

Scottish Enterprise's Impact Appraisal and Evaluation Guidance

April 2024 Version



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Summary Check List

Undertaking an appraisal or evaluation or establishing a monitoring framework involves a number of stages. To ensure that all of these are followed this information sheet outlines in general terms what needs to be undertaken for each stage.

Why is it important?

It is important that, if appraisals and evaluations are to be done in a consistent way, (and if monitoring frameworks are to provide the information that will inform an eventual evaluation) the various technical stages involved in each process are followed. This information sheet sets out in very broad terms the key elements of each stage.

Step	Issues	Checked
Develop gross impact estimates		
Time period set	<ul style="list-style-type: none"> • Ensure an appropriate time period is set for the EIA. • Ensure a clear base year has been set. 	
Annual impacts presented	<ul style="list-style-type: none"> • Ensure all impacts are presented on an annual basis. • Ensure all impacts are discounted. 	
Constant prices	<ul style="list-style-type: none"> • Ensure impact values are presented on a consistent price basis. 	
GVA method	<ul style="list-style-type: none"> • Check method for assessing GVA has been clearly stated. 	
Employment method	<ul style="list-style-type: none"> • Check method for assessing jobs has been clearly stated. 	

Summary Check List

Summary steps for Appraisal

Step	Issues	Checked
Adjust for additionality		
Deadweight	<ul style="list-style-type: none"> • Ensure deadweight has been adjusted for. • Check the range against appropriate benchmarks. 	
Displacement	<ul style="list-style-type: none"> • Ensure displacement has been adjusted for. • Check the range against appropriate benchmarks. 	
Leakage	<ul style="list-style-type: none"> • Ensure leakage has been adjusted for. • Check the range against appropriate benchmarks. 	
Multipliers	<ul style="list-style-type: none"> • Ensure multiplier has been adjusted for. • Check that the multiplier is based on the appropriate sector. • Check the range against appropriate benchmarks. 	
Optimism Bias	<ul style="list-style-type: none"> • Ensure optimism bias has been adjusted for. • Check the method used to assess optimism bias. 	

Summary Check List

Summary steps for Appraisal

Step	Issues	Checked
Develop cost estimates		
Annual SE Costs	<ul style="list-style-type: none"> Ensure all appropriate SE costs have been collected and presented on an annual basis. 	
Annual wider public sector costs	<ul style="list-style-type: none"> Ensure all appropriate wider costs have been collected and presented on an annual basis. 	
Constant prices	<ul style="list-style-type: none"> Check all costs have been converted to a consistent price base. 	
Apportion Impacts	<ul style="list-style-type: none"> Ensure impacts are apportioned based on discounted costs across partners (where relevant). 	
Impact ratios for milestone years	<ul style="list-style-type: none"> Ensure milestone year impact investment ratios have been calculated. 	
Cost per job for milestone years	<ul style="list-style-type: none"> Ensure milestone year cost per job estimates have been calculated. 	
Tax revenue	<ul style="list-style-type: none"> Ensure that the potential tax revenue to Scotland from employment is calculated. 	
Carbon Equivalent Emissions Estimation		
Estimate carbon emissions	<ul style="list-style-type: none"> Estimate carbon emissions based on turnover increases because of SE's supports. 	

Economic Impact Glossary

This glossary provides short definitions of some of the terms that are commonly encountered when undertaking impact assessments. Most of the terms are defined more fully in the accompanying information sheets.

- **Activities:** in terms of the logic model, activities are what a support project does/delivers, for example provision of advisory support funding support, learning journeys.
- **Additionality:** this is the combination of adjustments that are applied to gross impacts in order to arrive at a net value. It therefore includes deadweight, displacement, leakage and multipliers.
- **Appraisal:** the process of estimating the likely impact of support in advance of its implementation.
- **Benchmarking:** the process of comparing the impacts of support project to a similar one in order to arrive at a judgement as to its effectiveness and efficiency.
- **Carbon Emissions:** the additional carbon equivalent emissions produced from the impacts of support (e.g. employment or turnover increases). The necessary data is provided in the Scottish Government's input-output Tables which provides for 98 Standard Industrial Classification (SIC) Divisions and Sub-divisions the direct and indirect Carbon equivalent emissions in tonnes per £1 million of turnover.
- **Constant prices:** Prices that are corrected for the effects of inflation over time. This enables the costs and benefits of a support to be compared on a consistent basis.
- **Construction impacts:** SE can provide funds for construction and infrastructure projects as a way of stimulating economic development. This construction activity has an impact on the economy. However, this should not be incorporated into wider project impacts but should be reported separately.
- **Cost Benefit Analysis:** the process of quantifying as many of the costs and benefits of support as possible. This includes the social and environmental issues that the market finds it difficult to price.
- **Cost centres:** a part of a company that does not produce separate profit and loss accounts so that the calculation of the GVA impact of its operations is not possible.
- **Crowding out:** the negative impact that a project support has on the private sector, for example by providing a service that the market is perfectly capable of offering without any public sector support.
- **Current vs Constant prices:** current prices are the prices of goods and services in the year in which the transaction occurred. Given inflation they are not comparable over time. To allow comparability they need to be adjusted and expressed as constant prices.

Economic Impact Glossary

- **Deadweight:** the extent to which the outcome that a support project is intended to create would have occurred in the absence of the project.
- **Discounting:** the process of expressing future costs and benefits in present values through the application of a discount rate of (typically 3.5% for first 30 years and 3% thereafter). This assumes that beneficiaries would prefer to receive impacts sooner than later.
- **Displacement:** the extent to which support results in economic growth for a beneficiary is offset by reductions in the activities of non-beneficiaries, for example where supporting one Scottish business to win orders comes at the expense of another Scottish business, and results in no net increase in turnover at the Scottish economy level.
- **Economic Impact Assessment:** this is the type of assessment of the impact of support undertaken by SE. It is not a Cost Benefit Analysis but a more limited assessment concentrating on measurable impacts, in particular jobs and GVA.
- **Effectiveness:** the extent to which a project achieves its stated objectives.
- **Efficiency:** the extent to which a project is assessed as being efficient (in comparison with similar support) in terms of, for example, the cost per job created/safeguarded and the Impact Ratio.
- **Employment densities:** benchmarking data that give, for types of usage, the numbers of employees who can be accommodated per unit area of floorspace. This information can be used to give broad estimates of impact for projects that construct offices and industrial space for other end users.
- **Equity:** a rationale for support where public sector support is justified on the grounds that it will result in a more equitable distribution of benefits than the market would produce if left to its own devices.
- **Evaluation:** an assessment of the extent to which a project or programme has attained its objectives. This is normally a backward-looking process, assessing impacts to date. However, when support being assessed is still underway its evaluation may include a forward-looking element with beneficiaries being asked to estimate future impacts as well as impacts to date.
- **Externalities:** the impacts (both positive and negative) of support that are not borne by the companies that generate them, often as they are not priced by the market.
- **Full Time Equivalent (FTE) job;** this is the preferred measure of employment. It adjusts the head count employment in a company by equating two part time employees to one full time. Thus, two-part times equal one FTE.

Economic Impact Glossary

- **Gross Value Added (GVA):** GVA is one of the most widely used measures for assessing the impact on the economy of support. Essentially it is measuring the extent to which economic activity creates value. There are several ways that it can be calculated. One of the most widely used for individual companies is: turnover less cost of materials and inputs.
- **Head count:** this is the number of individual people employed in a company regardless of the number of hours they work or employment status, for example full or part-time.
- **Impacts:** the key impacts of support that appraisals and evaluations try to capture are: net GVA, net jobs created or safeguarded and the measures that can be derived from these especially the Cost per Job and the Impact Ratio, the Scottish Income Tax payable by the jobs created, and the carbon emissions as a consequence of support.
- **Impact decay:** the impacts of support last (persist) for a certain time. Over this period there will be decay, that is the impact (for example GVA) declines. This decline (decay) is expressed as an annual percentage.
- **Impact period:** the period over which SE profiles the impacts of its support: ten years. This does not mean that it is assumed that the impacts of all support projects persist for this length of time: some last for shorter periods others for far longer.
- **Impact persistence:** the impact of support does not last forever as economic and social factors change. The persistence of a support project is an estimate of the time over which impacts can still be attributed to it.
- **Impact Ratio:** the Impact Ratio is the net GVA impact of support per £1 of SE spend.
- **Imperfect competition:** when market power is in the hands of a limited number of companies, rather than there being perfect competition. This results in a sub-optimal use of resources. This is one of the rationales for public sector support.
- **Imperfect information:** this is one of the justifications for public sector support. It arises when an individual does not have perfect information about the available options and the costs and benefits of these. This can result in sub-optimal decisions being made resulting in economic inefficiencies.
- **Information asymmetry:** the situation where information is not equally shared so that some parties have an advantage when making decisions.

