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# RAPPORT

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# 1. Executive Summary

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This report engages into an indicative review of the various methodologies and indicators used to evaluate schemes of Knowledge and Technology Transfer.

The first cluster of schemes to be addressed is those supporting SMEs to access a public sector research organisation. The review clarifies the followed approach and the meaning we attach to the notion of Knowledge and Technology Transfer before considering the various caveats of measuring success. It then turns to define the precise level of evaluation (broad areas of policy versus specific schemes) and provide a categorization of the various schemes according to the main objective. This part concludes with presenting one policy instrument for each category with a description of the evaluation strategy and the range of indicators that has been used in each case.

The second cluster of programmes addressed in this review, is the Knowledge and Technology Transfer programmes based on a public-private partnership model. Given that this is relative new area of support, the review starts with providing a definition of the programmes. It then categorises the known public-private partnership schemes according to the type of beneficiaries (high or lower absorptive capacity SMEs) and give a concise description of the various Knowledge and Technology Transfer activities taking place in these programmes. To enable better understanding, it puts forward a number of real public-private partnership cases that cover the full range of categories identified earlier as well as the various indicators that have been deployed to evaluate these programmes.

Finally the report concludes, presenting the similarities and differences between the evaluation strategies and indicators deployed in the two generic areas of Knowledge and Technology Transfer schemes, calling for a further advance of the understanding in the area.

## 2. Overall Aim and Approach

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The aim of this report is to review indicators that have been used in past studies to measure the success of Knowledge and Technology Transfer schemes involving Small and Medium-sized Enterprises (SMEs). It also aims to shed more light into the less known part of the research, that is the Public-Private Partnership programmes through the means of providing a clear definition and a set of knowledge and technology activities they offer. This review aspires to form the background for the Workpackage 4 (construction of key performance indicators and selection of good practices) and Workpackage 5 (in-depth analysis of good practices).

The review is split in two main parts. Sections 3-5 review the schemes that aim to connect SMEs to *public sector research (PSR)* organizations. Sections 6-9 review the *public-private partnership (PPP)* programmes aimed at supporting innovation in SMEs.

More specifically this report goes as follows. Section 3 presents the background to the report by discussing the concept of KTT, notions about measuring success and evaluation of policies. In Section 4 we discuss a broad brush categorization of KTT schemes and in Section 5 we give specific examples of indicators that have been used in the evaluations of schemes within each broad category.

Section 6 introduces the public private partnership programmes and provides a set of criteria that can be used to define them. Section 7 draws a distinction between PPP programmes that target SMEs of high absorptive capacity and PPP programmes that target SMEs of lower or medium absorptive capacity and attempts to shed light on the actual knowledge and technology transfer they deploy. Sections 8 and 9 offers some real cases of PPP programmes, providing a brief description of the way they operate as well as some of the indicators used to evaluate them.

Finally Section 10 draws the conclusions to this review.

## 3. KTT for Public Sector Research: Background

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### 3.1 The Approach

We begin by making a distinction between indicators that are based on studies that have focused on evaluating support for technology transfer in general and those that are concerned with evaluating specific KTT schemes. In the former category a large number of studies are concerned with analyzing the performance of technology transfer offices of universities and other public sector research organizations. A recent example is the report published by DG Research in 2009: *Metrics for Knowledge Transfer from Public Research Organizations in Europe*.<sup>1</sup> While such studies are interesting they have very little to say about the evaluation of specific schemes, which by definition are dependent on the detail design of the scheme, its objectives and how they can be achieved. Moreover evaluations of technology transfer offices are focused more on the “supply side” than on the demands of the firms and the benefits accrued.

In order to enumerate the indicators relevant to measure the success of KTT schemes the approach adopted here is as follows. We begin by very briefly summarizing the literature on the benefits of knowledge created in the public sector research system for firms. This forms the basis of providing a broad-brush categorization of technology transfer policy programmes or schemes. The aim here is not to propose a categorization based on a comprehensive list of objectives of KTT policies as this is beyond the scope of this deliverable. It is more to align the objectives of some reported policies to the main benefits of the knowledge created in the public sector.

In order to assemble our list of indicators and the methodologies used to obtain them, we examine a number of evaluations of specific KTT policies. This is not meant to be a comprehensive review of all the policy evaluations in the EU. The focus is more on specific interesting examples which reveal indicators. However, the main difficulty faced in this deliverable is that evaluation studies measuring the success of specific schemes are not generally published as academic articles or even in government reports as they are a part of the evaluation system, which exists mainly for the consumption of the scheme manager. This means that by definition such studies are difficult to obtain as they lack visibility because they are not distributed or indexed by commercial publishers. The approach to this problem adopted here is to identify examples of evaluations of specific schemes in each of the broad categories of policy. These are then used to summarize the types of indicators used and the methodologies employed.

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<sup>1</sup> [http://ec.europa.eu/invest-in-research/pdf/download\\_en/knowledge\\_transfer\\_web.pdf](http://ec.europa.eu/invest-in-research/pdf/download_en/knowledge_transfer_web.pdf)

### 3.2 Knowledge and Technology Transfer

We take knowledge technology transfer to mean the transmission of knowledge, skills and competence generated by public sector research organizations to firms, who use them to produce new products and new processes or introduce new organizational methods (i.e. engage in innovation). A number of influential reviews (such as Martin and Salter (1996) and Salter et al. (2001)) have shown that publicly funded research produces a number of direct and indirect outputs which make important contributions to industrial innovation. Amongst the direct benefits to firms are scientific discoveries leading directly to new products and processes, engineering research techniques (such as computer simulations) and new scientific instrumentation. Other contributions of public sector research are *indirect*, for example, the training of graduates and other researchers, creation of background knowledge and professional networks contribute to business firms' own problem-solving activities. These are particularly relevant to experimental engineering research, design practices, production and operational activities located within firms. One danger in both policy making and analysis is giving excessive attention to the direct contributions of publicly funded research to technology, to the neglect of the indirect contributions that are often more highly valued the business practitioners themselves.

Most KTT policies are aimed at the mechanisms that would allow firms to appropriate the above outputs. Some of the most important mechanisms are as follows (for example see Polt et. al (2001) and D'Este and Patel (2007)):

- Engaging in joint research
- Creation of new firms
- Formal transfer through licensing
- Movement of research personnel
- Developing joint training and education programmes
- Engaging in consultancies

### 3.3 Measuring Success

There are a number of factors that need to be borne in mind in measuring the success of KTT schemes. The first is that the ultimate goal of schemes is to increase the level of innovation output of firms. This can take the form of introducing new products, new processes or new forms of organization. Some of these outcomes can be measured, e.g. by sales of new products or reduction in costs. However the main issue is whether such outcomes can be attributed to participation in the scheme. The problem being that the sales in new products can result from a number of different factors and cannot simply be attributed to participation in a KTT scheme.

Involvement in a KTT scheme can also result in some intermediate outcomes which can be grouped under the heading of increasing the innovation capacity of the firms. By this we mean that participation increases the likelihood of the firm to innovate in the future, by creating new knowledge, new skills or new intellectual property.

One way of getting closer to measuring the impact of a scheme is to address the question as to what would have happened had a firm not participated in the scheme (the notion of additionally)? For example if the scheme involves subsidizing R&D expenditures then it is vital that the participating firm has increased such spending by more than it would have undertaken anyway without the subsidy. In the same way success in terms of ultimate outcomes can only be attributed to the scheme if the participating firm, for example, produces new products (or undertakes new processes) that would not have occurred without the participation. One way of ensuring that the benefits can be attributed to the policy is by analyzing matched pairs of firms, for example those operating in the same industrial sector and of equal size, and collecting a set of quantitative indicators either of final or intermediate outcomes as discussed above. In practice such a procedure is rarely followed as in most cases it is not practicable.

A further issue in measuring the success of a scheme relates to timing. There is a great deal of uncertainty regarding the time lag between when a firm participates in a specific scheme and when the resultant new products and processes may come on stream. There is very little a-priori information on the length of such lags.

### 3.4 Evaluation of Policies

Evaluations of knowledge transfer policies can be undertaken at least two levels of aggregation: at the level of specific schemes or at the level of broad areas of policy, where schemes with similar aims are combined.<sup>2</sup> Each of these involves use of different sets of data and techniques. The first requires detailed information from administrative records of the scheme and from the participating institutions. This includes the amount of resources devoted to the scheme, some information about the characteristics of participants (in the case of firms this could be their size, sector, ownership etc.) as well as their opinions about the nature and effectiveness of the scheme.

