



Innovation Management

IMP³rove

IMP³rove II Study

**Gaining Competitiveness with Innovations
beyond Technology and Products:
Insights from IMP³rove**

July 2011

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1. Management Summary

This IMP³rove Study provides more transparency on the innovation success of both low- and high-tech SMEs. The “myth” that mainly high-tech companies contribute with their product innovations to Europe’s competitiveness is refuted with this study. High-tech companies can learn from low-tech companies how to leverage service innovations, organizational or business model innovations to strengthen their competitive position and achieve sustainable and profitable growth. We identified success factors that put low-tech companies in the growth mode. In addition, we also looked into the “hybrid innovators” and what to learn from them.

The IMP³rove Innovation Management benchmarking database shows that low-tech firms do invest in innovation on average more than 10 % of their total income. This is slightly less than what the high-tech companies invest (16.2 %). Low-tech firms take a similar long-term perspective for their innovation projects as the high-tech companies and they grow in terms of income almost in the same pace as the high-tech companies.

Within the low-tech firms those that invest significantly more in innovation than the others yield also a significantly higher yearly income growth rate and – especially important for the wealth in Europe – a higher yearly growth rate in employment. Hence, the low-tech companies that take innovation management seriously can serve as a role model for the others. Having a clear plan is crucial. This encompasses a clear innovation strategy and defined parameters for the innovation projects.

Low-tech companies also can give guidance to high-tech companies when it comes to other types of innovation than product innovation. Service innovation, process innovation, organizational innovation or business model innovations are an additional source for strengthening the company’s competitiveness. Manufacturing companies still rely very much on product innovations. They miss the opportunity to gain additional revenues and profit from business model or service innovations. However, the IMP³rove database shows a transformation in the producing industries. For example in the bio-tech and textile industries, hybrid innovators are very common. Hybrid innovators have more than just product innovation in their portfolio.

As companies get older they seem to rely less on service innovations and more again on product innovation. Older companies also seem to get tired of innovation. The share of non-innovators in the group of over 25 years old is growing up to almost 30 %. However, hybrid innovators outperform the product innovators in the yearly operational margin and in the employment growth rate.

Based on the results of the study on low-tech companies and hybrid innovators the support of SMEs can be designed more effectively. Helping SMEs in the manufacturing sector how to successfully innovate apart from new products can increase their growth in operational margin as well as in the employment growth rate. Also financial investors might find these results interesting to adjust their investment strategies.

2. Introduction

Innovation is fundamental to create and sustain the long-term competitiveness of small and medium-sized enterprises. There is no doubt about the relevance of innovation from an economic perspective. However, today's innovation landscape challenges traditional models of innovation and value creation: The shift towards a service-dominated and globalized economy requires managers of both large and small and medium-sized firms to rethink their approach to innovation.

The forms and strategies of innovation firms are most familiar with are R&D and technology-based innovations. These strategies primarily aim for technological product innovations. In addition, innovation policies and support program in the past heavily concentrated on technological innovations and support "high-tech" firms. However, the majority of SMEs will never become the next Facebook[©] or Skype[™] well-known for their technological innovations. A large proportion of SMEs in Europe operate in low-tech sectors. Thus, innovations in low-tech industries are just as important as innovations in high-tech firms. In addition, there are large opportunities for innovations in SMEs from service sectors which have hardly been exploited. About 70% of Europe's GDP is generated in service sectors¹. In these sectors, innovations not necessarily need to come from high-tech service firms.

The "myth" that only technology-based and product-oriented innovations matter is most dominant in manufacturing and producing industries. In these sectors, services are usually considered as something where firms need to cut costs rather than create value. In today's service economy manufacturing firms may shift from product to hybrid innovations, and bundle products and services. This is not just important to large manufacturing companies. Small manufacturing firms may also benefit from hybrid strategies in order to create superior customer value and to remain competitive.

To challenge the myths around technology-oriented and product-based innovations, the following study takes a closer look into innovations in low-tech SMEs in Europe. It also explores the opportunities of hybrid innovations for manufacturing SMEs in Europe.

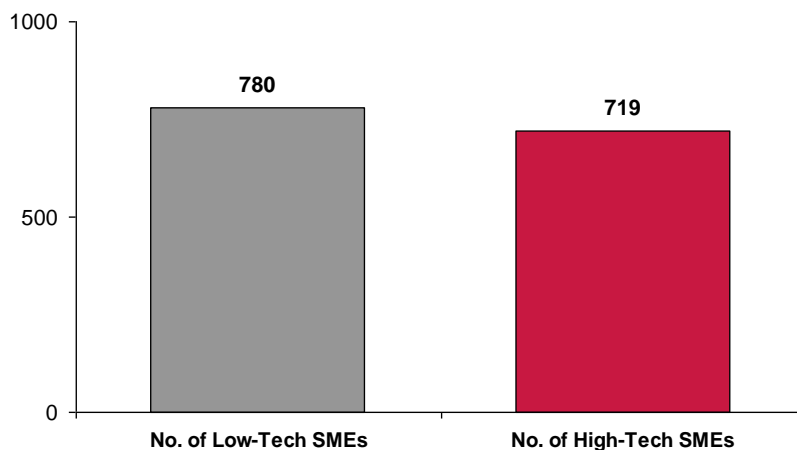
The study builds upon a large benchmarking dataset on SMEs from different countries, age and size classes. It covers nearly 1500 validated datasets which were collected between spring 2007 and spring 2011. They include both high-tech and low-tech sectors. Most of the SMEs employ between 5 and 100 employees.

¹ http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_%E2%80%93_GDP

3. Classification of Low-Tech and High-Tech Sectors

Not only high-tech companies but also low-tech firms are a relevant source for innovation. With 780 low-tech SMEs and 719 high-tech SMEs both sectors are covered evenly in the IMP³rove database.

Total Number of SMEs of Low-Tech and High-Tech Sectors



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1499
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Figure 1: Low-Tech versus High-Tech SMEs in the IMP³rove Database

The classification of the high-tech and low-tech sector in the IMP³rove data base follows the classification as proposed by OECD². We built upon the NACE code classification Rev 2 to classify the SMEs³.

As shown on the next page, 12 NACE codes classify as high-tech sectors. They also cover so called medium-high-tech sectors. 26 NACE codes classify as low-tech sectors. They also cover so called medium-low-tech sectors.

² OECD, 2006. Science, Technology and Industry Outlook. OECD, Paris.

³ See European Commission (2008) NACE Rev. 2 Statistische Systematik der Wirtschaftszweige in der Europäischen Gemeinschaft, EuroStat Methodologies and Working Papers

Industry group	Low-Tech Sectors	High-Tech Sectors
ICT / Electrical / Optical	<ul style="list-style-type: none"> ■ Publishing, printing and reproduction of recorded media 	<ul style="list-style-type: none"> ■ Manufacture of office machinery and computers ■ Manufacture of electrical machinery and apparatus n.e.c. ■ Manufacture of radio, television and communication equipment and apparatus ■ Manufacture of medical, precision and optical instruments, watches and clocks ■ ICT / Electrical / Optical - Others
Space/ Aeronautics / Automotive	<ul style="list-style-type: none"> ■ Manufacture of other transport equipment ■ Space, Aeronautics, Automotive - Others 	<ul style="list-style-type: none"> ■ Manufacture of motor vehicles, trailers and semi-trailers
Machinery / Equipment	<ul style="list-style-type: none"> ■ Manufacture of basic metals ■ Manufacture of fabricated metal products, except machinery and equipment ■ Recycling ■ Construction ■ Machinery/ Equipment (plant construction) - Others 	<ul style="list-style-type: none"> ■ Manufacture of machinery and equipment n.e.c.
Knowledge Intensive Services	<ul style="list-style-type: none"> ■ Wholesale trade and commission trade, except of motor vehicles and motorcycles ■ Retail trade, except of motor vehicles & motorcycles; repair of personal& household goods ■ Land transport; transport via pipelines ■ Water transport ■ Air transport ■ Financial intermediation, except insurance and pension funding ■ Insurance and pension funding, except compulsory social security ■ Activities auxiliary to financial intermediation ■ Real estate activities ■ Other business activities ■ Education ■ Knowledge intensive services - Others 	<ul style="list-style-type: none"> ■ Post and telecommunications ■ Computer and related activities ■ Research and development
Food and Beverages	<ul style="list-style-type: none"> ■ Manufacture of food products and beverages ■ Manufacture of tobacco products ■ Food and beverages – Others 	
Biotechnology		<ul style="list-style-type: none"> ■ Manufacture of chemicals (24) ■ Biotechnology (Pharma/Chemical), Others
Textile	<ul style="list-style-type: none"> ■ Manufacture of textiles ■ Manufacture of wearing apparel; dressing and dyeing of fur ■ Textile - Others 	

Figure 2: Low-Tech and High-Tech Sector Classification Based on OECD

In the following chapters the high-tech and medium-high-tech sectors will be referenced as “high-tech” and the low-tech and medium-low-tech sectors will be referenced as “low-tech”.

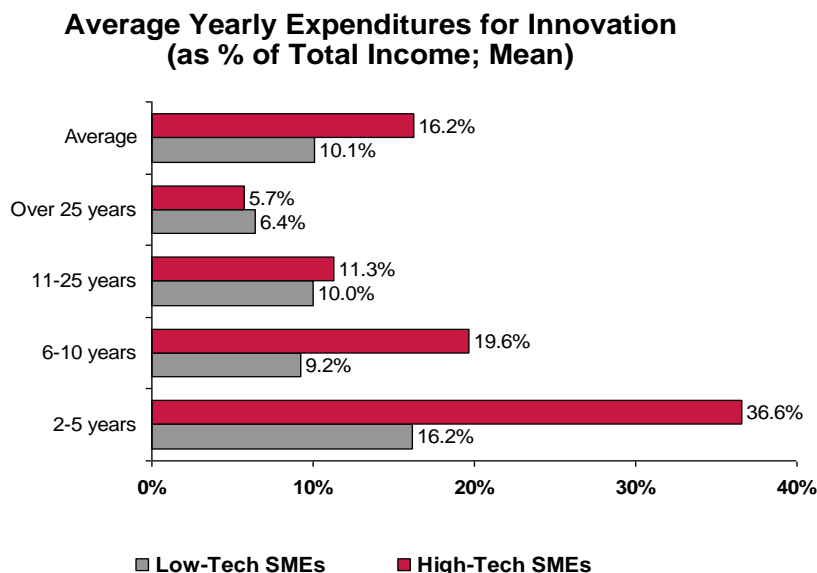
4. Low-tech Firms Are Ambitious for Innovation and Significantly Contribute to Europe's Competitiveness

Firms in low-tech sectors are usually considered as being the laggards in the innovation game. However, IMP³rove reveals that low-tech sectors are also ambitious to innovate and to create new valuable offerings for their customers. Our results also highlight that low-tech firms play a crucial role as driver of Europe's competitiveness.

4.1 Ambition for Innovation in Low-tech Sectors

It is widely known that high-tech firms invest significantly in R&D and new technological knowledge in order to strengthen their innovation posture. Low-tech firms usually do not engage in formal R&D. However, expenditures for innovation go beyond formal R&D and also relate to non R&D activities. Expenditures for innovation occur throughout the overall lifecycle, from the inception of the idea through to its successful launch and continuous improvement. IMP³rove takes such a lifecycle perspective when measuring "expenditures for innovation". When taking the more realistic "lifecycle" perspective, our results highlight that low-tech firms are ambitious for innovation. Across different age classes, low-tech firms invest in innovation to build their innovation capacity. As shown in Figure 3, especially older and more mature low-tech firms invest a significant portion of their income in innovations. Firms of age 11 and older are just as ambitious as high-tech firm.

As expected, young low-tech firms (age 2 to 5 years) invest less than their high-tech peers as young high-tech firms need to invest in the exploration and the development of new technologies. Small and young firms operating in low-tech sectors don't have to (or want to) bear such a high financial risk.

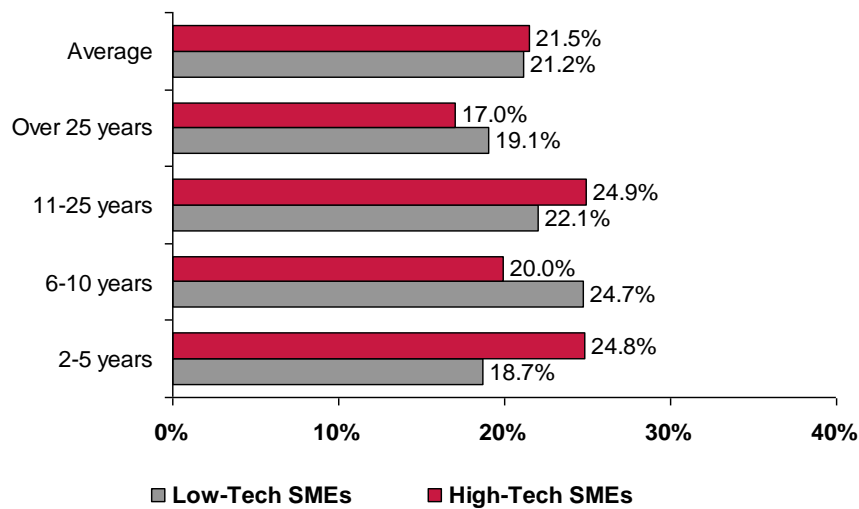


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1452
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 3: Expenditures for Innovation in Low-Tech and High-Tech SMEs

Interestingly, innovation expenditures are less volatile in low-tech firms. In high-tech firms the ambition for innovation and the investment in innovation seem to be conditioned by a firm's age and maturity.

