

COMMON CORE IMPACT INDICATORS FOR ASSESSING EFFECTS OF DTI INDUSTRIAL SUPPORT POLICIES

Introduction

1. This note outlines a common core set of indicators for use in gathering evidence about the effects of expenditure based DTI industrial support policies relating to the following DTI aims and objectives:

Overarching DTI aim: “To increase competitiveness and scientific excellence in order to generate higher levels of sustainable growth and productivity in a modern economy”

DTI Objective 1: “To promote enterprise, innovation and increased productivity”

2. The purpose of developing a common core set of impact indicators is to ensure that the Department has **consistent and comparable definitions of relevant forms of evidence** about the effects of its policies, which can be used to inform assessment of their respective effectiveness in achieving its aims and objectives. The following points are stressed:

- ***Pick and mix approach:*** There is **no** intention that an identical set of impact indicators should be used for all types of policies or programmes, but rather that common types of indicators, should be used consistently where they are relevant. A selective approach to applying indicators to different contexts will be needed, based on an understanding of the likely channels of policy impact. The use of common core indicators is also not intended to preclude the use of relevant supplementary indicators as may be required; it is recognised that some of these latter are likely to be policy specific;
- ***Wider scope than performance indicators:*** The common core set of impact indicators has a wider scope than performance indicators, because of the need for evidence about any important effects of policies which may not have been fully anticipated, or reflected in the definition of performance indicators, as well as the need for evidence about the achievements of objectives against agreed performance indicators;
- ***Focus is on intermediate outcomes:*** The focus in this set of indicators is on **forms of evidence for which causal links can reasonably be established between observed outcomes and DTI policy actions**. These are important as necessary, although not sufficient, conditions for establishing the effects which policy actions may have achieved with respect to the Department’s higher level aims and objectives;
- ***Use of generalised, composite indicators:*** In many cases although the detailed nature of impact may differ across programmes or policy areas, at a higher level of generality common types of impact can be identified. In order to respect and accommodate the need for evidence at both the general and specific level, a number of the indicators below have been defined at a rather general level, as composite indicators, with the intention that they should differ according to context in the precise range of indicators collected at the detailed level;
- ***Importance of wider research:*** Evidence gathered on intermediate outcomes needs to be set in the context of wider research which can shed light on the links between these and the higher level variables which policies are seeking to influence, underpinning the rationale and objectives for the particular policy. Thus, for instance, interpretation of evidence about the effects of DTI support on intermediate outcomes such as collaboration on R&D, or improved business management skills, needs to be informed by wider sources of research about the respective roles of these and other factors in UK economic performance;
- ***Gaps in the indicators:*** The set of indicators outlined below makes use of the DTI Evaluation Framework, and draws on established methodologies which have been used in evaluation of expenditure based industrial policies, but leaves some very important gaps, where further work is needed. The most important of these relate to areas of increasing policy relevance, such as effects on institutions and on business networks.

3. The set of indicators outlined below has been informed by discussions at two recent evaluation methodology workshops held at DTI, the first of which involved contributions from HM Treasury and from a number of academics and other external evaluation experts. In particular, speakers at this event stressed the hazards of over reliance on set of impact indicators; the significance of gaps in the established range of indicators; and the importance of drawing on wider evidence about the rationales, objectives, and likely effects of policies to guide selection of indicators and interpretation of evidence. At both events, the Department's need for consistent and comparable forms of evidence about common areas of impact was also highlighted, as was the need to strike the right balance between the use of consistent definitions of indicators for the sake of comparability, and the quest for more perfect forms of evidence through changes which restrict comparability across studies.

4. The indicators presented below are grouped under headings in the DTI Evaluation Framework¹, and reflect the types of indicators and methodologies which have been used in a wide range of evaluations of industrial support policies. In addition to the points outlined above, the following particular risks relating to selection and interpretation of impact indicators are highlighted:

- **risk of using indicators which are biased in favour of weak economic rationales:** Policies for which outcomes are more difficult to measure may be precisely those with stronger economic rationales, e.g. support for activities with public good outputs, or where externalities and spillovers are expected to be significant relative to observed benefits to direct participants; also support for R&D activities, where the results may be highly uncertain, diffuse and difficult to trace in their channels of impact, and of long term fruition. By contrast, activities which generate large, visible and quantifiable benefits to direct recipients of support, even though the economic rationale for the support may be weak, may nevertheless score higher on a limited range of measurable impact indicators;
- **risk of unintended bias in favour of 'short termism':** The time profile over which supported activities would be expected to feed through into significant impact on quantitative indicators of business performance – such as sales, or profits, or profitability - varies markedly across industry support policy areas. Hence over reliance on these indicators could give rise to bias in favour of activities giving short term impact, at the expense of those involving business investment in changes or activities which are likely to come to fruition over the longer term²;
- **omitted or miss-specified indicators:** Reasonably full identification of all significant channels of impact, intended and unintended, would require a good understanding, both of the policy and programmes being assessed, and of the behaviour of the organisations and market processes which they are likely to affect. Gaps in understanding can easily result in miss-measurement of impact, as the result of omitting or miss-specifying the range of impact indicators used;
- **overlooked linkages across policy areas:** Complementarities among programmes in different policy areas may have significant effects on the effectiveness of different programmes, which can easily be overlooked (particularly as rather little is known about patterns of multiple participation in programmes across policy areas). If these complementarities are not taken into account, misleading conclusions may be drawn about the relative effectiveness of different activities.

