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Beyond product innovation; improving innovation policy support for SMEs in traditional industries

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Innovation support measures in the EU are mostly designed to support product innovation in R&D intensive sectors. To increase the still considerable contribution to regional employment and competitiveness from SMEs in traditional manufacturing industries a broader innovation (policy) mix is more appropriate. This paper draws data from a survey of more than 300 SMEs from seven regions within the European Union, as well as case studies, to address the question: How can innovation policy interventions be improved to support SMEs in traditional manufacturing industries more effectively? We claim that innovation support should be sensitive to the way SMEs in traditional manufacturing sectors innovate and grow. We find that product innovation (and support used for product innovation) is less likely to generate growth, than (support used for) process innovation. Also (support used for) marketing innovations and organizational innovations are of particular importance – together with internationalization, design and cooperation. The increasingly selective application procedures applied are not the most efficient to generate impact, since those who are supported (and those who are supported more frequently), are the ones who are most likely to take the same innovative steps anyhow, irrespective of policy support.

Keywords

Innovation, SMEs, traditional sectors, low-tech, policy evaluation, manufacturing, process innovation

JEL-codes: O38, O33, D83, L60, O14, O33, O31, O32

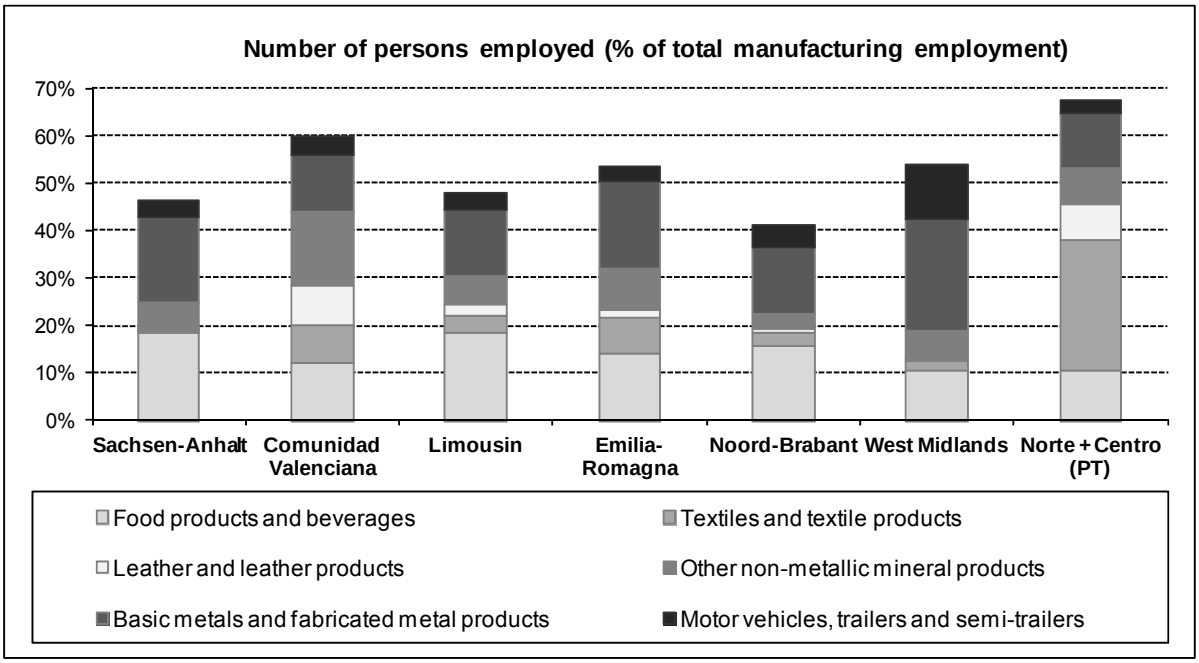
1. Introduction[1]

This paper focuses on the impact of innovation support measures for SMEs in traditional manufacturing industries across seven regions in different European countries: Sachsen-Anhalt (Germany); Noord-Brabant (Netherlands); West Midlands (UK); Limousin (France); Emilia-Romagna (Italy); Comunidad Valencia (Spain); and Norte and Centro (Portugal).

[1] This research benefitted from a grant from the European Commission, FP7-SME-2009-1; Grant Number: 245459 (http://www.gprix.eu/); this article is a revised and expanded version of a paper presented at the ICEIRD conference on 20t June 2013 in Istanbul.

Traditional industries include *inter alia* the manufacture of food products and beverages, textiles and textile products, leather and leather products, ceramics or other non-metallic mineral products, mechanical/metallurgy or basic metals and fabricated metal products, and automotive or motor vehicles, trailers and semi-trailers. Our definition of a traditional manufacturing sector is slightly different from the OECD classification of "high", "medium" and "low-tech" industries, which is based on the R&D intensity of the industries. Instead we defined as "traditional" those manufacturing industries with the following characteristics: long established; once a main source of employment at the (sub-)regional level; recent decline; still a major source of wealth creation, employment and exports; and retention of capacity for innovation.

The distribution of local units in the traditional industries ranges from 43 per cent of manufacturing in total in Noord-Brabant and West-Midlands to 62 per cent in Norte and Centro. Basic metals and fabricated metal products is, in the number of local units, the largest traditional industry in Sachsen-Anhalt, Comunidad Valencia, Emilia-Romagna, Noord-Brabant and the West Midlands. Food products and beverages is the largest traditional industry in Limousin with textiles and textile products being the largest traditional industry in Norte and Centro. For employment we observe similar patterns (Figure 1). The share of persons employed in the traditional industries ranges from 41 per cent (of total manufacturing employment) in Noord-Brabant to 68 per cent in Norte and Centro. Although not every single traditional sector is economically important in every region, we can conclude that overall traditional industries still represent reasonably high shares of activity in the regional economic structure of the selected regions, even for a 'high-tech' and R&D intensive region such as Noord-Brabant (Netherlands). Kaloudis & Smith (2005) also have shown that low-tech sectors have a remarkably stable and high share of employment.