Individual evaluation tools such as case studies, peer review and user summaries can be employed at the level of specific schemes.<sup>3</sup> Case studies have the advantage that they help to understand complex processes and explore situations where interesting variables are not predefined. The evaluator is able to learn as the work is progressing, gradually building up a model. The studies can be structured to facilitate cross-case

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<sup>2</sup> For a comprehensive discussion of methodologies for evaluating the socioeconomic impact of RTD policies see <ftp://ftp.jrc.es/pub/EURdoc/eur20382en.pdf>

<sup>3</sup> See <http://www.oecd.org/dsti/sti/stat-ana/prod/arnold.pdf>

analysis, and they can be a source of 'how to' understanding. The disadvantages of such an evaluation procedure are not only the high costs of information gathering but also the high dependence on the skill and experience of the evaluator and the difficulty to incorporate it into routine monitoring.

User surveys can provide a nuanced, quantified understanding of schemes, collect information on direct experience as well as on precise indicators. Such surveys can also form the basis for testing and generalizing results from case studies, enable estimation and description of key impacts and provide quality control of program management. The disadvantages of user surveys are that they are subject to bias, reflecting users' appreciation of receiving resources and optimism about impacts.

Evaluations at the level of broad policy areas can proceed on the basis of publicly available information (for a thorough discussion see (see Polt et.al (2001))). In the case of technology transfer policies this includes data obtained from R&D surveys, CIS (Community Innovation Surveys), ad hoc country level surveys, as well as bibliometric information on publications and citations, and patent data. The main advantage is that such data are readily available at low cost. One way of partially assessing policy impact would be to examine the relevant data series over time in order to identify structural breaks and to see if these coincided with the introduction of the policy. The problem with such an approach is of course that the secular changes in the data series may be driven by factors other than the introduction of the policy. Another major difficulty is obtaining information on the total amount of resources devoted to major groups of policies.



## 4. Categorization of PSR-KTT Schemes

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The aim in this section is to propose a broad classification of KTT schemes according to their objectives and discuss their relevance to different types of SMEs that are the focus of the RAPPORT project. Ideally such a categorization should be based on an inventory of the available KTT schemes across the EU and their objectives. However the resources available for this deliverable together with its timing makes this task impossible.

In this report information on the types of schemes in existence has been gathered from a cursory review of the European Inventory of Research and Innovation Policy Measures, which brings together national information on research and innovation policies, collected by ERAWATCH and INNO-Policy TrendChart. A number of other sources (published books, academic papers etc.) were also used to complement the picture. We distinguish between SMEs that are *the high-absorptive firms* (technology producing pioneers or technology adapters) and *the low-absorptive capacity SMEs* (that are neither producers nor adapters of technology)<sup>4</sup>.

In general KTT policies are aimed at 6 broad sets of objectives:

- *Policies aimed at encouraging collaborative research.*  
Under this heading are schemes aimed at providing: (a) subsidies for firms to contract out research to Public Sector Research Organizations (PSROs)<sup>5</sup>; (b) incentives for PSROs to supply consultancy and technical services to industry; (c) funding for collaborative programmes of research in specific areas of technology; (d) facilities in a specific location for interaction to take place (science parks).

Such policies are likely to be most relevant to SMEs of high absorptive capacity.

- *Policies aimed at encouraging direct commercialization of research results through the creation of spin-offs and licensing of IPRs.*  
These include: (a) changing regulations to make it easier for PSRO employees to set up new businesses; (b) changing IPR regulations making it easier both for PSROs to obtain patents and for newly set up firms to license technology developed within PSROs; (c) providing financial support to investigate the feasibility of setting up a new business; and (d) providing seed capital to enable commercial initiatives to be developed from university research.

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<sup>4</sup> For a full definition of SMEs of high and low absorptive capacity, see Deliverable 2.1 of this project.

<sup>5</sup> These include Universities, government laboratories etc.

Such policies are likely to be most relevant to the *technology pioneers*.

- *Policies aimed at developing co-operative training and education programmes.*

These schemes are aimed at setting up training and education programmes within PSROs that are more suited to the skill needs of industry. These include providing short courses for professionals as well as co-financing of post-graduate students.

Such policies are likely to be relevant to SMEs of high absorptive capacity.

- *Policies aimed at increasing the mobility of research and technical personnel.*

Some schemes under this heading are designed to encourage PRO staff to take up temporary or permanent positions in industry and vice-versa. Another set give incentives to hire recent graduates to work on a specified R&D project within firms.

Such policies are likely to be relevant to SMEs of high absorptive capacity.

- *Policies aimed at raising the awareness of firms*

These schemes aim primarily at helping SMEs to realise the value of external knowledge and hence of the knowledge and technology transfer process. They include schemes like the offer of innovation vouchers to buy services from public research organisations.

Such policies are likely to be most relevant to the *SMEs of low capability (neither adapters nor pioneers)*.

- *Policies aimed at assisting small firms to articulate their needs and/or finding the right research partner through the offer of consultancy and brokerage*

The schemes under this heading assign a specially trained consultant (or coach) to help the company to articulate its innovation needs and identify the right public research organisation for partnering in the process of knowledge technology transfer.

Such policies are likely to be most relevant to the *SMEs of low capability*.

## 5. PSR-KTT Schemes for SMEs: Examples of Indicators Used in Evaluations

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In order to identify indicators useful for measuring the success of KTT schemes involving SMEs we rely primarily on the newly launched Pro-Inno database on evaluations across the EU (available since April 2010).<sup>6</sup> This database is the result of a large scale EU-funded project which collected all available appraisal reports on innovation policy measures in the EU Member States dating back to 2003 and is based on information from the Trendchart database. In total, *Pro-Inno Appraisal* contains details of 173 publicly available evaluation reports across a range of different areas of innovation policies. Our aim is not to produce a comprehensive list of indicators based on a through review of all these reports as this is beyond the scope of this particular deliverable. Many of the reports are not in English and others contain very little information on the indicators used in the evaluation. The aim here is much more modest: to provide examples of indicator use.

### 5.1 Evaluation of SME-Specific Measures in FP5 and FP6

The policies below fall under 2 of broad headings discussed in section 4: *Encouraging Collaborative research* and *Raising awareness*.

#### *Policy Objectives*

DG Research recently commissioned a project to assess the impact of the following 3 SME-specific measures in the 5<sup>th</sup> and 6<sup>th</sup> Framework Programmes<sup>7</sup>:

1. The CRAFT (Co-operative Research Action For Technology) action under FP5, which was aimed at supporting SMEs that in principal could innovate but have no in-house R&D capabilities. This subsequently became the Co-operative Research measure under FP6. The idea behind these actions was to finance a specific research project to be undertaken by a “knowledge provider” (public sector research organization), to address a specific set of problems faced by a group of SMEs (minimum of 3).
2. Collective Research scheme aimed at expanding the knowledge base of a large community of SMEs, through the involvement of industrial research associations. The research would again be defined by the industry association but conducted by an RTD performer.

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<sup>6</sup> <http://www.proinno-europe.eu/appraisal>

<sup>7</sup> See [http://ec.europa.eu/research/sme-techweb/pdf/sme\\_impact\\_assess\\_2009\\_long.pdf](http://ec.europa.eu/research/sme-techweb/pdf/sme_impact_assess_2009_long.pdf)

3. Economic and Technological Intelligence support actions, aimed at improving the access of SMEs to scientific and technical information. The idea was to fund projects undertaken by intermediaries that use dedicated networks and information sources to promote innovation in SMEs.

#### *Methodologies employed*

- Online survey of participants and rejected applicants.
- Case studies of specific implementation of the schemes.
- Analysis of firm-level database on financial information.

