PILOT
NEWSLETTER

- No 5 -

The PILOT project is funded within the European Commission's Key Action Improving the Socio-economic Knowledge Base.

Editorial

Dear readers,

We are happy to present you the 5th volume of the PILOT-NEWSletter. In its first article Trond Einar Pedersen of NIFU-STEP in Oslo and coordinator of the PILOT work package 2 gives us his view on results and open questions of the macro-level analyses undertaken so far as part of the PILOT project.

Andrea Bardi, Francesco Garibaldo and Matthew Hancock of IpL Bologna present insights from the PILOT research on value chains and regional networks of low-tech firms and link this to the discussion on globalisation.

David Jacobson and Kevin Heanue of DCU introduce and discuss findings of the first phase of work package 5 which has, within the overall PILOT research programme, a special focus on policy related questions.

We would like to invite you to attend an international conference the PILOT consortium will hold in Brussels on 29 and 30 of June. At this meeting PILOT researchers will presents project results and we are very happy that we could win distinguished colleagues from all over Europe for critical comments on these presentations. The second day of the conference will have a focus on policy related issues. At this day we will have prominent guests from the European policy community. We are sure that this will be a highly interesting event and we are looking forward to welcome many of you in Brussels.

Please also note that a new book is forthcoming which comprises results of the project work and of related research. It is introduced in some detail below.

We would like to thank Andrea, David, Francesco, Kevin, Matt, and Trond for contributing to this volume of the PILOT NEWSletter and we hope you will enjoy reading.

Katrin Hahn & Gerd Bender

PILOT – NEWSletter No 5 –

Publisher
University of Dortmund
Chair of Economic and
Industrial Sociology
44221 Dortmund

email: is@wiso.uni-dortmund.de
phone: +49 / (0)231 / 755-3718
http://www.pilot-project.org

Authors:
Andrea Bardi, Francesco Garibaldo, Matthew Hancock, Kevin Heanue, David Jacobson, Trond Einar Pedersen

Subscription: If you want to receive the PILOT-NEWSletter please send an Email to:
s.gemicioglu@wiso.uni-dortmund.de

Layout:
Katrin Hahn, Sabrina Gemicioglu

Content

Risking low-tech hype when turning the high-tech bias upside-down. Towards final reporting of PILOT Work Package 2

Trond Einar Pedersen
(NIFU-STEP, Oslo)

The PILOT project has entered its final year, a year that is to be dominated by the finalisation of papers "in the pipeline", writing of final reports, synthesis and work on policy implications, and most importantly promotion and communication of the results. This Newsletter article discusses the educational difficulty of avoiding bias in the communication of the results of the PILOT project, and it exemplifies with some policy implications of work package 2, which is the macro level analysis of the impact low-tech industries have on economic growth and innovation in Europe.

The Brussels conference in the final days of June 2005 (see p. 26 below) is one of the main arenas for promotion and communication of project results. In this process of communicating PILOT's message, there is need for caution. Critics of the specific focus of the project – low-tech specificities in terms of growth and innovation – are inclined to call attention to possible bias in our message. In our eagerness to bring nuance to the so-called high-tech hype or high-tech argument, we run the risk of advocating the opposite unbalance – low-tech hype. It is our conviction that Europe's economies, European policy makers and the European research community will profit by a balanced perspective to how European economies innovate and grow. The PILOT project adds to the knowledge base on which policy for economic prosperity can be developed.

Even though we are constantly aware of the need for educational credibility in our work, we have concentrated on delivering data and results, and we have mainly been doing it internally in the PILOT project consortium, in interaction with similarly disposed researchers. Preparing for a conference where the message is presented to external stakeholders renews the issue of educational credibility. In work package 2 we are currently busy making a needed final progress in terms of writing papers and preparing for presentation in Brussels. The need for caution concerning credibility applies to the PILOT project in general, and to work package 2 in particular, where we study the aggregate significance of low-tech industries in industrial structure, economic growth and innovation.

Let it be clear once and for all. The PILOT project was not initiated because of hostility towards so-called high-tech industries or research and development intensive industrial activities. The researchers in the consortium are not by any means against the biotechnology industry, the telecommunications industry or other industrial activities be-

longing to the so-called high-tech industries. However, the PILOT project and its partners find meaning in *bringing nuance* to innovation research and science, technology and innovation policy, in particular the perspective that maintain that high-tech industries are the main engine of growth and innovation in Europe. Our main task is to challenge the high-tech argument – the conventional wisdom that so-called high-tech industries dominate in advanced economies, by means of their innovation, and by means of their contribution to growth and structural change.

In some more detail, the overall objective in PILOT's work package 2 is to complete a macro level analysis of the impact low-tech industries have on economic growth and innovation in Europe. This implies using the analytical and statistical concepts developed in PILOT's work package 1 for a re-interpretation of empirical analysis of economic growth and knowledge formation, in turn aiming at a better understanding of the relationships between innovation and economic growth. From the perspective of work package 2 bringing nuance to the high-tech argument implies in reality giving emphasis to the role and significance of the industrial sectors that tend to be neglected in innovation research and innovation policy. But it also implies adding emphasis to the relative role and significance of high-tech sectors. Our main working hypothesis is that the role and significance of low-tech sectors are generally underestimated. Or, to turn it the other way around, that the role and significance of high-tech sectors are generally overestimated. A good example of how strong the high-tech argument is in practice is when we look at R&D or innovation policy priorities across European countries. It is our observation that the majority of them are focused on high-tech. Consequently, if we compare the significance of low-tech industries in European economies with the low attention the same industries are shown in policy making, we arrive at one of the simple policy implications that can be derived from the Pilot-project. The low-tech industries need to be taken seriously as crucial economic players in European economies. There is urgent need for developing innovation policy for low-tech industries. A major task in the remaining year of the project is to map and analyse policy dimensions of the results, and to bring details to policy issues and policy implications.

We would be the first to agree that the task of challenging the high-tech argument is partly a question of perspective, presentation, interpretation and even rhetoric. Our findings on structural change and growth, which can be found analysed and discussed in the NIFU-STEP contribution (by Sandven, Smith & Kaloudis) to the forthcoming book introduced below (p. 24), may certainly be subject to criticism regarding presentation and interpretation of the data. Let us give an example.

Addressing one of our main tasks, the identification of growth patterns of Europe, we are confronted with the question of documenting and assessing growth and structural change in the economy. An important question here is:

What is structural change? When is structural change substantial or significant, and when is it rather not so substantial? There is need for some criterion or frame of reference for evaluating the magnitude of growth and structural change. What does a significant change in structure mean?