5. Further discussion of these and related issues can be found in the papers for the 13 November 2000 DTI Workshop on Impact Indicators, and in the Department's "Guidance on Preparing Evaluation Plans", which sets out the DTI Evaluation Framework. Copies are available from the DTI Central Evaluation Team. A summary of the indicators is provided at Box 1 below, with further detail at Annex A.

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¹ See DTI "Guidance on Preparing Evaluation Plans"; copies available from the Central Evaluation Team.

² This risk can be reduced by taking account of supporting evidence from wider research about the time profile of expected fruition for the type of activity, accompanied by data on timing of support and timing of indicator data collection.

BOX 1: Summary of common core indicators

Indicator category	Indicators
Standard company classification data	Size, age, GVA [Gross Value Added], productivity (GVA or sales per employee), exports; ditto current and 3 years previously; sector; region. <i>Supplementary:</i> capital expenditure; R&D; date began to export; distribution of turnover between: “new or significantly improved products” and “unchanged or only marginally modified products” (CIS).
<i>I. Indicators of impact on “the ability to generate income from given available resource inputs”</i>	
A. Effects on firms (participants in DTI supported activities or users of DTI supported services):	
A.1. Indicators of impact on hard business performance outcomes	“Effects (quantified where possible) on: Sales, GVA, productivity (GVA or sales per employee), exports; startup survival rates
A.2. Indicators of impact on intermediate business outcomes relating to: A.2.a. productivity; A.2.b. innovation; A.2.c. market access and creation/development [Note: The 7 QCD – Cost, Quality, Delivery – measures used by SMMT Industry Forum are outlined at Annex A and in DTI publication]	“Number (and/or %) supported businesses achieving (as a result of support given)...: A.2.a. ... significant ³ positive effect on 1 or more of the 7 QCD measures used by SMMT IF, or other relevant QCD measures; A.2.b. ... introduced new [improved] products or processes; significant ⁴ increase in the % turnover derived from products < 18 months old; A.2.c. ... entered new market (product; geographical: UK, EU, overseas); gained access to significant ⁵ new contacts (or ‘significantly improved access to contacts’); won new customers; etc.
A.3. Indicators of impact on business capabilities: A.3.a. increased investment in physical capital; A.3.b. increased R&D; A.3.c. increased/improved training; knowledge; skills (human capital) A.3.d. increased/improved use of ICT A.3.e. innovation capability; technology absorptive capacity A.3.f. entrepreneurial or management skills	“% supported projects/investment deemed additional” “Number (and/or %) supported businesses achieving significant⁶ increase in one or more of the following areas... Notes: For use with separate lists of likely effects tailored to aims of the particular policy area. Evidence based on ratings on standard 5 point scale for business view of significance of the effect rather than yes or no.]

³ “Significance” of effect to be determined by use of quantitative data where possible, otherwise through use of a 5 point rating scale in survey questions, excluding ‘don’t know’ responses, where 1 is defined as no effect, 3 is a significant effect, and 5 is highly important or critical effect (detailed wording of survey question will vary to suit context).

⁴ As previous footnote.

⁵ As previous footnote.

⁶ As previous footnote.

A.4. Indicators of impact on business practices, processes, methods	<p>“Number (and/or %) supported businesses achieving (as a result of support given) significant⁷ improvements in one or more of the following areas ... [for use with tailored list and rating scales as per A.3 above, e.g.]:</p> <p>... improved input supply management; improved recruiting processes; improved transactions processes; etc.</p>
B. Effects on market processes, networks, supply chain relationships Note: This group of indicators will need to be expanded, as coverage below leaves important gaps.	
B.1. R&D collaboration	<p>“Number (and/or %) supported collaborators which:</p> <p>... had not collaborated on R&D previously;</p> <p>... had not collaborated with <i>each other</i> previously;</p> <p>... planned to collaborate [with each other][on R&D] again as a result of experience in the supported project.</p>
B.2. supply chain relationships	<p>“Number (and/or %) supported businesses achieving significant positive effects on one or more of the following.....</p> <p>[e.g.:...exchange of information with suppliers/customers]</p>