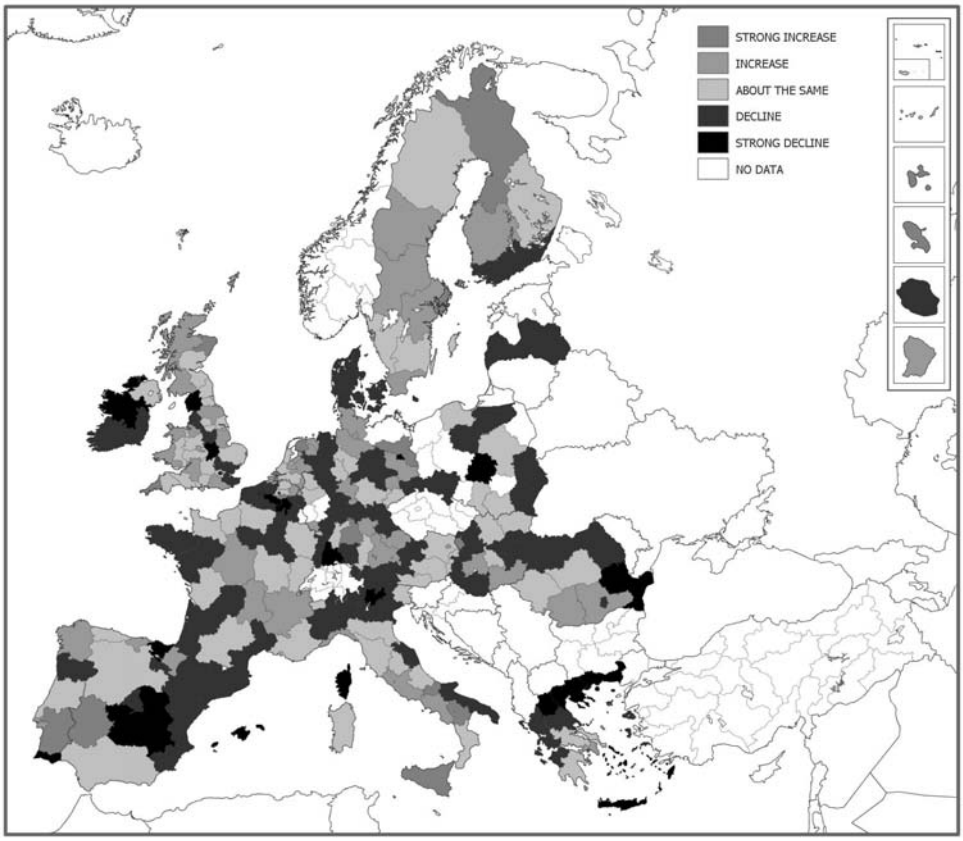
Data source: Eurostat, data for 2007, own calculations.

Figure 1 Employment in traditional industries in seven selected regions

In about half of all EU regions the share of traditional industries in manufacturing employment has increased over the last 15 years and in 78 EU regions this increase was more than 4.5 per cent (Figure 2). Although maps of regional innovation performance in Europe often show patterns of core and periphery, with lower levels of innovation

performance in the south and east of the EU (Wintjes & Hollanders, 2011), the geographic pattern of regions with a declining or increasing share of employment in traditional industries is quite scattered There are even regions where the traditional sectors appear to be in a state of revival, as they have a low but significantly increasing share of employment in traditional industries – these rather innovative regions being located in Germany, the UK and the innovative Nordic Member States. This indicates that firms also in 'traditional' or 'low-tech' industries can demonstrate growth and innovativeness (Tunzelmann & Acha 2005).

However, the regional economic importance of innovative SMEs in traditional manufacturing sectors is often neglected (Robertson 2009). Most attention goes to SMEs in research intensive sectors and innovation policy support is focused on supporting the most innovative and R&D intensive firms. Maskell (1998) stated that *"The prevailing ethos of high-tech production makes it easy to forget that low-tech industries are not synonymous with low growth or low profitability"(p.99)*. Hirsch-Kreinsen (2008) refers to low-tech industries as a forgotten sector in innovation policy.



Note: Map created with Region Map Generator. Data source: Eurostat. Data for 2009 and 1995 (or closest years available). The groups were identified using hierarchical clustering and Ward's method. Own calculation.

Figure 2 Change in European regions' employment share of traditional industries

2. Literature

According to Soete (2009) the focus on R&D and high-tech SMEs in EU policy (e.g. in the Lisbon agenda and the Barcelona target to spend 3 per cent of GDP on R&D) was rooted in the idea that the lagging EU productivity was caused by a failure in structural change towards R&D intensive high-tech sectors. According to Mason & Brown (2013) policymakers also favour high-tech sectors because they would generate more high-growth firms than low-tech

sectors, but several studies show that high-growth firms are not overrepresented in high-tech sectors (Henrekson & Johansson 2010; Bleda et al. 2013). For instance in the UK high-growth firms are almost equally present in high-tech and low-tech sectors (Nesta 2009). High-growth firms are not necessarily R&D intensive (Brown et al. 2014).

Studies of innovating firms have revealed that the multiple sources of knowledge creation, learning and innovation have become broader and more complex, regardless of the R&D intensiveness of their industry. Innovation surveys show that R&D is indeed not the sole source of innovation for firms (Arundel et al. 2008; Mairesse and Mohnen 2010). Potters (2009, p.13) shows that this is especially the case for companies in 'low-tech' sectors, for which: "Important inputs to innovation output – other than R&D – are technology acquisition, organizational and managerial innovation, design and marketing"[2]. Therefore, R&D policy needs to be complemented with specific measures targeting business innovation according to the needs of the existing industries and firms (Nauwelaers & Wintjes 2002).

The traditional market failure rationale for public intervention is to provide funding for an R&D project when the market mechanism is not able to allocate the resources for such long-term investments in innovation due to uncertainties. The result of market failures is production of knowledge embodied in innovation, under the socially optimal level, as was highlighted by Arrow (1962). The neo-classical notion that innovation is limited by the rate of investment is useful at the macro-level, but it is not very helpful for a firm, industry or policymaker in deciding how, and what kind of innovation should be pursued. Since, as argued by Nelson (1981) and Rosenburg (1976) there is a large variety in the sources, nature and uses of innovations. Pavitt (1984) showed with his taxonomy of innovating firms that the sources and purposes of innovation are industry-specific. Science based firms in high-tech industries innovate by performing in-house R&D for product innovation. For small firms in traditional industries like textiles, the process innovations coming from suppliers are typically important.