The answer is far from straight forward and it is certainly dependent on the perspective one takes. It is possible to argue that a significant change in industrial structure has occurred if high-tech doubled its share of manufacturing in a generation (25 years). We are in fact quite close to find ourselves in that situation. High-tech industries have experienced high rates of growth. An extrapolation of the numbers starting in 1980 on growth of high-tech manufacturing industries' value added indicates that the value is going to be doubled around 2010, after 30 years. The assessment of the significance of this trend would, however, depend on the initial share from which the doubling occurred, and even more importantly it would depend on what the share was calculated on basis of. Changes in shares cannot only be seen within total manufacturing, because manufacturing industries in most countries only represent around 25-30 percent of the total economy. There is need for considering the whole economy, i.e. including service industries, before we can say anything substantial about growth and structural change.

Taking the rising share of service industries in the whole economy into consideration brings nuance to the argument. While total manufacturing employment over the last 20 years has experienced a 5 percent decline in share of the total economy employment, services industries experienced a 9 percent increase in the share of total employment. In other words, the doubling of high tech manufacturing industries as share of total manufacturing is occurring in a context where total manufacturing is loosing shares to services industries and the economy as a whole. The story is of course then, critics would argue, that it is the low-tech industries that contribute to the decline in manufacturing industries' share. It is evidently true, in isolated terms, high-tech manufacturing industries grow and low-tech manufacturing industries decline. But since we have to include services industries in the whole calculation, the relevant question is rather whether it is in high-tech services we see the strongest increase at the expense of low tech industries? The answer is no. The strongest increase within services industries is in what we would call low tech business services (wholesale and retail trade) and in public services.

The example given belongs to the nitty-gritty subtleties of the more comprehensive argument that we are attempting to make. It shows that it is of crucial importance to treat the numbers with caution. The detailed statistics are definitively important, in particular in situations where indistinct numbers may become the source to claims of bias in the overall message. It should therefore be of highest priority to make sure that

the presentation of statistics is done with conviction. The ultimate test of this is linked to how critics and skeptics interpret it. It is our expectation that a critical debate will continue at the Brussels conference in June 2005.

In order to understand the argument we are making there is need for more contextual information. The overall background for our argument is the observed need for a critical assessment of the very widespread and influential view of economic growth as mainly linked to high tech industries. Partly there is a more general view of high tech industries also being the high growth industries, so that there will more generally be structural change in the direction of more high tech industries. But partly there is also here a concern about the competitiveness of national economies. The low tech industries are increasingly facing competition from low income economies that are able to compete on price because of much lower wages than those that prevail in the high income economies. The dominant economic view recommends that to keep up their standard of living, the high income economies must consequently relocate resources away from the low tech industries and over to high tech industries where the low income countries simply do not have the competence to deliver products of sufficient quality.

This perspective to how economic growth occurs and how growth is linked to structural change also embodies more specific expectations, on the one hand related to broader societal change such as institutional arrangements, i.e. the set up of regulation regimes, and on the other hand to ICT, in particular the production, diffusion and use of ICT. One version of the former issue about institutional arrangements prescribes that in order to accomplish the reallocation of resources required one has to promote a policy of deregulation, focusing on privatization, competition and the free functioning of the market mechanisms. This view often found in publications from the OECD (see, for instance, Bassanini et al p. 29) Thus, in this view stagnant economic performance is often found in countries 'that have been more hesitant in embarking on bold structural reforms' (Bassanini p. 28). However, there are also many who challenge this neo-liberal consensus, claiming that there are other viable roads to economic growth. For instance, Robert Boyer contrasts the deregulated economies to a more social democratic approach, claiming that 'deregulated economies explore a science-pushed innovation, along with external labor flexibility and significant inequality in terms of competences,' whereas 'social democratic countries develop a cooperative approach to the knowledge-based economy: rather homogeneous educational level, lifelong learning, negotiation by social partners of the consequences of innovation and collectively organized labour mobility' (Boyer, p. 1. See also Amable & Petit, and Stiglitz for a view opposing the 'deregulation mantra').

One's approach to these issues will be connected to how one relates to the Schumpeterian notion of capitalist development as 'creative destruction'; or

rather, how much weight one attaches to the destruction part of this, i.e. destruction of the old as opposed to transforming and building on the old. If one believes that radical changes in industrial structure are necessary, one might be more inclined to favour deregulation and 'pure' market mechanisms, where people have less power to defend their jobs. However, if one thinks that more gradual transformations are viable or even preferable, emphasising building on existing activities and competencies rather than doing away with them, more complex institutional arrangements may seem more relevant.

A central question in this connection will be to what extent engaging in ICT producing sectors is important for economic growth, and to what extent the *utilisation* of ICT in other sectors of the economy is what matters most. If engaging in ICT production on a large scale is essential, this would lend support to the more traditional high tech focus, implying reallocation towards the (high tech) ICT producing sectors from other sectors of the economy, and perhaps from low tech sectors in particular. However, if the utilisation of ICT throughout the rest of the economy and not so much engaging in ICT production itself is what matters, this would be more compatible with continued involvement also in low tech industries, provided these industries are continuously transformed through the utilisation of ICT. According to Boyer, intensity of ICT utilisation seems to be the crucial factor here (Boyer, p. 2 and p. 25), not ICT production. This is also the conclusion reached in an IMF working paper by Bayoumi and Haacker (2002).

It is against this background we look at developments in the low-tech industries compared to the high tech industries and also the rest of the economy. What impact do low-tech industries have on growth and innovation? We have seen that there is substantial variation across the countries that we have studied when it comes to the shares of output and employment accounted for by high-tech respectively low-tech industries. However, with the data we have utilised we find no evidence of a simple relationship between technological intensity of the industrial structure and economic growth at the national economy level. Thus, we find no simple relationship to the effect that the high tech economies are also the high growth economies. Economies with a high share of their production and employment in the low-tech industries do not tend to have any worse growth performance than the high tech economies.

In line with the theme we started off with in this article – caution concerning possible bias in the results and communication of the message - these results are above all useful in our process of bringing in nuance to the prevailing perspective, which we think of as high tech biased.

In addition to our investigation of industrial structure and growth, which we of course have done within the prevailing regime of statistic categories and related indicators, one of the other tasks of work package 2 in the PILOT project is to evaluate and improve existing indicators to measure innovation and growth in low-tech industries. As a joint product of work

package 1 and work package 2 in the PILOT project we submit a paper to the mentioned Brussels conference, making a basic argument concerning innovation and growth indicators and how they need to be developed in order to comply with the results of the Pilot-project. We are not diving into the details of the argument of that paper (Laestadius, Pedersen & Sandven, Towards a new understanding of innovatitvity – and of innovation based indicators). As a final point in this article we will only make one of the most basic points that the paper maintains. It is the point that indicators have to be developed and exploited on enterprise level rather than on industry level. The main lesson from the paper is that exploitation of indicators using enterprise level adds very interesting policy relevant details to the analysis, namely the identification of high-tech or high-end firms in all industries.