Shares of Budget for Long Term Innovation Projects (as % of Total Expenditures for Innovations; Mean)



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1495
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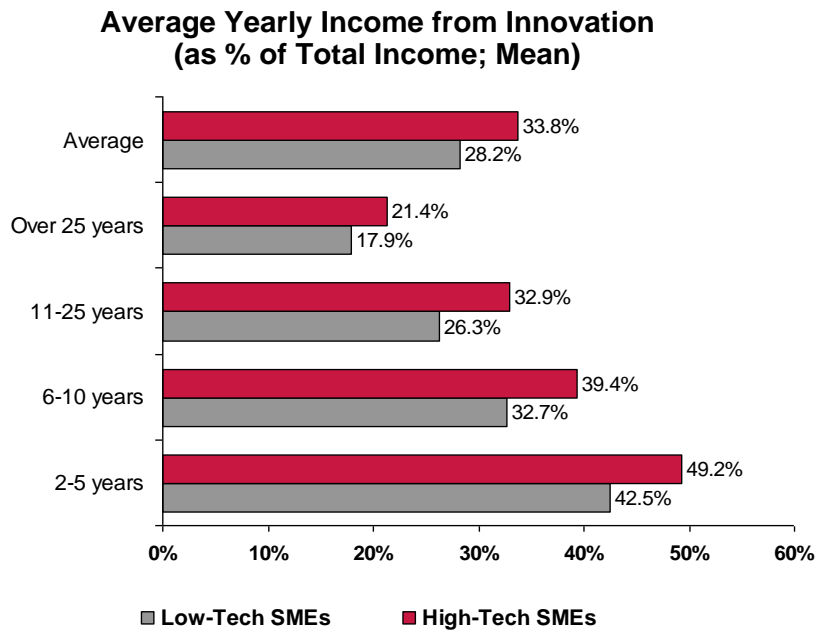
Figure 4: Investments in Long-term Innovation Projects in Low-Tech and High-Tech Firms

The IMP³rove database reveals that low-tech firms are not short-sighted. They engage in long-term innovation projects to build innovation capabilities for the future. On average, they put aside 18.7% to 24.7% of their budgets for long-term innovation projects. They are just as long-term oriented as high-tech firms are. And it is not just the “mature” low-tech firm that takes a proactive position in innovation. Both old and young low-tech firm take a long-term oriented innovation strategy. Overall, our results reveal that low-tech firms are aware of the need of a continuous flow of new ideas to fill the innovation project pipeline.

4.2 Low-tech Firms and Their Contribution to Europe's Innovation Performance and Competitiveness

Across different age classes, high-tech as well as low-tech firms generate a significant share of income from new products and services⁴ (those products and services which have been introduced within the last 3 years).

⁴ The novelty level is defined from a firm perspective and not from a market perspective; “new to the firm” and not “new to the market”

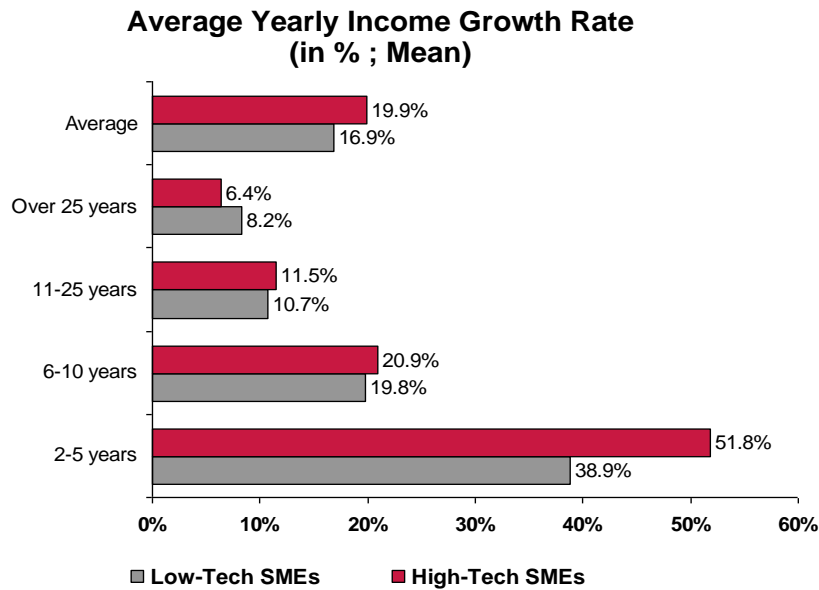


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1454
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 5: Average Yearly Income from Innovation

As shown above, high-tech firms show a higher innovation performance; however, the difference is rather small. For example, high-tech firms of age 2 to 5 years earn a share of income of 49.2% (Mean values); low-tech firms are close to high-tech firms and earn 42.5 %.

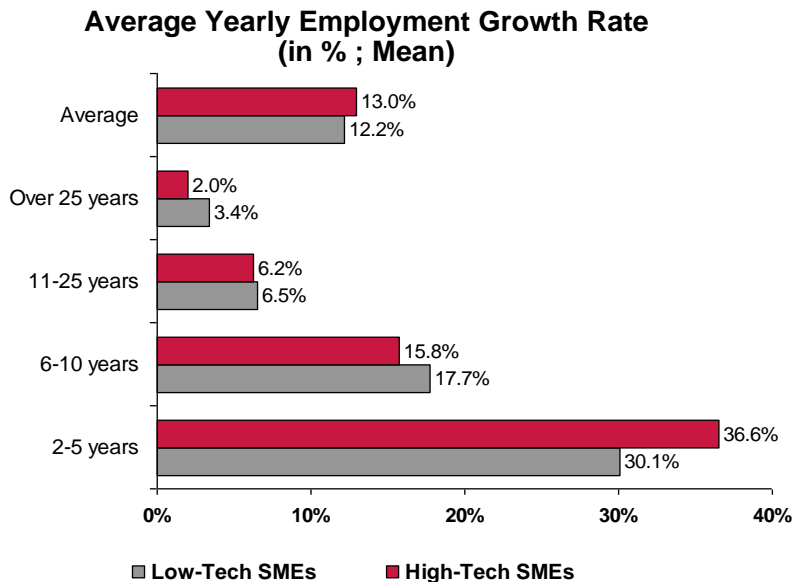
Low-tech sectors are usually considered as being less dynamic and agile than high-tech sectors. Changes occur at a slower pace and conditions for innovation are different from those in high-tech sectors. Despite this slower pace, low-tech sectors achieve a significant growth in income from innovations. As shown in Figure 6, SMEs from low-tech firms that are older than 5 years grow as fast as high-tech firms. For example, low-tech firms of age 6 to 10, achieve an average yearly growth rate of 19.8 %. High-tech firms of the same age class achieve a growth rate of 20.9%. Only in the age class 2 to 5 years, do the high-tech firms significantly outperform low-tech firms in terms of income growth. Once high-tech firms have mastered their first years of high growth their growth rate is quite similar to the ones of low-tech firms.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1488
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Figure 6: Average Yearly Income Growth in Low-Tech and High-Tech SMEs

High-tech SMEs are usually considered as the “job creation engine” in Europe. Our results highlight that low-tech firms also contribute to the creation of new jobs. On average, they achieve a yearly employment growth rate of 12.2 % (high-tech firms grow with a growth rate of 13.0 %). They are highly important for Europe’s employment growth and wealth.

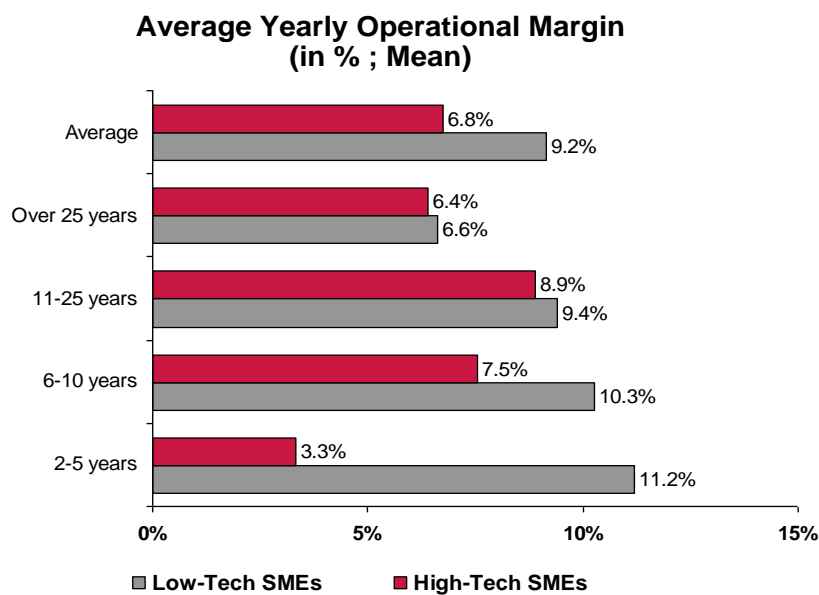


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1494
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Figure 7: Average Yearly Employment Growth in Low-Tech and High-Tech SMEs

Low-tech firms that are older than 10 years grow just as fast or even faster in terms of employees than high-tech firms. Only in the youngest age class (2 to 5 years) high-tech firms show a higher momentum in terms of employment growth. The higher growth ambition in young age categories seems to level out at a similar pace in older age categories.

Low-tech firms are high performers in terms of profitability. Across all age classes, they show a higher operational margin than their peers in high-tech sectors. On average, low-tech firms achieve an operational margin of 9.2 % (as share of total income). As shown in Figure 8 high-tech firms achieve an operational margin of 6.8 %. Especially in young age classes, the difference is significant. While low-tech firms in the age class 2 to 5 years achieve an average margin of 11.2 %, really young SMEs in high-tech sectors achieve only 3.3 %.

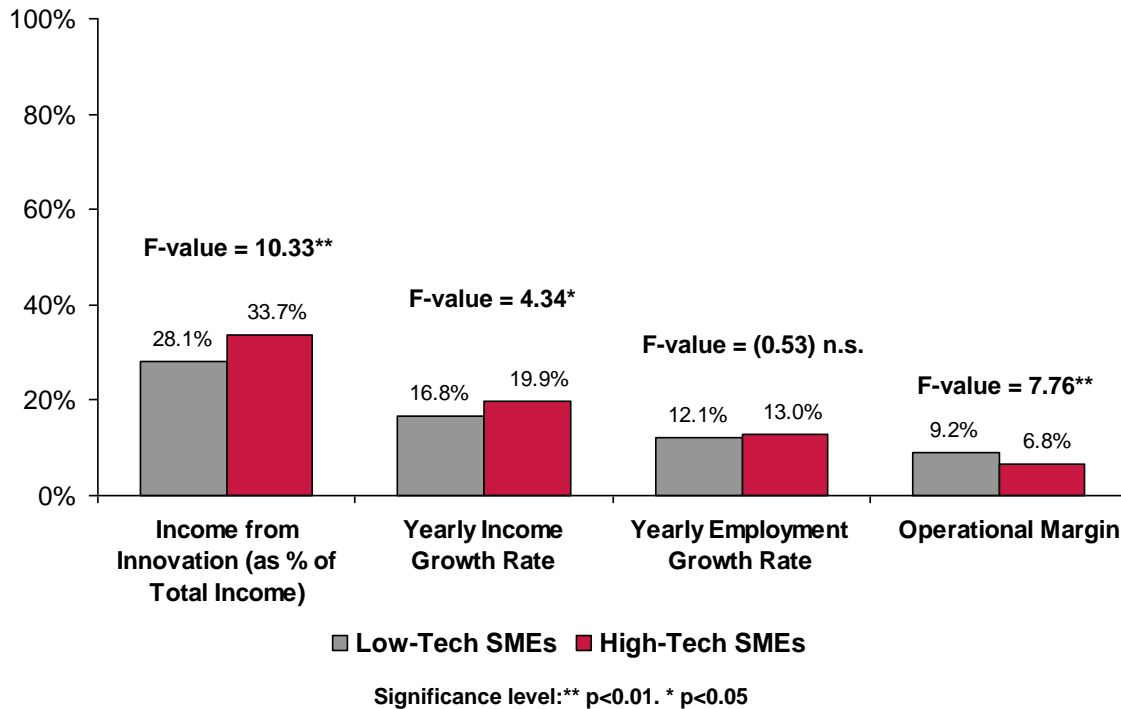


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1491
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Figure 8: Average Operational Margin in High-Tech and Low-Tech SMEs

The performance differences between low-tech and high-tech firms discussed above are not random effects. This insight might increase the attractiveness of low-tech firms for financial investors.