#### *Indicators measuring the impact on SMEs*

The evaluation survey data were used to make comparisons between the participants and the rejected applicants. These showed:

- Increase in the degree of formalisation of R&D amongst the participating SMEs(% of firms with formal R&D (budget for R&D or a separate R&D department))
- Increase in the self-declared R&D capabilities of the participants (% of firms declaring their R&D capabilities as High-Low (5 point likert scale))
- Participating SMEs are likely to continue co-operating with domestic universities and research institutes (% of total firms declaring).
- Increase in R&D and economic performance: mean score of firms declaring that there has been an increase in the trends since the start of the project (3 point likert scale (negative, no change positive)) in the following variables:
  - R&D expenditure as % of sales
  - R&D personnel as % of total staff
  - Number of outsourcing contracts
  - Competence level of employees
  - National market share
  - Overall competitiveness of the firm

The SMEs were also asked to indicate the extent to which the trend in each case could be related to participation in the project (4-point likert scale : *no relationship, limited extent, large extent, totally*)

- Overall change in the economic standing of the firm due to participation (% of firms declaring on a 5-point likert scale (negative change to very large improvement))
- Other effects measured by asking whether participation helped increase the following capabilities:
  - scientific and technological knowledge of personnel.
  - ability to network with universities or public research institutes.
  - ability to network with other firms.
  - ability to look for a solution to problems through innovation.
  - ability to be up to date with the latest innovative solutions in the sector.

- ability to develop innovative products or services.
- ability to look for public research funding more regularly.

The SMEs were asked the extent to which they agreed with a number of statements about the impact of their participation (5-point likert scale from *completely agree* to *completely disagree*)

#### *Process Indicators: Characteristics of the Participants*

- Number of SMEs participating
- Average size and size distribution of SMEs participating in the scheme
- Industrial sectors represented amongst the participants
- Level of Innovative capabilities before participation

## 5.2 EXIST programme in Germany

This programme falls under the heading of policies aimed at *Direct Commercialization of Research* discussed above.

#### *Policy Objectives*

The main objectives of the EXIST programme are:

- to establish a lasting “culture of entrepreneurship” at universities and research establishments
- to support the preparation of innovative business start-up projects at universities and research establishments
- to increase the probability of success of the start-ups.

#### *Methodologies*

- Empirical survey involving university students and their entrepreneurial culture
- Communication and network analysis, by assessing the methods, the barriers and the progress of the networking process.
- The innovative activities of the start-ups created over 1996-2000 were studied by using a commercial database of companies. The start-ups were asked to take part to a written survey on the role of universities in start-ups activities.
- There were phone interviews with approximately 200 start-ups among the first founded in the frame of the project at the end of 2002 and beginning 2003.
- The final part of the evaluation will include case studies: example of good practice in developing entrepreneurship education from the program and also abroad experiences.

### 5.3 UK Teaching Company Scheme (TCS)<sup>8</sup>

This scheme falls under the heading of policies aimed at increasing the mobility of S&T personnel.

#### *Objectives of the scheme*

The objective of this long running scheme was to provide access to knowledge and technology for firms and to facilitate academic-industrial technology transfer by employing graduates to work on a specific R&D project of relevance to the firm.

#### *Methodology employed*

There have been a number of evaluations of this scheme. Each has included multiple methods. For example:

- Collecting quantitative data on a selected number of programmes from the detailed records kept by the scheme managers. These consisted of end of award reports filed by the firm, the academic institution, the graduate employee, and the assessment of the Teaching Company Executive. Out of 500 programmes 95 were selected on the basis of ensuring representativeness of the full range of programme types, academic disciplines, firms of different sizes and industrial sectors, and universities from different geographic areas.
- Supplementary information obtained directly from 40 academic departments by means of questionnaires and interviews.
- Detailed case studies of 15 programmes.

#### *Indicators measuring success*

The following indicators were deemed to represent the effect of participation on business performance:

- Increase in overall sales, sales to domestic markets or exports
- Increase in company valuation
- Increased profitability
- Increase in the number of employees
- Reduction in operating costs
- Increase in income from IP

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<sup>8</sup> See: Senker and Senker (1994), “Transferring technology and expertise from universities to industry: Britain’s Teaching Company Scheme”, *New technology, Work and Employment*, Vol. 9, pp. 81-92.  
Senker and Senker (1997), “Implications of industrial relationships for universities: a case study of the UK Teaching Company Scheme”, *Science and Public Policy*, vol. 24, pp. 173-182

This information was gathered by simply asking the participants if there were increases in the above activities (the indicator used was the % firms who answered in the affirmative).

The following indicators were deemed to represent the effect of participation on R&D and innovation performance:

- Increased investment in R&D and innovation in general (e.g. employing more R&D staff)
- Increased investment in new machinery
- Additional staff training
- Improved management of R&D and Innovation
- Increased capacity to recruit and utilise S&T skilled graduates
- Increased skills profile of the company
- Improved the quality of products, processes and services
- Improvement in the ability to get external expertise
- Increased awareness of collaborative opportunities with Universities and public sector research

This information was gathered by simply asking the participants if there were increases in the above activities (the indicator used was the % firms who answered in the affirmative).

Success of the program was also judged by analysing the information contained in the end of award reports from each specific implementation of the scheme. The researchers (i.e. those in-charge of the evaluation) subjectively scored on a number of different factors that were deemed to be important contributors to success. The following factors were significant determinants of success:

- The closeness of the relationship between the various actors: the Company, University and the Teaching Company Associate (i.e. the graduate employee).
- The Company's commitment to the programme.
- The clarity and cohesiveness of the objectives.
- The efficiency of monitoring progress against agreed targets.
- Expertise of the academic partner relative to the company's existing capability.

#### 5.4 Innovation Voucher Scheme in the Netherlands

This scheme falls under the heading of *Raising Awareness* amongst firms.

##### *Objectives of the scheme*

The main objective of this scheme is to get SMEs to buy knowledge inputs from public sector knowledge providers. Thus the overall aim is to increase interaction between

firms and public sector research. This scheme exists in many countries and is one of the main instruments to reach SMEs with very little innovative capacity and no previous contact with universities and other knowledge providers.

### *Methodologies employed*

The scheme was evaluated on the basis of two surveys. The first was in 2004, when 443 firms out of a total of 1044 applicants for the scheme were contacted. Of these 98 were unsuccessful applicants and 345 were beneficiaries of the policy. For 2005, the number of applicants was 1995 and the sample was composed of 287 firms, divided in 85 unsuccessful applicants and 202 successful ones.

### *Indicators measuring impact*

- Creation of jobs resulting from involvement in the scheme (firms were asked about the % increase in jobs resulting from the participation in innovation)
- Increase in terms of (a) new products and processes (new to the market or new to the firm) or improved products and processes (CIS type of questions)
- Effect of the voucher to innovate through a contract with a research institution, the indicators are expressed into marginal effects and the 95% confidence interval, measuring innovation product and processes (separately) making the difference for innovation project completed and ongoing innovative projects; measured in the 2004 phone survey
- Change in terms of outsourcing R&D (expressed in the marginal effect and the 95% confidence interval, three categories are distinguished: private, outsourced, own and outsourced; gathered on the 2004 phone survey)
- Change in the attitude towards the own innovation capacity (2004 (one round) and 2005 (two rounds)); different categories were tackled: My company has struggled to innovate, My company is capable of the latest techniques, My company does more than two own research and development; the effect are expressed in positive (negative) comparing the one participating at innovation vouchers and the one that don't.)
- Ongoing contact with knowledge institutes after the end of the scheme (Effect on attitudes towards research institutions, 2004 (one round) and 2005 (two rounds); My company is benefiting from knowledge and advice from a research institution, Knowledge institutions are hard to access, My company knows what our knowledge institutions offer, For each innovation we consider to cooperate with a research institution; the effect are expressed in positive (negative) comparing the one participating at innovation vouchers and the one that don't.
- Effect voucher number of companies with contract research institution, measured in the round one and two from the 2005 survey; the results are shown in marginal effect and 95% confidence interval.
- Effect on participation (Impact of the 2004 and 2005 vouchers to participate in voucher round 2006; results shown in marginal effect and 95% confidence interval; effect of the participation in 2004 to the participation in 2006, effect of the participation in 2005 round 1 to the participation in 2006, effect of the participation in 2005 round 2 to the participation in 2006, Impact 2004 voucher for



participation 'big' voucher 2006, Impact 2005 round one voucher for participation 'big' voucher 2006, Impact 2005 round 2 voucher for participation 'big' voucher 2006. Question asked: Why did your company after the voucher period did not participate again; multiple choice question, possible answers (more than one answer were accepted): Knowledge no longer available on the question, well informed question, but .... (own research, private research, Knowledge Creation too expensive, knowledge Creation too expensive without a voucher, no time / other priorities), other.

