems weaker in developing countries. Foreign and domestic subs are uniformly more productive, but do more R&D only in France and Brazil
Van Leeuwen & Klomp (2006)	Netherlands	CIS2 1194-96 1400 innov firms	CDM variations: 3SLS	Log sales per emp	Process dummy; innov sales share	prod: 0.13 (0.03)*** proc: -1.3 (0.5)***	Includes market share eq; feedback from sales to innovation; revenue function approach better than VA prod function framework (innov sales do not enter VA function in the presence of R&D and markup coefficients).
Siedschlag, Zhang, and Cahill (2010)	Ireland	CIS3 2004-2006 CIS4 2006-2008 723 firms (balanced panel)	CDM variation: sequential with IV	Log sales per emp	Product, process and organizational dummies, innov sales share – all separately	innov sales: 0.11 (0.02)*** prod: 0.45 (0.08)*** proc: 0.33 (0.08)***	Uses innovation expenditure instead of R&D spending: includes FDI and foreign ownership characteristics.

*CDM= Crepon, Duguet, Mairesse model described in text. ALS=asymptotic least squares on multi-equation model. 3SLS= three stage least squares. FIML=full information maximum likelihood on multivariate normal model. OLS=ordinary least squares. IV=instrumental variable estimation.
Source: Author´s collection, supplemented by Tabla A1 (Chudnovsky et al 2006), Table 4.1 (Peters 2006)

Figure 14: Empirical studies of the productivity-innovation relationship using productivity levels . (Quelle Hall Appendix Figure 1)

Productivity is defined as follows: “it is the quantity of output that can be produced using a given level of inputs” (Hall, 2011, p. 7). For the further analysis, the concept of total factor productivity is used, which illustrates the share of growth which cannot be put down to the production factors of work and capital.

Most studies measure innovation by asking companies whether they produced an innovation in a given period. The second question then is what role these innovations in driving turnover.

Hall differentiates the studies according to how they measure the relation between innovation and productivity:

1. “levels, using innovative sales share”
2. “levels, using the product innovation dummy”
3. “growth rates” (Hall, 2011, p. 14)

Figure 15 shows studies that used the share product innovations have in a company's turnover to measure the productivity effect of product innovations. Most studies show high significance.

Sample	Time period	Elasticity with respect to innov sales share	Process innovation dummy
Chilean mfg sector	1995-1998	0.18 (0.11)*	
Chinese R&D-doing mfg sector	1995-1999	0.035 (0.002)***	
Dutch mfg sector	1994-1996	0.13 (0.03)***	-1.3 (05)***
Finnish mfg sector	1994-1996	0.09 (0.06)	-0.03 (0.06)
French mfg sector	1986-1990	0.07 (0.02)***	
French Hi-tech nfg #	1998-2000	0.23 (0.15)*	0.06 (0.02)***
French Low-tech mfg #	1998-2000	0.05 (0.02)***	0.10 (0.04)***
German K-intensive mfg sector	1998-2000	0.27 (0.10)***	-0.14 (0.07)**
Irish firms #	2004-2008	0.11 (0.02)***	0.33 (0.08)***
Norwegian mfg sector	1995-1997	0.26 (0.06)***	0.01 (0.04)
Swedish K-intensive mfg sector	1998-2000	0.29 (0.08)***	-0.03 (0.12)
Swedish mfg sector	1994-1996	0.15 (0.04)***	-0.15 (0.04)***
Swedish mfg sector	1996-1998	0.12 (0.04)***	-0.07 (0.03)***
Swedish service sector	1996-1998	0.09 (0.05)*	-0.07 (0.05)

Source: author´s summary from Appendix Table 1

Innovative sales share and process innovation included separately in the production function.

Figure 15: “Results for the productivity-innovation relationship in TFP levels (Products innovation measured as innovative sales share)” (Hall, 2011, Appendix Figure 2a)

The strongest impacts on revenue productivity are caused by innovations in the "knowledge-intensive or high technology sectors" (Figure 15) (Hall, 2011, p. 14). Low-technology sectors also have lower elasticity.

Hall's meta-analysis leads him to the following conclusion: "The foregoing survey of empirical evidence on the relationship between innovation and productivity finds an economically significant impact of product innovation on revenue productivity and a somewhat more ambiguous impact of process innovation. […] the latter result is primarily due to the fact that we are not able to measure the real quantity effect of process innovation" (Hall, 2011, p. 16). Here the problem of measuring quantitative impacts of process innovations is clearly mentioned.

Empirical analysis of innovation management and performance

Up until now, proof was given of the positive effects innovations have on performance. The contribution 'exploitation of innovation potential' by Vahs and Schmitt 2010 implicitly illustrates the impact innovation management has on the performance.