Results of F-Test on Differences of Means



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1454
www.improve-innovation.eu; IMP³rove is a registered trademark

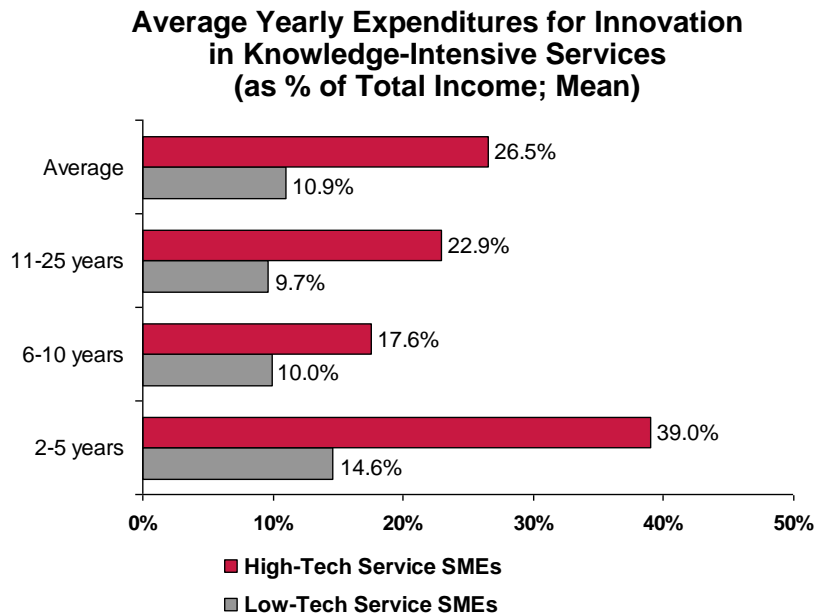
Figure 9: Significance of Performance Differences between Low-Tech and High-Tech SMEs

We performed statistical tests to strengthen our arguments. Except for the performance category “employment growth”, performance differences are statistically significant. Considering all age classes, high-tech firms outperform their low-tech peers in terms of income from innovation and yearly income growth. In contrast, low-tech firms are performing better in terms of profitability.

4.3 Low-tech Service Sectors – Often Forgotten but Important for Europe’s Competitiveness

Service firms may either be low-tech or high-tech. In the IMP³rove database a large proportion of SMEs in service sectors are low-tech firms. 71% of the subsample “knowledge intensive services” (KIS) (428 data sets in total) in the IMP³rove database can be classified as low-tech service firms. It is widely assumed that only high-tech service firms from sectors such as telecommunications, IT and related services, or research and development matter when it comes to innovations in services sectors. Low-tech service firms from sectors such as trade, transportation, real estate and education are usually considered as laggards in terms of innovation. Indeed, our analysis of the IMP³rove database underlines the assumptions that these low-tech service firms are rather resistant to engage in innovation. They invest significantly less in innovation than high-tech service firms, especially in the young age class with firms of age 2 to 5. High-tech service firms in the age category 2 to 5 years spend 39 % of their in-

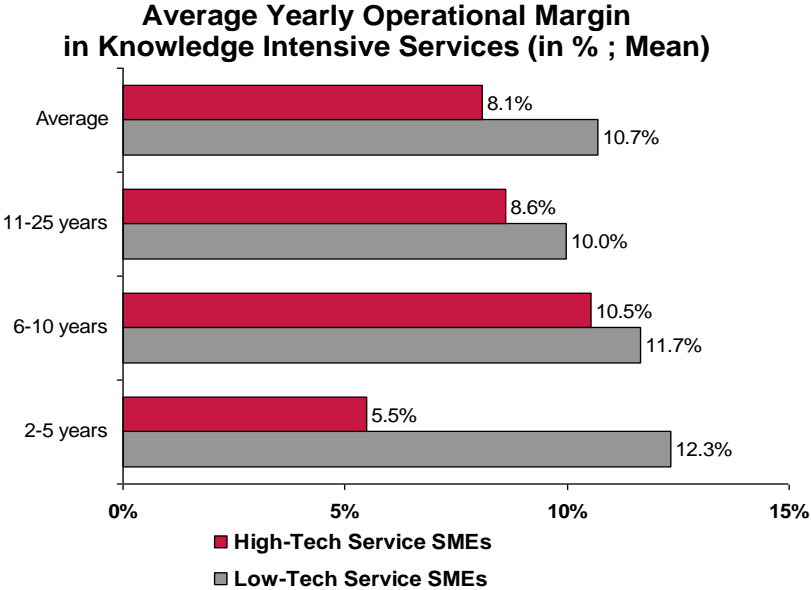
come on innovations, while the low-tech service firms in the KIS sector spend only 14.6 %. Interestingly, the expenditures for innovation in low-tech services firms decreases in older age categories. High-tech service firms in the age category 11-25 years show a higher expenditure rate than their low-tech service firms of the same age category.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=428
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Figure 10: Expenditures for Innovation in Low-Tech and High-Tech Service SMEs

In previous chapters, we highlighted that low-tech firms are ahead of high-tech firms in terms of profitability. When looking in the service sector only, we found that this also applies to low-tech service firms. Despite their resistance to engage in innovation, they show a relatively high profitability. The average operational margin of low-tech service firms is about 10.7 % while high-tech service firms achieve only 8.1 %. This suggests that there are lots of opportunities for innovation and profitable growth in low-tech service sectors, which are not yet exploited. Just imagine if these low-tech service firms would take a more proactive position and develop new value-creating service offerings. Here policy makers need to address the barrier why older low-tech companies refrain from investing in innovation. Barriers might be risk averseness, or lack of ambition.

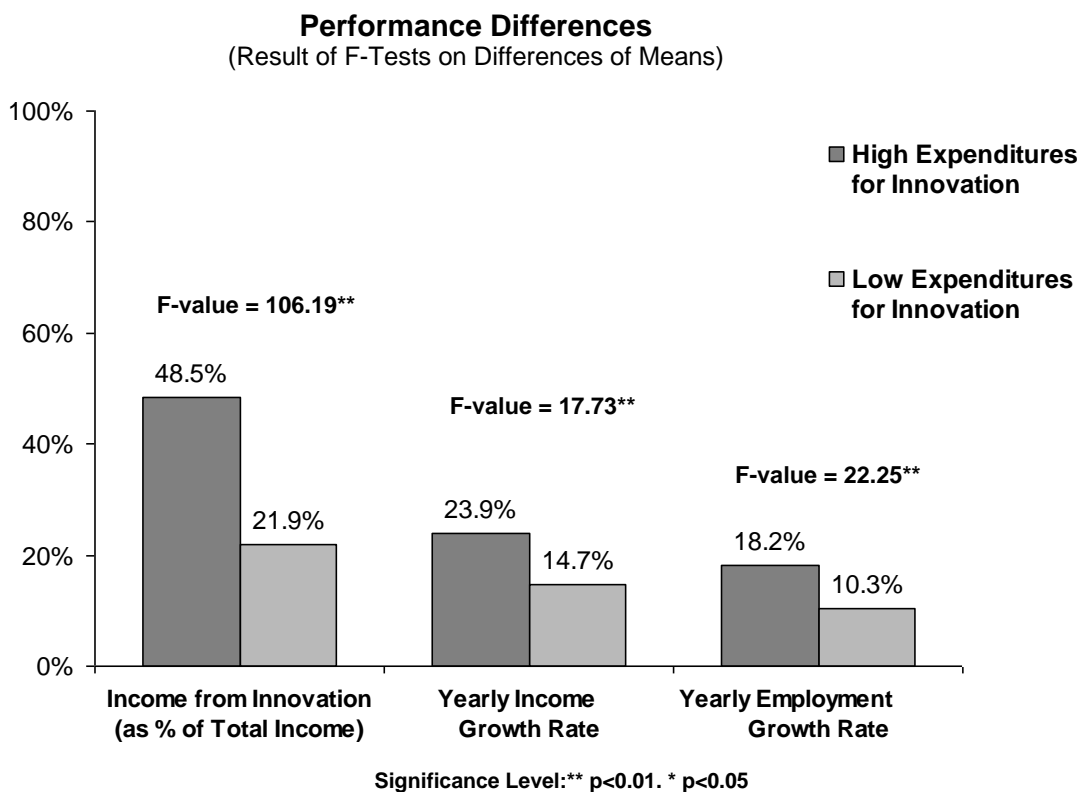


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=437
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 11: Operational Margin in Low-Tech Service and High-Tech Service SMEs

5. Low-tech Firms' Investments in Innovation Pays Off

Does it pay off if low-tech firms engage in and invest in innovation? Our results indicate that it does. In the following chapter we take a closer look at the impact of a firm's ambition for innovation and financial dedication on its competitive posture. For that we differentiate between firms that spent more than 10% of their income on innovations and firms that spent 10% or less.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=745
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 12: Significance of Performance Differences between Low and High Investing SMEs

As shown in Figure 12, low-tech firms with high expenditures for innovations are performing better than their peers that spent less money in three dimensions: income from innovation, income growth and employment growth.

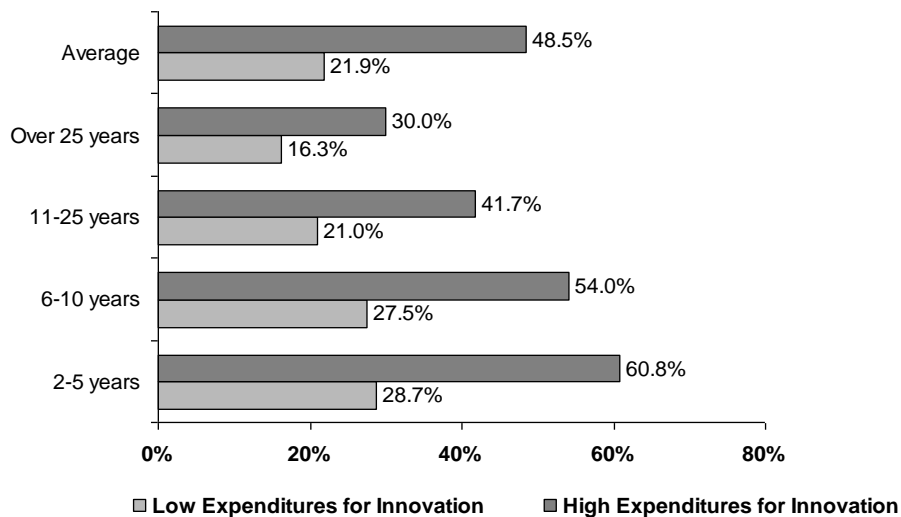
Taking a look at the income from innovation as a performance indicator, the income from innovation of firms that have high expenditures is more than twice as high as that of firms with low innovation expenditures.

The difference in terms of income growth also underscores the importance of innovation in low-tech sectors. If low-tech firms do not invest in innovations, their yearly income growth rate is 9% lower than the one of highly dedicated low-tech firms.

The same pattern can be found in their yearly employment growth rate. High spenders have an 8% higher rate than the low spenders, those that do not take the risk and invest in innovation to ensure a continuous flow of innovations. These results should motivate firms in low-tech sectors to invest in the development of innovative offerings.

This finding holds true when the groups are differentiated between age classes.