Economic Impact Glossary

- **Input:** in terms of the logic model, inputs are the public sector resources used to deliver support, usually some combination of funding, accommodation and staff.
- **Leakage:** the proportion of the gross impacts of support that benefits areas or individuals outside of the support target area or group, in this case Scotland.
- **Logic model:** a logic, or theory of change, model is a way of illustrating, or conceptualising, the development trajectory of support. This is structured into 5 key parts: inputs, activities, outputs, outcomes and impacts.
- **Market failure:** an imperfection in the operations of the market so that an efficient allocation of resources does not result. This then provides the rationale for public sector support. Market failures include imperfect and asymmetric information and imperfect competition.
- **Multipliers:** these are the knock-on effects in the economy because of support. There are two types: the Type I multiplier that measures the indirect impacts on the supply chain as the beneficiary purchases additional goods and services; and the Type II that, in addition, measures the economic impacts arising from wages expenditure.
- **Net Present Value (NPV):** the difference between the discounted value of the future costs and benefits of support.
- **Optimism bias:** the assumed tendency for those estimating the future impacts of support to be over-optimistic.
- **Outcome:** The outcomes of support are the changes that occur to beneficiaries and the wider economy. These might be increased sales or a growth in exports.
- **Output:** this is the measurable direct result of support, for example the development of a new product or service or qualifications gained.
- **Person Year Equivalent (PYE):** An expression of number of jobs in a given time equivalent to the number of FTEs per year. This method is often used when estimating jobs from capital spending or construction where spend may be spread across variable time periods and result in temporary employment and supporting existing employment in the supply chain. This measure aims to quantify the total employment supported in PYE equivalents. An average annual FTE employment can be estimated if the time frame over which the PYE is known (for example, 10 FTE jobs held over 3 years = 30 PYE jobs).
- **Present Value (PV):** the discounted future benefits of support.
- **Project income:** some support projects aim to deliver services for which a contribution will be paid by beneficiaries, for example course fees or rental income. As these income streams can be difficult to predict the practice is to report them but not to use them in impact calculations when undertaking appraisals.

Economic Impact Glossary

- **Rationale for support:** the justification for public sector support in the economy, rather than leaving this to the private sector. Rationales are usually based on Market Failures or Equity.
- **Research income:** this is the income won by further and higher education and public sector research establishments. Where this income comes from outside of Scotland (and would not otherwise be spent in Scotland) its economic impact should be assessed.
- **Scottish Income Tax and National Insurance Contribution:** estimate of the tax contribution made by the employees whose jobs are created or safeguarded by Scottish Enterprise's support projects. The current rates of Scottish Income Tax should be used and either the detailed salaries for specific types of post or, should this not be available, then the average salaries.
- **Standard question set:** this is SE's preferred survey question set to be used when assessing the impacts of support for appraisals and evaluations. This then ensures that the reported impacts are comparable between different support projects.
- **Substitution:** the behaviour of a beneficiary when one activity is substituted for another solely to take advantage of public sector support. This is often a problem in labour market support projects when companies change recruitment activities to take advantage of financial support. In mainstream economic development support, it is less of an issue. SE does not usually adjust for it for that reason.
- **Sunk costs:** sunk costs are the investments that have already been made in a project. As these costs have already been incurred it is generally suggested that they are reported rather than incorporated into any impact calculations, especially when undertaking appraisals. However, there may be instances where their inclusion is legitimate as the support project being appraised may be capitalising upon this earlier investment. Its exclusion would therefore give misleading impact figures.
- **Time preference rate:** the preference of individuals for benefits to be delivered sooner rather than later. As such the future benefits are decreased by an annual percentage (currently 3.5%).

Logic Model (Theory of Change)

A logic model is a conceptual way of understanding the causal path of project development illustrating how the resources used during implementation ultimately deliver economic impacts.

Why is it important?

To ensure effective support *and* value-for-money, public sector organisations have an obligation to understand how project (and/or programme) activity will lead to improvements within the economy. A logic (or theory of change) model is a conceptual way of presenting the causal pathway and effects of project delivery: capturing the linkages between the resources allocated, the activities undertaken to deliver the outputs, follow-on outcomes, and, over time, expected economic impact.

The logic model is a key step in the development of a monitoring and evaluation framework (MEF).

The main benefits of having a conceptual logic model include:

- The ability to inform strategic planning, contribute to project design, aid development of project objectives and assist with decision-making;
- Aiding understanding of key deliverables and both “how” and “where” economic impact (and wider benefits) will be derived;
- Acting as the backbone for the Monitoring and Evaluation Framework (MEF) (for those variables identified across the project pathway as inputs, activities, outputs, and outcomes throughout its active lifetime); and
- Underpinning both measure and target setting and aiding the ability to influence the mid-term direction of the project/programme which will feed into the eventual evaluation.

Logic Model (Theory of Change)

Key considerations

A logic model breaks down a project into five stages, from inputs to impacts. Table 1 defines what each of these stages is and gives examples of the types of measures that might be relevant for each stage. These measures can then become the monitoring indicators: the things that are “counted” at regular intervals so that project performance can be tracked and, if necessary, adjustments made.

In addition to the quantitative effects of a project it is important to note that not all benefits can be quantified or monetised. Accordingly, the wider qualitative benefits should also be captured and reported so that the journey to impact can be described according to underlying project objectives. This might include a greater understanding of the route to market, cultural changes in company management and greater appreciation of the benefits of working with academic institutions.

TABLE 1 The Stages of the Logic Model

Logic Model Stage	Definition	Example
Inputs	Public sector resources needed to deliver the project.	Money, staff, premises.
Activities	Actions needed to deliver the project.	Products/services delivered, research undertaken, workshops delivered.
Outputs	Measurable direct results of the activities.	Leverage of business Research & Development, qualifications gained, development of new products and services.
Outcomes	Changes that occur to the beneficiaries and the medium-term benefits on the economy.	Increased sales, IP generated and protected, export markets entered.
Impacts	The quantitative effect upon the Scottish economy.	Net additional GVA and employment.

Logic Model (Theory of Change)

The attached guidance note on for the Monitoring and Evaluation Framework Template outlines the stages and flow of the logic model approach, followed by supporting detail on the key variables. What can be seen is that:

- The project's aims and objectives should influence activity at the various stages of the model, from inputs to impacts;
- For each of the stages it should be possible to specify what it is hoped will be achieved, for example how many workshops will be run and how many companies will attend? As far as possible these factors should be quantified in terms of numbers and timing. These can then become the measures and targets for each stage of the model;
- The measures and targets are then used to further populate a Monitoring and Evaluation Framework (MEF);
- At regular intervals the measures are counted, and progress assessed against the targets. The MEF will set out the frequency and process for collecting data, for example, application forms, company feedback surveys, event feedback forms, management data to be collected, etc.;
- If there is substantial variance then the targets may need to be reviewed to understand whether targets are appropriate (too challenging or not challenging enough) or if these reflect a genuine over- or under-achievement, and why. This can often be the case with innovative projects where there may not be any experience to inform target setting when the project is developed. Such a reassessment should not be taken as an admission of failure but is recognition of the many uncertainties surrounding project implementation; and
- Any such reassessment might then result in adjustments to the measures and targets set for the other stages of the model. In essence this is formative evaluation.

Templates

A template for completing the logic model is part of the Monitoring and Evaluation Framework (MEF) Template (See separate guidance note).

Gross Value Added

Gross Value Added (GVA) is an indicator of wealth creation, measuring the contribution to the economy of a specified investment in economic activity.

Why is it important?

GVA is one of the most commonly used indicators of economic impact and provides a measure of the wealth generated within the economy (over time) resulting from direct investment in economic activity.

It is defined as being the value of the output produced in the economy over a particular period less any appropriate intermediate consumption (i.e. the value of the goods and services consumed as inputs to the production process)¹.

GVA is useful in that it adds important *quantitative* economic detail to inform the assessment of support project's actual or potential economic development value. Net GVA, for example, indicates the scale of wealth generated by a support above that which would have been generated by beneficiaries anyway.