References

Amable, B.; Petit, P. 2003**, The diversity of social systems of innovation and production during the 1990s.** In: Institutions, Innovation and Growth, ed.J.-P. Touffut, Cheltenham, UK: Edward Elgar.

Bassanini, A.; Scarpetta, S.; Visco, I. 2000, **Knowledge, technology and economic growth: Recent evidence from OECD countries.** Economic Department Working Papers, no. 259, OECD.

Bayoumi, T.; Haacker, M. 2002, **It's not what you make,it's how you use IT: Measuring the welfare benefits of the IT revolution across countries.** IMF Working Paper WP/02/117.

Boyer, R. 2004, **New growth regimes, but still institutional diversity.** Socio-Economic Review, vol. 2 (1), 1-32.

Laestadius, Pedersen, Sandven**, This is innovation! Critical review of innovation as concept, available indicators and how we should measure it,** paper to the Pilot Brussels conference 29/30 June 2005, Low tech as Misnomer The role of Non-Research-Intensive industries in the Knowledge Economy

Sandven, Smith and Kaloudis**, Structural Change, Growth and Innovation,** forthcoming in Hirsch-Kreinsen/Jacobson/Laestadius, 2005 (eds.), P. Lang

Contact

NIFU-STEP, Oslo

Trond.Einar.Pedersen@nifu.step.no

Work Package 4, Research Overview

Andrea Bardi, Francesco Garibaldo, Matthew Hancock (IpL Bologna)

Is local embeddedness of firms a thing of the past? Does globalisation and the hyper-mobility of capital mean that firms are no longer rooted in local communities? Do firms now roam the globe in search of low cost inputs, or are local and regional territories a source of competitive advantage, helping embedded firms compete in the new, global marketplace?

The answers to these questions are crucially important for businesses and policymakers alike. The answers have significant implications for firm behaviour and governments seeking to retain and provide support for businesses, effectively promote the creation of new businesses and boost employment. These issues were at the core of work package 4 (WP4), coordinated by the Institute for Labour. It built on the research done for work package 3. In WP3 researchers analysed innovation and knowledge creation at the level of the single firm. In WP4 the unit of analysis was enlarged to include the value chain and regional network.

WP4 partners each picked one company from among the case studies they conducted in WP3. That company became the starting point for the study of the value chain and regional network. Researchers then investigated the nature of that company's relations with clients and suppliers, focusing on the 'value chain' or series of up and downstream relationships. Next, researchers examined the particular company's web of relations, beyond the value chain; for example relations with other companies, agencies and institutions making up that company's 'regional network'.

The value chain analysis was based on a series of interviews with the focal company, one client and one supplier. Interviews were based on a commonly accepted guideline. In addition, for each of the companies studied in the value chain, researchers filled out a checklist regarding the nature of the relations among the companies and the degree of integration of the supply chain, providing the WP4 coordinators with qualitative and quantitative data on the value chain.

Researchers then proceeded to map the companies' regional networks, interviewing the companies, agencies and institutions (including government, technical schools, labour unions, and business associations) that make up the company's regional network of relations. These interviews also were based on a common interview guideline. Interviews regarding the regional network gave the WP4 team data regarding the firm's degree of local or regional embeddedness, a term we will clarify later on.

As coordinator, the Institute for Labour produced a larger summary and analysis of the results from individual partners' reports, including policy recommendations. What follows are some excerpts of the analysis and conclusions drawn in the WP4 Final Report. The results of WP4 will

provide inputs for work packages 1, 5 and 6 and will be presented in a paper at the PILOT conference in Brussels.

Value Chain

The first step in our analysis was to look at the data, reports and questionnaires regarding the relationships among companies in the same value chain. We analysed data from 43 firms in nine different EU member-states, including Poland. We were able to make some interesting observations about firms in low and medium tech industries (LMTI) and innovation and knowledge creation.

An analysis of the value chain makes clear the strategic role of LMTI firms in terms of innovation in high tech companies. In different cases we saw how LMTI companies actually boost high tech companies' innovative capacity. Often we found cases where the low tech firm, the user of the technology, pushes a high tech supplier to innovate through requests to improve an already existing product, or develop a new one. In other cases, formally low-tech and medium low-tech companies (as measured by expenditures on R&D) turn out to be high tech companies in disguise. These are companies that exhibited the capacity to modify high tech equipment, and to work closely with clients and suppliers on product design and process innovation.

On the other hand, conflicting tendencies regarding physical proximity and the supply chain emerged. These tendencies depend largely on the type of product produced. On one hand, you have cases where the trend is toward greater globalisation of the supply chain. On the other hand, as in cases where the relationship between clients and suppliers is based on JIT or when personalised and non-standardised solutions are required, proximity between the company and its suppliers is important, if not essential.

In addition, a third type of proximity emerged: cultural proximity. This is not based on location, but on the compatibility of different firms' particular organisational cultures and systems.

Suppliers turned out, often, to be important, if not key, contributors to innovation. In our cases innovation was rarely confined to one firm, instead occurring as a result of cooperation between supplier and client. In this case, early involvement of the suppliers is crucial and a high degree of cooperation is a factor for strategic success. This was also often the case with equipment suppliers, who are often important for productivity and innovativeness in terms of knowledge-transfer.

We were also able to see some of the impacts of globalisation reflected in the value chain analysis. The trends toward greater concentration and the increasing role of multinational companies in local economies reduces the role of SMEs. In some cases this leads to a situation in which, though they still exist, clusters and agglomeration economies are more and more a holdover of the past. This does not always translate into decreased importance of local embeddedness. In some cases foreign investors, like pension funds, define their acquisition strategy based on the level and nature of existing regional resources, like a network of locally embedded, small and medium

companies specialised in a particular phase of the productive process.

Something else that became clear through the value chain analysis is the critical importance of the social context for technological evolution and innovative capacity. Clusters and fragmented economies need strong intermediate institutions and institutional infrastructure to provide local collective goods. Such institutions are most effective when created through the combined effort of public institutions and local stakeholders, creating the kind of social context that strengthens the innovation process. When dealing with SMEs, these kinds of institutions are also important supplements to the tacit knowledge-base of the enterprise, by providing support for R&D and more systematic basic research and development.

Regional Embeddedness

The discussion on local and regional embeddedness of firms is fundamentally linked to that of globalisation. Regarding globalisation, there are very simplistic narratives on both sides. It is either a process of overwhelming quantitative and qualitative homogenisation of the world; every kind of idiosyncratic feature will be more and more disregarded and loose any real market relevance; the manufacturing process will become more and more mobile, irrespective of the cultural and social differences at the country and sub-national level among different nations or regional areas. Or there is the narrative in which, despite globalisation, “places” do matter and, in the long run, only some activities will actually be globalised. The term “glocal” was introduced as a compromise view, stressing the very positive and optimistic view that the two drivers can support each other in some kind of virtuous circle. But “glocal” is an omnibus concept with very little, if any, analytical power.