Also the innovation systems concept as developed by Freeman (1987) and Lundvall (1992) puts innovation in a broader perspective. R&D is not the only source for innovations and the main role for policymakers is not to secure funding for individual innovation projects, but in creating the conditions for firms which promote innovative behaviour and interactions, and which enhance capabilities for innovation. In the words of Metcalfe (2005, p.443): *"the evolutionary policymaker is not an optimizing supplement to the market, correcting for imperfect price signals in such a way as to guide private agents to a better innovation mix".* Policymakers are not perfect either and are boundedly rational, so a policymaker does not know what the best innovation mix would be for an SME. This also means that there is no one-size-fits-all, 'best practise' policy. What may be a good innovation mix (and innovation policy mix) for one group of firms (say high-tech) may be less appropriate for another group of firms (say low-tech). Also within these groups of firms the uncertainty of both the firm and the policymaker remain. The argument moves away from a narrow focus on market failure arguments from mainstream neoclassical economics, which favour public support for R&D, to a broader emphasis on the shortcomings of innovation systems which favour a broader range of innovation support interventions, aiming for a change in behaviour and routines (Nelson & Winter 1982). The uncertainties and risks involved with technological change, put a premium on learning by doing, learning by using and learning by interacting (and this actually applies to both the SME as well as the policymaker). Nauwelaers & Wintjes (2003) therefore distinguish policy instruments along different logics of intervention: those which lower the price of inputs aiming to fund the best innovation projects and those which aim for

[2] In the Community Innovation Survey (CIS), as well as our survey, these inputs are included in the total expenditures on innovation.

behavioural additionality by providing firms a learning to innovate experience (see also Asheim et al. 2013), which can be an eye-opening experience, an opportunity to try new things, to increase capabilities, to get to know new partners, to get inspired, to discover export opportunities, etc.

R&D subsidies are mostly evaluated for input additionality and output additionality. In theory, public support might enhance private investment (additionality) but there is also the possibility of substituting private with public funds (crowding out). In recent years, empirical analysis of the impact of public support on firms' innovative activities has been mainly concerned with providing evidence on additionality versus crowding out. Clarysse et al. (2009) also found behavioural additionality from R&D subsidies. Perhaps more interesting is that they found that these learning effects decreased with the number of subsidized projects that were undertaken by the company. Although there are many kinds of additionality (in fact as many as the kinds of induced changes we can think of) innovation policy literature recognizes three main concepts of additionality (Falk, 2007; Streicher et al., 2004): *Input additionality* refers to the effect of support measures on innovation expenditures; *Output additionality* refers to the impact of subsidies on firm performance (innovative sales, productivity, growth in turnover and/or employment, profitability); and *Behavioural additionality* refers to changes in firms' innovative behaviour induced by public support measures. These three concepts of additionality are not mutually exclusive, but are based on different logics of intervention.

One of the things we learned from studies using CIS data was that company clients and suppliers are a major source of innovation. For Lundvall (1992) this interactive learning between users and producers was central in developing the concept of innovation systems. In the study of Laforet & Tann (2006) variables related to learning by doing, learning by training and learning by interacting have the highest impact on the degree of novelty of innovation. The main constraints they found for innovation in manufacturing SMEs concerned a poor learning attitude and poor networking, which they relate to their traditional characteristic of being insular and autonomous. Also the results of Amara et al. (2008) point out the importance of learning by doing and learning by interacting for low- and medium-tech manufacturing SMEs, as it has significant impact on innovation as well as the degree of its novelty, and they found that research and information networks are crucial assets in this respect. Grimpe & Sofka show that, compared to high-technology firms, the search for externally available knowledge of firms in low-technology industries is focused on market knowledge. Santamaría et al. (2009) provide evidence for a higher importance of external sources for process innovations in low-tech firms compared to high-tech firms.

Four types of innovation as defined by Schumpeter (product innovation, process innovation, organizational innovation, and market innovation) are still the basis for questions in the CIS on each of these four innovations. However, within combinations of these four types of innovations in an innovation mix of a firm, they are often related and very hard to separate from each other. For Low-tech manufacturing industries there are several studies that show that product and process innovation are related. Santamaría et al. (2009) for instance show for Spanish firms that non-R&D activities, such as design and the use of advanced machinery, are especially important for low- and medium-tech industries and particularly for achieving product innovations. Raymond & St-Pierre (2010) provide an explanation for the positive impact that process innovation in low-tech industries often have on product innovation. They make an important distinction between two types of process innovations: those used for product development (e.g. Computer aided design and manufacturing: CAD or CAD/CAM) and those used for production (e.g. Computer numerical control: CNC). They show that ‘product development process technologies’, have an especially strong effect on product innovation for firms in low-tech industries, compared to more high-tech firms. Only for low-tech manufacturing industries they found that also process R&D has a significant

positive effect on product innovation. Product R&D has in low-tech industries the weakest and not significant impact on product innovation, probably because it mostly concerns improvements to existing products.

Not only the importance of R&D, but also the importance of product innovation seems to be lower than is often assumed, especially for SME's in traditional industries. Kirner et al. (2009) found that low-tech manufacturing firms in Germany (compared to medium- and high-tech firms) lag behind in terms of product (and service) innovation performance, but not in terms of process innovation. For some aspects of process innovation low-tech firms even perform better. Laforet & Tann (2006) show that developing new ways of working in manufacturing SMEs is more important for innovation than developing new products. In relation to employment output Lachenmaier and Rottmann (2010) conclude that process innovations have a higher positive effect on employment than product innovations.

In this respect, demand-side innovation policies, such as loans for purchasing new machinery, innovative public procurement or support for internationalization (Wintjes 2012) seem more relevant for SMEs in traditional industries than R&D policies (supply-side innovation policy), since R&D and science do not give the main impulses, but conversely these firms rather react to practical problems and changes in customer demand (Kline and Rosenberg 1986; Mowery & Rosenberg 1979). Practical knowledge includes user experience of operation, shop floor experience in production, and 'rules of thumb' from previous experience in design (Faulkner et al. 1995). Learning-by-doing and learning-by-using are typical ways to develop practical knowledge and dynamic capabilities (Teece & Pisano 1994).

Data from the Innobarometer 2007[3] show that fewer firms in traditional industries (6 per cent) receive direct support to finance R&D based innovation projects than firms in other manufacturing industries (10 per cent) or services (8 per cent). This may have two reasons: these firms may less often ask for this support, and/or the policymakers may less often be willing to give it to them. Firms in traditional industries have received more support from the following measures: subsidies for acquiring machinery, equipment or software; attending or participating in trade fairs or trade missions; networking with companies; and information on market needs, market conditions, new regulations, etc. Again, the concerning firms and/or the policymakers might see this as more relevant support.

So, SMEs in traditional sectors might indeed need a different kind, a less-R&D focussed kind of support. However, many regional agencies have increasingly adopted a venture capital approach, selecting research and innovation project-proposals, which programme managers believe likely to succeed and thus offer a good 'return on investment'. This regional innovation policy strategy might not work for SMEs in traditional industries.