II. Indicators of impact on “the availability, cost, and quality of resource and technology inputs”	
A. Effects on Technology	
A.1. R&D level and quality A.2. technology outputs A.3. technology dissemination outputs	<ul style="list-style-type: none"> • % supported projects deemed additional; • % supported projects which met technical objectives; • innovative quality of projects [peer review ratings; standard survey question about ‘how innovative was the project, by firm standards; by regional/UK standards; by EU standards; by global standards’]; • measures of technology outputs achieved (e.g. number of patents; standards; prototypes, etc.); • measures of dissemination outputs (e.g. number of publications, presentations to trade shows, conferences, etc.).
B. Effects on links between industry and science base	
B.1 collaborations between HEI and industry	<p>“Number (and/or %) supported HEI-industry collaborators which:</p> <p>... had not collaborated on R&D previously;</p> <p>... had not collaborated with <i>each other</i> previously;</p> <p>... planned to collaborate [with each other][on R&D] again as a result of experience in the supported project.</p> <p>“Number of PhDs resulting from supported HEI-industry collaboration projects”</p>
C. Effects on access to finance	
C.1 Rate of rejection of applications for finance C.2. Cost of finance	<p>To be defined. Could also include reference to:</p> <ul style="list-style-type: none"> • leverage of public sources of finance, and • sources of finance used.
D. Effects on institutions: the supply of relevant business services (e.g. information, training or advisory services)	

⁷ As previous footnote.

<p>D.1. indicators of relevance to business need</p>	<ul style="list-style-type: none"> • number of users; • willingness to pay ('how much did you pay for this service?... would you still have used the service if you had been required to pay 25%/50% more?'); • number or % users who would not otherwise have had access to equivalent service (based on response to survey question);
<p>D.2. indicators of service quality and value for money</p>	<ul style="list-style-type: none"> • % users giving target rating for overall satisfaction (standardise on 3-5 or 4-5 on a 5 point scale); • % users giving target rating for overall value for money (same standard and rating scale); • % users giving target rating for quality of service (same standard and rating scale)

BOX2: Levels of impact indicators and measures relating to a hierarchy of aims, objectives, and targets

Expenditure based channels of policy impact involve: Inputs and Activities:

<p>Inputs (£ and staff time) lead to Activities, may give rise to Activity outputs (e.g. R&D outputs; training tools)</p>	<p>Input measures Activity measures Activity output measures (measures of activity and output additionality)</p>	<p>Input targets Activity targets Activity output targets</p>
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..... which give rise to: Intermediate Economic Outcomes

<p>Intermediate outcomes include direct and indirect effects on any of the factors affecting competitiveness, e.g.:</p> <ul style="list-style-type: none"> • effects on firms; • effects on resources; • effects on institutions; • effects on the wider framework for business. <p>See Annex A, Box B, “Framework for comparability of evaluation results”</p> <p>Wider effects (spillovers, externalities, etc.)</p>	<p>Intermediate outcome indicators (indicators of impact on one or more of the factors which affect competitiveness, GDP per capita, and/or other high level outcomes)</p> <p>measures of additionality</p> <p>Indicators of wider effects</p>	<p>Intermediate outcome objectives and targets (e.g. % of supported businesses improve their performance as a result of using supported services)</p> <p>The economic rationale for activities should identify the nature of the expected intermediate outcomes, on the basis of theory and evidence about links between the activities and outcomes, and the channels of their expected impact on high level economic outcomes.</p>
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..... which in turn lead to impact on High Level Economic Outcomes

<p>High level outcomes: GDP per capita, per worker, per hour worked;</p>	<p>High level measures:</p>	<p>DTI Aims, Objectives, and PSA Targets [See Annex A]</p>
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Notes: **Intermediate outcomes** can in turn be broken down into many different levels. These include a logical hierarchy of **intermediate effects on firms** (e.g. **reduced failure rates, improved logistics, etc.**), which may result from supported activities, either directly, or indirectly via effects on any of the factors which affect the context in which business operates. Intermediate effects on firms may lead through to effects on “**bottom line**” **indicators of business performance**, but these are still only ‘**intermediate outcomes**’ from the perspective of the economy as a whole. Intermediate economic outcomes are summarised in the Department’s **Evaluation Framework**⁸ under 3 headings, covering effects on: “the ability to generate income from given available resource inputs,” “the availability, cost and quality of resources,” and “the wider framework for business.”

The term “**wider effects**” generally refers to effects on firms (or other organisations or bodies) which did not participate directly in the supported activities. Wider effects may be important to the economic rationale for public sector support, but are generally difficult (and costly) to trace and to measure.