A realistic account of globalisation looks different. Globalisation is a process of dynamic connections mostly of previously embedded economies; the setting up of these new and broad connections leads to a new positioning of these economies – national or sub-national – that can produce both a destructuring of their territorial features or a different kind of embeddedness. The very existence of a division of labour on an international scale is not brand new in itself – this was the starting point of both Smith and Marx. In the 19th century there were very good examples of the international division of labour, for instance the cotton industry that related distant places.

The novel aspect of globalisation is to be found not in the existence of an international division of labour, but in the distinction between multinational and transnational firm: the multinational division of labour means coordination, on a global scale, of activities of corporations that remain embedded in national economic systems; the transnational division of labour, on the other hand, means a world wide, intra-firm division of labour. In both contexts the dynamic between global and local, regional embeddedness of firms and increased internationalisation is present.

This complexity is reflected in the behaviour of the firms that PILOT researchers studied, specifically in the analysis of the regional network. While all the firms were moving toward increasing levels of internationalisation, this does not always imply placelessness. Indeed many of the firms maintained a relative degree of embeddedness while at the same time internationalising. Our firms clearly demonstrate the fallacy of the equations '*low medium tech = structural weakness to globalise*' and '*low medium tech industry = local embedded processes*' The actual picture is much more complex and dynamic. This opens up many different possibilities for businesses and policy-makers. Companies who want to compete globally can do so by using local embeddedness as a competitive factor, by pushing for taking roots. A process that can be supported by local and national policy makers.

Finally, though our sample is not geographically distributed in or around global cities, they are found partly in global city regions and in new regional or sub-regional centres. In this case 'regional' is a subdivision of global and not the administrative unit of a country. In some cases a process of redefinition of the global hierarchies of different places is quite evident. Our sample is a very good illustration of the dynamic of centralisation and dispersal, and of the redefinition of centrality and hierarchies among different places.

Conclusions

Successful LMTI firms are going global though along different paths: either by strongly reducing their own degree of embeddedness in a specific territory, or by utilising it as a competitive asset on the world market.

The devaluation of the global value chain is a very difficult strategic issue that must be confronted by businesses and policy-makers alike. Generally speaking the overall process of concentration of most of the business activities leads to a restructuring of the value chain with a trend towards the devaluation of basic manufacturing activities in favour of the final producers or distributors. In this case the company's position along the value chain is of critical importance. LMTI firms are distributed at different levels, so no single recipe exists for all. Basically the firms in the upper part of the value chain (that is, firms that produce a greater share of total value added) of that specific branch of industry are not so keen on designing new strategies for moving up the value chain. For others moving up is a matter of survival. Increase the share of total value added means acquiring the capability (managerial capability, organisational renewal and workforce skills) to handle customised product/service innovation. This presents the necessity (and problem) of moving to a new degree of integration with clients and suppliers. What is really new is the fact that clients, in general, and in many cases also suppliers, are no longer bound by geographical proximity. So again the problem is how to cope with the globalisation trend.

Based on the results of our research local policies for the creation of public goods in

support of the innovation process and operating on all sets of environments to which a firm belongs, must be stressed. Such policies are of overwhelming importance in order to achieve a balanced dynamic between global and local.

The crux of the argument is that technology and innovative capacity evolve also thanks to the social context. Generally firms, but namely small and medium LMTI firms, are very sensitive to the solidity of the institutional set up both of the national and of the sub-national dimension. Solidity here means a mix of physical, available infrastructures and of educational, vocational, knowledge creation, diffusion and brokerage facilities and institutions.

Another policy problem is the circulation of knowledge. Low and medium tech firms are actually utilising high tech knowledge in original and often informal ways. To facilitate these processes of knowledge exploitation the presence of a dense network of institutions favouring knowledge circulation is critical. The policy problem is, therefore, to support capacity building for low and medium tech SMEs to access knowledge resources in a critical and selective way.

Finally, what is clear from the cases analysed in WP4 is the enduring importance of LMTI firms for sustainable development patterns. Policymakers need to create a positive coupling of the presence of LMTI firms with the long standing economic and social sustainability of an industrial sector in a specific country or region.

There are two main reasons for this association. First of all the employment factor: now and for a long period to come, the employment multiplier of the manufacturing sector in general, and of the LMTI firms in particular, is one of the highest among many different industrial activities. A decline among these kinds of firms in a specific territory will lead to a high level of unemployment. The second reason has to do with the very peculiar role of LMTI firms in the knowledge dynamic. They are channelling, intermediating and fusing two different flows of knowledge: one based on social capital, the uniqueness or the idiosyncratic feature of a specific industrial culture, which is mainly tacit, and the other coming from scientific and technological development on a broader social scale, mostly global, which is mainly codified. The fusion of theses two knowledge flows produces new tacit and new codified knowledge. This is not a spontaneous, linear and automatic process. It depends, rather, on the social environment, on the soundness of the industrial environment, on the sophistication of the organisational setup, on the nature and the scope of the workers' skills, on the nature and the effectiveness of cooperation among the different actors at the micro, meso and macro level, on the soundness of the firms' strategies, and finally on the right public policies.

Contact

Istituto per il Lavoro Bologna

a.bardi@ipielle.emr.it
f.Garibaldo@ipielle.emr.it
m.hancock@ipielle.emr.it

Work Package 5, Policy for Low-Tech Industries

David Jacobson and Kevin Heanue (Dublin City University)

This article reports on some of the policy-related results of the PILOT research. The Irish partner in PILOT (Dublin City University) is responsible for reporting on the results in relation to policy of the PILOT project. This article is an interim report on the policy work package, WP5.[1]

Various contributions to the PILOT project have shown that there tends to be an over-emphasis on high-tech and R&D, to the relative detriment of innovation in so-called low-tech industries, in innovation policy. The dominant view is that there is a strong relationship between scientific and advanced technology research on one hand, and industrial competitiveness on the other. From this it follows that science, technology and innovation policies should focus on scientific and advanced technological research. This kind of research is what is generally measured, on the basis of the OECD definitions, by R&D expenditure. At the micro level, this is inappropriate for a number of reasons, including:

- Science does not always lead to innovation
- Learning and innovation can take place without R&D, e.g. through acquisition of tacit and practical knowledge, and through diffusion between firms
- Non-research-based innovation sometimes leads to scientific discovery
- There is learning and innovation in so-called low-tech industries
- Some low-tech industries remain significant and even continue to grow in Western European economies

Among the problems is that in many instances innovations are unrelated to R&D; they are born in the production department (factory floor) itself; in many others are suggested by customers, or by suppliers. Some innovative firms do not have research departments and, thus, apparently no R&D expenditure at all. To quote Lundvall (1992), 'R&D expenditure is not the only kind of relevant input to the process of innovation — learning in connection with routine activities may be more important than R&D'.