At regional level the supply-side (R&D oriented) innovation policy measures are still dominant (Walendowksi et al. 2011). A large share involves public R&D support measures, despite efforts to support knowledge transfer and collaboration, linking the public research base with industry. Business innovation support at regional level has increased, especially within the EU Structural Funds for regional development. However, the mainstream regional innovation instrument typically provides subsidies for (a share of the R&D component of) product innovation, that is: to the winning proposals of competitive application procedures. Many of these schemes also include trajectories with smaller amounts of subsidies for feasibility studies, or for prototyping, and increasingly also to support the development of a marketing plan. These schemes are typically designed to support product innovation in high-tech industries and start-ups.

[3] http://ec.europa.eu/enterprise/policies/innovation/policy/innobarometer/index_en.htm

Contrary to the linear view on innovation, innovation and new 'value added' can come from many activities and sources. Especially for SME's in traditional sectors innovation may not be based on new technological inventions from internal R&D, but rather on serving market-needs and the application of process technologies developed externally. Rejecting the notion of a single best practice instrument for every type of ambition or need, we rather aim to explain the difference between interventions: which kind of support is good for which kind of innovation and which kind of impact?

3. Methodology

Most of the scientific literature on the impact of innovation policy support focus on a single attribution question: does 'treatment' in the form of R&D subsidies make a difference. Since the literature questions the relevance of product R&D for SMEs in traditional manufacturing industries, and suggests that many other innovative activities matter, we evaluate the various contributions from different interventions. In counterfactual evaluations, many questions concerning why, how and for whom the different interventions work or do not work, are often ignored. For the sake of accountability it might be sufficient when an econometric evaluation can assess to a high level of certainty if policy intervention worked or not, however for improving policy more insights are needed.

The survey sample includes 312 SMEs, comprising 145 firms that have participated in an innovation policy support measure and 167 firms which did not participate in any innovation support measure. To align the sample frame as closely as possible with the target population we used, wherever possible, regional industry lists of SMEs. To ensure a sufficient number of programme participants we also approached, with the help of programme managers, firms who had applied for support. These firms were approached by e-mail or by post, and in a follow-up by phone. The survey was translated in the languages of the seven regions and SMEs could respond on-line, by e-mail or return-envelope. Data were gathered in 2010 and cover the period from 2005-2009.

The first part of the survey largely followed the questions and definitions as used in the Community Innovation Survey, e.g. concerning innovation input, output and concerning product innovation, process innovation, organizational innovation and marketing innovation. This implies for instance that significant changes to the aesthetic design or packaging, are reported as marketing innovations, and not as product innovations. This part of the survey (on how firms innovate) was answered by all firms. The second part of the survey addressed public support for innovation. Those who had received support were asked a few questions for a maximum of two support measures: e.g., for which kind of innovation they had used the support, and to rate themselves the importance of 20 predefined, possible impacts from the concerning support.

The survey sample has a good balance between participants and non-participants, and similar characteristics between participants and non-participants with respect to size in terms of the average number of employees and strength of competition.

4. Survey analysis

4.1 Innovations and improved capabilities in relation to output

In this paragraph we will first analyse how the total sample of firms innovate and grow. The survey respondents are quite innovative, since 37 per cent of the respondents have spent 1-5 per cent of their turnover on innovation activities, which is standard for most sectors. But a quarter of all responding SMEs spend 6-10 per cent, which is more at the level of research

intensive industries.[4] Almost a third spends even more than 10 per cent of their turnover for innovation activities. Nearly 10 per cent do not spend anything for innovation or research. Since these SMEs are in manufacturing industries it may not be surprising that innovation in goods is more important that innovation in services: over 70 per cent of all participants had introduced product innovations in goods between 2005 and 2009. More surprising perhaps is that almost 50 per cent of responding firms have realized a service innovation. In terms of sales from new goods and services as a share of turnover (innovation-output), the responding firms are moderately innovative: 14 per cent could reach 25-50 per cent innovative turnover and 17 per cent even realized more than 50 per cent of annual turnover with innovations. For comparison, German research-intensive industrial companies have reported a 32 per cent innovative turnover in 2009 (ZEW, 2011).

Respondents have rated capabilities for product innovation as most important, but when we look at the improvement in the four distinguished capabilities and the achievement of one or more of the four types of innovations we find that the impact on the various outputs suggests otherwise (Table 1). An improvement in the self-assessed capabilities for product innovation (relative to their industry, between 2005 and 2009), has a significant positive effect in terms of the share of new products in sales, but this is also true for the other forms of innovation. Also the relation between having realized a new product innovation and having a more than 15 per cent share of innovative sales is significant, but so is the relation with having realized an organizational innovation. What we did not find is a significant positive effect of improved product innovation capabilities, or having achieved a product innovation, on growth of turnover or employment. We did find such an effect from improved capabilities in process innovation (on turn-over growth), and from having achieved a process innovation (on employment growth). Also 'improved capabilities in marketing innovation' and 'having achieved an organizational innovation' has a positive impact on economic output. We can conclude that for all four types of innovations, improved capabilities matter for innovation output, but that product innovation is less likely to generate growth.

	Share innovative sales (<6% vs ≥ 6%)	Growth in turnover (≤ 15% vs >15%)	Growth in employment (≤5% vs > 5%)
Improved capabilities[1] relative to industry for:			
product innovation	21.2**		
process innovation	22.4**	6.9*	
organizational innovation	17.6**		
marketing innovation	16.8**	7.9*	
Realized 1 or more[2]:			
product innovation	23.4**		
process innovation			6.9**
organizational innovation	23.3**		20.5**
marketing innovation	18.0**		

Note: Pearson Chi-square is shown; *p≤0.05, **p≤ 0.01; 1= improved vs same, or less (df=2); 2= realized an innovation versus not realized an innovation (df=1)

Table 1 Effect of improvement of capabilities and introduced innovations on innovative and economic output