#### *Process Indicators*

- Share of vouchers actually used (number of vouchers used in comparison to the number of vouchers issued expressed in percentage)
- Share of new participants for the scheme (Percentage of firms that hasn't used any innovation scheme before, percentage of the application new to the innovation agency)
- Diversity of the audience (some remarks on the innovation of the SME's in the frame of the scheme, but no precise indicators)
- Time length for the sale of all innovation vouchers (numbers of days needed for selling all the vouchers available in 2004 and 2005)

### **5.5 TEFT programme in Norway<sup>9</sup>**

This programme falls under the heading of policies *offering consultancy and brokerage assistance* discussed above.

#### *Policy Objectives*

The main objectives of the TEFT programme are:

- make the knowledge base of research organisations more accessible to SMEs
- to enhance the capability of SMEs to initiate and carry out R&D projects, especially in sectors with low or medium R&D intensity
- reorient research organisations towards activities relevant to SMEs.

#### *Methodologies employed*

- Telephone, postal and interview surveys of sample groups of clients (beneficiary companies)
- In-depth interviews with selected clients

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<sup>9</sup> See Gil, J., A., Saez-Cala, A., Vazquez-Barquero, A., and Vinas-Apaolaza, A.I., 2003, "Results and Impacts on policy instruments" in Asheim, B. T., Isaksen, A., Nauwelaers, C. and Todtling, F., (eds), Regional Innovation Policy for Small-Medium Enterprises, Edward Elgar

- Interviews with administrative and support staff involved in the scheme implementation

*Indicators measuring immediate impact*

- Level of satisfaction in companies funded by the programme
- Relevance of the funded project to the business plan of the company (according to the senior management team)
- Improvements in existing products
- Process technology improvements
- New products to the firm
- Increased R&D activity and capability

*Indicators measuring long-term impact*

- Share of firms that engage in new procurement of R&D services
- Share of firms that repeated interaction with the host institution as percentage to total number of beneficiaries
- Share of firms that initiated a larger project with the host institution after the programme-funded project as percentage to total number of beneficiaries
- Percentage of researchers who continued interaction with the funded company after the completion of the project
- Percentage of researchers who entered discussions with the funded company for planning a new innovation project

*Process Indicators*

- Number of company visits
- Number of technology projects initiated/funded
- Share of companies with a project funded as a percentage of total number of companies approached (company visits)
- Easiness of the project implementation and the quality of link with the researchers

## 6. Public Private Partnerships for KTT to SMEs

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Deliverable 2.1 has engaged in an extensive review of the research and the experience of PPP, especially in the area of knowledge and technology transfer. One of the main points coming out of this review is that the understanding on these schemes is still at an infant level and “much research needs to be done to determine how these programs can accomplish their goals”<sup>10</sup>. This puts the work in this project in an awkward position. On the one hand it increases the value and the originality of the work since it seems that this is a quite novel KTT approach. On the other hand, it creates the need for a minimal operational definition to enable the joint work and the shared meaning among all project partners. This is a challenging task, given the shortage of previous academic literature in the field. To enable the joint operations of the different tasks in the project, an operational definition was developed based on the existing literature and the previous research of some of the partners.

The definition includes five criteria, all of them need to be fulfilled for a programme to qualify as a public-private partnership for technology transfer. Needless to say, that these criteria are only provisional and subject to the actual research which will take place later in the project. These criteria are the following:

- Significant element of Knowledge and Technology Transfer (KTT)
- Proven capability in terms of having established a repetitive process and associated set of services
- Direct participation of the wider public sector (e.g. Universities, national government departments, regional authorities)
- Considerable contribution of resources from the private sector (e.g. technical know-how, marketing expertise, research facilities)
- Focus on strengthening SMEs innovation capabilities (at least one of the two key innovation dimensions, namely offerings or processes).

The implications of these criteria are that cases like the following are excluded from the above definition:

- Business to business open innovation practices without any participation of the public sector (e.g. Cisco R&D, Pharmaceuticals)
- Collaborative research projects between industrial partners even if they are supported by public policy (e.g. FP7 Cooperation, TechnoKontakte in Austria)

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<sup>10</sup> Stiglitz J. E. and S. J. Wallsten, 1999, “Public-Private Technology Partnerships: Promises and Pitfalls”, American Behavioral Scientist, p. 71.

since they are one-off projects without any possibility of repeating the process or the offered services

- Industrial or academic networks (e.g. Knowledge Transfer Networks in the UK) since they do not assume a significant contribution in terms of resources from the private sector.

Next section differentiates between two general types of PPP programmes, those which hope to capitalize on the potential and the ideas of promising SMEs and those which try to convert SMEs into more innovative companies because their improvement would accrue an obvious benefit to the private sector organisations which contribute the resources (e.g. the SMEs are their suppliers). To get a better understanding of these two types of PPP programmes, next section reviews the actual KTT services they offer.

## 7. Categorization of PPP-KTT Schemes

### 7.1 KTT Activities for PPP

KTT programmes that follow a public-private partnership logic be grouped into two categories:

- a) Programmes targeting SMEs of Higher Absorptive Capacity (HA) that promote usually joint R&D and technology transfer
- b) Programmes involving SMEs of Lower Absorptive Capacity which facilitate access to already developed competencies and knowhow transfer<sup>11</sup>.

A range of activities are implemented in each of these categories. It is impossible to capture all possible services and activities that take place in these programmes but an indicative range of activities can be found in Table 1. Needless to say that this list will be expanded, modified or confirmed through the actual research part of this project.

**Table 1: An Indicative List of KTT Activities within PPP Programmes**

<i>High Absorptive Capacity SMEs</i>		<i>Lower Absorptive Capacity SMEs</i>	
HA1:	Validation and testing activities including use of facilities	LA1:	Tailored implementations (production re-engineering; purchasing & supply capability)
HA2:	Access / Exploitation of intellectual property	LA2:	Sharing product specifications to develop joint solutions/offerings
HA3:	Insights to customer requirements	LA3:	Referrals from customers with large purchasing power
HA4:	Personnel visits and secondments of Qualified Scientists and Engineers	LA4:	Seconding highly-skilled staff to SMEs
HA5:	Compliance with standards and regulations	LA5:	Implementing and/or establishing de facto standards
HA6:	Assistance with technology sourcing	LA6:	Structured education and training

<sup>11</sup> This classification is according to the type of final beneficiaries in contrast with the classification that is provided in Deliverable 2.1 which is according to the configuration of the participants relationships.

## 7.2 PPP-KTT Activities for SMEs of High Absorptive Capacity

### *HA1. Validation and testing activities including use of facilities*

Product development involves a series of activities covering design of the production system, prototype construction, testing & product feasibility analysis, product & production system supplementation and validation.<sup>12</sup> Private enterprises people often supported by public sector's resources and infrastructure (e.g. access to facilities or scientists) provide assistance to SMEs to carry out such activities. The facilities can be housed by dedicated R&D centres part of the private sector or the public infrastructure (e.g. government labs).

### *HA2. Access / Exploitation of Intellectual Property Rights (IPR)*

While carrying out a venture, SMEs may need complementary knowledge and access to existing patents. This category facilitates the access of (usually large enterprises') IPRs by the involved SMEs. The programme can also facilitate the access of IPR outside the involved partners. The public entities can also share owned IPR with SMEs.

### *HA3. Understanding and profiling customer requirements*

This part of the process depends on the nature of the product and the nature of the market. Key issues facing SMEs include profiling of potential customers, type of customer distribution and revenue model. The programme and the resources-supplying partners (e.g. the large enterprises) can facilitate the intrinsic requirements of SMEs so they have an edge over their competitors.<sup>13</sup> The inside of the customers' requirement is a key marketing edge for the SMEs.

### *HA4. Allocating highly-skilled staff to SMEs*

One of the major challenges of SMEs is the limited human resources outside the core areas of technical expertise. Public-private partnerships can provide highly skilled staff to SMEs e.g. scientists and researchers, managers with expertise in a crucial area (e.g. lean manufacturing), patent attorneys or marketing experts.