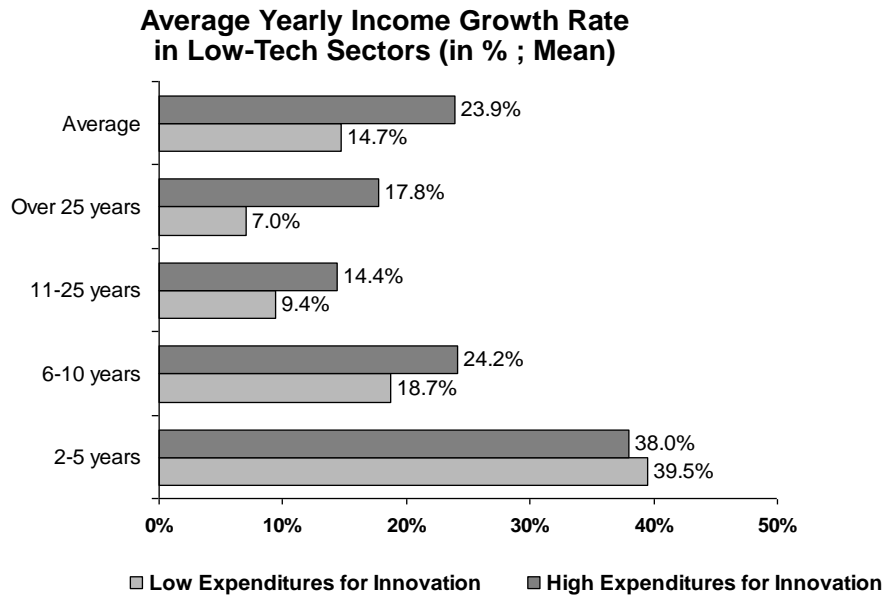
Average Yearly Income from Innovation in Low-Tech Sectors (as % of Total Income; Mean)



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=754
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Figure 13: Average Income from Innovation in Low-Tech and High-Tech SMEs

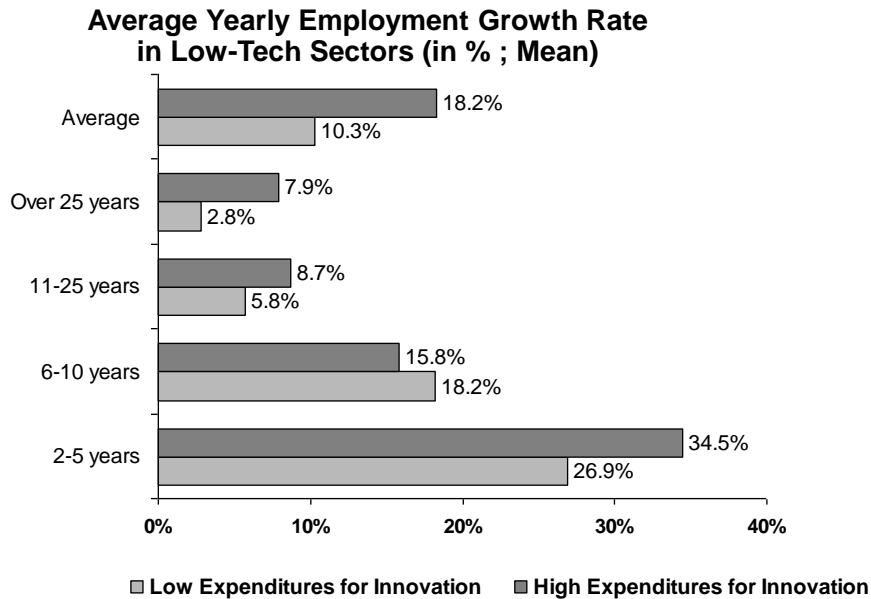
As shown above, across age classes low-tech firms that invest heavily in innovations have a higher innovation performance. The high spenders perform significantly better than their risk-averse counterparts. It does not matter if the company is a young, agile and small firm or a mature firm. Even among mature firms which usually show a lower share of income from innovations high spenders are much more successful than the low spenders.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=772
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Figure 14: Average Yearly Income Growth and Low-Tech and High-Tech SMEs

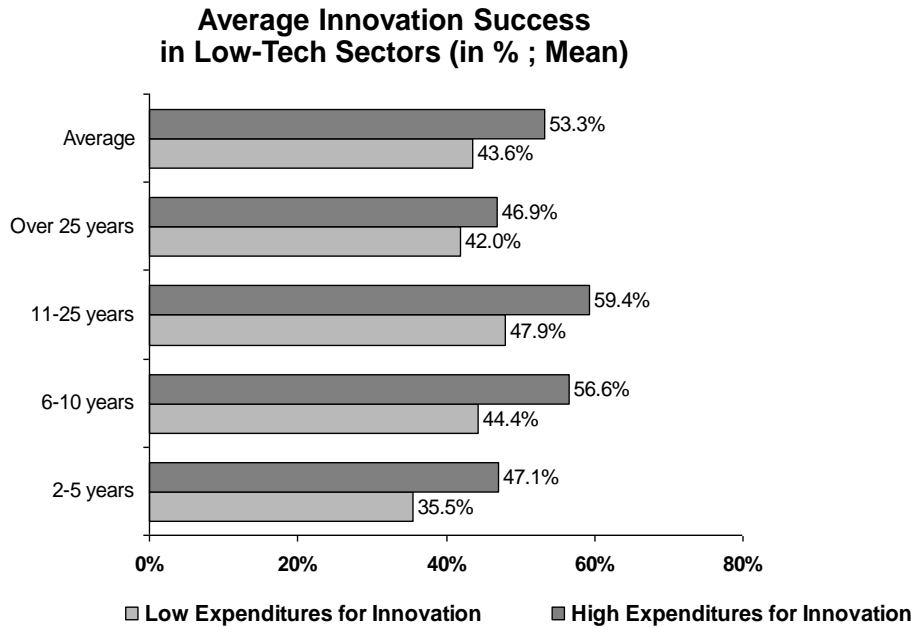
Low-tech firms that significantly invest in innovation also achieve a higher innovation income growth (across different age classes). As expected, small and agile SMEs do have the highest growth rate in terms of income. Among really young low-tech firms, the ambition for innovation does not yet shape a firm’s income growth. However, in older age classes, ambition for innovation and resource endowment unfold their potential to drive income growth. Mature low-tech firms with high dedication towards innovation grow nearly twice as fast as firms that invest less than 10% of their income into innovations. For low-tech firms that are among the oldest age category (25 years and older), ambition for innovation is a relevant “attitude”: Firms that do not heavily invest in innovation achieve a yearly income growth of 7%; high innovation spenders achieve an average yearly income growth of 17.8 %.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=776
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Figure 15: Average Yearly Employment Growth of Low-Tech and High-Tech SMEs

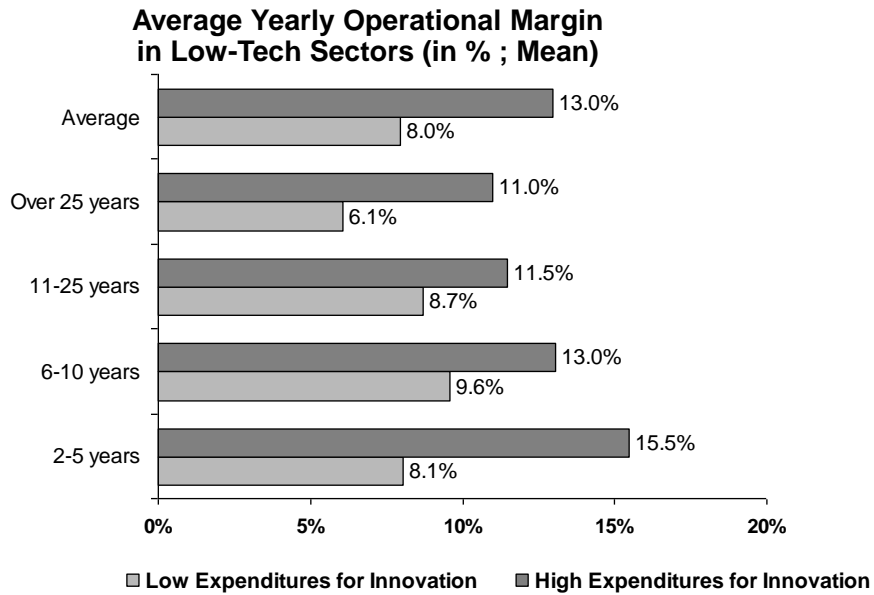
Low-tech firms have a significant impact on the employment growth in Europe. If they invest more than 10% of their yearly income in innovation their yearly growth rate is higher in the long run. As with the other success indicators employment growth naturally slows down with the degree of maturity of a firm. Within the older firm class, the firms with high innovation investment have an employment growth rate that is three times higher than that of the firms with low innovation spending.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=777
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Figure 16: Low and High Investing SMEs and Innovation Success (as Share of Successfully Completed Innovation Projects)

Firms that are dedicated towards innovation take innovation seriously and have discipline. On average, low-tech companies with high innovation expenditures are also more successful in launching innovations. Figure 16 highlights that discipline is highly critical in firms that are younger than 25 years. To conclude, if low-tech firms take innovation seriously and dedicate resources to it, they are not in the “blind flight”. They move effectively from the idea generation through to their commercialization.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=777
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Figure 17: Average Operational Margin of Low-Tech and High-Tech SMEs

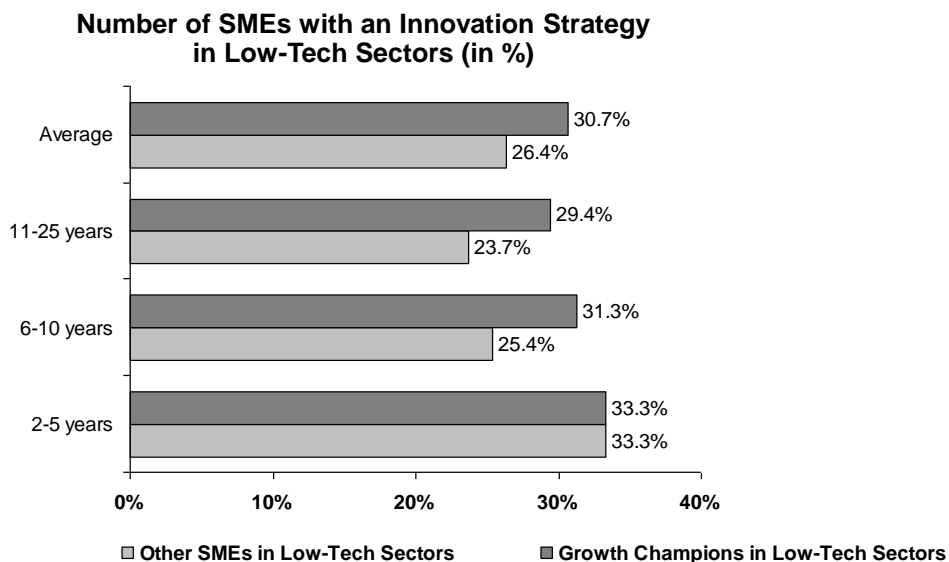
Dedication towards innovation is also related to a higher profitability (see Figure 17). Low-tech firms outperform their peers in operational profit if they spend a lot on innovation. This applies to low-tech firms from different age classes, for small start-ups and mature medium-sized firms.

6. Low-tech Growth Champions Provide Guidance for Improving Innovation Management Performance

Growth Champions in the often under-valued low-tech companies provide guidance to develop the own Innovation Management performance. They have more strategic focus and hence often have more success with their innovation projects. However, even the Growth Champions have room for improvement as the figures on a more detailed level demonstrate.

6.1 Maintain your Innovation Strategy over Time

When low-tech companies are at the beginning of their lifecycle about 33% have an innovation strategy in place. Once they are older more Growth Champions maintain their focus on innovation strategy than the other SMEs of the low-tech sector as shown in Figure 18. However, when low-tech companies get older, more of them neglect the focus on innovation strategy. Within the Growth Champions it is still about 30% while in the other SMEs the ratio declines to less than 24%. Considering the definition of Growth Champions (the 10% of the companies that show the highest growth rate in terms of income, profit and number of employees) the recommendation is to invest in the development of the innovation strategy. This will help the organization to align their Innovation Management and generate higher innovation results. They can better define targets for their innovation projects and thus increase the number of successful innovation projects.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=780
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Figure 18: Existence of an Innovation Strategy in Low-Tech SMEs

6.2 Define Clear Targets for Your Innovation Projects

Growth Champions in the low-tech sector manage their innovation projects more systematically than the other low-tech companies. They have clearly defined project parameters defined as shown below. They measure the time to market, which indicates how long it takes from the first idea to the market launch of the innovation. Even more important for business success is the parameter “time-to-profit”. This measures the time from the first idea to the break-even-point when the company begins to make profit from their innovations. Especially for the “time-to-profit” a higher percentage of Growth Champions (40%) from the low-tech sector set their targets compared to 33% of the other SMEs.

Measuring the time it takes to successfully commercialize an idea has to be complemented by measuring the cost for developing and successfully launching the innovation. Budgets for investment and human resources need to be defined. Often, companies do not take into account that the cost for marketing and promotion of the innovation need to be included in these budgets. The difference between the share of Growth Champions (38%) and other SMEs (36%) is here rather small.