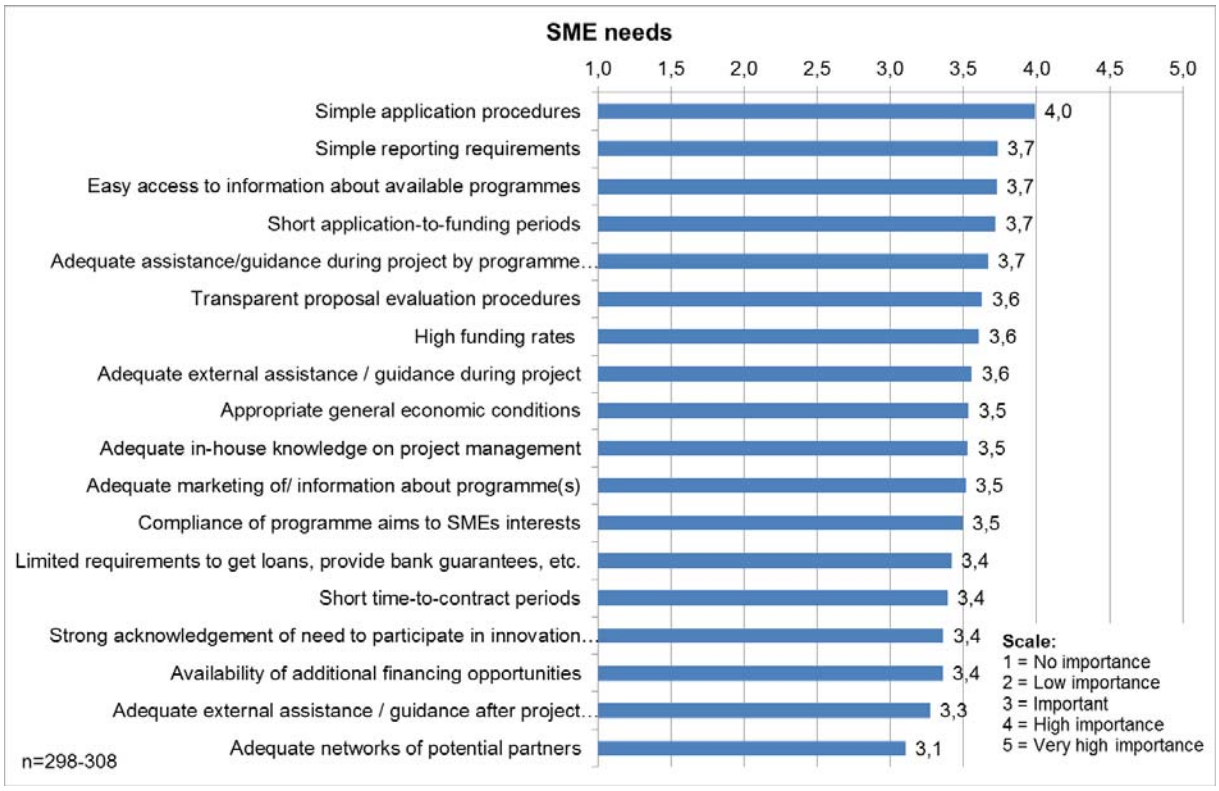
[4] In Germany the overall innovation intensity (innovation spending as share of turnover) was 2.74 per cent in 2009, Research intensive industries had an innovation intensity of 8.4 per cent in 2009 (see ZEW 2011, p. 6).

A particular feature of innovation by SMEs in traditional manufacturing industries, which was repeatedly attested to in our case studies, is the salience of design, especially that of technical design (rather than R&D as the platform). Design is one of the intangible aspects that touch on one of the difficulties concerning the definition of the various types of innovation, and it can explain why and how some innovations serve as input to other innovation in a systemic way. E.g., applying new techniques for product development such as Computer Aided Design (and CAD/CAM systems) can be seen as a process technology. Product designers also create additional value with intangible experiences, e.g. aesthetic or user-friendly aspects of goods, but this is often merely captured as marketing innovations. Design of new services often involves changing the various interactions with clients (and or suppliers). Service design is therefore to be seen as a means to advance business models (Chesbrough, 2010), and this may transform the organization in firms and value chains. But again, mainstream policy measures often do not support such kinds of innovation.

4.2 SME programme needs

Support programme features appear influential on the decision of an SME in traditional sectors to participate in a particular programme (Figure 5). Heavy bureaucratic procedures are a burden to all firms, but this seems especially the case for SMEs in traditional sectors. The survey asked respondents not directly about their own experience of programme participation but for their view on SME needs in general: “What are the specific needs for SMEs to enable them to participate in innovation support programmes?” The main need identified was procedural simplicity and transparency (according to those responding with “high importance” and “very high importance”, which were the extreme categories on a five-point Likert scale). Bureaucratic procedures are a barrier to entry, as they impose a fixed cost on programme participation.

Also highly rated was “short time to contract”. Timeliness is significantly important: in case study interviews SME owners and managers emphasized the point that delay increases the risk that “another firm may get to market first”. Moreover, a common theme was that the need for timeliness can be a source of tension between SMEs and, for example, Universities. Other needs noted as important were “guidance during the project” and “mentoring/coaching”. Regular contact with programme managers/case officers combined with mentoring/coaching could increase the effectiveness of support measures.



Source: survey

Figure 3 SMEs needs concerning design and implementation of measures

4.3 Additionality of intervention and its frequency

In order to evaluate if the innovations and output in terms of innovative sales can be attributed to the received support, we have reported elsewhere on the results of an econometric analysis, which captures the difference between firms that received support and those which have not received support. The main finding of this analysis is that, support programmes have on average no additionality effect on the innovation of SME participants, but they would have had a positive effect on randomly selected SMEs.[5] Moreover, the more likely a firm is to participate in a support programme the less likely that firm is to innovate as a consequence. Conversely, firms that are less likely to participate would be more likely to innovate as a consequence (i.e. were they to participate). These results are consistent with evidence from interviews with programme managers in all seven EU regions. Namely, the selection procedure adopted by programme managers is typically one of extreme "cream skimming" or "cherry picking"; in other words, firms are selected for programme participation on the basis of observed characteristics that are positively associated with innovation. The firms selected for innovation support are those most likely to innovate irrespective of programme support.

In this article we do not focus on the counterfactual issue by comparing those supported with the not-supported in detail, but the survey included a question which directly asks for the counterfactual situation: 'Would you have taken the same or similar steps without this public support?'. This question was raised for the one or two interventions in focus. Of those who have participated in three or more support measures, 70 per cent has answered that without the support they would have taken the same or similar steps (Table 2). Of the SMEs which

[5] The analysis is available at http://www.gprix.eu/ (under the "Reports" tab).

have benefitted from only one or two support measures 56 per cent has answered that they would have taken the same innovative steps without the concerning support. So, the firms which are supported more frequently are most likely to take the innovative steps anyhow, irrespective of programme support. The less frequently supported are more likely to take additional innovative steps, steps they would 'not at all' have taken without participating in the concerning support measure. This result is consistent with those of Clarysse et al. (2009) showing that learning effects decrease with the number of subsidized projects.