### *HA5. Compliance with standards and regulations*

Implementation and enforcement of new market regulations can result in substantial additional costs to SMEs. The SMEs are typically subjected to the same standard and regulations as large enterprises. In fact SMEs can be more exposed and more sensitive

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<sup>12</sup> Koufteros, Vonderembse, Doll; *Integrated product development practices and competitive capabilities: the effects of uncertainty, equivocality, and platform strategy*; February 2002; *Journal of Operations Management*; Vol. 20 (2002) pg. 331–355

<sup>13</sup> *Promoting Entrepreneurship And Innovative SMEs In A Global Economy: Towards A More Responsible And Inclusive Globalisation* (Available [www.oecd.org/dataoecd/5/24/31919590.pdf](http://www.oecd.org/dataoecd/5/24/31919590.pdf))

to regulatory burdens in general and formalities in particular.<sup>14</sup> SMEs struggle with compliance of standards and regulations so the PPP programme can support the involved SME to comply with existing regulation and standards. In rare but possible cases, the PPP can become the vehicle for lobbying for a particular version of standards and regulations.

*HA6. Assistance with technology sourcing*

A PPP programme can also help an SME to organise technology sourcing especially in areas that the SME is not very familiar with. This could involve support for better understanding of the technology and its compatibility with other technologies of the SME as well as support for the implementation of the technology in the organization of the small company.

### **7.3 PPP-KTT Activities For SMEs of Lower Absorptive Capacity**

*LA1. Tailored implementations for SMEs production re-engineering and/or enhance their purchase and supply capabilities*

The current and anticipated future market challenges in the SME environment increase pressure for cost-cutting, responsiveness and agility. This creates a need for production reengineering and tailored implementations which lower absorptive SMEs are not capable of carrying out themselves. The PPP programme can provide 'know-how' and training in addition to some resources such as auditing tools and implementation techniques. The process can involve a process of diagnostics, development of action plan and implementation of action plan.

*LA2. Sharing product specifications for development of joint solutions/offerings*

The programme can facilitate the discussion between different small companies (e.g. suppliers of the same supply chain) in order to co-ordinate their innovation actions (e.g. sharing their product specifications) or even develop joint solutions (e.g. share prototype outlines). The PPP programmes can play a critical and impartial role in this intermediation which involves very often a significant element of knowledge and technology transfer.

*LA3. Induce KTT through referrals from customers with large purchasing power*

In some cases the introduction of the focal SME into the process of KTT is happening through coercion. In particular a large (public or private) organisation which purchases products or services from a small company can demand from its supplier to 'attend' to

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<sup>14</sup> OECD report: [www.oecd.org/dataoecd/36/15/2348201.pdf](http://www.oecd.org/dataoecd/36/15/2348201.pdf)

the activities of the programme so it can improve its operations and raise the level of its offerings. While this has obvious benefits for the large organisation, it also introduces the small company into the process of knowledge and/or technology transfer.

*LA4. Secondment of Qualified Scientists and Engineers*

The contributing partners can 'borrow' qualified people to the programme which in turn can help SMEs with improving their production and introduce a number of process innovations. The seconded managers usually have significant experience and probably expertise in a crucial area. They also create opportunity and environment for improvement and learning within the SME.

*LA5. De facto standards*

The partnership can use its collective power to lobby public authorities for the adoption of friendly standards or even contribute to the enforcement of de facto standards in the market. In any case the programme can provide critical assistance to the SME to cope with the full deployment of some standards, which can enable the SME to get access to international value chains and customers.

*LA6. Structured education and training*

This category benefits the SMEs in gaining access to valuable vocational or managerial training delivered by the private-public partnership programme. This education and training can target vocational skills and apprenticeships or more advanced management techniques such as quality assurance and implementation of ISO (for the environment, medical standards etc.).



## 8. PPP-KTT Schemes for SMEs of Higher Absorptive Capacity: Examples and Indicators

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One of the important tasks for private-public partnerships is to look at existing practices and try to look for indicators used to evaluate the scheme. The public-private partnership can be comprehend by some existing cases. The following schemes meet the criteria of PPP Knowledge and Technology Transfer (Section 6) and involved SMEs of High Absorptive Capacity.

### 8.1 QinetiQ Advanced Sensors Innovation Project in UK

This programme was launched in 2007 to help SMEs enhance their products and business by taking advantage of the broad range of sensing capabilities within QinetiQ. The programme is toward its final stages where the partners are looking at commercial exploitation.

The programme has focused on:<sup>15</sup>

1. access to an extensive portfolio of sensor intellectual property (IP) by the SMEs;
2. technology de-risking;
3. bespoke sensor solutions developed to meet market requirements.

Advantage West Midlands which is the Regional Development Authority (RDA) has been the public sector involved in the scheme. The number of SME involved is four. Each has benefited in terms of rapid innovation and transfer of technology. The scheme consists of access to concepts and expertise by QinetiQ, in form of extensive intellectual property portfolio and support to broader market. The partnership targeted towards identifies sensor applications against tangible and qualified market needs and benefits. Advantage West Midlands (AWM) is backing businesses in implementing new product technology by investing £10.5 million in the Advanced Sensors Innovation Project.<sup>16</sup>

A methodology was employed to evaluate the performance of AWM from 2002/03-2007/08<sup>17</sup>. The review was carried out for all the schemes where Advantage West Midlands was involved including this particular scheme. The review looked at the following issues:

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<sup>15</sup> Advanced Sensors Innovation Brochure accessed from [www.qinetiq.com/home/capabilities](http://www.qinetiq.com/home/capabilities)

<sup>16</sup> Advanced Sensors Innovation Project; Report accessed from Resource library of Advantage West Midlands [[www.advantagewm.co.uk](http://www.advantagewm.co.uk)]

<sup>17</sup> High Technology Corridors Evaluation Study - A final report to Advantage West Midlands - Main report; March 2009; SWQ Consulting, Cambridge, UK [accessed [www.advantagewm.co.uk](http://www.advantagewm.co.uk)]

- Estimate the economic impact of AWM investment on the development of the High/Higher technology Corridors (HTC), and the contribution this has made to regional outcomes and delivery of the collaboration.
- Identify key lessons for the future development of the programme.
- The analysis of key documentation and data in relation to the High/Higher technology corridors. The review consisted of monitoring data i.e. Advantage West Midlands 'spend on HTC and outputs, secondary statistical data relating to the HTCs, key programme documentation and recent strategies and action plans at individual SME level.
- Finalising the analysis and presenting and discussing these back to key stakeholders and case study consultation.

The following Indicators were used to represent the effective involvement of public sector i.e. AWM on SMEs:

- Increase in regeneration through physical infrastructure i.e. increasing revenue for AWM by investing in better infrastructure where eventually SMEs can be housed or facilities can be provided
- Decrease in revenue cost considerably and increase in total expenditure<sup>18</sup>
- Increase in business development by SMEs and competitiveness increased for AWM. e.g. number of business proposals increased over the years significantly
- Increase in investment for people and skills in SMEs. e.g. more investment in training and workshops.
- Increase in business engagements among SMEs. e.g., SMEs' engagement with each other increased in number for carrying out business.
- Increase in job creation within SMEs

## 8.2 MBDA, Innovation Gateway for Complex Defence Systems in UK

MBDA<sup>19</sup> is a global missile systems company and the only company in the world with the ability to design and produce missiles and missile systems for army, navy and air forces. MBDA has around 11,000 employees based across the UK, France, Italy, Germany and the USA.

MBDA *Innovation Gateway for Complex Defence Systems* is a KTT initiative started in 2007 as a way of communicating the company's immediate and longer term technology requirements to the broader SME/academic communities and announce requirements for solutions to technology or manufacturing issues. Cranfield University, sponsored by MBDA, has been delivering the programme with an objective to improve the innovation identification and exploitation links in the field of Complex Weapon Systems. According

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<sup>18</sup> The revenue cost invested by Advantage West Midlands decreased as SMEs were able to generate revenue and hence Advantage West Midlands diverted its investments.

<sup>19</sup> Named after merger of Matra Defense, BAe Dynamics and Alenia Marconi Systems (AMS) <http://www.mbdasystems.com> MBDA is jointly held by BAE SYSTEMS (37.5%), EADS (37.5%) and FINMECCANICA (25%).

to the plan, Cranfield University searches out, using web-based calls and workshops, technologies being developed by academics and SMEs with a view to development and exploitation in future MBDA products. Links with the academic community and innovative SMEs aim to source non-traditional funding organisations and encourage 'spin-in' from non-defence research.