The micro examples of what goes on at the level of the firm aggregate to raise serious questions about the assumed relationship between R&D and innovation in a country or region. It is clear, then, that as an alternative to – or at least in addition to – R&D expenditures, other indications of innovativeness and of the level of technology in an economy in general, must be used. Among other such indicators commonly used are (Andreosso & Jacobson, 2005): number of researchers employed nationally; number of patents, measured in various ways to take ac-

[1] This article is an abbreviated version of our chapter "Implications of Low-Tech Research for Policy" in the book Low-Tech Innovation in the Knowledge Economy.

count of national regulatory differences; and trade in high-tech products. All of these have various weaknesses, among which is that they all exclude innovations in so-called low-tech industries. In short, they all focus closely on R&D, either as an activity in itself (e.g. number of researchers) or as an element defining other indicators (e.g. patents and trade in high-tech products). Moreover, even though there is an increasing awareness of the complexity of the innovation process (as evidenced for example by the growth in the 'systems of innovation' literature), policy remains focused primarily on R&D (Mytelka & Smith, 2002).

Interim Findings of PILOT Case Studies

Relative to funding for R&D and science-based innovation in general, both at the EU level and at the various levels within member countries, very little explicit policy attention is paid to innovation and knowledge formation in low-tech industries. There is thus a reasonable hypothesis that policy towards innovation and knowledge formation in low-tech industries can be improved.

One way in which to study this idea– and that on which we concentrate in the remainder of this paper – was through the PILOT case studies. It was an inherent objective of the case studies of the individual firms to elicit information on what policies impacted on these firms, either positively or negatively. In addition, interviewees in the companies were asked for suggestions as to what new policies or changes in existing policies would assist their companies and industries.

Due to lack of space we present here only the results in relation to the policies that were reported by the companies as impacting on them. They are listed under headings which are a rough categorisation of policy types. There is inevitably some overlap. Also included are suggestions from firms as to new policies or changes in existing policies. In the more extensive report on which this paper is based we have additional sections on positive and negative indirect policy impacts and company responses about the level of governance – EU, national, regional and local – at which the policies impacting on them are implemented. Some of these omissions are, however, included in the summary tables at the end of the section, respectively on positive and negative impacts of policies and normative perspectives on policy.

The Impact of Policy on Low-Tech Companies: Case Study Results

The responses from the interviews confirmed that a variety of policies impacted on the case study companies. The responses can be grouped under the following headings 1) Funding Policy, 2) Public Support Policy, 3) Innovation Policy, 4) Labour Market Policy, 5) Cooperation Policy, 6) R&D Policy and, 7) Environmental Policy.

1) Funding Policy

Funding policy is defined here as direct funding and subsidies including taxation-based mechanisms towards any activity. Specific examples of positive impacts include finance towards the purchase of new machinery (engineering, Italy) and subsidies for job-training courses, fund-

ing to cover the cost of temporary labour, competitions encouraging product innovation, financial incentives promoting technological innovation and tax incentives to hire new personnel and increase industrial investments (clothing, Italy). The Irish case study firms (furniture, engineering) had all, at different stages, availed of direct financial assistance from various enterprise support agencies towards training, marketing and the purchase of machinery and equipment.

In some cases it was argued that tax incentives and export subsidies were focused on priority high-tech sectors and the food industry, at the expense of other industries (packaging, Latvia). The retention of such financial instruments where they already existed, or their instigation where they were absent, was considered important by many case study firms. This included funding for the recruitment of new staff (especially young people), innovation, new machinery (printing, Poland) and subsidies to help attend trade fairs (engineering and clothing, Italy). Another example was funding towards investment in continuous technological and equipment innovation, and in areas such as pre-competitive R&D (engineering, Italy). On a more general level, it was also argued that enterprise support agencies needed to help companies take a more strategic view of their business environment (engineering, Ireland).

2) Public support policy

If we define public support policy as the broad array of policy initiatives directed at firms, there is a need for consistency, predictability and coordination in these policies. For example, the uncertainty about the availability of funds is seen as a substantial hardship in planning corporate innovation and R&D projects (textiles, Austria). In addition, specific policies such as environmental policy are sometimes seen as arbitrary and selective in the manner in which they impact certain companies (textiles, Austria).

In some cases, poor communication between the authorities and low-tech companies probably accentuated a lack of knowledge of the policies relevant to those companies (printing, Poland). By contrast, in Italy (engineering), people from the case study company attended a course to help them take better advantage of available support policies. In other instances, neither negative nor positive policy related issues specific to that company were reported (furniture, Germany).

In contrast to calls for additional or continued public support policies, some companies favoured less intervention by the state in industrial activity (printing, Poland). Moreover, it was suggested that the influence of policy should be limited to the smallest possible scale, except possibly for financial assistance from the EU (meat processing, Poland) and that business should stand on its own without public support (packaging, Latvia).

The need for a public policy designed to help low tech companies deal better with the trauma of generational changes in the work force emerged from the Italian case studies. Such a policy should be aimed at helping companies create effec-

tive knowledge management systems so that when one generation retires, all of that generation's knowledge is not lost.

3) Innovation Policy

An Austrian textiles company viewed innovation policy with a strong focus on sustainability as a fundamental requirement for both corporate success and economic growth. Acknowledging that innovation as a competitive strategy was increasingly important, a Polish engineering company suggested that a national innovation policy was needed for Poland, which could provide grants for companies introducing innovations to compensate for any possible losses incurred if the innovations were unsuccessful.

4) Labour Market Policy

4.1 Need for hybrid qualification

In many of the companies, the bundle of skills needed by their workers is changing; craft based competences and skills are becoming less important or obsolete while at the same time the ability to operate computer controlled machines is becoming more important. Currently, however, there is an absence of the provision of this type of 'hybrid' qualification, a lacuna that contributes to recruitment problems (paper, Germany). This lack of tailor-made curricula by education/training providers was a common theme with several other companies (engineering, Finland; engineering, Ireland).

4.2 Need for assistance in training

Allied to the point above, many companies reported that most of their training has to be done in-house and/or relies on work-place learning (engineering, Italy; engineering, Ireland; engineering, Finland). In the first years of employment, this represents a significant drain on the company – financial aid from the state or public agencies would facilitate the hiring and integration of more workers, especially young people. Compounding this situation, some firms reported that there is a relatively long training period required for their operatives – a period significantly longer than for operatives in 'high-tech' companies (engineering, Ireland; furniture, Ireland).

In some cases, companies in conjuction with outside agencies have developed specialised vocational training. A Spanish metal engineering company cooperates with the National Employment Office INEM, which certifies the qualifications of the trainees. A similar situation arose in Ireland where a precision engineering company was involved with establishing a Training School in conjunction with FÁS, Ireland's national training and employment authority, to train people in the range of specific skills needed by that company, and that industry.