GVA data can be used:

- To highlight the absolute impact of support (at both gross & net levels);
- To calculate the **Impact investment Ratio** (an indicator of the relative cost effectiveness of support);
- As a contributor to assessing the impact on productivity because of support; and
- To help assess the 'quality' of jobs generated (either through comparisons of the wage component of GVA or through comparisons of GVA per employee).

¹ GVA is equivalent to GDP (gross domestic product) less taxes on production (net of subsidies)

Gross Value Added

Please note that the approaches to measuring GVA described below will not necessarily apply to pre-commercial activity (such as the product development phase of a new start company), or a business with strong focus on R&D, during which negative GVA can be generated as no income is being generated at a time when costs are being incurred. In such instances it may be preferable to base any GVA calculations on employee costs alone. This is explored in greater detail in the [Pre-revenue Impacts](#) information sheet.

How do we measure GVA impacts?

GVA can be measured in a number of ways. For reasons of robustness, if possible, the preferred method of calculating GVA should be to build this up from company data, collected either using SE's [standard impact question set](#) or sourced from company accounts.

GVA at the firm level can be estimated in two ways (Box 1). Both methods will result in the same GVA value.

BOX 1: Estimating GVA at the Business Level

Method 1:

GVA = Operating Profit² (before tax) + Employee Costs³ + Depreciation + Amortisation^{4, 5}

Method 2:

GVA = Turnover (or sales) less the cost of bought in goods & services (excluding employee costs)⁶

² There are various definitions of profit and it is useful to be clear about what definition is needed to calculate GVA. Operating Profit is turnover minus the cost of sales, employee costs, depreciation and other overheads. It excludes any interest the company may earn or pay and taxes due. It is also known as Earnings Before Interest and Tax (EBIT). Common accounting terminology also often includes EBITDA (Earnings before Interest, Tax, Depreciation and Amortisation). Gross Profit is turnover minus the cost of sales (this excludes employee costs and overheads). Net profit before tax is Operating Profit minus interest. Net profit after tax is the profit after all costs (including tax) have been deducted.

³ Including costs such as NI and pension contributions.

⁴ *Amortisation* is the writing off or depreciation of goodwill and other *intangible* assets and will normally be reported in accounts if relevant.

⁵ Often amortisation data is not available in company accounts as it is judged not to be relevant. Accordingly, it is often not included as part of the GVA calculations. It is, however, mentioned here for completeness.

⁶ Such as raw materials and energy.

Gross Value Added

It should be noted that employee costs should be the total costs to the employer of employing someone, that is wages, pension and employers National Insurance contributions and any other costs directly associated with employment such as bonuses and overtime. At times it may be difficult to get accurate information on these total costs. If all that is available is data on gross wages and salaries (that is the gross amount paid to the employee) then a broad rule of thumb is to gross these figures up by 15% (though this has increased continuously from ~14% in 2008 to 17% in 2021). This is based on the ratio between the total Gross Wages and Salaries and Total Labour Costs between 2008 and 2021 for all Scottish employees (excluding agriculture, finance and parts of the public sector)⁷.

There are some differences by sector too, with total labour costs for some sectors such as oil and gas extraction, and manufacturing of drinks, chemicals, pharmaceuticals, and petrochemical products typically being 25% or more than wage and salary costs. The average ratio may be too low for some companies and too high for others, but if company specific information is not available then it is probably the easiest adjustment to make.

Where company level data is not available it is possible to derive estimates based on proxy values (Box 2). These estimates use sectoral averages and at best will provide a rough indication of GVA and should only be used when the detailed metrics outlined above are not available.

Box 2: Estimating GVA from Proxy Values

Where turnover estimates are available, these can be converted to GVA by determining appropriate sectoral turnover to GVA ratios using secondary data from the Scottish Government⁸.

Where employment estimates are available, these can be converted to GVA by applying the average GVA per employee for the relevant sector using secondary data from the Scottish Government⁹.

⁷ <https://www.gov.scot/collections/business-and-innovation-statistics/#scottishannualbusinessstatistics>

⁸ <https://www.gov.scot/collections/business-and-innovation-statistics/#scottishannualbusinessstatistics>

⁹ <https://www.gov.scot/collections/business-and-innovation-statistics/#scottishannualbusinessstatistics>

Gross Value Added

There may be instances when a 4th method of estimating the impact of support is called for. This is when the activity being supported is a **cost centre**, that is a site that is part of a larger concern (often a multi-national company) that does not produce separate accounts and where the inter-company transactions are based on notional values rather than real costs. In these instances, it is preferable if the GVA estimates are based on the value of the employee costs alone. If this information is not available then the average wage costs for the relevant sector based on Scottish Government statistics can be used.

In all cases, summing across all beneficiaries over the required timeframe will yield the total GVA impact. The gross GVA impact will simply be the GVA summed across all support beneficiaries, with net GVA impact derived by applying appropriate additionality factors.

How should we report GVA impacts?

GVA impacts **must always** be reported separately from other impacts and benefits identified. The following must be reported:

- Cumulative gross GVA impact attributable to the support received over the impact period, expressed in present values and constant prices for the given **base year**;
- Cumulative net additional GVA impacts attributable to the support received over the impact period, expressed in present values and constant prices for the given **base year**; and
- Cumulative net additional GVA impacts attributable to the support received at **key milestone years**, expressed in present values and constant prices for the given **base year**.

Employment

Employment is defined as all persons who are either in paid work for a company (an employee) or are self-employed.

Why is it important?

Employment is a common impact indicator. Its creation is a key objective for much economic development activity and is a core measure for Scottish Enterprise. This can be supporting the creation of new jobs or safeguarding existing jobs for target sectors, areas or populations. However, to ensure greater consistency standard definitions need to be used.

There are many different definitions of employment, including:

- **Headcount** jobs – this is a simple count of all the individuals who work at a specific location, regardless of the number of hours they work;
- **Full-time Equivalent (FTE)** jobs – this is a count of employment to adjust for part time working. It is the number of full-time equivalent hours worked divided by the average weekly hours in a full-time job;
- **Full-time jobs** – a member of staff working a minimum of 35 hours per week (though the definition on this can vary across companies);
- **Part-time jobs** – a member of staff contracted for less than 35 hours per week (though, again, the definition can vary across companies);
- **Temporary staff** – staff who work under a fixed term contract who may be part or full-time; and
- **Permanent staff** – staff who work where there is no fixed date for the termination of their employment.

For appraisal and evaluation purposes all job impacts should be stated in terms of **annual full-time equivalents**, that is full-time jobs lasting for one year, albeit it is accepted that this may not be always easy to do.

Employment

How do we calculate Annual Full-time Equivalents Jobs?

FTE jobs can be calculated by:

- Determining the number of headcount jobs in a company in a given year;
- Establishing how many of these were part-time in that year;
- The part-time staff can then be converted to FTEs on the rule of thumb assumption that two part time staff are equivalent to one full time staff member; and
- The part-time FTEs can then be added to the full-time FTEs to get the total FTE numbers.

What data must be captured?

The data collection requirements for calculating FTEs must always be based on site employment levels. There are two stages:

- Core data for assessing FTEs in any given year; and
- The period over which data must be collected.

The core data for assessing the FTEs in any given year is the total headcount jobs and the proportion of the total headcount staff who are part time. This data allows an estimate of the FTEs at that point in time to be estimated. This establishes the gross FTE employment figure in a given year.

The period for which data is collected will vary depending on the period covered by the appraisal or evaluation. In general data should be collected on an annual basis over the period under study. However, where this involves estimating future employment levels, data at set points in the future can be used. When this is the case then either:

- Employment can be held constant for the intervening years based on the employment level for the last year for which employment data was collected; or
- Data can be extrapolated between the data points, assuming that there is a gradual change over time.

Either approach will provide a profile of employment over a set period in FTEs.

Employment

How should we report Employment Impacts?

Employment impacts can be reported in two broad ways:

- Point in time estimates – showing the total number of FTEs at a given point in time; and
- Person Year Equivalents (PYE) – showing a sum of FTE jobs over a set period (for example. 10 FTE jobs held over 3 years = 30 PYE jobs).

In general, point in time estimates presented at milestone years (years 1, 3, 5 and 10) should be used as the main employment value presented, along with the peak FTE job level in the period. **It is the peak FTE job level that should be used when calculating such impact metrics as the Cost per Job.** In addition, the cumulative FTE jobs should be reported as Person Year Equivalents (PYEs) to show the value of the employment over time (and capture any issues around temporary workers). Again, these cumulative values should be presented for milestone years (years 1, 3, 5 and 10).