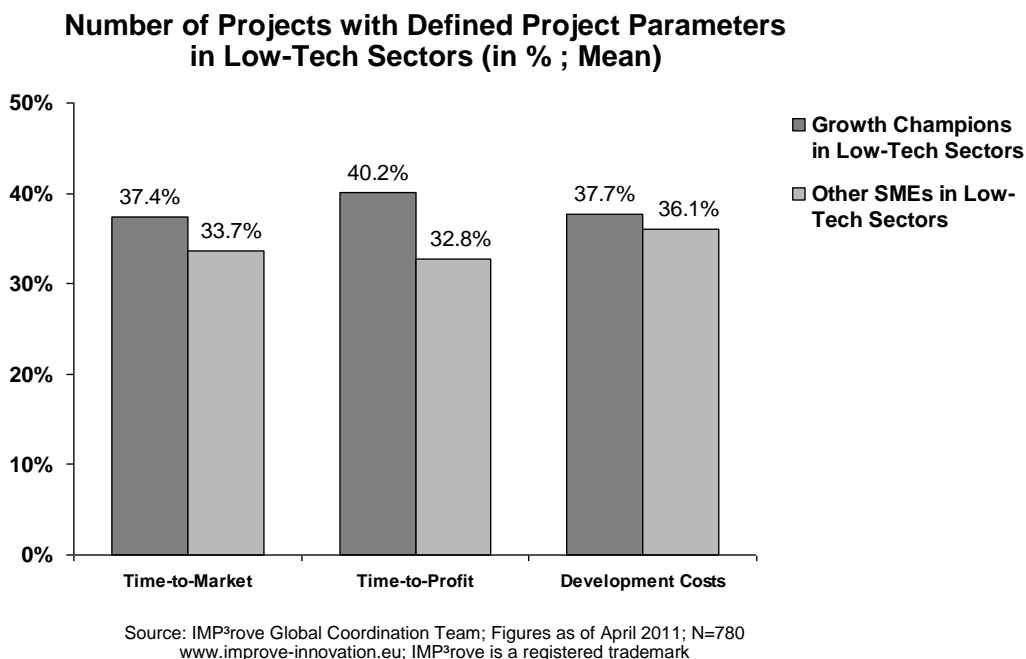
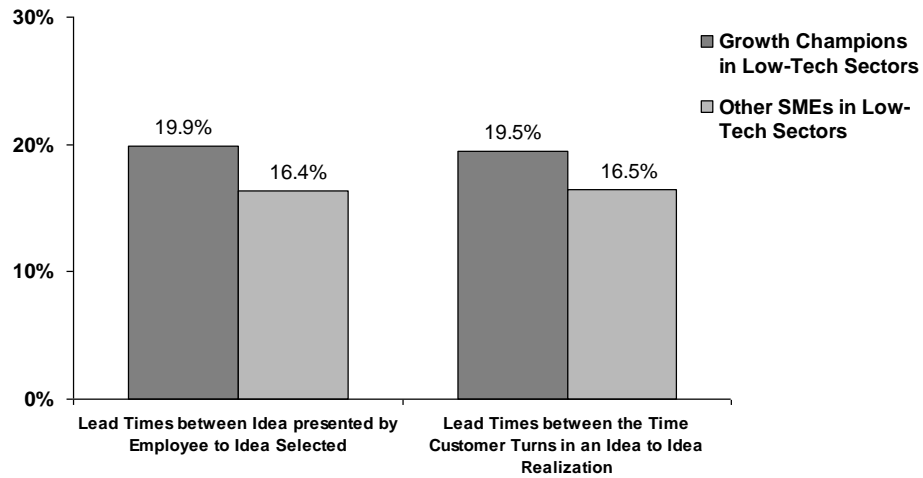


Figure 19: Definition of Project Parameters in Low-Tech SMEs

Professional Innovation Lifecycle Management processes are also documented by the fact that there are targets defined for lead-times in the idea management. 20% of the Growth Champions have defined targets for the lead-times between the idea presented by an employee and the selection of the idea as shown in Figure 10.

Lead Times in Idea Management in Low-Tech Sectors (in % ; Mean)



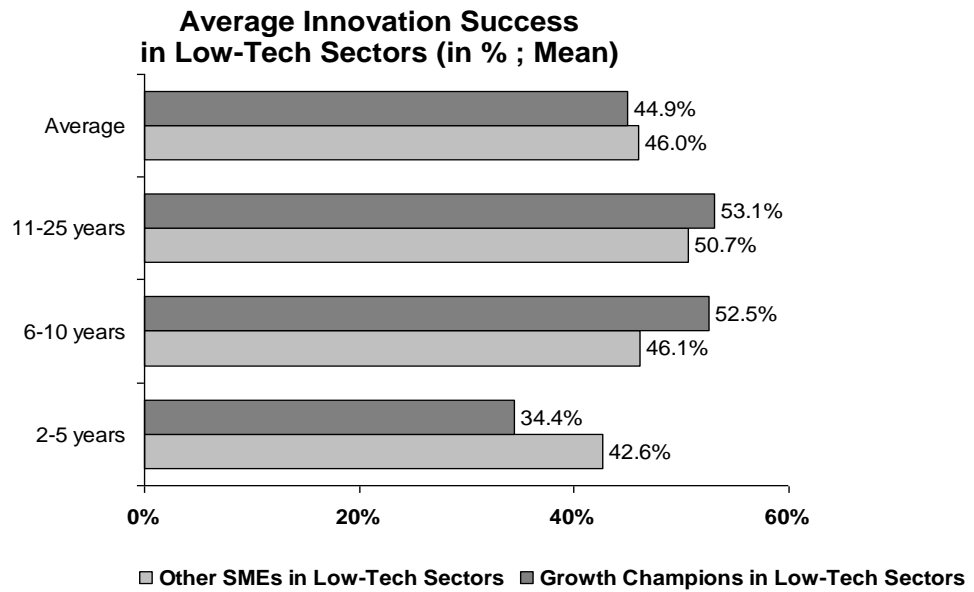
Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=780
 www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 20: Definition of Lead Times for Idea Management in Low-Tech SMEs

Only 16% of the other SMEs have this parameter in place. A little less significant is the difference between Growth Champions and other SMEs when it comes to setting targets for lead-times between the time a customer turns in an idea to idea realization.

Setting targets for the innovation projects and defining lead-times has to be complemented with the analysis of the share of successful projects, where these targets have been met in the low-tech sector.

Figure 21 shows that low-tech companies learn over time to successfully launch their innovations. Growth Champions achieve a higher learning curve than the other SMEs. Young Growth Champions reach only 34% of successful launches while their peers that are between 6 to 10 years already achieve 53%. Compared with the Growth Champions the increase of successful launches at the other SMEs from young to more mature companies is only from 43% to 46%. In the age class between 11 and 25 years, the other SMEs catch up with the Growth Champions.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=777
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Figure 21: Innovation Success in Low-Tech SMEs

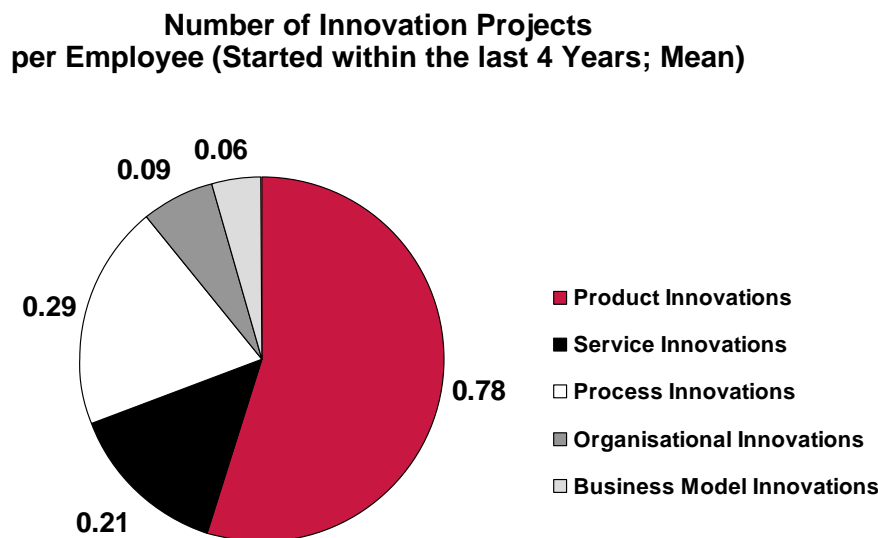
Taking a look into Growth Champions' strategic approach to Innovation Management leads to the question, to what degree the mix of innovation – product, service, organizational, or business model innovation – is essential for business success and increased competitiveness in the low- and high-tech sector.

7. The Transformation of Producing Industries: From Product Champions towards Hybrid Innovators

In manufacturing SMEs the assumption that only product innovations matter is predominant. Services are usually perceived as a cost driver as many SMEs do not charge for many of their services. However, our data analyses indicate that a solely product oriented innovation strategy is not the optimal choice. Manufacturing firms may shift from product to hybrid innovations, and bundle innovations in products and services (or business models). In the following sections we will show that hybrid innovators have significant advantages over product-only innovators.

7.1 Service and Business Model Innovations Gain Importance in Manufacturing Industries

IMP³rove highlights that manufacturing sectors are dominated by product-oriented innovation activities. However, innovation activities related to services and business models are on the rise.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1061
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 22: Distribution of Innovation Projects

Figure 22) shows that SMEs start the vast majority of their innovation projects to generate product innovations (0.78 product innovation projects per employee started over the last 4 years). Following the innovation activities of SMEs participating in IMP³rove, process innovations (0.29 of projects per employees) and service innovations (0.21 projects per employee)

are far less important than product innovations. Business model innovations (0.06 projects per employee) rank lowest.

As one may have expected, the relevance of different innovation projects varies across different industries. Our data analyses show that the relevance of service and business model innovation is linked to the maturity of the industry. In younger industries such as ICT and biotechnology SMEs are already aware of services innovation and new business models. However, in mature and traditional industries such as machinery, equipment and plant construction service and business model innovation play a minor role.

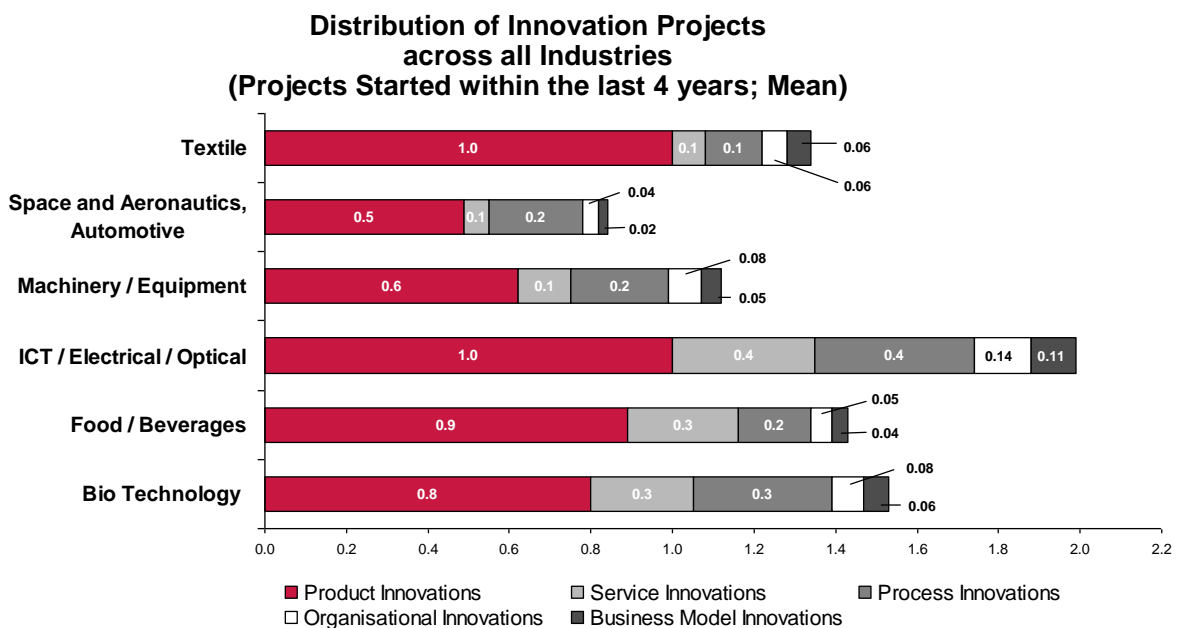
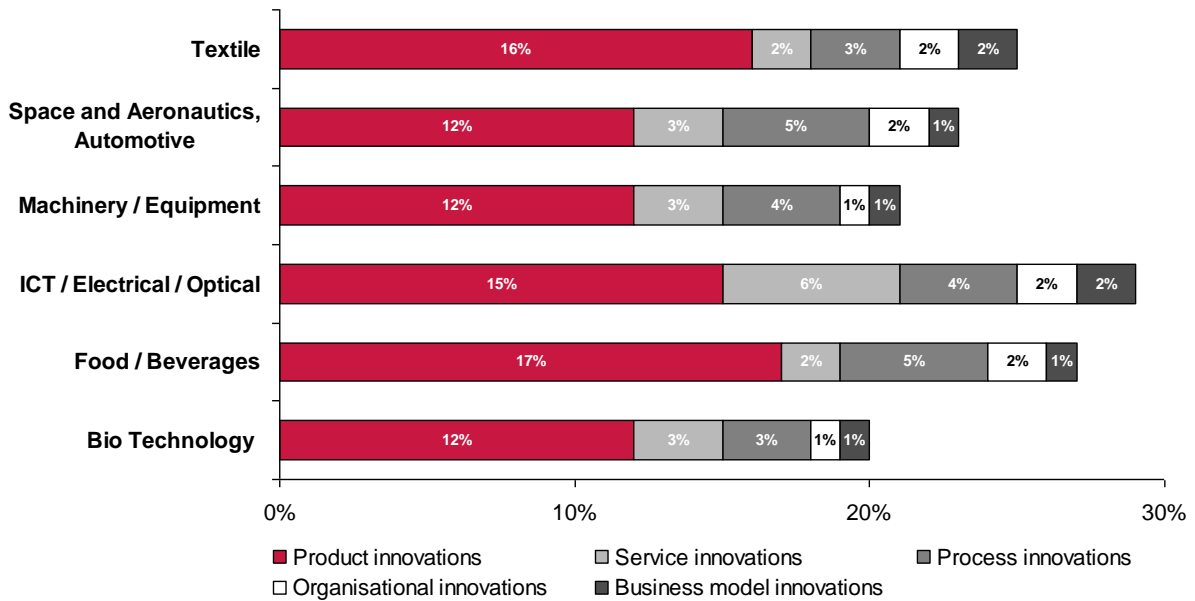


Figure 23: Distribution of Different Innovation Projects across Industries

A closer look in the nature of innovation projects of SMEs from 7 different industry groups underlines that traditional industries are dominated by product innovation projects. In sectors such as machinery and equipment, space, aeronautics and automotive, and textile there is the lowest activity in services innovation (0.1 service innovation project / per employee started within the last 4 years). In younger industries like ICT and bio technology there is a higher awareness towards service innovations and also business model innovations.