4.3 Recruitment difficulties

Many of the firms reported recruitment difficulties. In some instances, the problem was an inability to recruit sufficiently skilled people due to the mismatch between company requirements and the training provided by education institutes (paper, Germany; see also section 1.4.2 above). In other cases, recruitment problems arose because for many of the case study companies (furniture, Ireland;

engineering, Finland; paper, Sweden) the general image of their industries created problems with recruitment. One firm, an Irish furniture company, raised the question as to whether publicly supported initiatives could be undertaken to improve the image of the furniture sector and thereby stimulate interest in that industry as a career choice. In other cases, this inability to attract local labour to a firm is overcome by hiring immigrant workers; this is the strategy of the other Irish case company in the furniture industry.

4.4 Immigration policy

The cost of work permits and the associated bureaucracy in employing non-national workers was an issue for at least one company (furniture, Ireland).

5) Cooperation Policy

As with most other policy areas, the case companies reported a variety of experiences, even within the same country. In Spain, one engineering company has very little cooperation with public R&D institutions. In contrast, a second company maintains strong links with the Supreme Council of Scientific Research (Spain's main research centre, part of the Ministry of Science and Technology).

The Spanish case studies also indicated that a positive initiative taken by several municipalities is the creation of technology parks where engineering firms, research laboratories, technology centres, etc. are brought together. Start-up companies or firms that are new in the region are given support and business people can get to know each other; this is important in a region where previously they had little interaction. This situation also makes it easier for small firms to get together and collaborate on projects, which as individual entities they would have had to ignore.

Several companies reported international cooperation facilitated by participation in EU programmes. Such programmes included Eureka, ADAPT, and, in Ireland, Skillnets – a programme funded out of the Irish National Training Fund – to encourage groups, clusters and networks of enterprises to collaborate in establishing training and learning activities in the workplace, "leading to enhanced skills, employability and competitiveness" (Skillnets, 2005).

There was much evidence of networking, both stimulated by policy and otherwise. Particularly dense networks among firms, technical universities and funding agencies were reported in Finland. There were specific instances of international collaboration reported by an Irish (furniture) and a Polish (engineering) company. A German metal engineering company, although not involved with collaborative production or development, is involved in a cooperative marketing venture with other local steel tube producers.

A need for policies to encourage the creation of new, and the reinforcement of existing networks between companies in the same sector, and between companies and other institutions such as universities, emerged from the Italian case studies. In contrast, although other companies considered such policies potentially advantageous they were not considered crucial (engineering, Ireland). No such policies, and/or no knowledge of such

policies emerged in German (furniture) and Polish (printing) firms.

6) R&D Policy

As with other policy areas, the attitude of case study firms to public assistance for R&D was varied. In some cases, firms reported that public resources to promote R&D were not focused on their industries (engineering, Sweden). This particular case was due to the Swedish policy of trying to establish large research centres in accordance with a cluster and innovation system policy, which directs resources to certain regions and sectors of industry that did not include the case study firm.

Even within the same sector and country, opinion on the accessibility of public support initiatives to promote R&D was divided. For example, one Irish engineering firm reported that the main publicly financed R&D initiative was inappropriately devised for SMEs like them. In contrast, another Irish engineering firm had three active R&D projects sponsored under the same initiative.

For one Finnish engineering company the availability of funding for R&D projects is not a problem. In fact, R&D programmes are widespread across most technology fields, especially at the intersection of electronics, ICT and machinery.

It was suggested by two companies (Irish and German, both engineering) that initiatives to support the investigation of technological problems relevant to companies by final year students at universities and technical colleges would be useful. Such initiatives would be a relatively cheap way of facilitating access by firms to scientific expertise, who otherwise do not have the resources to do this work.

7) Environmental Policy

Environmental policy is particularly interesting because it is reported by some firms as having an extremely positive impact, particularly in the context of process innovations, and by others as having a negative impact, for example increasing costs.[2] In one case, environmental policy was reported as the most important policy impacting positively on the company (paper, Germany); through public subsidies for reduction of environmental impact, the company was able to introduce major process innovations.

Another German company (engineering) also argued that environmental policy had an important positive impact on the company. On the one hand growing public investments in new and improved sewage treatment systems and plants led to growing markets for the company. On the other hand, new legal standards for valves, implemented because of environmental policy, provided important impulses for product innovation.

In Ireland, environmental regulations requiring reduced solvent emissions led one of the furniture case companies to introduce a new finishing system more appropriate to water-based lacquers, a process innovation that helps underpin

[2] This confirms the findings – in relation to a high-tech industry – of Hilliard and Jacobson (2003). The paper argues that the key differentiator between firms that gain and those that lose from rigorous environmental regulation is dynamic capability.

the characteristics of their niche market product. In Spain also, an engineering company was forced to innovate due to legislation on gas emissions for aluminium production.

In some cases, however, environmental policy was viewed as imposing costs on firms leading to a reduction in competitiveness (printing, Latvia; textiles, Austria).

Summary of Findings[3]

Table 1: Policies with positive impact on the case study companies
Subsidies for equipment, training, innovation; tax incentives to hire certain types of personnel; cooperation with training agencies in courses and certification (Spain, Ireland); local authority support for technology parks (Spain); international cooperation through EU programmes (Eureka); support for cooperation nationally (Adapt, Skillnets); environmental policy (Germany, Ireland); international promotion (Swedish design); EU funding (new members)

Table 2: Policies with negative impacts on the case study companies
Some evidence of bias in favour of high-tech or other specific sectors (Sweden); training is a problem – time, funding, mobility; mismatch between training and skill needs; environmental policy increases costs; restrictive regional/ spatial policy; new EU members (existing members); co-funding on EU programmes (new members).

Table 3: Normative perspectives
Call for a sustained, predictable, pro-innovation policy; need for a 'hybrid' skill certification; recruitment problems because of image of industry – need for change, or easing of employment of immigrants; need for policies, or publicity about policies, on networking; funding agencies should help companies take a strategic view of their business environment; final year students to investigate companies' technological problems; call for local low-tech innovation policy (Poland); training for EU funding application.

[3] Note that we in general insert the case companies' home country only where the point was raised only in one country.

Discussion

As pointed out by Mytelka and Smith (2002), there has been a co-evolution of theory and policy in Europe that seemed to enhance both. To the extent that empirical issues, and in particular those relating to the actual development of firms and industries, impinged on this co-evolution, it was through the research of the academics and the perceptions of the policy makers. The result was that while the rhetoric increasingly incorporated the eclectic nature of the learning and innovation processes across firms, industries, regions and economies, elements of the linear model remained, leading to a continued bias in favour of high-tech, R&D-based innovation.

With this as backdrop it was interesting to examine the ways in which firms in the so-called low-tech industries, across Europe, experienced policy. We wanted to know, for example, what policies, at what levels, the firms found to have been supportive of their efforts to remain competitive, and in what ways? Were there policies, on the other hand, that the

owners or managers in these firms perceived to impede their efforts to remain competitive? Finally how, if at all, would these findings relate to the issues that dominate the academic and policy realms as discussed above?