The Rational for Support

“Market failure occurs where, a market is unable to function fairly according to the economic ideas of efficient markets, from a Green Bookprovide perspective which looks beyond simply economic efficiency this means the market is unable to satisfactory levels of welfare efficiency.” HM Treasury Green Book¹.

Why is it important?

The rationale for support should be dealt with in the Strategic rather than in the Economic Case in the HM Treasury’s Five Case business model². If there is not a clear rationale for support there is a risk that any impact assessment, undertaken as part of the Economic Case, will identify limited net additional impacts. The reason for this is that, in the absence of a clear rationale, deadweight may be very high, that is the support may be assisting, for example, a company to do what it would have done even without the support. Accordingly having a sound, explicit support (which then shapes the nature of this support) underpins the creation of net additional impacts. Given this, it is useful to understand the rationale that justifies public sector support in the market, albeit that this is not part of an economic impact assessment.

The main rationales are:

- **Equity or redistribution**, where public support is justified on the grounds that it will result in a more equitable distribution of benefits than the market would produce if left to its own devices. This might mean that support is given to target groups (for example the long term unemployed or unemployed young people) or to areas where indicators such as unemployment rates may be higher than the national average. Underpinning this rationale is a view that the operation of the market is resulting in distributional impacts that are deemed to be economically, socially or politically unacceptable; and
- **Market failures**, where the market is judged not to be working effectively causing inefficiencies in the use of resources and in the resultant outcomes. In such instances public sector support is justified. However, if there is support in the absence of such failures then this could be counterproductive, resulting in market distortions and sub-optimal resource allocation.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749086/Project_Business_Case_2018.pdf

The Rational for Support

Accordingly, the identification of a clear rationale should underpin all public sector supports. Being clear about the justification for support should also help to identify what is the most appropriate public sector response. For example, if there are identified barriers to achieving efficiency then any support should be targeted at overcoming these barriers, in a way that promotes market adjustment. If successful, the barriers will be removed and the public sector's role will no longer be necessary. Conversely, if there is no clear rationale, or this is poorly defined, then there are likely to be high levels of impact deadweight, and the support may offer poor value for money.

The key question for policy makers should therefore be **“As a result of this support will there be economic benefits that would otherwise not come about?”** If the answer is **“No”** then it is likely that there is no justification for support. One consequence of this is that supports justified on the grounds of exploiting opportunities need to be carefully examined to ensure that the private sector would not take these opportunities if left to its own devices. If the public sector intervenes in circumstances where the private sector would take these opportunities on its own, then one outcome is likely to be displacement (crowding out) of the private sector and resulting economic inefficiencies.

What types of Market Failure might be Encountered?

The Green Book³ identifies four types of market failure. These are:

- **Public goods:** this is a category of goods and services which the private sector is reluctant to supply but for which there are strong economic, political or social efficiency cases for provision. In technical terms, public goods are:
- **Non-rival** which applies where one person's consumption does not prevent others receiving the same benefits. An example might be a public museum or art gallery; and
- **Non-excludable** which applies where there is no mechanism to exclude consumers from accessing the good or service that is created because of public sector support. An example might be clean air.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

The Rational for Support

If a good or service is “non-rival” and “non-excludable” then there will be little or no incentive for consumers to pay for provision, nor for the private sector to provide it. In such cases the “**free rider**” concept arises which affects consumer behaviour: Why pay for access if you cannot be excluded from consuming it?

The absence of a market in which private businesses supply goods or services to consumers who want these goods and services means that unless the public sector intervenes the likelihood is that no provision, or under-provision will be made. Common examples include, the protection provided by the police and military, the road network and clean air. In a public sector economic development context the public good rationale applies to support such as improvements to the public realm and on-line information resources

➤ **Externalities** arise when an economic activity results in costs and benefits for others which are not reflected in market prices. An obvious example is a factory that is polluting the water supply. Unless the factory’s owners are required to meet the costs of treating this pollution then their activity is imposing a cost on water consumers which is not reflected in the prices charged for the factory’s final output.

These “**negative externalities**” require public sector support to “internalise the cost” so that it is either reflected in output prices, or the factory’s operators are required to treat the pollution directly. **Positive externalities** are also possible, for example education provision can bring additional benefits to the wider economy and society, in addition to those gained by the direct beneficiaries and the provider;

➤ **Imperfect information:** markets can only work well if good quality, accurate and up-to-date information is available on market conditions. Producers need to be aware of, for example, what customers want, where and when they want products and the prices they are willing to pay. Likewise, consumers need to know who can supply the good or service, when it will be available and what it will cost. Information failures occur where there are barriers to producers and/or consumers accessing accurate and reliable information. Two broad information failure types can be identified:

- **Information deficiencies** where there is a lack of information of sufficient quality to enable informed decisions to be made; and
- **Information asymmetries** where either producers or consumers have access to the necessary information, but the other party does not.

The Rational for Support

Imperfect information is probably the most common type of market failure that public agencies address. However, the support need not always be the direct provision of information. For example:

- A company may want to attract external investment, but does not know who, how or when to approach potential lenders. Here, the appropriate response may be to signpost the company to relevant information sources and advice to overcome this deficiency rather than to set up, for example, an investment fund; and
- Potential investors may not have sufficient information about an applicant, or about its products or markets, to enable them to make rational investment decisions. Again, the appropriate response may be to assist the applicants to supply, or the investors to access, the necessary information thereby overcoming this asymmetry;
- **Market power:** efficient markets imply that there is no concentration of power among a single or small group of producers (monopoly) or consumers (monopsony or a buyers' market in which a small number of consumers dominate the market). The abuse of monopoly power can result in market prices for goods and services being above the levels that would prevail were there more competition between suppliers, thereby generating abnormal (or supernormal) profits for the monopolist. Likewise, the abuse of monopsony power can force businesses to pay higher prices for labour or other inputs than would otherwise be the case or drive down market prices making it difficult for businesses to operate profitably. The abuse of market power can also result in high barriers to entry which discourages new entrants.

Market Failure versus Symptoms

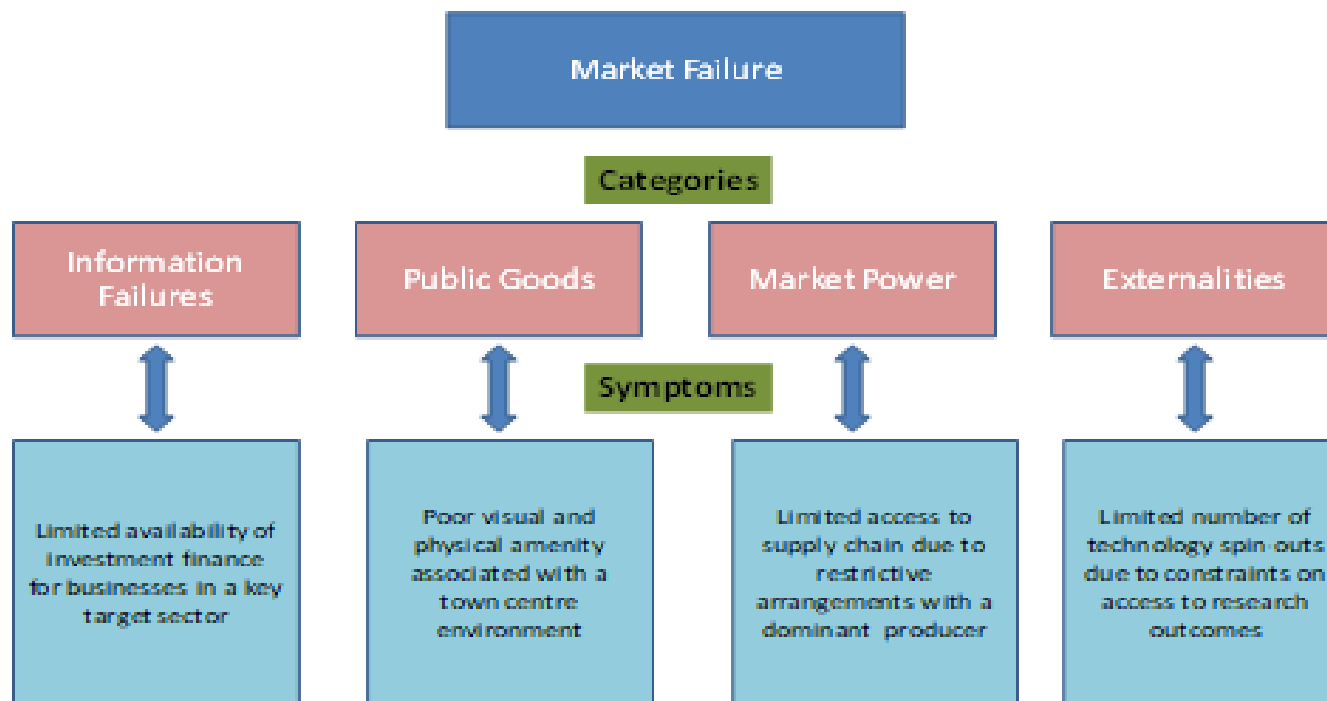
There can be a tendency to confuse the symptoms of market failure with the underlying causes which may, or may not, be a market failure. Examples include:

- **Risk averse behaviour:** for example, investors may be unwilling to invest in a company because it is felt to be too risky. This can be a perfectly rational decision, if there is sufficient information on which to come to an informed judgement. However, it could also be symptomatic of a market failure, in particular imperfect information, if investors are not being provided with the information needed to fully assess a proposition's chances of success or failure. It can be difficult to distinguish between these two reasons without research; and
- **Cultural factors:** it is often claimed that the failure to fully exploit the commercial potential of academic research reflects a cultural barrier in terms of poor attitudes to business among academics and vice versa. In reality, it may simply be that academics (and the business community) are not fully aware of the potential benefits (and costs) of engagement with one another: again, imperfect information.

The Rational for Support

Given this, it is important to go beyond a simple statement of market conditions, and of the observed problem, to try to understand what the underlying cause of the problem is. Appraisers should ask “why” – WHY is it felt to be too risky, WHY can’t they access the information they need to understand the risks, etc. This should help to clarify if this is actually a market failure or some other issue. This can then make any resultant support more effective, for example, identifying the type of information needed to address the market failure. This is illustrated in Figure 1 below which gives examples showing how symptoms can be indicative of underlying market failures.

FIGURE 1: Symptoms of Market Failures



The Rational for Support

Clarifying if a Market Failure Exists

In an appraisal the identification of the market failure rationale should be undertaken in parallel with other support development tasks. Table 1 below sets out the “gold standard” approach, which would be expected to be used when the support accounts for a substantial amount of public sector investment.

In an evaluation, the validity of the market failure rationale set out in the appraisal can be tested through direct questioning of beneficiaries and other market participants about:

- The nature of the constraints that were faced;
- The deficiencies in their capabilities and capacities to respond to these;
- How they had tried to address constraints in the absence of support; and
- How support had changed their behaviour in a way that was consistent with market adjustment.

The Rational for Support

TABLE 1: Stages in the Clarification of the Market Failure Rationale

Stage	Action	Details	Outcome
Stage 1: Identifying the Problem/ Opportunity	Clearly identify and describe the problem to be addressed.	<ul style="list-style-type: none"> • Why is it a problem? • What is its scale? • Why is it our responsibility to intervene? 	A clearly defined support specification.
Stage 2: Develop Initial Rationale for Support	Based on understanding of the problem, develop an initial proposition that describes the rationale for support.	This should be based on an applicant’s own experience and/or general evidence from other similar projects.	An initial proposition for market testing.
Stage 3: Develop the Evidence Base for the existence of the support rationale	Need to develop beyond a general theory – it needs an evidence based approach.	Source of evidence could include: <ul style="list-style-type: none"> • Evaluation evidence; • Market research; • Published research; • Partners input; • Similar projects; and • Own experience. 	A suite of research and other evidence that can be used to assess the validity of the rationale for support and provide justification for it.
Stage 4: Review Proposition	Review the initial proposition based on the available evidence and revise as appropriate.	<ul style="list-style-type: none"> • Does the evidence support the initial proposition? • How robust is the evidence? • What does the evidence tell us? • How does it support our proposition? 	A confirmed rationale for support against which the support will seek to deliver.
Stage 5: Inform Project Design	Need to show how understanding of the rationale has been addressed through support design.	<ul style="list-style-type: none"> • How should we intervene? • How will the support specifically address the underlying identified rationale? • What changes would we expect to see as a result? 	Support specification that clearly shows how it will address the identified support rationale.
Stage 6: Monitoring and Evaluation	Develop an M&E framework that is able to test the support rationale proposition from an evaluation perspective.	<ul style="list-style-type: none"> • How will we know if market correction has occurred? • What indicators/measures will be used to track progress? • What are the key questions an evaluation will be asked to confirm? • How will it show progress towards market correction? 	An effective M&E framework with feedback and communication so that formative evaluation can take place.

The Rational for Support

Relating the Support to the Rationale

The specific nature of any support needs to relate to the identified rationale. For example, if it is felt that there is an information failure, and that overcoming this would bring net economic benefits, then any support should seek to provide this information rather than undertake some other activity. As an example, if it is felt that start-up companies in a specific sector have difficulties in gaining funding, as they do not know how to present a case to investors, then the support should be the provision of information to enable them to make such a case. Establishing a separate investment fund would not be justified on this evidence.

Indeed, if the nature of any support is not justified by the rationale, then there is a risk that any subsequent evaluation will find high deadweight and limited additionality.

Does a Rationale for Support Imply that Support is Justified?

The presence of a sound support rationale is a **necessary but not sufficient** condition to justify public sector support.

Even if the rationale can be evidenced, a specific support can only be justified if it passes other appraisal tests for whether it:

- Is aligned with wider policy and strategic objectives;
- Will help promote market adjustment; and
- Will generate benefits in a cost-effective manner.

If these tests cannot be passed, then it may be that support is not justified.

Deadweight

Deadweight refers to the impacts of support that would still have occurred if public sector support had not been provided.

Why is it important?

Public sector economic development agencies want to stimulate positive changes in behaviours, and in the economy, that would not happen without support. Through the support, the aim is to help businesses do things they would not otherwise have done or even have considered doing – or to do things bigger, better and/or faster. In its turn this means that the support results in net impacts to the economy: the economy grows because of the support.

Measurement of the significance of public sector support is a complex concept and it is possible on occasions that support is provided to businesses to make changes that would have happened in the absence of support. For example, grants might be provided for product development activity which, in all likelihood, the company would have taken forward regardless. In this case, most (if not all) of the beneficial impacts would still have occurred and there would be limited economic development return from the public sector resources invested.

The extent to which the impacts would have been attained even without public sector support is known as **deadweight** and is usually expressed as a percentage. Those devising support should always seek to minimise deadweight. However, this is not always easy. It is never possible to be 100% certain that beneficiaries would not undertake the activity without support. This means that having a very strong understanding of the market failures and rationale for investment are essential for understanding deadweight.

Minimising deadweight is of fundamental importance: if investments do not make a substantive positive difference to behaviours, or to the nature and scale of impacts which are achieved, then the rationale for those investments must be questioned. Support may simply crowd out private sector activity or distort market competition for no net economic development gain. The public sector resources invested might have been used to better effect if spent on alternative support.

Deadweight

Activity and Impact Deadweight

There are two key deadweight concepts to be considered:

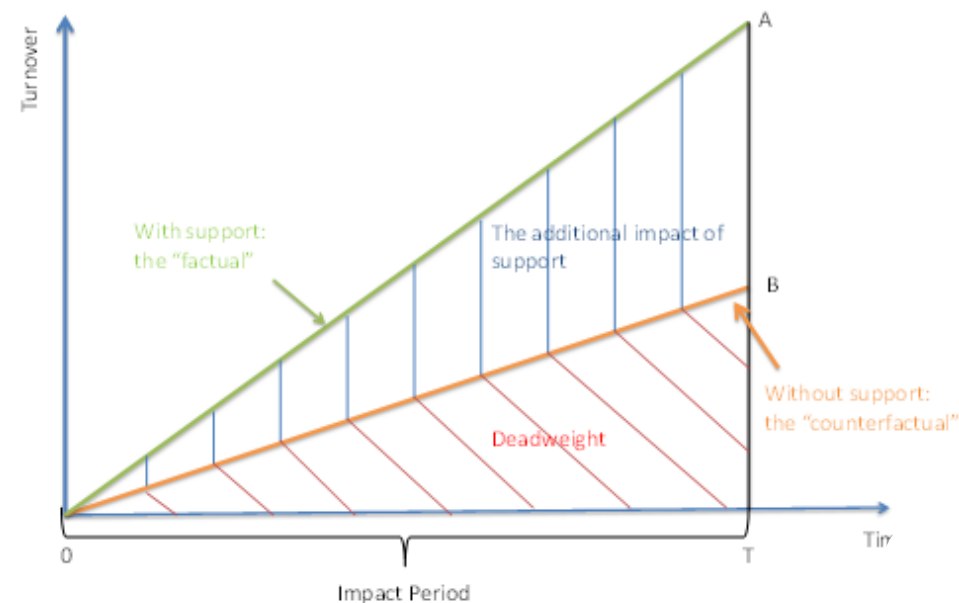
- **Activity (or output/outcome) deadweight** is an assessment of whether the actual activity related to the project would have gone ahead without public sector support. For example, is a company's R&D activity higher than it would have been as a result of an R&D grant? An assessment of activity deadweight can be considered as preliminary to the assessment of impact deadweight; and
- **Impact deadweight** is the extent to which the resulting estimated impacts (GVA and employment) within the economy from support would still have occurred without support. For example, if the company above had not received an R&D grant, it may have invested resources it committed to the R&D activity elsewhere to generate turnover. In effect, it is comparing the **impacts** achieved with support to the **impacts** that would have been achieved without support; the difference between the two being the impacts that can be validly claimed as the benefits generated by the support. The implication of this is that there may be instances where the **activity** deadweight is different (e.g. higher) than **impact** deadweight.

Figure 1 shows the turnover for a business over the time (the impact period) that it has been supported by one of SE's support. The observed gross impact of the support can be measured as the area of the triangle OTA, with the observed turnover linked to the support shown by the green line, this is what happened, the **factual**.

Without support the beneficiary company would have undertaken an alternative course of action, and this would have produced, in this example, lower turnover impacts (the **counterfactual** - the orange line) equivalent to the area of triangle OTB.

The area of the triangle OBA (the blue hatched area) represents the extent of turnover impacts that are additional because of the support provided whilst the area of triangle OTB (the red hatched area) gives the extent of impact deadweight: that is the turnover growth that would have occurred if there had been no support.

FIGURE 1: Impact Deadweight



Deadweight

Deadweight is one of the key factors that need to be estimated when converting gross to net impacts. Failure to do so will mean that net impacts are overstated, and this would bias the assessment of both relative performance and value for money.

When do we need to consider Deadweight?

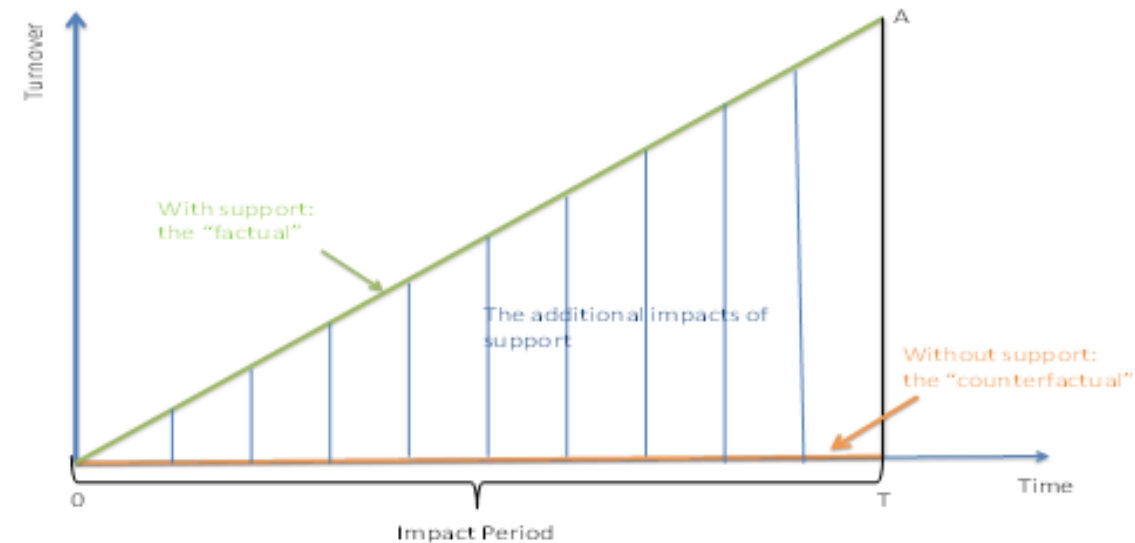
Activity deadweight must be assessed for projects where it is deemed appropriate to understand the importance of the public sector’s support in stimulating the undertaking of the activity to deliver outputs or outcomes. This is typically more relevant in areas such as R&D where the activity is deemed to be important to the company but where there are no guaranteed returns. One consequence might be that in the absence of public support no activity would be undertaken.

Impact deadweight must be assessed in every appraisal and evaluation as it forms a core element in the process of converting gross to net impacts.

Considering Zero, Absolute and Partial Deadweight

Deadweight can, in principle, take any value between 0% and 100%. A value of 0% means no deadweight. **In such an instance none** of the gross impacts attributed to support would have occurred without support. This is illustrated in Figure 2.

FIGURE 2: Zero Impact Deadweight



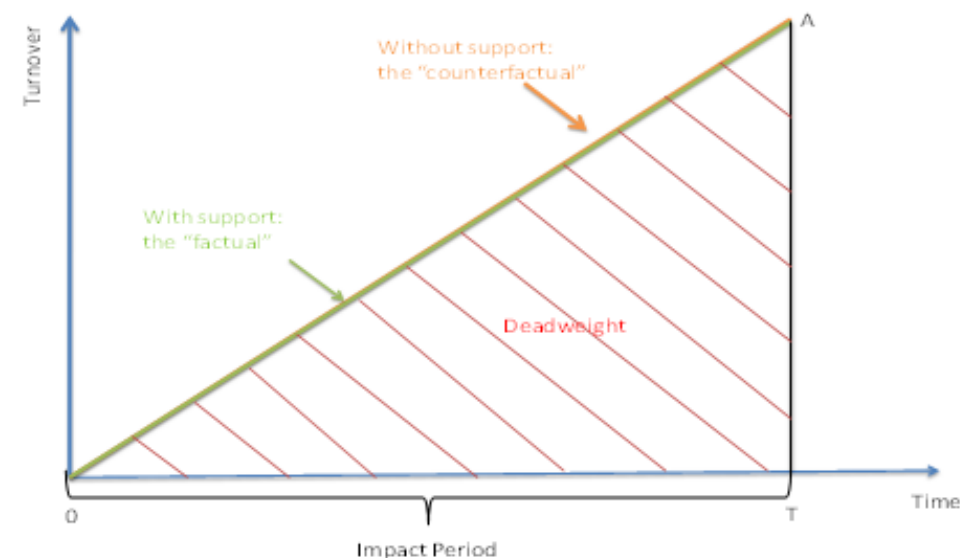
Deadweight

A value of 100% means complete deadweight. In such an instance **all** impacts would have occurred even if no support had been given, as shown in **Figure 3**. In this instance the resources spent are wasted in that there are no net benefits to the economy.

However, these are extremes: for most support at least some proportion of the observed impacts (the factual) would not have occurred without support. This can be for a variety of reasons, although practice tends to focus on identifying three types:

- **Scale additionality**, as detailed in Figure 1, where support means that a company carries out a growth project that was of a different scale to what it would have been without support, and this has had a positive influence on the scale of impacts. For example, a business might use public sector support to attend more trade missions than it would otherwise, and the greater effort to attract export customers is translated into higher export sales;
- **Time additionality** - where support means that impacts are achieved earlier. For example, support could enable a business to undertake a project earlier and outcomes, such as increased sales, will occur earlier in the impact period. An example is illustrated in Figure 4 which shows that the improvement project is forecast to generate gross turnover impacts equivalent to the area of triangle OTA . If support were not provided, however, the growth project would be implemented later, starting at time t . While turnover impacts would accrue, these would occur later and by the end of the impact period (T) have still not reached the same level as in the “with support” scenario. So, within the impact period:
 - The time additional impact is equal to the area $OtBA$ (the blue hatched area); and
 - Deadweight is equivalent to the area of the triangle tTB (the red hatched area).

FIGURE 3: Absolute Impact Deadweight



Deadweight

Calculations for time additionality (measured in years) can be assessed separately and quoted alongside overall (%) levels of impact deadweight/additionality; and

- **Quality additionality** (again see Figure 1) - where support means that a growth project was of a better quality than it would otherwise have been, resulting in larger impacts than would otherwise have accrued. For example, public sector support may enable a business to invest in better equipment that improves productivity and possibly results in a better-quality product.