Business model innovation and service innovations are generating benefits. SMEs owing to service and business innovations earn a significant share from innovations; operational profits from services and business model innovations range between 8 to 14% depending on the industry.

Operational Profit by Type of Innovation in Manufacturing SMEs (over the last 4 years; Mean)



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1061
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 24: Operational Profit from Different Innovation Types

Product innovations are still the most important source for increasing a firm's profitability. However, IMP³rove reveals that SMEs should not underestimate the value of services innovation to ensure profitability. Service, process, organizational and business model innovations combined account for an average of about 10%. Here it can be seen that non-product innovations constitute a little below half of the total operational profit from innovation projects. Small and medium-sized businesses would be well advised not to neglect this potential source of operational profit. In the ICT sector the operational profits from service innovations are with 6% two times higher compared to other industries.

7.2 Hybrid Innovators Shape Europe’s Innovation Landscape

To better understand the relevance of product and non-product innovations for SMEs, we now turn to different types of innovators: Non-innovators, product-only innovators, service-only or business model-only innovators, and hybrid innovators. They describe the focus of a firm’s innovation model. Hybrid innovators constitute a special type of innovator: They combine product innovations with service or business model innovations⁵. Hybrid innovators do not underestimate the value of product innovations. However, they also innovate in services or business models. They perceive services and business model innovations as additional value drivers and have moved away from the solely product oriented innovation strategy. IMP³rove highlights that hybrid innovators do characterize the innovation landscape in producing industries.

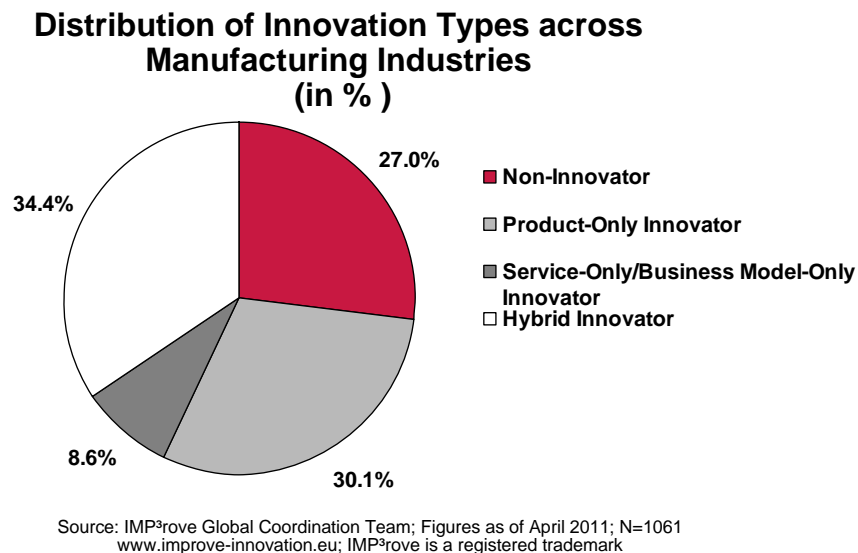
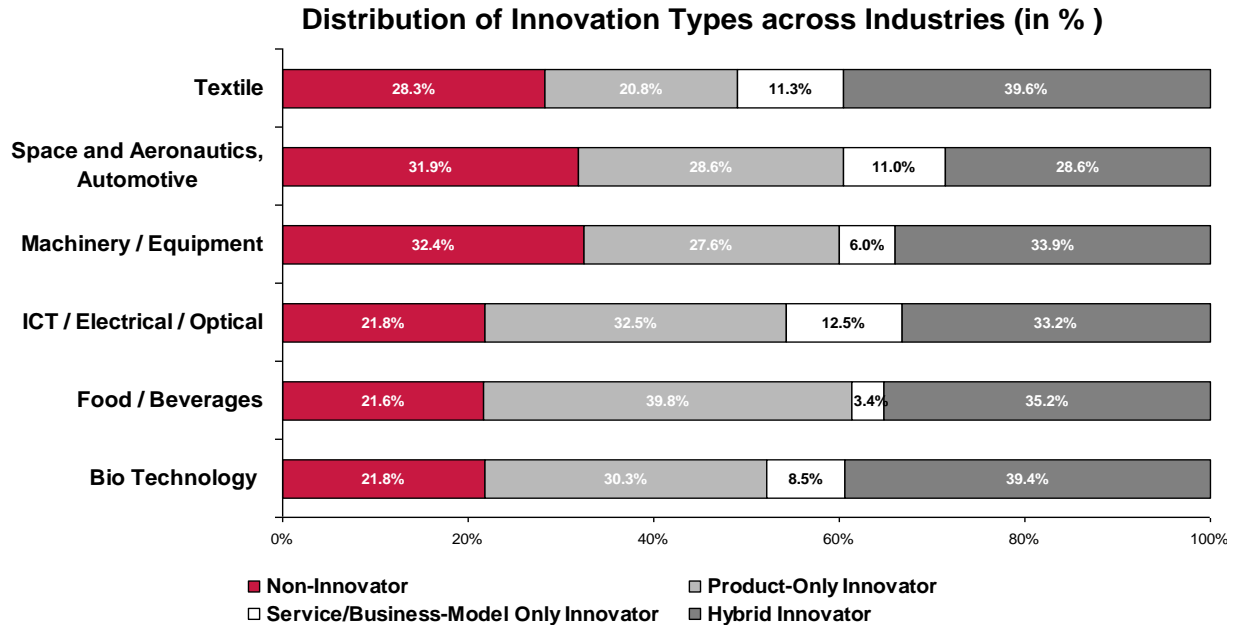


Figure 25: Distribution of Innovation Types across Manufacturing Industries

The IMP³rove database shows that about 34% of manufacturing SMEs classify as hybrid innovators. Considering all manufacturing SMEs in the IMP³rove database, this is the largest group. Product-only innovators and non-innovators follow with a share of 30% and 27% respectively. SMEs, that focus on service or business model innovators only, are rather rare; only about 9% of manufacturing SMEs engage in service or business model innovations only.

⁵ In our study hybrid innovators combine product innovations with at least one service or business model innovation in the last four years.

All industries are not alike and shaped by different types of innovators. IMP³rove highlights that hybrid innovators are also active across all industries.



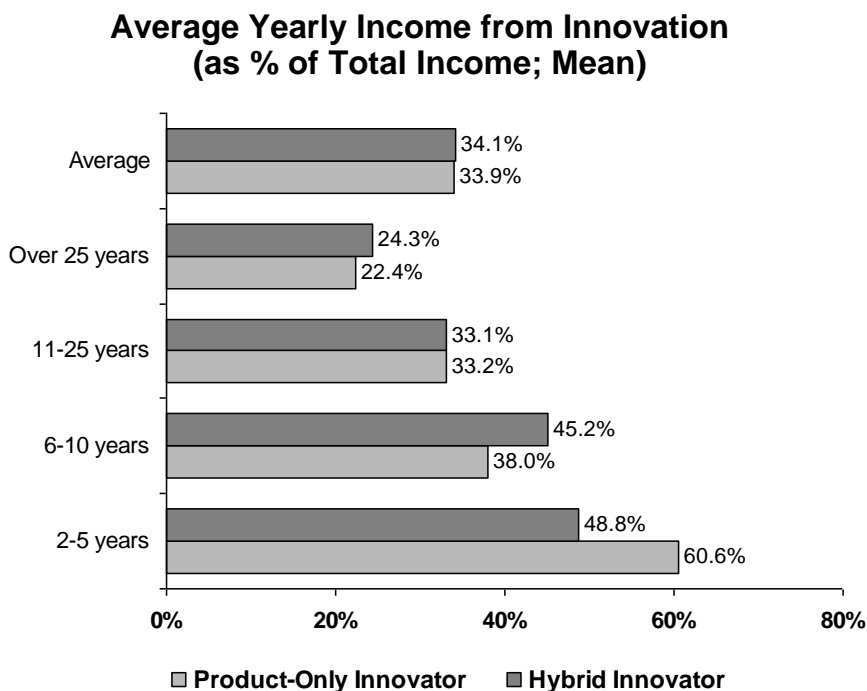
Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1061
 www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 26: Distribution of Innovation Types across Industries

Our analysis of the distribution of innovation types across different industry groups shows that hybrid innovators are important in all industry sectors. The highest share of hybrid innovators can be found in textile (39.6 % of manufacturing SMEs) and bio technology (39.6 % of manufacturing SMEs). ICT/electrical/optical (33.2%) and space, aeronautics and automotive (28.6%) show the lowest share. It is worth pointing out that while ICT/electrical/optical shows the highest share of “service-only or business-model only” innovators, hybrid innovators are less dominant in this volatile sector.

Considering the relevance of hybrid innovation strategies in manufacturing SMEs, one may ask: Does it pay off to take additional effort and combine product innovations with services or business model innovations? Our results indicate that it does.

Hybrid innovation strategies may help SMEs to achieve a higher share of income from innovations; especially if SMEs have mastered setting up the business and commercializing the first products. As they are becoming more mature they are running the risk of falling into the commodity trap.



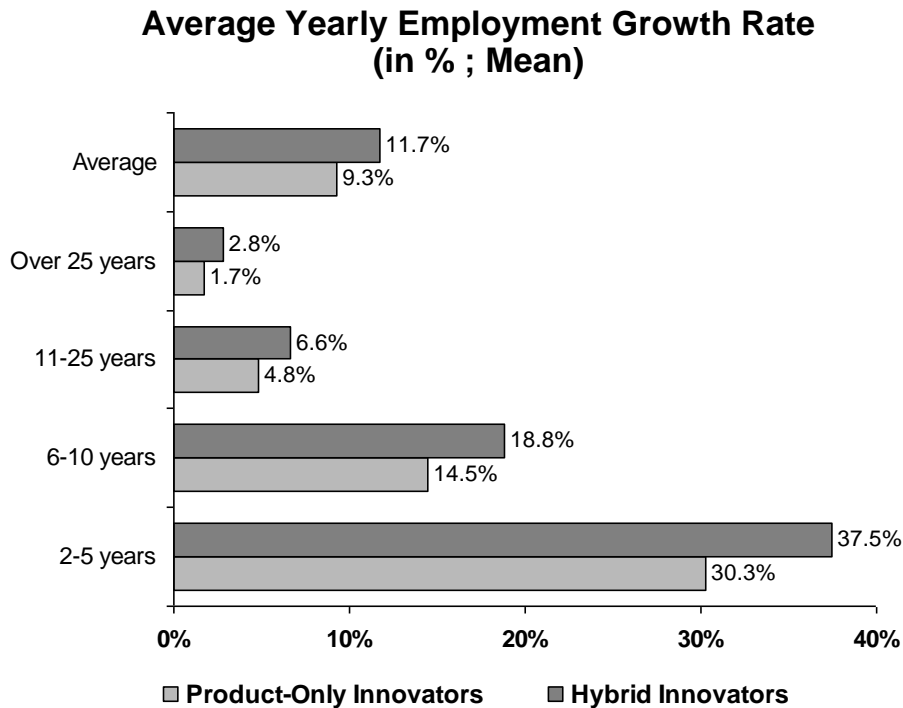
Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=668
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Figure 27: Income from Innovation Compared between Hybrid and Product-Only Innovators

A comparison of product-innovators versus hybrid innovators across different age classes highlights that a product-only innovation model may be superior in the start-up phase. Young companies need to concentrate on successfully realizing their product innovation activities they started off with. Data shows that among young firms (age of 2-5 years) product-only innovators have a 12% higher income from innovation than the hybrid innovators.

However, over time they need to shift their focus and combine their product innovation activities with services or business model innovations. In age class 6-10 years, hybrid innovators show a higher income from innovations than product-only innovators.

A hybrid innovation strategy may also impact a firm’s employment growth. Indeed, IMP³rove confirms that hybrid innovators outperform product-only innovators in terms of employment growth.