This initiative also aligns well with objectives expressed in the UK Defence Industrial Strategy.

The programme works to benefit the SMEs from access to MBDA's experience, exploitation paths, sponsorship and industrial network as well as Cranfield University's understanding of defence. The programme provides an infrastructure enabling MBDA to assess technologies being developed external to the defence industry. A web portal facilitates collaboration on a range of related subjects e.g. Navigation Systems, Bandwidth in communications systems, operational life of weapon systems and missile motion sensors etc.

The programme aims to support innovation through:

- Directly funded programmes from MBDA to any of the members.
- Collaborative programmes involving more than one member of the group
- Jointly funded programmes, involving research councils, Technology Strategy Board, (TSB), UK, EU etc.

MBDA/Cranfield undertakes to protect any commercial sensitivity and recognises non-defence exploitation may also be a key outcome of this partnership.

The following indicators were found to be used to assess the effectiveness of the initiative:

- Number of ideas suggestions received
- Number of solutions to problems and complex issues provided
- Quality of new techniques and structured training for project teams
- Number of awards for outstanding innovations
- Number of new collaborations with external bodies

### **8.3 Corallia Clusters Initiative (Hellenic Technology Clusters Initiative), Greece**

Corallia is a cluster initiative in Greece aiming to promote technology and innovation in order to boost growth and competitiveness. The initiative has been running under the Greek Ministry of Development (General Secretariat for R&T) with main emphasis on micro electronics and embedded systems. The first phase of the initiative ran from May 2006 to November 2008 and was co-financed by the ERDF (EU contribution € 3,090,000).

Corallia has been focusing on SMEs that lead innovation as well as large corporations that lead product development. It provides support and incentives for expanding the cluster members' activities, attracting foreign and local investment and establishing strong human networks. In particular, Corallia aims at:

- Easing the innovation gap through complementarities and partnerships among cluster-members as well as between cluster-members and national and international organizations, including world-class innovation centres of excellence, in Europe, USA, and Japan.
- Sponsoring actions to establish strong ties with universities and research centres, in order to enhance technology transfer and R&D commercialization in the thematic technology areas of the clusters.
- Expanding the innovation-knowledge horizon with a thorough training program, through which members of the clusters gain best-in-class.

Corallia also acts as a reference point for all interested stakeholders involved in Nano/Micro-electronics & Embedded Systems, who wish to obtain services on issues such as: Legal & Accounting start-up support; Intellectual Property; Networking; Transfer of know-how and promotion of partnerships; VC support; and Attraction of highly specialised human capital.

The results include disseminating technology within the clusters, upgrading production processes, establishing technical standards, attracting new companies and gifted individuals and, finally, setting up powerful networks among people and companies, which will bring about the promotion of exports.<sup>20</sup>

The cluster was included among best practices out of a total of 151 participations from all European Union member states within the "Strengthening SME dynamics at technology level" in a corresponding initiative of the GD Industry of the European Commission

The following indicators were found to be used to assess the effectiveness of the initiative:

- Change in turnover of participating companies
- Change in employment of participating companies
- Exports of participating companies
- Patents of participating companies

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<sup>20</sup> HTCI - Background, Goals, "Why Semiconductors and Embedded Systems?"; 2007; accessed through [www.greekembassy.org](http://www.greekembassy.org)

#### 8.4 Swansea Centre for Innovation in Photography, Film & Video (SCI-PV), Swansea, UK

The Swansea Centre for Innovation in Photography, Film & Video (SCI-PV) is an initiative between Swansea Metropolitan University (SMU) and Sony UK Ltd. Conceived in 2005, with a European Regional Development Fund (ERDF) grant, Swansea Centre for Innovation in Photography; Film & Video has been successful in establishing this specialised ICT centre for the region. The Centre provides a fully equipped digital video and sound studio, editing facilities with AVID and Final Cut Pro systems and a digital photography and print unit. Sony has provided equipment and advanced training<sup>21</sup> to SMEs or sole traders.

SCI-PV caters for all sectors and levels of experience & expertise and has adopted a variety of delivery methods in order to reach outcomes. Beneficiaries include members of the public, SMEs, Practitioners and Community Groups.<sup>22</sup> The services to SMEs include:

- A series of introductory, intermediate and advanced workshops as well as ad hoc workshops in for example Steadycam training, HD training, using green screen
- Access to facilities and video & photographic equipment with training.
- Individual training & support.
- Participation in a series of specialised workshops.
- Inclusion in events/seminars/lectures.

Another major knowledge and technology transfer comes in form of collaboration with Creative Industries Research and Innovation Centre (CIRIC), a Knowledge Transfer Centre, which acts as an umbrella organisation for several projects across several creative areas.<sup>23</sup> Each member benefits from CIRIC's unique support package, which includes access to the latest digital technologies: laser cutting and etching, digital printing and video editing.

CIRIC is a Knowledge Transfer Centre, which acts as an umbrella organisation for several projects across several creative areas, one being the CIRIC design Bureau service. CIRIC aims to provide an environment that supports creativity and research in Video, Applied Arts, Textiles and other areas.<sup>24</sup>

The following indicators were used to assess the effectiveness of the initiative:

- Number of professionals and SMEs trained and used the facilities

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<sup>21</sup> [www.abertawe.gov.uk](http://www.abertawe.gov.uk)

<sup>22</sup> <http://www.swansea.gov.uk/media/pdf/f/t/SCI-PV.pdf>

<sup>23</sup> *ibid*

<sup>24</sup> <http://www.smu.ac.uk/research/index.php/ciric>

## 8.5 Boots Centre for Innovation, Swansea, UK

The Boots Centre for Innovation<sup>25</sup> was established in 2007 as a partnership between Alliance Boots, Longbow Capital<sup>26</sup> and The Institute of Life Science at Swansea University to help researchers and entrepreneurs from around the world to develop new products. The Centre, backed by a £300,000 Regional Selective Assistance grant from the Welsh Assembly Government, will use its facilities – and the Institute’s expertise – to assist the innovators to develop new products for Alliance Boots plc in areas as diverse as pain relief, skin treatments, diabetes, and healthy ageing. It is believed to be the first retailer in the UK to adopt an Open Innovation approach to new product development.

The Boots Centre for Innovation aims to support SMEs throughout the development process, providing valuable advice on how to develop their idea and bring it to market from an experienced organisation, and through the gateway to market provided by the Alliance Boots stores and distribution and retail network (3,200 retail outlets and providing access to over 135,000 independent pharmacies). The amount of support provided is tailored to the individual company’s needs.

Products that developed through the partnership will be marketed through the Alliance Boots and partner networks. The inventor retains their original IP rights. The Boots Centre for Innovation does not provide direct funding for SMEs that it works with. However, venture capital partner, Longbow Capital has set up a Healthcare Fund which will support ventures emerging from the Centre. In the first year of operation, the Boots Centre for Innovation evaluated more than 400 ideas and expect to launch some ten products into Alliance Boots stores in the following year.

The following indicators were found to be used to assess the effectiveness of the initiative:

- number of applications for new product ideas received
- products expect to launch into the market.

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<sup>25</sup> Boots Centre for Innovation; [www.bootsinnovation.com](http://www.bootsinnovation.com)

<sup>26</sup> Longbow Capital is a venture investor and specialises in the healthcare, wellbeing and life sciences sectors.

## 9. PPP-KTT Schemes for SMEs of Lower Absorptive Capacity: Examples and Indicators

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One of the objectives of the RAPPORT project is to identify practices where KTT involves SMEs of lower absorptive capacity. In a private-public partnership where SMEs are being able to effectively access knowledge from external sources is increasingly recognised as a key factor in a firm's competitiveness.<sup>27</sup> For a SME with a lower absorptive capacity, a KTT project could be a turning point for the way the company operates. Some of the cases where such practice takes place have been profiled below.