The most important result in the context of this paper is that there is little awareness of policies aimed specifically at innovation that is not R&D based. There is one possible – though minor – exception to this in that one Irish company had participated in an EU ADAPT programme. The impression, that the firms in the PILOT project perceived themselves as in some sense excluded from R&D policies, was reinforced by explicit responses from some of the firms that there was a lack of interest in their industry (forestry, Sweden) or that tax incentives and export subsidies were aimed at high-tech in particular, at the expense of other industries (packaging, Latvia) or that R&D policies were focused on large companies rather than SMEs (engineering, Ireland).

In contrast, a second Irish engineering firm seemed to be extremely successful in obtaining funding for R&D. It may be tempting to explain the difference through the fact that the latter firm is more medium-tech than low-tech but this does not cast much light on what differentiates firms, in the same industry and in the same country, where one does and the other does not obtain R&D funding. Size may matter in that the application processes are time consuming and where all personnel are fully occupied with existing business, in the short term the opportunity costs of devoting time to R&D applications may be too high. There may be other factors relating to differences in the products and processes that the two firms are involved in, or skill and knowledge issues like differences in dynamic capability. Such issues are discussed elsewhere in the PILOT project. The issue of main relevance in the policy context, is the starkly different ways in which the same policies are perceived by different companies.

The lack of awareness of policy support for innovation in LMT industries does not contradict the finding that many of the firms see various policies, at various levels, as being helpful. Table 1 summarises the findings in relation to policies that are seen to have a positive impact. National policies providing tax incentives and subsidies for various activities were seen as helpful, as were local policies to encourage science parks (Spain) and EU policies like the Framework Programmes and Eureka. For smaller countries like Ireland and Sweden, most of the positive policies were seen to be at the national rather than local or regional levels, for example Skillnets in Ireland and the Swedish Design promotion in Sweden. For larger countries like Germany, local and regional policies may be more important.

A key problem, reflected in a number of the points in Tables 2 and 3, relates to training and recruitment needs. The necessary training for the bundle of skills required by workers in the LMT companies is not readily available from mainstream providers. Second, many of the firms are experiencing recruitment diffi-

culties due either to the negative image of the industries or skills shortages.

To conclude, what emerges from the case studies is that there are combinations of real policy lacunae and lack of knowledge about existing policies. In relation to the former, the co-evolutionary process described by Mytelka and Smith (2002) will not by itself lead to the plugging of the policy gaps; research, results, and the feeding of these results into the policy process are an essential contribution to the process. In relation to the latter, improved publicity and information distribution, particularly among firms in the new member countries, will ameliorate the problem.

Contact

Dublin City University

david.jacobson@dcu.ie
kevin.heanue@dcu.ie

References

Andreosso, B. and Jacobson, D. (2005) **Industrial Economics and Organization: A European Perspective.** McGraw-Hill.

Hilliard, R. and Jacobson, D. (2003) **'Dynamic Capability, the Pharmaceutical Industry and Technical Change'.** Paper to the DRUID Summer Conference on Creating, Sharing and Transferring Knowledge, June, Copenhagen.

Lundvall, B.-Å (1992) 'Introduction'. In B.-Å Lundvall (ed.) **National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning.** Pinter, London.

Mytelka, Lynn K.; Keith Smith (2002) **Policy learning and innovation theory: an interactive and co-evolving process,** Research Policy, Vol. 31, pp.1467-1479.

Skillnets (2005) www.skillnets.com

New Book:

H. Hirsch-Kreinsen, D. Jacobson & S. Laestadius (eds.), Low-Tech Innovation in the Knowledge Economy Frankfurt: Peter Lang

Results of the project work and of related research will be published in a volume edited by Hartmut Hirsch-Kreinsen, David Jacobson and Staffan Laestadius. Publication is expected for June 2005.

In their introduction **Hirsch-Kreinsen, Jacobson, Laestadius & Smith** present a broad review of the issues underlying the PILOT project. They begin with an examination of the policy focus on high-tech industries and the related concept of the knowledge society and the location of production. This leads to a focus on knowledge itself and the relationships between science, knowledge and innovation. Sections on innovation in low-tech industries and regional localisation follow.

In their article on structural change, growth and innovation **Sandven, Smith & Kaloudis** challenge the argument that high tech industries drive growth, that growth in low tech is low and that low tech activities relocate to low wage economies. Using OECD manufacturing and trade data (1980-1999) they show changing economic structures in OECD economies, reflecting growth of services. Within manufacturing, however, structural change has been rather small. The slowness of structural change means that low tech and medium low tech sectors remain the largest components of manufacturing output and employment in OECD economies. Trade patterns for low tech sectors are examined, showing that changing domestic demand for low tech manufactures has largely been met by changing domestic production. There has been no trade-driven 'hollowing out'. It is argued that low tech industries persist because of pervasive innovation within them – they are constantly renewed by technological upgrading, which accounts for their survival and growth.

Laestadius discusses problems of classification and taxonomies of industries.

Bender introduces results of the work package 3 company case studies completed in summer 2004 as regards the innovation issue. These studies prove that innovation, that is, the ability to create novel products and/or processes, is a critical issue for the competitiveness of very many LMT firms. But the studies do not support the suggestion that low-tech firms have a special mode of knowledge formation or innovation. The article concludes with an outline of what became the starting point for a conceptualisation of non-science based innovation within the PILOT project.

In his second contribution to the book **Laestadius** argues for the development of a new innovation concept which is less focused on R&D than the available.

Robertson, Pol & Carroll assume that the incentive to develop innovations is a function of the speed at which the costs of development are recouped. The rate of innovation is therefore heavily dependent on the ability and willingness of potential customers in established industries to assimilate new products. As a result, policies to encourage innovation should target technological upgrading in established industries as well as R&D in innovating industries per se.

Hirsch-Kreinsen refers to the discussion on the emerging knowledge society. Firstly, the view that knowledge is clearly measurable is reviewed. Then, the concept of knowledge is discussed working out the specific features of the knowledge which is relevant to the low-tech sector. The specific knowledge base of low-tech companies is characterised as 'practical knowledge'. Subsequently, the author discusses organisational measures taken by low-tech companies to use and develop their specific knowledge. Finally, he raises the question of the future of low-tech industries.

Schmierl's paper focuses on the basis of knowledge formation in low-tech companies and addresses the question, how companies in low-tech sectors cope with the increasing competition from low cost- and low wage-nations. Following, he presents some evidence that R&D-intensity is an insufficient indicator for innovativity of firms. Thirdly, and to underpin his conceptual reasoning, empirical findings concerning complex processes of reorganisation (automation, division of labour, cooperation, personnel policy) in selected LMT firms are discussed in some detail.