	Would you have taken the same or similar steps without this public support?			
	Yes - and as quickly	Yes - but more slowly and less effectively	No - not at all	
SMEs with 1 or 2 interventions	11%	45%	44%	100.0% (N=137)
SMEs with 3 or more interventions	7%	63%	29%	100.0% (N=82)

Note: Pearson Chi-Square= 6.8, df=2, p=.034

Table 2 Difference in additionality between frequently and less frequently supported SMEs

Table 3 describes some differences between firms which are not supported, firms that had less than three, and those that had three or more policy support interventions. A striking difference is in the share of firms cooperating in innovation, since of the non-supported SMEs only 34 per cent cooperate in innovation, while of the frequently supported 94 per cent cooperate in innovation. Although this simple comparison does not point out which of the various causes is most important (cooperation can be the result of intervention; firms who do not cooperate in innovation might less often seek support; and policy agents may favour applications from firms who do cooperate in innovation), the striking difference supports the view that a more inclusive policy approach would be appropriate.

The fact that the self-assessed product innovation capabilities in 2005 do not differ significantly between firms which had no, few or frequent interventions, suggests that the policy agencies did not simply favour applications on the basis of their innovation capacities. It is more likely that the share of turnover spent on innovation is a characteristic that has served in getting selected, at least for getting selected more than twice, since between the firms which had few or many interventions there is no difference in the share of firms that has increased its innovation expenditure (table 3).

Concerning 'increased spending on innovation', 'having realized innovations' and 'improved capabilities', the lower performance of the frequently supported SMEs (compared to those supported once or twice) supports the above finding that additionality is lower for the frequently supported. For instance, 41 per cent of the firms which received support once or twice has improved their capabilities for product innovation, while for the frequently supported 35 per cent has improved those capabilities, which is actually quite similar to the 31 per cent of the not-supported.

	Not supported (N=171) 100%	1 or 2 interventions (N=101) 100%	3 or more interventions (N=49) 100%	Pearson Chi-square	df
Cooperate in innovation, yes (vs no)	34%	79%	94%	166**	df=2

Lagging process innovation capabilities relative to industry, 2005 (vs average, above average and leading)	25%	22%	11%	21**	df=6
Lagging product innovation capabilities, 2005 (vs average, above average and leading)	25%	23%	11%		
≥ 6% of turnover spend on innovation (vs < 6%)	41%	65%	84%	67**	df=2
Spending more on innovation now than in 2005 (vs same or less)	29%	52%	51%	35**	df=4
Less than 6% of sales are new products, 2009 (vs ≥ 6%)	55%	47%	46%		
Realized a process innovation, 2005-2009 (vs no process innovation)	79%	93%	86%	20**	df=2
Realized a product innovation, 2005-2009 (vs no product innovation)	73%	92%	88%	33**	df=2
Improved capabilities for process innovations (vs same or lower)	29%	42%	33%	13**	df=4
Improved capabilities for product innovation (vs same or lower)	31%	41%	35%		

Note: ** p≤0.01; * p≤0.05

Table 3 Differences between SMEs which had no intervention, few interventions and 3 or more interventions.

4.4 Comparing types of innovation support measures on impact

Based on the survey data we can indicate the extent of impact from participation in various types of schemes. The responding participants gave a score on a wide range of possible impacts for one or two of the most important programmes they participated in. The impact from Collaborative programmes and especially the support measures concerning Internationalization seem to be the ones generating relatively high impacts in certain fields of impact. For the largest group of measures: 'internal innovation' the impact-scores are often close to average, with less outstanding fields of impact. The high impact-fields are often not very surprising. For example, collaborative schemes generate specifically high impacts on 'Formation of new partnerships and networks', and Internationalization measures specifically score well on 'Internationalization of activities'.

In the case studies, many firms reported the need for assistance with marketing. Some lacked the resources to employ a marketing specialist and complained that programmes had a focus on technological innovation. The corollary is that to promote SME innovation in traditional sectors there should be more emphasis on non-technological innovation, especially design and international marketing.

When asked for which innovative activities they received support, around 10 per cent responded with export promotion. This was an unexpected result, because export promotion was not mentioned in the questionnaire among the guidance notes for respondents on innovation: all the examples of types of innovation followed the Oslo Manual (2005) and the Community Innovation Survey, in which marketing innovation is restricted to varieties of new marketing techniques, but excludes entry into new markets. This perspective is consistent with both case study interviews and survey data, both of which suggest that SMEs in traditional manufacturing regard exporting as innovatory activity.

The information captured by the answers on the 20 impact questions have been reduced into four impact factors, with the use of principal component analysis. The main factor (which explains the largest share of the explained variance) consists amongst others of the impacts on ‘access to markets’, increased profitability, increased turnover, commercial linkages and internationalization. This impact factor has been labelled ‘access to markets’. The second factor includes, amongst others ‘R&D linkages and improved research competence and is labelled ‘R&D links’. The third factor includes the impact on: business and innovation strategy, improved internal organization, skills and design & marketing capabilities, and has been labelled ‘Strategy, organization & skills’. The fourth factor has been labelled ‘Certification’ (see table 4).

	Impact factors			
	F1: ‘Access to markets’	F2: ‘R&D links’	F3: ‘Strategy organization & skills’	F4: ‘Certification’
Access to markets	.796			
Increased profitability	.762			
Increased turnover	.731			
Improved commercial linkages with other organizations	.680			
Enhanced reputation and image	.624			
Internationalization of activities	.572			
Faster 'completion' of innovation project	.529			
Improved R&D linkages with universities/research institutes		.815		
Improved research competences		.723		
Improved R&D linkages with other business organizations		.684		
Facilitated participation in other R&D or innovation programs		.660		
Formation of new partnerships and networks		.517		
Improved business or innovation strategy (e.g. new business model)			.736	
Improved internal organization			.698	
Improved level of skills of personnel			.650	
Improved marketing competences			.587	
Improved design capabilities			.413	
Impact on quality certification				.851
Impact on safety and environmental certification				.823
Enhanced productivity	.516			.587

Legend: Low factor loadings are not shown. Extraction Method: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization. Rotation converged in 10 iterations.

Table 4 Factor analysis; four types of self-reported impact and the loading for the main components

The first three self-claimed impact factor scores are significantly different for the various types of support measures (Table 5). Firms that participated in an internationalization scheme have on average the highest impact factor score on ‘access to markets’. The participants in collaborative programmes have a high score on the impact factor ‘R&D links’,

which is much higher than for participants in ‘Internal innovation’ schemes, which to a large extent consists of R&D subsidies. This suggests that collaborative measures are more effective in generating impact in terms of R&D.