### 9.1 Fashion Industry Forum, UK

The Fashion Industry Forum started in 2004, as a four-year joint Government/industry initiative to deliver a supply chain development programme. Funded with £3.75m through the department of Trade and Industry (DTI), UK, the initiative was led by the British Clothing Industry Association and 12 industry collaborators and partners including major retailers and manufacturers including Marks & Spencer, House of Fraser Plc, Next Plc, Tencel Ltd and Quantum Clothing Group Ltd.<sup>28</sup>

The forum's objective was to design, make and deliver fashion to the consumer 'better, faster and more cost effectively'. It delivered supply chain improvement projects through its team of specialist project managers. Its sister company, Industry Forum Services, assisted companies to source effectively from domestic and international suppliers and delivered<sup>29</sup>:

- Design for New product development and co-developments
- Manufacturing to aim to compete at global standards
- Delivery - Covering physical logistics and Inventory management processes
- Supply Chain Management

The Department of Trade and Industry (today named as Business Innovation and Skills) recorded the following key achievements in SMEs through this partnership:

- Reduced product development cycles and 'better' products
- Increased speed to market
- Improved processes: less waste and duplication
- Reduced costs
- Improved sales, stock turns and reduced work in progress

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<sup>27</sup> Robert Huggins, Hiro Izushi, Nick Clifton, Sarah Jenkins, Daniel Prokop and Chris Whitfield; Sourcing knowledge for innovation - The international dimension; NESTA report; May 2010.

<sup>28</sup> [www.industryforum.net](http://www.industryforum.net)

<sup>29</sup> [www.bis.gov.uk/files/file36128.pdf](http://www.bis.gov.uk/files/file36128.pdf)

Throughout this programme 100 SMEs were assisted in terms of Supply Chain Improvement, Workshops to improve production capabilities, assistance for Best Practice Projects, Overseas Missions and various training programmes.

A case study of one of the SME in this partnership highlights the success of this programme. The project took a traditional Cut, Make and Trim (CMT) business called Fashion 8 located in Leicester, UK and added the skills of design, fabric sourcing and lean manufacturing to deliver a fast fashion full service supplier able to deliver innovative product to the high street from concept to store shelf in 4 weeks. Sales doubled and the work force has increased by 40% in a 12-month period<sup>30</sup>. Fashion 8 was able to benefit from the expertise of the leading enterprises but also enjoyed the privilege of state support.

## **9.2 Automotive Industry Forum (also known as Society of Motor Manufacturers and Traders Industry Forum - SMMT IF), UK**

The Industry forum was established in 1996 and was the originator for the Industry forum Adaptor programme in UK<sup>31</sup>. It aimed to achieve sustainable world class operations within the automotive manufacturing and supply chain industry. A key element within the automotive sector is the existence of large Original Equipment Manufacturers (OEMs) and the level of influence these have within the supply chain.<sup>32</sup> A principal component within the programme has been the development and delivery of MasterClasses<sup>33</sup>. The original focus was on manufacturing process improvement developed and delivered by engineers practising within the automotive sector, by the sector for the sector. The Industry Forum has been instrumental in assisting other similar forums and partnerships in developing their service offerings, especially through providing Master Engineers to MasterClasses.

SMEs are supported directly, through large company supply chains, and also delivers on behalf of the Manufacturing Advisory Service, Multi-nationals are assisted to develop and implement their own manufacturing and operating systems worldwide. The automotive industry forum benefitted 1200 companies (including SMEs)<sup>34</sup>. The major objectives of this partnership were<sup>35</sup>:

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<sup>30</sup> [www.bis.gov.uk/files/file36128.pdf](http://www.bis.gov.uk/files/file36128.pdf)

<sup>31</sup> Each Industry Forum is focused on improving productivity and competitiveness in its particular sector. In most cases the Forums are attached to the major trade associations for their industries. This has helped to provide industry insight on the key issues to be addressed.

<sup>32</sup> [www.bis.gov.uk](http://www.bis.gov.uk)

<sup>33</sup> MasterClasses is a structured 15-day programme, with teams drawn from all disciplines and levels within host companies, working under the guidance of Industry Forum Engineers to undertake process improvement on the shop floor (source: [industryforum.co.uk](http://industryforum.co.uk))

<sup>34</sup> Source: [www.bis.gov.uk](http://www.bis.gov.uk); The data doesn't clearly state number of SMEs; however it does say number of automotive companies i.e. 800 automotive, 400 other sectors

<sup>35</sup> The formally started Industry forum concluded in 2002, but after that it diversified its interests in other sector as well.



- MasterClass Programme to SMEs
- Value Stream Mapping
- Supply Chain to compete with global standards
- Lean Assessment
- Team Leader Training

This programme has many achievements and has evolved over the time by diversifying its interests. Whilst its roots remain in the automotive industry it has grown steadily in its first ten years; absorbing initially the aerospace sector industry forum from the Society of British Aerospace Companies (SBAC) and subsequently the Metals Industry Forum, UK. In addition to this growth by acquisition it has diversified into other major sectors such as food and drink, (including dairy, meat processing, fresh produce and cereals) as well as white goods, medical equipment and the public sector. Recognising the importance of the supply chain, and supply networks, it developed the methodology and techniques for the National Supply Chain Programme, and as a deliverer for that programme undertook more than half of all the implementations with customers in the automotive and aerospace industries.<sup>36</sup>

An in house study by the Industry Forum was conducted to evaluate the effectiveness of their programme. The evaluation was confined to MasterClasses which is the main components of the forum. This evaluation was conducted after two year since the inception of the scheme. The data was not restricted only to SMEs but to other participants as well.

The key findings were<sup>37</sup>:

- In line rejects were reduced by 75%, since this is a major cost parameter, SMEs balance sheets changed significantly.
- Scrap costs were reduced by 59%
- Output per man-hour increased by 41%
- The overall output increased by between 14% and 97%
- In line Work-in-progress (WIP) reduced from £1200 to £36
- Process lead time reduced from 75 to 6 minutes
- Changeover times reduced by between 49% and 72%
- Downtime reduced by 37%
- Value added per person increased by 35%
- Direct labour cost reduced from £103,000 to £39,000
- Floor space utilisation improved by between 21% and 29%

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<sup>36</sup> [www.industryforum.co.uk](http://www.industryforum.co.uk)

<sup>37</sup> [www.industryforum.co.uk/pdf/SMMTEnglishversion.pdf](http://www.industryforum.co.uk/pdf/SMMTEnglishversion.pdf); 2002, Channel Publications/SMMT Industry Forum; pg. 18; All these findings were calculated on shop or the workshop floor.

### 9.3 Durban Automotive Cluster (DAC), South Africa

The Durban Automotive Cluster (DAC) is a well-established, public-private partnership between the eThekweni Municipality and the automotive industry in KwaZulu-Natal region that is focused on developing the competitiveness of that industry. KwaZulu-Natal is home to a significant portion of the automotive industry in South Africa. The partnership, established in 2002, is supported by the major role players and stakeholders in the regional automotive industry.<sup>38</sup>

This partnership has many elements of KTT but of all the elements, there is a specific programme which highlights how this partnership has been successful to SMEs.

DAC runs a scheme called Automotive Business Retention and Development Week Programme for SMEs. In this scheme, SMEs are provided with the skills and knowledge to compete in changing and challenging industry as well as a potential direct link with commercial opportunities. This is done by conducting workshops and knowledge sessions. The workshop sessions that are run during the course of this programme consist of the following focus areas: (1) domestic and global automotive trends, (2) world class manufacturing principles, (3) financial management, marketing & export readiness programme and (4) face-to-face meeting with major automotive buyers.

The programme takes place in the Pietermaritzburg, Durban and Richards Bay regions. The development mechanisms and activities employed to support these SMEs are listed below<sup>39</sup>:

- Benchmarking and strategy development: Benchmarking against national and international automotive performance standards identifies priority improvement areas, which are in turn used to inform a planning and strategy development process.
- Twinning: Formalising developmental relationships between individual SMEs and larger DAC member firms act as a means to transfer high level skills and knowledge from large firms to the SMEs via non-commercial means.
- Mentoring: In cases where 'twinning' was ineffective or not possible, mentoring is introduced. Through this process a retired industry executive provides guidance and support to the SME on a basis of approximately two days per month. This fast-tracks the development of business systems and facilitates more sustainable growth than engaging with consultants for short term projects.

SMEs are encouraged to participate in all DAC activities that other DAC member firms would ordinarily benefit from. There is however a recognition that the smaller size of

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<sup>38</sup> [www.dbnautocluster.org.za](http://www.dbnautocluster.org.za)

<sup>39</sup> <http://www.dbnautocluster.org.za/dac/index/view/alias/Transformation>

these firms necessitates specific support that will assist them in terms of their growth and expansion<sup>40</sup>.