In the 1990s the concept of networking was the focus of a significant amount of research, in particular, in the fields of economics and business organization. **Bardi & Freddi** examine the Italian industrial districts in light of this research, and explore how company networks can be the basis of a new model of development capable of meeting the challenges of global competition, while maintaining the level of social cohesion and well-being that characterise traditional industrial districts.

Heanue & Jacobson ask whether low-tech industries can survive in high-cost economies such as Ireland in an increasingly globalised world and whether embeddedness in local regions in advanced economies can contribute to the continued competitive advantage of successful low-tech enterprises. They examine two Irish low-tech industries, fabricated metal products and furniture, and show that neither of these questions adequately addresses the complex behaviour of low-tech firms in response to their changing environment.

Bardi & Bertini address the importance of cluster-based initiatives for the success of industrial districts and networks of firms. The authors look at the historical development of cluster initiatives like ERVET and the sector-based service centers in Emilia Romagna. They explain how these initiatives provide collective goods to clusters and networks of firms, as well as the challenges facing the cluster initiatives today and the ways that they are changing to meet these challenges.

Pedersen discusses results of an empirical study of the links between production techniques, skills and product development in the Norwegian mechanical engineering (ME) industries which are medium low-tech according to the OECD classification. The overall picture that emerges in Norwegian ME industries implies that a high level of technological sophistication – in terms of product development and formal skills – co-exists with an absence of advanced methods of production, i.e. with the operation of what can be labelled conventional hardware technology. This result is at variance with the literature that argues that technologically advanced and sophisticated methods of manufacture are crucially linked with adoption of the latest technological applications in ME.

Based on four Swedish case studies, **Gustavsson & Laestadius** analyse the potential for low-tech firms to stay competitive in a globalised knowledge economy. By opening the black box of knowledge formation and catching the variety on firm level within industries, they argue that competitiveness – and lack of competitiveness – can be expected throughout the industrial spectrum, that is to say, knowledge intensive activities may be found all over the high-tech/low-tech scale.

The focus of the concluding article by **Jacobson & Heanue** is on policy. In the first half of the chapter they consider, from the policy perspective, the problems of and recent improvements in the way policy makers perceive innovation. In the second half of the chapter they report on the findings from the case studies in relation to perceptions of policy. The authors consider the implications of the findings, relate them to the discussion in the first half of the chapter, and draw policy implications, in the conclusion.

CONTENTS

Advance Notice:
International Conference "Low-Tech as Misnomer" Brussels, 29+30 June 2005

It is a general understanding that the industrialised nations are currently undergoing a fundamental transformation into knowledge-based societies. The competence to generate and utilise new knowledge is seen as a decisive factor for both economic success and societal progress in this era. And there is a firm belief that in this situation the improvement of research-intensive high-tech industries is the key to welfare. Correspondingly, in this scenario so called low-tech sectors appear to be less important in and for the major industrialised countries. The underlying logic of the argument is simple whether it is posed reactively, describing the need for science-based innovation as a necessary answer to constraints imposed by globalisation, or proactively, as a world-wide development model. It is based on the view that due to their high level of costs the wealthy nations can only be competitive when they produce highly sophisticated products that cannot easily be imitated elsewhere. And these are, the reasoning continues, goods that can only be created with a high level of scientific knowledge and expertise. Because information and learning processes diffuse ever more rapidly, there is a constant pressure on the industries in the high-cost countries to permanently innovate. If such countries are to meet the challenges of global competition they must produce research-intensive products. It follows that only high-tech companies and industries are sustainable whereas more traditional, non-research-intensive sectors will lose their relevance and gradually disappear from high-income countries.

A critique of this widely held belief is the starting point of the PILOT project: The sketched argument conjures away the role of low-tech industries in the current structural change in advanced economies. However, many of the processes we witness today in Europe, both in the old and the new member countries, are based on developments outside the realm of high-tech.

The project is financed within the FP5 Key Action Improving the Socio-economic Knowledge Base (HPSE-CT-2002-00112). It comprises research teams in nine European countries, the co-ordinator is the University of Dortmund, Chair of Industrial and Economic Sociology. Since early 2003 the national teams have conducted case studies in low-tech companies, analysed their value chains and regional networks and policies that impact on these sectors. This was complemented by quantitative analysis of non-research-intensive industries' contributions to employment, growth and innovation in OECD countries.

In June the consortium will hold an international conference to present and discuss research findings and their policy consequences.

Low-Tech as Misnomer: The Role of Non-Research-Intensive Industries in the Knowledge Economy

Conference in Brussels, 29+30 June 2005

Wednesday, 29 June, 10h–19h

Hartmut Hirsch-Kreinsen (University of Dortmund)
„Low-tech" industries: innovativeness and perspectives
Aris Kaloudis, Tore Sandven (NIFU STEP, Oslo), Keith Smith (IPTS, Seville)
Structural change, growth and innovation: the roles of medium and low-tech industries

Gerd Bender (University of Dortmund), Staffan Laestadius (KTH, Stockholm)
Non-science based innovations: on capabilities relevant to generate profitable novelty
Discussant: Stan Metcalfe, University of Manchester

Holm-Detlev Köhler (University of Oviedo), Klaus Schmierl (ISF Munich)
Organisational learning: Knowledge management and training in low tech companies
Discussant: James Wickham, Trinity College, Dublin

Francesco Garibaldo (IpL, Bologna), David Jacobson (Dublin City University)
The role of company and social networks in low-tech industries
Discussant: Guiseppe Strina, OSTO, Aachen

Staffan Laestadius (Technical University Stockholm), Trond Einar Pedersen, Tore Sandven (NIFU STEP, Oslo)
Towards a new understanding of innovativity – and of innovation based indicators
Discussant: Nick von Tunzelmann, SPRU, University of Sussex

Paul Robertson (Griffith University, Australia), Pari Patel (SPRU)
New wine in old bottles: The diffusion of high-tech technologies to mature industries

Thursday, 30 June, 10h–14h

Tadeusz Borkowski, Alexander Marcinkowski (Jagiellonian University, Krakow)
Dilemmas of policies on low-tech industries. The Polish case.
Discussant: Krystyna Poznańska (Warsaw School of Economics)

David Jacobson, Kevin Heanue (Dublin City University)
Policy conclusions and recommendations

Panel discussion with

Giles Chichester, Chairman of the European Parliament's Committee on Industry, Research and Energy

Reiner Hoffmann, Deputy General Secretary ETUC

Gerhard Huemer, Director Economic Policy, UEAPME

More details on the conference will be available on the project website **www.pilot-project.org** soon.

If you want to attend the conference please register at **is@wiso.uni-dortmund.de**. You will then receive all necessary information automatically in due time.

Contact

Dr. Gerd Bender

Email: gerd.bender@udo.edu

Phone: +49231 755 5571