The above different types of additionality are not mutually exclusive: one, or any combination of the three, may be observed in projects.

How do you assess the level of Impact Deadweight?

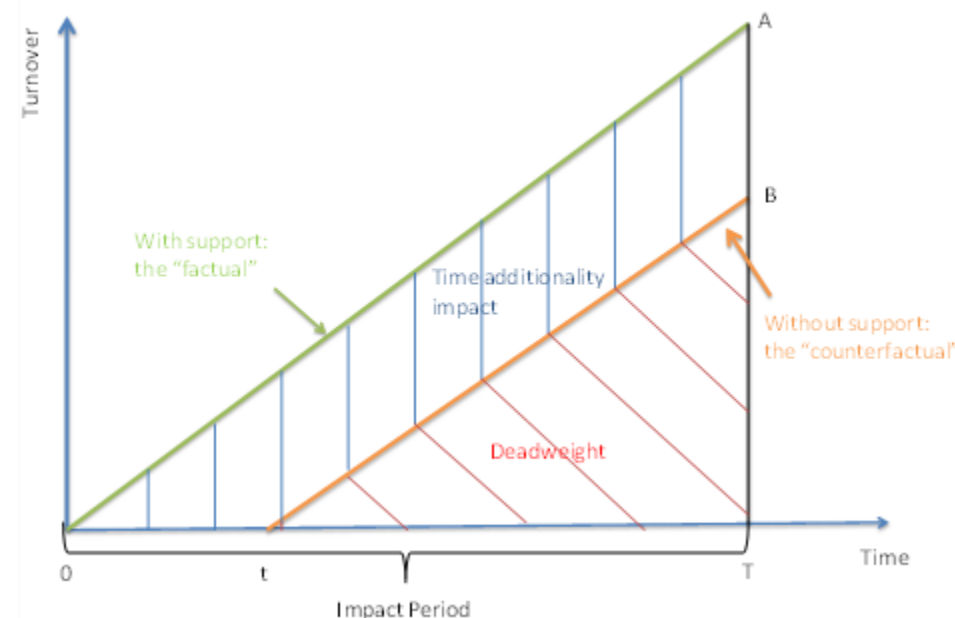
The recommended approach to assessing impact deadweight is to focus on the performance changes attributable to the improvement project and to the counterfactual. This involves:

- Establishing a clear understanding of the rationale for support and what specifically SE's support or funding is providing, and how that would be different in the absence of support;
- Assessing the level of gross impacts attributable to the support;
- Assessing the level of impact that would have been achieved had no support been provided (the counterfactual); and
- Calculating the difference between the two, which will be the additional impact attributable to the support provided.

This is the approach illustrated in the various Figures above.

The main difficulty is likely to be the assessment of counterfactual impacts. To do this the standard question set should be used, although this might need to be adapted to the needs of particular cases, following guidance from SE's Appraisal and Evaluation Team.

FIGURE 4: Time Additionality



Displacement

Displacement is the extent to which the gross economic impacts arising from support are offset by reductions in these impacts elsewhere within the area that the policy support is to benefit, in SE's case elsewhere within Scotland

Why is it important?

Most of SE's support aims to improve the competitiveness of targeted businesses, sectors or areas. However, support is not normally available to every business, sector or area. Because of targeting support in this way it is likely that some of the gross gains for beneficiaries (for example increases in turnover) will be offset by losses for non-beneficiaries as competition increases and they lose market share. Accordingly, in an appraisal it is important to examine the extent to which the support will have an adverse impact on other businesses. Likewise, evaluations need to examine the extent to which other businesses may have lost market share because they did not receive support.

When do we need to consider displacement?

Displacement is one of the factors that must be considered when converting gross to net impacts in both appraisals and evaluations. Failure to take account of it will mean that net impacts are overstated, and this would bias the assessment of both relative performance and value for money by making the impacts of support look better than they are.

What types of displacement might occur?

There is a variety of displacement effects which can occur because of public sector support:

- **Product market displacement:** occurs when support is provided to one business to, for example, improve the efficiency of its operations or increase production. Through this the business may be able to increase its sales and turnover. If these gains are at the expense of other companies within Scotland, then there will be product market displacement;

Displacement

- **Labour market displacement** occurs when a company increases turnover following public sector support and must recruit additional staff. This increased demand for labour can impact on the ability of other businesses to retain their staff or, if they recruit from the same labour market, make it difficult for them to recruit staff. Increased labour demand can also drive-up wage rates in the local area, which can impact on the cost base of all businesses who employ staff with similar skills and qualifications, regardless of whether or not they have benefited from support. The extent to which wage inflation is desirable may depend on the balance between profitability and employee costs. If employee costs are too high, this may impact on the attractiveness of Scotland as a place to operate from and competitiveness of firms based in Scotland, but low wages and high profits may suggest a highly inequitable distribution of wealth (and could result in leakage, particularly if profits are repatriated via ownership outside Scotland);
- **Capital market displacement** can occur where support is provided to assist businesses to access investment funds from public or private sector providers. This might then reduce the funding available for non-beneficiary businesses. From an SE perspective it therefore makes sense to support Scottish companies to bid for UK or EU funding where they are competing with companies outside of Scotland. Capital market displacement would be much greater if SE support was given for accessing competitions open purely to Scottish companies.

It is clear that a variety of displacement effects can occur through the different markets in which beneficiary organisations participate. The main focus is upon product market displacement, with the other types being normally only commented upon if felt to be relevant. When unemployment rates are particularly low and labour market availability is restricted, particularly in sectors where demand outstrips supply, labour market displacement should be commented on and factored into additionality adjustments (where labour market and product market displacement effects stack).

What will influence the level of product market displacement?

The extent of product market displacement will be influenced by a variety of factors, including:

- **How universal is the support?** For example, if support is freely available (for example, online information services that any business can access) then displacement can potentially be very low. Conversely, if support is provided to a limited number of businesses then displacement effects may be much higher;

Displacement

- **The uniqueness of the products or services produced by the beneficiaries.** In general terms the more distinctive the products or services of beneficiaries then the lower product market displacement is likely to be as there is less likelihood that there will be other businesses in Scotland offering the same products or services. However, this needs to be treated with a degree of caution as there can be disruptive technologies that result in totally new products and services. In these instances, there may be no Scottish competitors but the new products may totally disrupt or even destroy existing markets so there can be a major displacement impact¹. However, this is inevitable if there is to be technological or service innovation. In these cases, product market displacement should be commented upon but should not be calculated quantitatively. Likewise, displacement impacts may be high if the products or services are similar to those provided by Scottish non-beneficiaries;
- **The geographical markets served by beneficiaries.** The higher the proportion of any increase in sales by beneficiary businesses which is made to customers based outside of Scotland then the lower product market displacement is likely to be. Conversely, the higher the proportion of increased sales made to customers within Scotland then the higher displacement is likely to be, assuming, of course, that these local markets are served by other non-beneficiary Scottish businesses;
- **The location of competitors.** The higher the number of Scottish competitors for sales in the same geographic markets then the higher displacement will be. Conversely, fewer Scottish competitors will mean lower displacement;
- **Market conditions.** Displacement will be lower in growing markets where beneficiaries can increase market share without necessarily unduly harming Scottish competitors. Conversely, if markets are static or declining then winning market share is more likely to be at the expense of other Scottish competitors and displacement will be higher; and
- **The target area that the support is intended to benefit.** Generally, displacement increases the larger the spatial area of interest. For example, support targeted at a sub-region is likely to have a lower displacement effect on other businesses based within this sub-region than the same support delivered throughout Scotland. This partly reflects the fact that larger regions tend to have more regional competitors servicing similar markets with similar products and services.

A full and detailed examination of all of these factors can be difficult and resource intensive. The approach outlined below, whilst it may not explore all the issues outlined above, has the advantage of making it easy to gather the necessary information as well as being understood by interviewees.

¹ However, this is not to argue that such disruptive technologies should not be supported by the public sector. Such disruptions may eventually be provoked by competitors, and it may be better to establish competition to established markets in Scotland. Establishing renewable energy companies disrupting the energy sector and Scotland's established fossil fuel energy providers is one example. Another is establishing Fintech companies in Scotland which are disrupting the financial services market. Providing support may be a way of enhancing Scotland's economic competitiveness in the longer term which may more than offset any short-term displacement impacts.