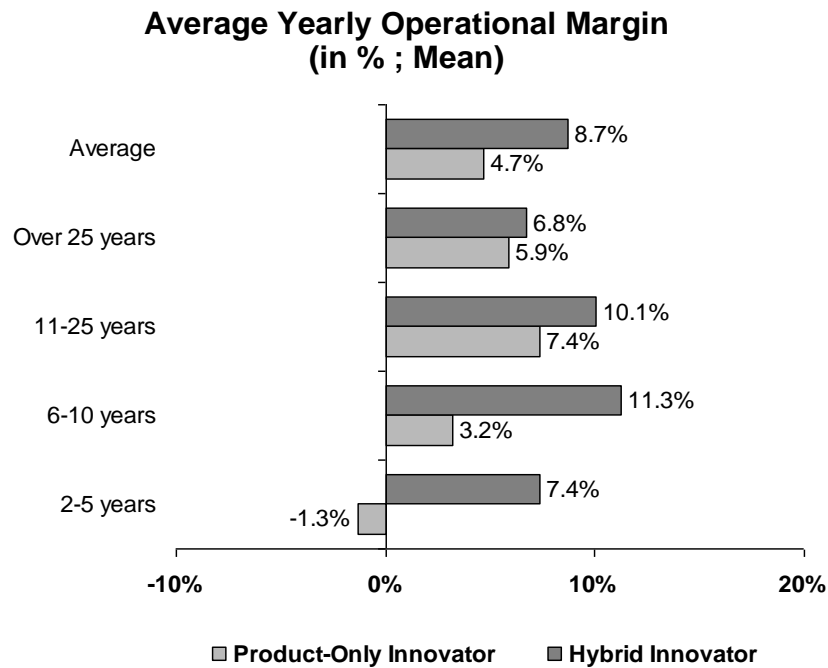


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=682
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 28: Growth in Employment Compared between Hybrid and Product-Only Innovators

A comparison of the performance of product-only versus hybrid innovators in terms of the employment growth rate suggests that hybrid innovators are more inclined to increase their work force. On average the hybrid innovator has a 2.4% higher employment growth rate. As expected, this difference is more pronounced in the younger age classes. In age class 2-5 we found a performance gap of 7.3% in favour of the hybrid innovator and a 4.3% difference for firms between 6-10 years.

Hybrid innovation models also help SMEs to remain competitive and profitable. Our data reveals that hybrid innovators outperform product-only innovators in terms of average margin in every age group.

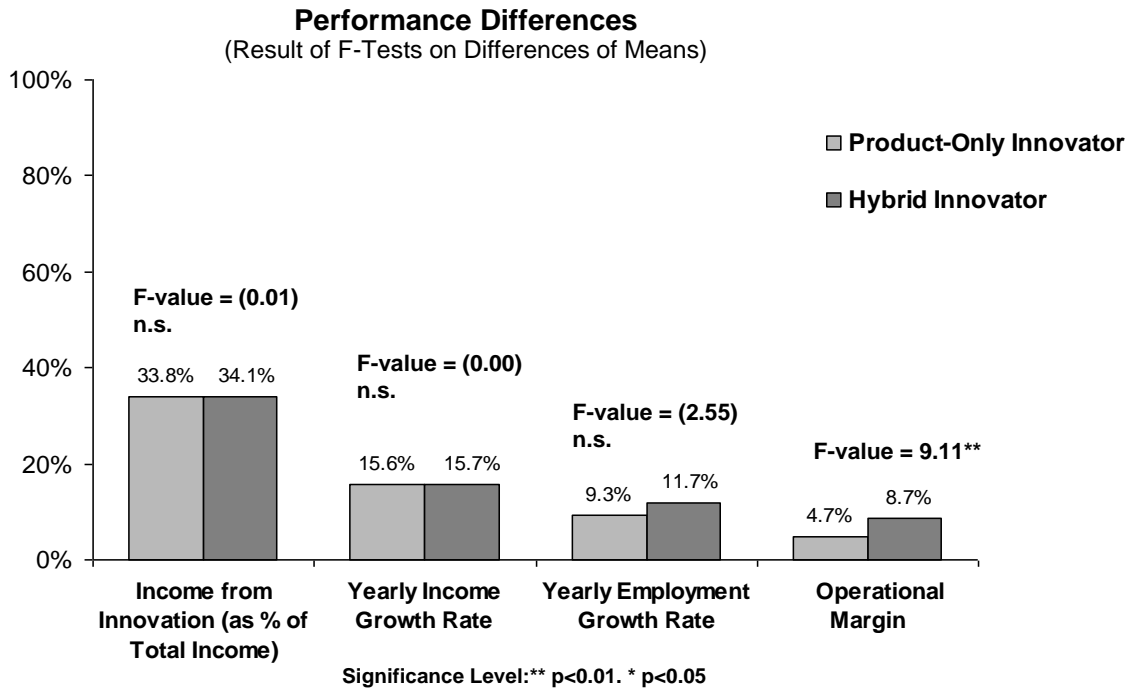


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=681
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Figure 29: Average Operational Margin Compared between Hybrid and Product-Only Innovators

When considering average yearly operational margin, the hybrid innovators have yet again a significant lead over the product-only innovators. This is most pronounced in the firms with the age between 2-5 years in which the hybrid innovators have an 8.7% higher average yearly operational margin than product-only innovators. As with the employment growth rate, the gap between product-only and hybrid innovators narrows as the firm becomes older. On average the hybrid innovator has a yearly operation margin that is 4% higher than that of the product-only innovator. This result highlights that combining product and services innovation is highly beneficial to drive firm performance.

To strengthen these findings, we also performed a significance test of mean differences in four performance categories: Income from innovations, income growth, employment growth, and operational margin. The two values that stand out the most are yearly employment growth rate and operational margin.



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=646
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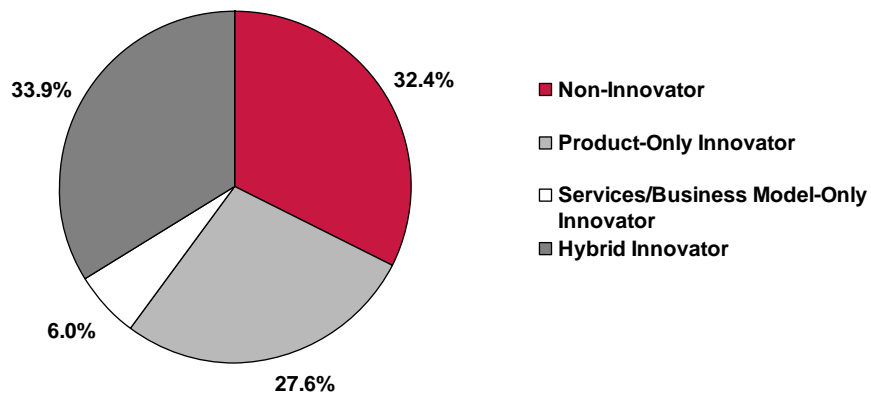
Figure 30: Significance Testing of Mean Performance Differences between Product-Only and Hybrid Innovators

It is worth pointing out that the difference in operational margin is statistically significant (at the significance level of 0.01). Accordingly hybrid innovators have a nearly twice as high operational margin (8.7%) than product-only innovators (4.7%). The differences between product-only innovators and hybrid innovators for the other three performance indicators, income from innovations, yearly income growth rate and yearly employment growth rate do not differ in a statistically significant way from each other. Considering the significant variation of performance across different age classes, this is not surprising.

7.3 A Closer Look into the Machinery Sector: Hybrid Innovators May Drive Europe's Future

The machinery sector is regularly perceived as a very conservative one, dominated by a technological and product-oriented understanding of innovation. Currently, this sector goes through a paradigm shift in order to address competitive pressure in today's globalized world. Thus, we take a more detailed look into the role of hybrid innovations in this sector. Indeed, hybrid innovators characterize the innovation landscape in the machinery sector.

**Innovation Types in Machinery
(in %)**

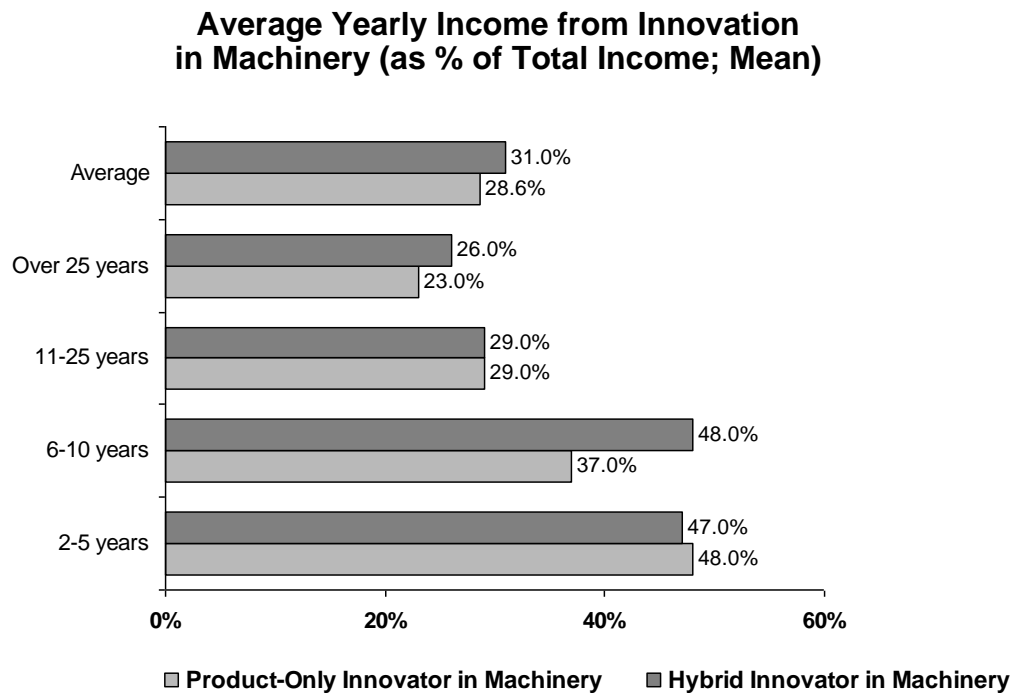


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=238
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 31: Innovator Types in Machinery

IMP³rove reveals that hybrid innovators account for the largest portion of SMEs in machinery (33.9%). A significant share of firms in the machinery sector has shifted the focus and combines product-innovations with services or business model innovations to create additional value. The next largest group is non-innovators (32.4%), followed by product-only innovators (27.6%). Pure service-only and business-model only innovators are rare in the machinery sector (6.0%).

Our data analyses reveal that it may pay off to abandon a very narrow focus in the innovation model which usually concentrates on product innovations and means to cut services costs (especially in machinery sectors). Combining product with services innovation may help SMEs to create additional value for the customer. A comparison of hybrid innovators with narrowly focused “product-innovators” shows that hybrid innovators are more successful in terms of innovation performance.

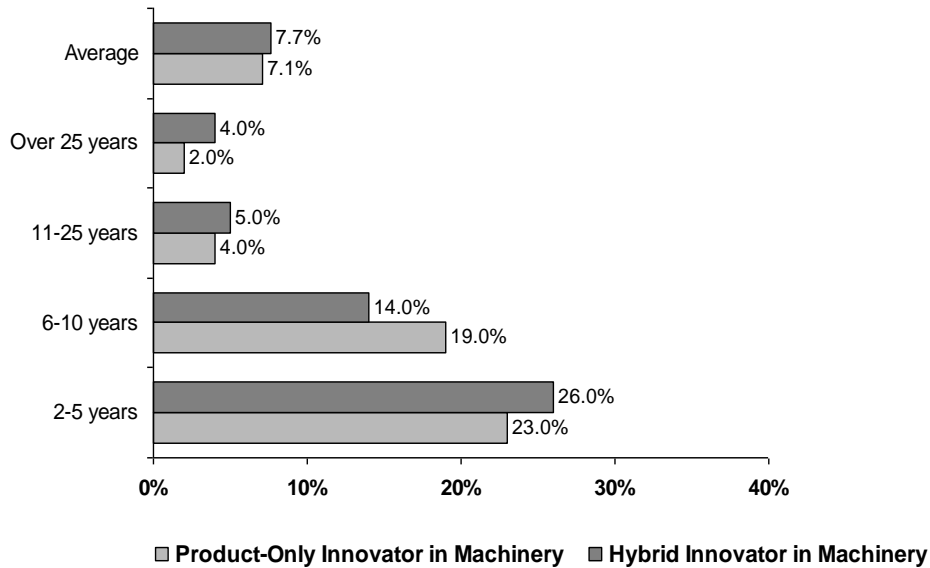


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=238
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 32: Comparison of Hybrid and Product-Only Innovators in Machinery in Terms of Income from Innovation

Our results depict that it seems to be difficult for firms in the young age class (between 2-5 years) in machinery sectors to turn a hybrid innovation strategy into a higher income from innovations (measured as share of income from new products and services); there is very little difference between product-only and hybrid innovators. Apparently, it is difficult to generate appropriate value from additional efforts put into services innovations alongside product innovations in the early phases of an organizational lifecycle. However, a hybrid innovation strategy pays off once manufacturing firms have managed to successfully establish their business. In the age class of 6-10 years the difference between hybrid innovators and product-only innovators is significant. The income from new products/services is 11% points higher for hybrid innovators. Machinery firms of age 25 and higher, the hybrid innovators also show a higher income from new products/services. All in all, the hybrid innovator model seems to be a valid model even in the traditional machinery sector.