The support from one measure can be used for more than one type of innovation. Of the participants in internal innovation measures 80 per cent used the support for product innovation and 47 per cent used it for process innovation (Table 5). Among the participants in internationalization schemes only 10 per cent used it for product innovation, and 10 per cent for process innovation. For collaborative schemes the usage for product and process innovation is also equal, but at a higher level of 70 per cent. Overall, the use of the support for product innovation is dominant. Since we have recorded for all firms (including the non-supported) that process innovation is the most frequently realized innovation among all the four types of innovation, we can conclude that the design of the measurements must have favoured or prescribed the use of the support for product innovation.

	External know-ledge (N=16)	Colla-borative (N=19)	Internal innovation (N=89)	Inter-national-ization (N=19)	Other (N=55)	
Policy impact factor scores						*F (ANOVA)*
Average Factor 1: 'access to markets'	.34	-.11	.03	1.06	-.30	F= 7.9**
Average Factor 2: 'R&D links'	-.14	.91	.02	-.49	-.15	F=5.8**
Average Factor 3: 'strategy, organization & skills'	-.43	.07	-.02	.68	.01	F=2.9**
Average Factor 4: 'certification'	-.32	-.28	.14	-.29	.02	
Used the policy support for:						*Chi-square*
Product innovation (vs no)	69%	70%	80%	10%	60%	36**; df=4;
Process innovation (vs no)	44%	70%	47%	10%	39%	16**; df=4

Note: ** p≤0.01; * p≤0.05

Table 5 Differences in impact and use between types of innovation policy instruments

SMEs that have used the support for product innovation have on average a higher (self-claimed) impact factor score on ‘R&D links’, but this does not seem to pay off in terms of additional input, innovations, capabilities or output (Table 6).

The support is mostly used for product innovations (Table 5 and Table 6), but impact in terms of innovation input, realized innovations, increased innovation capacities, and economic output seems less than could have been achieved when the support was used for process innovation, organizational innovation or marketing innovation (Table 6).

The highest average factor score for firms which have used the support for process innovation is ‘certification’. Using it for organizational innovation lead to high impact on ‘Strategy, organization & skills’, and using it for marketing has led to high impact in terms of ‘Access to markets’ and ‘Strategy, organization &skills’. Besides the modest self-claimed factor-scores for those who have used the support for process innovation, these firms seem to have benefitted from the broadest range of impacts, ranging from increased innovation expenditures, more organizational innovations, improved innovation capabilities for product, process and organization, as well as jobs created as a result of innovation.

	used support for innovation in: Product (N=163)	Process (N=109)	Organization (N=37)	Marketing (N=59)
Self-claimed policy impact factor scores	*Average factor scores¹*			
Average Factor 1: 'access to markets'	-0.07	0.10	0.03	0.32**
Average Factor 2: 'R&D links'	0.21**	0.07	0.16	-0.09
Average Factor 3: 'strategy, organization & skills'	-0.06	0.08	0.48**	0.45**
Average Factor 4: 'certification'	0.03	0.22**	0.23	-0.04
	Pearson Chi-square			
Innovation input				
Increased innovation expenditure (vs same or lower)		7.2 *		
Innovations realized last five years				
1 or more organizational Innovations (df=1)		4.5*	11.5**	
1 or more marketing innovations (df=1)				8.3**
Improved capabilities relative to industry				
improved product innovation capabilities (df=2)		9.6 **		
improved process innovation capabilities (df=2)		10.7 **		11.8 **
improved organization innovation capabilities (df=2)		8.1 *		
improved marketing innovation capabilities (df=2)			12.0 **	
Innovative and economic output				
>15 % growth turnover (df=1)			5.8 *	
>15 % innovative sales (df=1)				
Jobs created as result of innovation (df=5)		10.9 *		

Note 1: the average factor scores are analysed with ANOVA, df=1; ** p≤0.01; * p≤0.05

Table 5 Differences in impact between support used for innovation in product, process, organization and marketing

5. Two case-study companies

From about 60 case-study firms two are selected which support, represent and illustrate some of the main findings.

5.1 Metaal Industrie Uden BV

This case study involves a small firm engaged in manufacturing of metal products in North-Brabant (The Netherlands). The main problem for this company and the sector as a whole is the competition from firms in countries with lower wages. Many competitors have moved production to Eastern Europe. The company produces metal frames for the furniture industry, the high-end market that is, where new designs, small series, customer preferences, short life-cycles and innovations play an important role.

According to Metaal Industrie Uden (MIU) the core issue is: "to be consumer oriented, to offer what the market demands", while many other companies often merely focus on reducing costs. Turnover in 2009 was 1000,000 Euro (and 700,000 in 2005). Total number of employees was 10 in 2009, which is three more than in 2005. Most products are sold regional to a number of furniture companies (80 per cent of turnover in the region, 15 per cent is sold in other European countries). The firm has a very broad conception of innovation, besides product and process innovations, also marketing, organizational innovations and design are very important, but on all possible types of innovation activities MIU has made improvements. Between 10-15 per cent of turnover is spent on innovation. About 35 per cent

of turnover is from new (since 2005) or strongly improved products. This very high rate is due to the very short life-cycle in the furniture industry for which the firm is producing the metal frames. The series are small, but unique.

Design is particularly important. "At one time, customers want the black chair legs and the next moment they want metallic chair legs. You have to respond to such needs very fast".

A major customer is a customer-oriented manufacturer who keeps only one day supply in stock, and who only wants to work with Dutch suppliers, because of these fast changes in demand. Proximity also allows us to offer more service, if anything goes wrong with our delivery or our products, we can be there to discuss and fix things.

MIU's strength is in rapid design and in keeping abreast of the technological possibilities. Not everyone in this industry reads their professional literature and magazines from beginning to the end. Other ways to keep up technologically include: go to trade-fairs, use interns, buy new machinery and test new things. Most innovations at MIU are design-oriented innovations, certain shapes, angles, thickness, material, size, finish, and new combinations, etc. For a particular test they now work with a machine that MIU has put together themselves in cooperation with an education institute in the region. For both of them this was a good learning experience.

In the beginning of the recession two machines to bend tubes were purchased in Italy, because at that time, the Italian supplier had fewer assignments, so the machines were around 70,000 euro's cheaper than normal.

As Mr.Schepers has said: "everything we do is innovation, and innovation is all about design, design, and again: design; not only regarding the nature and speed of product innovations, but also concerning technological process innovations. Design also leads to a need for new skills of workers (the 3-D design software package which MIU is using is not taught in the schools), and also has organizational implications, and finally design is even important in improving the marketing. With a new software application, they can now digitally visualize a drawing in such a way that it resembles a picture of a real prototype. That sells a lot easier than showing the old technical design-drawings, e.g. in the case of the drawing of a distribution trolley they have designed for the largest supermarket chain in the Netherlands.