The term “**immediate outcomes**” is sometimes used to refer to the direct effects of activities as distinct from effects which may take longer to materialise.

⁸ (see DTI’s “**Guidance on Preparing Evaluation Plans**”, available from the DTI Central Evaluation Team)

ANNEX A: NOTES ON INDICATORS

I. Notes on BOX I, Section I: Indicators of effects on “the ability to generate income from given available resource inputs” (productivity):

1. “Productivity” at the national aggregate level is an element of DTI objective 1. Improvements in productivity at the level of individual firm are only one aspect of achieving this objective, however, since improvements at national level can also result from growth of high productivity firms relative to those with low productivity. Hence the list of indicators in Box 1 below is broader than indicators of impact on firm level productivity.

2. Sources of evidence for indicators of effects on hard business performance outcomes, subject to data availability and quality, costs of data collection, and other particular circumstances, could be:

- company data collected e.g. in context of client relationship (for instance, Business Link advisor relationship, or participation in Industry Forum Masterclass), and/or data collected for ONS surveys (e.g. GVA);
- survey of business participants/clients, for which respondents are asked for a best estimate. GVA in this context could be obtained by asking for best estimate of ‘the proportion of total sales which represents GVA’.

II. Notes on the 7 QCD [QUALITY, COST, AND DELIVERY] measures used by SMMT Industry Forum

The following 7 impact measures are used by the SMMT Industry Forum to measure the results achieved through the various services which they offer in the area of manufacturing process improvement. More detailed information about the measures is contained in a DTI publication about these indicators. (Notes below are taken from the DTI publication.)

Measure	Definition	Rationale
1. “Not right first time” [Not RFT] Area of impact: Q, C, D	Expressed in ‘number of defect parts per million’, it is a measure of a product’s ability to match a specification.	“To the manufacturer, it means wasted effort, wasted resources, and wasted production time – all leading to excess costs. To the customer, it means interrupted production flow, poor quality and ultimately higher prices. Reducing Not RFT can help improve Quality, Cost, and Delivery.”
2. “People Productivity” PP	A measure of “the ratio between the number of units made and the number of direct operator hours associated with manufacture of those units.”	“Under QCD methodology, we define work under 3 divisions: Work which adds value; work which does not add value; and work which is wasteful and counter-productive. A high PP value can only be obtained when the highest proportion of direct employees’ work is applied to adding value to the process, non-value added work is reduced to a minimum, and waste is eliminated. The purpose of measuring PP is to encourage a continuous focus on a key element of product cost...”

<p>3." Stock Turns" ST</p>	<p>A measure of "how frequently the stock, raw material, work-in-progress and finished goods are turned over in relation to the sales revenue of a product."</p> <p>"ST =(Sales turnover of product)/ (value of raw material+ WIP+ finished goods)"</p>	<p>"ST is an important measure because it reflects the level of control and co-ordination of materials that flow through the process. Inventory levels (by value or quantity) are key indicators of the 'leanness' of the process and are directly related to the simplicity of production flows. (In contrast, excess inventory means unnecessary cost.) Inventory levels can be used to buffer against any production flow interruptions. Ideally the operator aims to eliminate any interruptions to the manufacturing process to ensure that the production stream is continuous...."</p>
<p>4. Delivery Schedule Achievement DSA</p>	<p>A measure of "how well a supplier matches the planned delivery requirement of the customer".</p> <p>DSA= No. of planned deliveries less [no. of late deliveries + no. of part deliveries] as a percentage of no. of planned deliveries</p>	<p>Fundamental to customer satisfaction. "DSA is a function of good plant performance, which in turn is a reflection of good management."</p>
<p>5. Overall Equipment Effectiveness OEE</p> <p>Availability % = the up time of the process as a % of the total available time;</p> <p>Quality % = the ratio of good parts to the total number of parts produced</p>	<p>A "total measure of performance that relates the availability of the process to the productivity and quality...[and] shows how well the company is utilising resources..."</p> <p>OEE= Availability% x Productivity % x quality %</p>	<p>Indicator of efficiency of use of resources.</p>
<p>6. Value Added Per Person VAPP</p>	<p>A "financial measure that relates the number of direct people involved in the conversion process to add value to the product."</p> <p>VAPP = [Output value less input value] divided by the number of employees</p>	<p>"The VAPP has a direct impact on the costs associated with a process and shows specifically how well people are used to transform materials into the finished product."</p>
<p>7. Floor Space Utilisation FSU</p>	<p>A measure of "the sales revenue generated per square metre of factory floor space."</p> <p>FSU = Turnover of model area/ Square metres of model area</p>	<p>"High fixed costs, such as factory space, are not usually desirable and capital decisions which require expanded buildings can be expensive. So there is generally a strong desire to minimise the use of space taken up by the manufacturing process."</p>