In the style of the 7-S model, Vahs/Schmitt name two determinants for the success of innovation: innovation culture (soft factors) and organization (hard factors). Leadership, competence/know-how, communication, values and orientation towards innovation are variables of innovation culture. Form of organization, instruments of coordination and an orientation towards creating value fall in the category of variables of organization.

Their hypotheses correspond to a multi-stage approach:

- H1: The sooner an organization enables or supports innovation, the greater the innovative success.
- H2: The sooner the corporate culture supports innovations, the greater the innovation success.
- H3: The greater the innovation success, the greater the corporate success.

Organization and innovation culture constitute the first factors that have an influence on the innovative success. The innovative success has an impact on the corporate success.

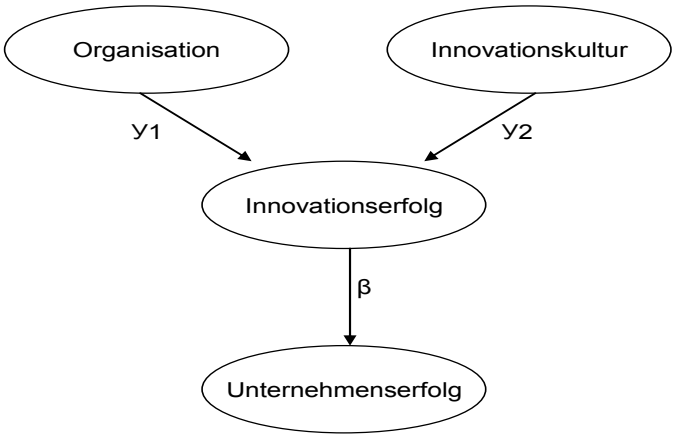


Figure 16: Structural model of innovative and corporate success

Vahs and Schmitt define the types of companies that have different characteristics as far as culture of innovation and organization is concerned (Figure 17):

- Lethal class: below average culture of innovation and organization
- Creative company type: above average culture of innovation, below average organization
- Ideal company: above average culture of innovation and organization

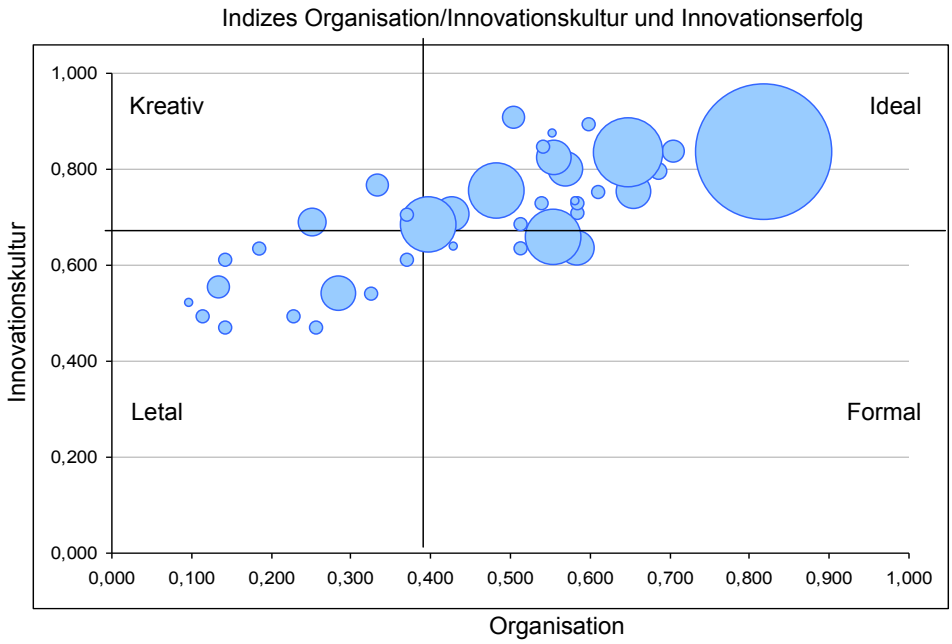


Figure 17: Basic grid for the classification of companies according to their culture of innovation and organization

The following graph (Figure 18) illustrates the different manifestations of these three company types in different indicators of culture of innovation.