This partnership has been a major influence to the Automotive Industry of South Africa and there have been a number of evaluations of this partnership. This scheme has been reviewed by:

1. eThekweni Municipality in their annual Internal Audit and Performance Management Report on the Organisational Performance Scorecard. A new electronic Performance Management system has been deployed to facilitate this process. The objective and scope of the review includes:
  - Whether service delivery performance of the entire Municipality has been achieved as per the set targets which include the performance of Durban Automotive Cluster.
  - An assessment of the appropriateness of targets and baselines set and whether the targets are Specific, Measurable, Achievable, Realistic and Time Related (SMART).<sup>41</sup>
2. A set of indicators measuring the impact on value chain of SMEs has been established by School of Development Studies, University of KwaZulu-Natal, Durban.

They measured critical success factor for Durban Automotive Cluster under following titles<sup>42</sup>:

- Improvement in Cost control of SMEs [Change in Total inventory (in number of days); Change in Raw material (Days); Change in Work in progress (Days); Change in Finished Goods (Days)]
- Quality of product by SMEs [Customer return rate (products per month); Internal reject rate (%); Supplier return rate (products per month)]
- Flexibility of SMEs [Change in Lead time; Supplier on time (%); On time delivery to customers (%)]
- Capacity to change [Training spend as % total remuneration; Absenteeism (%)]

#### **9.4 KwaZulu-Natal Clothing and Textile Cluster (KZN CTC), South Africa**

The KwaZulu-Natal (KZN) Clothing and Textile Cluster is a not-for-profit public/private sector partnership of clothing, textile, footwear and retail firms in KZN. eThekweni Municipality and KwaZulu-Natal Provincial Government are the public sector partner and the major textile firms are the private partners in this partnership<sup>43</sup>.

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<sup>40</sup> Mike Morris, John Bessant, Justin Barnes, (2006) "Using learning networks to enable industrial development: Case studies from South Africa", International Journal of Operations & Production Management, Vol. 26 Iss: 5, pp.532 - 557

<sup>41</sup> Internal Audit and Performance Management Report on the Organisational Performance Scorecard for the period ended 30<sup>th</sup> June 2006; source: [www.durban.gov.za/durban/government/ar/scorecard](http://www.durban.gov.za/durban/government/ar/scorecard)

<sup>42</sup> [http://www.unctad.org/sections/wcmu/docs/com3em31p014\\_en.pdf](http://www.unctad.org/sections/wcmu/docs/com3em31p014_en.pdf)

<sup>43</sup> [www.durbanportal.net/sectors](http://www.durbanportal.net/sectors)

The cluster was formed in August 2005. The objective of the cluster was to address the threats confronting the KZN clothing and textile industries and maximize existing growth and development opportunities. Three key areas that the cluster focuses on is manufacturing competitiveness, human resources development and stakeholder interface. These areas were identified after an industry scoping audit attended by twenty clothing and textiles manufacturers was undertaken. Business plans were then developed based on these key areas through a technical steering committee (TSC). The Manufacturing Competitiveness (MC) business plan emerged. This program resulted in many achievements like the benchmarking of fifteen clothing and textile manufacturers, dissemination of best practices through workshops, manufacturing seminar series, training of benchmarking champions within firms, infusion of expertise into firms through workshops, broadening of clusters reach to incorporate two major retailers, Edcon and Mr. Price<sup>44</sup>.

The aim of the partnership is to generate the following for the SMEs:

- Generates critical mass of resources
- Shared learning
- Supports the rapid diffusion of ideas
- There is collective action and risk sharing
- Reduced costs
- Enhanced ability to compete on a global platform

The key programme called Manufacturing Competitiveness (MC) is the programme this scheme is executed. It focuses on following key areas of SME<sup>45</sup>:

- Firm-level benchmarking - This involves the benchmarking of firms using B&M Analysts 'Market Driver' benchmarking methodology. The result is a detailed report on each company every year which highlights the operational competitiveness of the firm. The following measures are used to determine performance: cost control, quality, value chain flexibility, value chain reliability, human resource development and product development. The firm receives its report and is also given in-depth presentations of its findings.
- Manufacturing seminar series - The seminar focuses on the requirements for world class manufacturing and provides details of the tools required to achieve world-class performance.

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<sup>44</sup> KZN Department of Economic Development (Economic Information Unit); source: [www.durbanportal.net](http://www.durbanportal.net)

<sup>45</sup> KwaZulu-Natal Clothing and Textile Cluster, Manufacturing Competitiveness Business Plan: 1st August 2006 to 31st July 2007, <http://www.kznctc.org.za/Downloads/>

- Best practice workshop and factory tour series - This provides training that focuses on the development of critical knowledge and skill relating to world class manufacturing.
- Quarterly best practice newsletters - The newsletters are distributed to all firms and stakeholders and will explore best practice challenges in the KwaZulu-Natal clothing and textiles industry.
- Expert workshops - Brings outside expertise into the regional industry with a view to infusing new expertise and ideas on manufacturing best practices.
- Facilitation of joint upgrading interventions within firms - This involves two joint firm-level interventions each year. Examples would be implementation of a common team-based manufacturing system or a preventative maintenance program involving a few firms.
- Value chain alignment - The value-chain alignment sub-programme focuses on forging synergies between KwaZulu-Natal clothing and textile suppliers and the major clothing retailers which they supply.
- Regional competitiveness database - Development of a comprehensive regional competitiveness database for the KwaZulu-Natal clothing and textile manufacturers.

## 10. Conclusions

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Previous literature on two generic areas of Knowledge and Technology Transfer programmes (access to public sector research and public-private partnerships) have been reviewed in order to develop an indicative understanding of the evaluation methodologies and indicators that have been used to assess these programmes. The analysis has enabled us to develop some insights into the evaluation of these schemes and the similarities and differences between them.

The common factor in both areas is that evaluation is still in progress and a lot of ground needs to be covered before arriving to a satisfactory threshold of understanding. Evaluation of KTT schemes are ‘few and far between’, leaving a big challenge for academics, practitioners and policy-makers to tackle.

There are also differences between the two areas. Firstly the evaluation discussion in the area of KTT schemes enabling access to PSR is more developed than the relevant discussion in the PPP area. In general, the PSR programmes have developed a critical mass of methodologies, although more precise indicators are needed to address the specific objectives of each scheme. On the other hand most of the evaluation methodologies and indicators for the PPP programmes are ad hoc evaluations and a critical mass is far from being achieved. A critical enabler in trying to reach this threshold is the deeper and more analytical understanding of the processes and the eventualities of the PPP programmes.

Secondly compared to the PPP programmes, the evaluations of PSR programmes use a wider range of indicators. In particular evaluations of PSR programmes have used three clusters of indicators: (a) process indicators, to provide evidence of the activities of the programme (b) indicators assessing the immediate impact of the programme to the beneficiaries (e.g. new products, process or product improvements, satisfaction of the company, increased sales) and (c) indicators using the long-term impact of the programme such as share of firms that repeated interaction with the host and other PRS institutions, change in the attitude against innovation, capacity to recruit qualified scientists and engineers and improvement in the ability to get external expertise. In contrast, most of the PPP programmes have used indicators concentrating on the immediate impact.

Thirdly, evaluation in the PSR area have addressed a range of stakeholders like: the actual SME beneficiaries, staff and managers of any potential intermediaries, academics involved in the process as well as SMEs whose applications for support have been rejected. Some evaluations have paid special care to have a representative sample of programmes, academic disciplines, SMEs of different sizes and different

sectors and PSR organisations in different geographies. In contrast, PPP programmes address primarily the beneficiaries of the programme.

Finally, the evaluations of PSR programmes have deployed a range of methodologies which range from surveying the beneficiaries SMEs' opinion, getting financial data of the participants from commercial databases, surveying the trends of the general SME population (whether beneficiaries or not), comparing participating SMEs with rejected applicants, in-depth investigations of individual cases of beneficiaries and detailed case studies of good practices (of programmes or beneficiaries). A few evaluations have also engaged with network analysis. On the other hand the PPP evaluations have focused on measuring the actual improvements the programme has enabled in the SMEs.

In conclusion, it must be emphasised that the field of evaluation needs further development. At the very least this will critically contribute to the legitimisation of these programmes to the wider society. This will also push the understanding frontier even further, especially in the areas of support programmes for the lower absorptive capacity and the programmes based on a public-private partnership.

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