The firm has made use of the national R&D tax deduction measure WBSO. "You must be careful that you do not waste too much time in reporting. More importantly, not all the research and development activities are suitable for the WBSO measure, because they cannot write a project proposal for each and every small R&D activity. For example, during the interview Mr. Schepers was asked by a client about the possibility to place wheels under a specific chair frame. It should be figured out whether this is possible, because the legs of the chair concerned are actually too small. It has never been done, so it would be a unique product. Perhaps his expert supplier of wheels might have a solution, but at least they would have to test if the solution is good or if it calls for more radical adjustments. "This type of R&D activity does not fall under an R&D project for which you can use WBSO, it has to be solved today or tomorrow".

5.2 Textile-SME

This SME is located in the UK and has received support from two measures: Passport-to-Export and the ERDF Internationalization Scheme. Established 1985 the firm designs and manufactures children's costumes and accessories. "We received two lots of support enabling us to grow in international markets (e.g. Denmark) and building our brand through web-based sales". This support outcome stimulated the need for better packaging and allowed the firm to enter other potential European markets. At the suggestion of an International trade advisor at the local Chamber of Commerce, the company joined the DTI Passport-to-Export scheme and later the ERDF funded Internationalization scheme.

“Passport-to-Export was crucial in helping our firm gain the confidence that exporting was right for us”. It assisted the firm in enabling a self-imposed programme of objectives. The firm’s owners believed that you get out of Passport-to-Export what you put in – “It led us to using the companion Overseas Market Introduction Service to investigate the Swedish market. With 20 new contacts and trade-visits we received orders almost immediately from wholesalers, retailers and other outlets, and new business in Norway as well as Sweden....we followed this with a bespoke matched-funded European Regional Development Fund which helped us to re-design and translate packaging and attend workshops for improving knowledge of European standards, which opened more new markets in Finland, Switzerland and Germany”.

The SME admitted they would have undertaken export expansion types of scoping activities without funding support, but more slowly and probably less focused. The ERDF programme was regarded as a successful additional advancement in the form of marketing innovations that would not have occurred without the matched-support. Success was believed to be dependent on willingness to exploit a relatively standard measure and customize it to the firm’s needs. In both cases, the establishment of specific objectives appeared important to achieving successful engagement with support measures. “We see innovation as essential for survival, especially marketing”.

6. Conclusions

For SMEs in traditional industries we can conclude that for all four types of innovations, improved capabilities matter for innovation output, but that realizing a product innovation is less likely to generate growth.

A second conclusion is that firms which are supported more frequently are most likely to take the innovative step anyhow, irrespective of programme support.

A third conclusion is that the support is mostly used for product innovations, but impact in terms of innovation input, realized innovations, increased innovation capacities, and economic output seems less than could have been achieved when the support was used for process innovation, organizational innovation or marketing innovation.

These conclusions are supported by the following three statements of respondents:

“Do not prescribe how the innovation is to be done. This is a contradiction of terms and prevents new ideas being brought forward and moulded into something of economic value”;

“Try to be less prescriptive”;

“R&D tax credit rules are too restrictive. They do recognize the innovative application of new technology to an existing process”.

The innovation measures have a limited, or not optimal, impact in terms of additionality, which is due to: lack of marketing for innovation support measures to recruit a wide range of potential beneficiaries; restricted programme access and “cherry picking” selection procedures, which means that support goes (and goes more frequently) to firms that are most likely to innovate in any case; and too narrow a focus on support measures for product innovation.

Concerning the design features of the programmes it is recommended to increase the demand led aspects of programmes which are a way to achieve customized projects for SMEs. Demand led programmes are more generic than specific and can be characterized as follows: broad focus on different innovation types (product, process, organization and marketing – i.e. both technological and non-technological innovation); covering the overall innovation life cycle from the first idea to implementation; wide eligibility of different costs;

and flexibility in using the applied budget (internal budget shifts). Moreover, since the additionality or learning-effect of support tends to reduce after the same firm is provided support frequently, pro-active engagement of SMEs which have never received innovation support seems relevant.

Good practice measures are headed under: cluster policy, value-chain specific schemes, innovation vouchers, coaching schemes, tailored schemes, schemes dedicated to design, to develop new export markets, and pro-active schemes which specifically target to support firms which have not received support before.

The strategic thinking behind existing innovation policy programmes often does not match SME needs in traditional sectors. For example, although recent reforms might help, R&D tax credits have not helped traditional-sector SMEs with innovation models based on design and/or marketing and, hence, with broad innovation needs. Conversely, SME respondents explicitly favour demand-led support programmes, such as Innovation Voucher schemes, which can be used to assess innovation potential and to scope/initiate customized projects, and are relatively easy to access. Alternatively, a “one stop shop” can help SMEs to avoid having to navigate the complexity of supply-driven support: SMEs take their needs to a single point of contact and are matched with the most appropriate support programme(s).

There is potential for improving the overall innovation outcomes of innovation support programmes for SMEs in traditional manufacturing industry by selecting firms with the most to gain from support rather than selecting those with the greatest propensity to innovate but the least to gain from support. A corollary of moving away from ‘cream-skimming’ is the need to remove participation obstacles; in particular, by making application, selection and reporting procedures less bureaucratic and more inclusive.

There are many ways to compete with innovation rather than competing on low costs, since there are several ways to increase added value, but both due to uncertainties about the appropriate types of innovation both the entrepreneur and the policymakers have to invest in learning and discovery. For mature products further away from the technological frontier, ways to increase value added rely less on R&D input for product innovation and more on process innovation, market(ing) innovation and organizational innovation. In combination with product and service innovations firms learn to find new niche business models, new combinations within their innovation mix.

Chesbrough (2010) has looked into the question why it is difficult for companies to innovate their business model. He refers the insights from Amin & Zott (2001) and Christensen (1997) that in the cost-benefit perception of adjusting the business model that is required to exploit a disruptive technology, the established technology and business model is disproportionately favoured. This is due to a ‘dominant logic’ build up over time, which makes a company blind for some opportunities that do not fit this ‘dominant logic’. This is why McGrath (2010) claims that adopting a new business model calls for a discovery driven approach instead of a cost-benefit analysis. Policymakers should rather support a broadened discovery and experimentation processes than a narrow, one-size-fits-all subsidized prescription focussing on R&D for product innovation, which merely steers the outcome of a cost-benefit analysis, incident by incident, towards only this specific type of innovation. In this respect both the SME and the policymaker should engage in a discovery process which goes beyond the ‘dominant logic’ of product innovation.

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