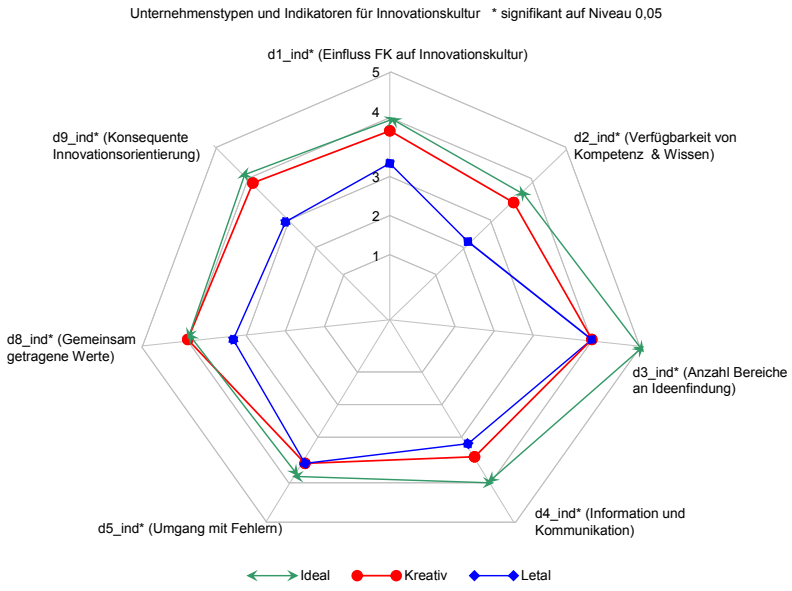


Figure 18: Correlations between company type and indicative variables of culture of innovation

The ideal company thus differs from the others mostly because it integrates more company areas in the process of generating new ideas.

The following graph (Figure 19) illustrates the different forms of company types when it comes to different organization indicators:

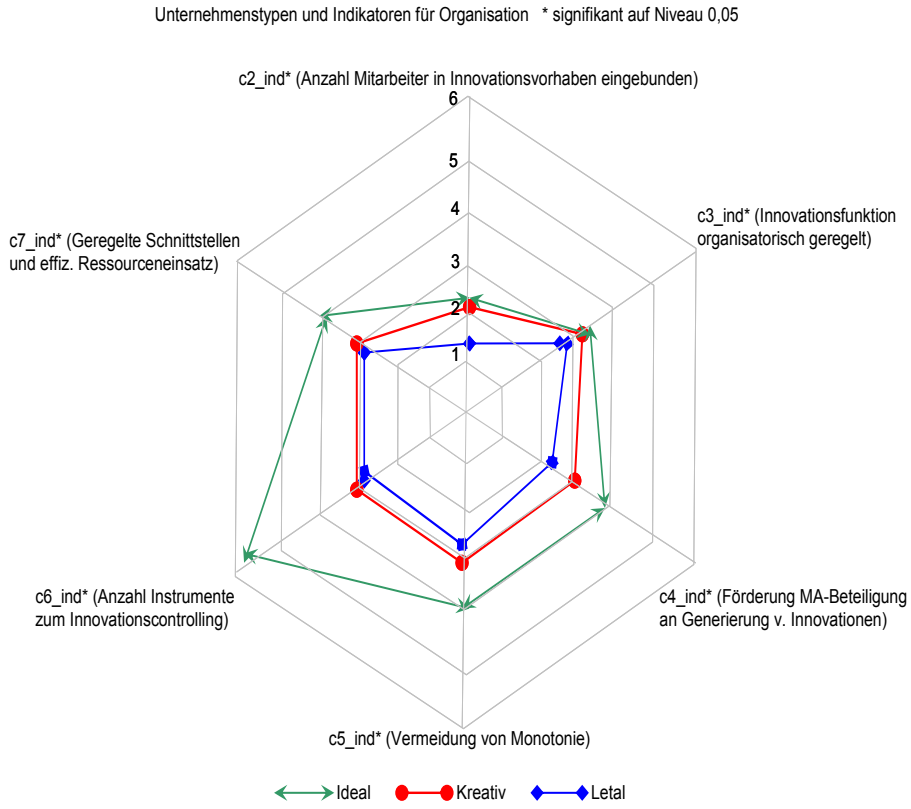


Figure 19: Correlation between company type and indicator variables

"Ideal companies use far more tools for planning, controlling and evaluating innovation projects (up to six tools) and they use the tools in a more targeted way" (Vahs/Schmitt, 2010, p. 8).

"This explains – at least partly – the greater innovative success because only with systematic and continuous innovation controlling that encompasses all phases from the first idea up until the market introduction and success on the market can problems be identified in time and improvements be made quickly and successfully" (Vahs/Schmitt, 2010, p. 8).

The characteristics that were tested here – such as the promotion of staff participation and the creation of innovations and, most importantly, innovation controlling – permit the statement that at least the ideal companies practice real innovation management.

"The causal model shows that an organization has a significant, direct impact on the innovative success. There is clear causality between the innovative and the corporate success, i.e. successful innovations increase the corporate success. This result also goes to show that innovations are a *conditio sine qua non* for long-term corporate success" (Vahs/Schmitt, 2010, p. 9).

Innovation management has a positive impact on the innovative success, which in turn, increases the company's performance.

What stands out is that "in contrast to the organization, innovation culture is not a direct determinant of innovative success; there is, however, a high correlation with the organization. This means that the two constructs organization and culture of innovation cannot be taken into consideration separately" (Vahs/Schmitt, 2010, p. 9).

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