Average Yearly Employment Growth Rate in Machinery (in % ; Mean)

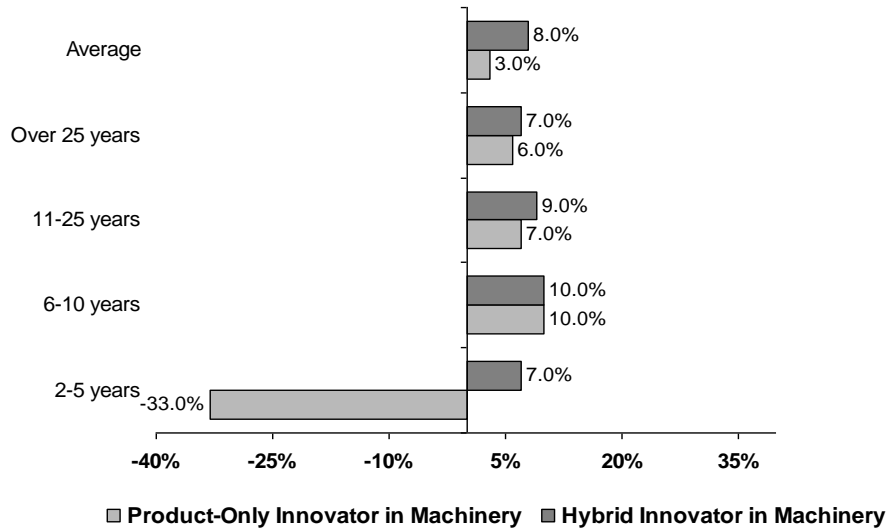


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=244
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 33: Comparison of Machinery Hybrid and Product-Only Innovators in Terms of Employment Growth

In the previous chapter, we showed that across all manufacturing sectors hybrid innovators are associated with a higher employment growth rate than firms with a narrowly focused product innovation model. On average, this result also holds for manufacturing firms. For example, hybrid innovation models are associated with significant growth in employment in young firms between 2 to 5 years. In this age class hybrid innovators have an employment growth rate that is 3% higher than product-only innovators. For mature firms the hybrid innovators seem to have a slight lead over product-only innovators, between 1% and 2%.

Average Yearly Operational Margin in Machinery (in % ; Mean)



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=244
 www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 34: Comparison of Machinery Hybrid and Product-Only Innovators in Terms of Average Operational Margin

Considering the significant investment into additional employees, one might question the profitability of hybrid innovators. IMP³rove reveals that hybrid innovators achieve a significantly higher margin across different age classes. Indeed, the difference in the 2-5 year category is very strong. Overall there is a 40% point difference between hybrid and product-only innovators. It is quite clear here, that hybrid innovators have an extremely advantageous position between 2-5 years. Although the trend tends to even out after that, the hybrid-innovators maintain a small lead of 1 to 2% in the later years.

8. Conclusions and Implications

The comparison of low-tech and high-tech companies regarding their innovation performance showed that there is potential in low-tech companies to contribute to competitiveness and economic growth. Low-tech companies have ambition to leverage innovation. Investment in innovation in low-tech firms pays off. This is a result that especially investors and policy makers should keep in mind. For investors, the investment in low-tech might be attractive as the premium is lower than for high-tech SMEs or start-ups.

For policy makers, low-tech firms might have an advantage especially in areas with a workforce that is dominated by fewer people with higher education. Employability of this workforce is often higher in low-tech companies compared to the demand of high-tech companies. Thus low-tech companies can contribute to the economic development of the regions in which they are located.

It is not only the Growth Champion in the high-tech sector that can serve as benchmark. There are also low-tech companies that demonstrate the power of systematic Innovation Management to generate high growth rates in income, operational margin or in number of employees. These companies take a strategic approach to innovation. They define clear targets, in terms of time, budgets and quality for their innovations. The IMP³rove benchmarking database shows, that young SMEs need time in order to fully capture the benefits of systematic Innovation Management. However, if they do not plan for establishing Innovation Management well in advance, they might not be able to move up to the Growth Champions.

When analyzing the type of innovation that the low- and high-tech companies are aiming at, the product innovation is the main focus followed by process innovation, service innovations and to a much lower degree organizational or business model innovations.

However, those companies that achieve a good balance between the various types of innovation out-perform their peers. These “hybrid” innovators achieve a higher yearly income from innovation once they have left the “start-up and young” enterprise phase. The hybrid innovators also achieve a higher growth rate in employment. They also reach a higher operational margin. Companies that are between 6 and 10 years old can achieve an operational margin that is almost 4 times as high as the “product-only” innovators.

For policy makers this result should stimulate policies that foster both, product innovators and hybrid innovators combining products and services or business model innovations. A balanced view on low- and high-tech as well as on hybrid innovators pays off.

The secret for success is in the integration of manufacturing-driven and service-driven innovation. In the mid- and long-term competitiveness will increase if there is a fruitful cross-fertilization of the manufacturing and the services sector. Manufacturing companies both in high- and low-tech industries need to better understand how to leverage service innovations to improve their competitiveness. Service oriented companies need to learn from the Growth Champions how to develop their Innovation Management capabilities for sustainable and profitable growth.

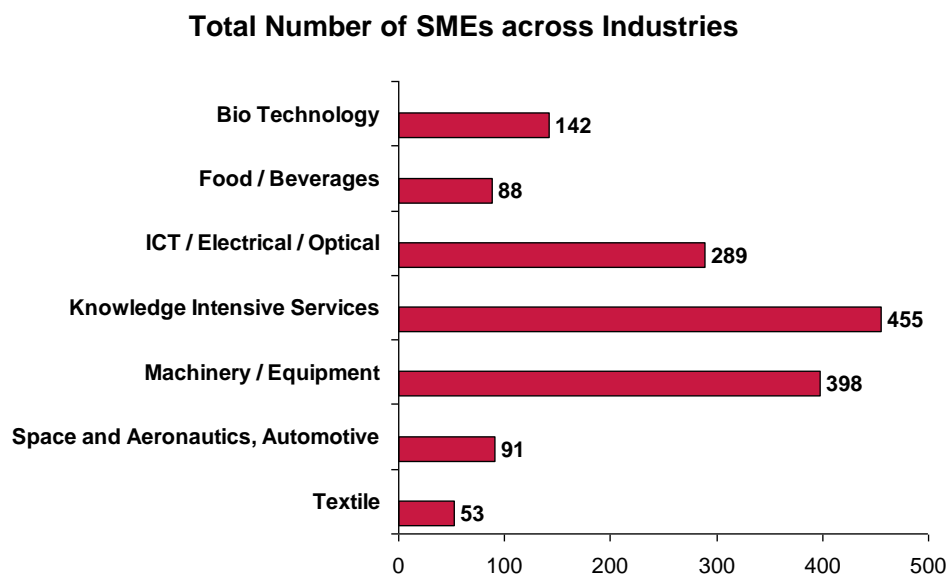
Innovation policies should foster all types of innovation - and not just R&D and technology/product oriented innovations or just services. The integration of both should be stimulated. Manufacturing companies in the low- and high-tech need to better understand how they can value their innovations in services, processes, business models or organizational improvements, and how they get paid for the value that these innovations generate.

9. Appendix

9.1 The IMP³rove Benchmarking Database

The IMP³rove database represents one of the largest and most up-to-date databases on Innovation Management in SMEs. By 2011 more than 3000 SMEs have registered on the IMP³rove platform to assess their Innovation Management based on the structured IMP³rove benchmarking questionnaire. More than 2800 SMEs have completed the IMP³rove Assessment.

This study builds upon a database of 1516 assessments that were completed between the spring of 2007 and spring 2011. All datasets were validated based on pre-defined criteria and statistical evaluation procedures (e.g. outliers that show a significant deviance from the sample mean were removed).



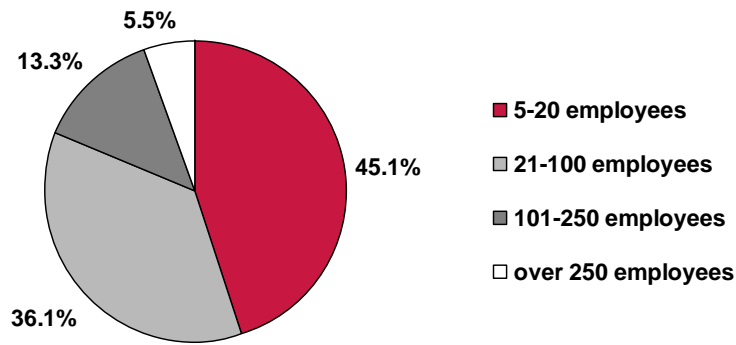
Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1516
www.improve-innovation.eu; IMP³rove is a registered trademark

Figure 35: Industry Distribution in the IMP³rove Validated Database

The IMP³rove Database covers SMEs in a wide range of industries. The companies in the sample were taken from 7 different industry sectors. The largest group is in Knowledge In-

tensive Services, followed by Machinery and Equipment and the ICT/Electrical and Optical industry sector. This allows for a broad view on the European SME landscape.

Firms per Size Class (in %)

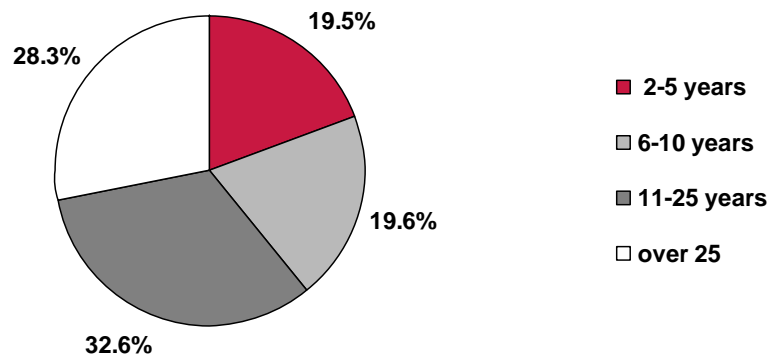


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1516
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Figure 36: Distribution of SMEs across Size Classes in the IMP³rove Database

The distribution of SME datasets across different size cases highlights that the IMP³rove data base includes both small and larger sized SMEs.

Firms per Age Class (in %)

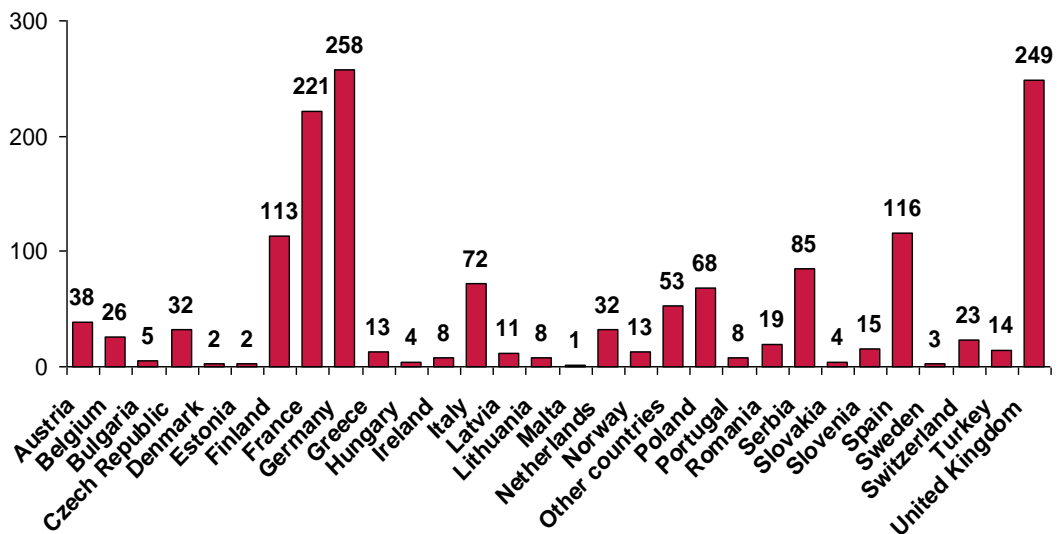


Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1516
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Figure 37: Distribution of SMEs across Age Classes in the IMP³rove Database

IMP³rove is not restricted to young firms only. The companies in the IMP³rove database are distributed evenly across all age classes. 40% of the firms are younger than 10 years. 60% are older than 10 years. This allows for differentiated analyses and interpretations of results.

Total Number of Firms by Country



Source: IMP³rove Global Coordination Team; Figures as of April 2011; N=1516
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Figure 38: Country of SMEs in the IMP³rove Database

IMP³rove covers SMEs from different European countries. As shown in Figure 38 it includes SMEs from all European member states. Countries such as Germany (258), the UK (249) and France (221) are well represented.

The IMP³rove database will be continuously developing both in terms of size, geographic coverage as well as in terms of innovation related topics. Thus, the IMP³rove database will maintain its topicality and value for further research on Innovation Management.

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11. Abbreviations

EU European Union

ICT Information and Communication Technologies

NACE Nomenclature Statistique des Activités Economiques dans la Communauté Européenne

OECD Organisation for Economic Co-operation and Development

SME Small and Medium Sized Enterprise

R&D Research & Development

UK United Kingdom

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