Displacement

How do you estimate the level of Product Market Displacement?

To estimate product market displacement, beneficiaries need to be asked, or estimates made of, two key factors:

- The location of the company's competitors; and
- The state of the market that the company is operating in.

The location of the company's **main competitors** is assessed by asking beneficiaries where their competitors are based using a series of graded questions from "All businesses I compete with are based in Scotland" to "None of the businesses I compete with are based in Scotland". This is then followed by a further question which asks interviewees to provide a percentage estimate, if this is possible.

Market conditions are again assessed by asking interviewees to give responses to a series of graded questions, ranging from "Declined strongly" to "Improved strongly".

A "ready reckoner" approach is then used, with a standard weighting being applied to the responses, although if interviewees can provide a specific percentage response to the main competitors question, then this is used.

For example, if all competitors are judged to be based in Scotland then the displacement percentage would be put at 100%. If they then said that the market in which they were operating had "Grown strongly" than an adjustment of 0.5 would be made to the displacement percentage so that the final product market displacement factor would be:

($100 \times 0.5 = 50\%$).

The questions to be asked are outlined in the Standard Question set which is to be used when assessing the additionality adjustments.

What about other types of Displacement?

Other types of displacement are generally much more difficult to quantify, and the effort required to provide robust estimates of the negative impacts may not be justified. In general, therefore, only a qualitative commentary is required unless the necessary information is readily available.

The only instances when this might not be the case may be for labour market displacement, especially when the support project can only be successful if skilled staff are recruited. In these instances labour market statistics for the local area, can be examined to obtain some indication as to whether the necessary skills are available². It is also worth exploring whether bodies such as Skills Development Scotland or sectoral bodies such as Scottish Engineering have undertaken research on the labour needs of particular sectors. On the basis of this evidence it may be felt that there may be justification to make a percentage adjustment to the gross impacts.

Leakage

Leakage is the proportion of gross impacts of activities supported by SE that accrue outside of Scotland, SE's area of policy support.

Why is it important?

Some of the direct benefits from support might accrue to people or organisations based outside of SE's target area. For example, some of the jobs and wages created because of SE's support with a beneficiary organisation might be gained by people working outside of Scotland.

Given that SE's remit is to achieve net economic development gains for Scotland then both appraisals and evaluations must identify the impacts that will benefit economies outwith Scotland as a result of support. This then needs to be subtracted from the gross impact of the support.

Failure to take account of leakage may mean that net impacts are overstated, and this would bias the assessment of both absolute and relative performance by making the support appear to be having a greater impact on the Scottish economy than it really does.

When do we need to consider leakage?

Leakage must be considered in every appraisal and evaluation. It forms a core element in the process of converting gross impacts to net impacts.

What types of leakage might occur?

There are two main types of leakage which can occur when:

- Some of the gross direct jobs created through support may not be based in Scotland. The wages paid to these people will therefore not benefit the Scottish economy as they will be spent in other regions or countries; and
- The operating profit created by the beneficiary (which is often a key component of GVA) may go to shareholders or others who live outwith Scotland. Again the assumption is that this may not then benefit the Scottish economy.

Leakage

Of the two types of leakage the first can be assessed relatively simply (and perhaps simplistically) by asking questions about where the additional employees work using the **standard question set**. This, allied with other metrics can enable employment and GVA leakage to be assessed, as is shown below.

The second, whilst undoubtedly a very important consideration (especially when companies headquartered outside of Scotland are being considered) is far more difficult to assess. For example, it may be that a company headquartered in Germany has shareholders, be they individuals or institutions such as pension funds, based in Scotland. Accordingly, it may be erroneous to assume that all of the profits of a foreign headquartered company will benefit areas outwith Scotland. Given the difficulties in assessing this type of leakage generally attempts are not made to calculate it. However, it can be reported upon if, for example a company is Scottish owned then it may be that there is less likelihood of GVA leakage than one, for example, headquartered outside of Scotland.

How do you assess the level of leakage?

Assessing the level of leakage will require information from beneficiaries on:

- Where the gross direct jobs generated by support are based, distinguishing between jobs in Scotland and those elsewhere. This may be complicated by use of home/remote working, in which case it may best to understand the number of jobs to be recruited to work at the Scottish site and the number of home/remote working jobs and any factors likely to influence location (e.g. if they are required to visit the office regularly they may be more likely to be located in Scotland); and
- The proportion of any change in wages and salaries that will be paid to those not working in Scotland, although it may not always be possible to obtain this level of disaggregated data.

The data should be captured for each year of the **impact time period**, (if possible) to reflect the fact that the amount of leakage can vary over time. This is especially the case for a programme of support where leakage can vary across different beneficiaries, as can be the case with company support programmes.

Leakage

Provided the data are available then it is relatively straightforward to calculate the leakage. Consider the following case of a single company supported in which:

- The number of new gross direct jobs generated was 20;
- Two of these jobs went to people based at the beneficiary's London office while the remainder were based at its Perth office. The employment leakage factor will therefore be 2/20 or 10% at the Scottish level;
- Gross GVA impact in the same year was £700,000, of which £560,000 was wages and salaries and the remainder (£140,000) was profits¹;
- The two jobs for non-residents accounted for 8% of the gross GVA impact²; and
- The total leakage factors will therefore be 10% for employment and 8% of GVA, with the appropriate gross impacts being reduced by these percentages

If data is not available to enable the GVA impact to be calculated then employment leakage can be assumed to apply equally to GVA. Given that leakage generally accounts for a relatively small portion of the gross to net impact calculations, it is unlikely that making such an assumption will have a significant effect on the net impacts.

¹ For simplicity we are assuming that there is no depreciation or amortisation.

² The two London-based employees are assumed to account for 10% of the wages bill (£56,000). The wages therefore that contribute to the Scottish economy are therefore £504,000 (£560,000 - £56,000). It is assumed that all of the profits benefit the Scottish economy so that the GVA that benefits Scotland is £644,000 (£504,000 + £140,000). This GVA leakage is 8% (1 - (£644,000/£700,000) x 100).

Leakage

Other Considerations

The measurement of leakage can be challenging, and the above methods may have some limitations. It may also help for analysis of leakage to include qualitative commentary on aspects such as ownership and the potential for benefits to be repatriated. For example, the profit component of GVA could easily be repatriated, while the employment costs paid to Scottish employees are far less likely to leak out of Scotland. It may be helpful to consider what the potential for leakage due to ownership is and the implications of this. This can however be extremely challenging, for PLCs for example, where ownership is dispersed globally amongst a wide range of shareholders. In such instances, it may be worth highlighting specifically the benefits that will be likely to be retained in Scotland (e.g. employee costs and amortisation and depreciation of assets in Scotland) and considerations around how other aspects can be retained in Scotland – for example, reinvesting profits into Scottish businesses and communities, etc.

Substitution occurs when a company or other beneficiary specifically changes its activities or processes to benefit from public sector support. The most obvious examples are labour market subsidies when companies may change their recruitment practices solely to take advantage of the money on offer.

Why is it important?

Substitution is generally seen as a negative factor in that any economic gains accruing to the beneficiary are offset by reductions in employment or output elsewhere. Whilst this is likely to be the case for mainstream economic development, there are often strong equity reasons why programmes that result in substitution are introduced.

For example, it may be felt by politicians and policy makers that some groups (for example young people, those living in specific areas or members of ethnic minorities) are at a disadvantage when applying for jobs. Offering employers some form of financial incentive may be a way of overcoming these disadvantages. The objectives are therefore to secure community and social benefits rather than necessarily achieving net economic gains.

However, although substitution might, at times, be a factor in mainstream economic development support the evidence is that its impact is likely to be relatively insignificant, as well as being difficult to evidence.

What is Substitution?

The Treasury Green Book¹ defines substitution as the situation in which a firm substitutes one activity for a similar activity (such as the recruitment of a different job applicant) to take advantage of government support.

It is claimed that displacement and substitution are closely related in so far as both result in the economic benefits to the beneficiary being offset to some extent by the reduction in output or employment elsewhere. Substitution has also been described as “in-firm” displacement² which would be true if there were evidence that a company had stopped doing one activity and substituted another in order to take advantage of public sector support. It does, however, seem difficult to accept this as a valid definition for the labour market adjustments outlined above where the impact of changes in recruitment practices are mainly experienced externally.

1 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

2 <http://www.evaluationonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=530>, p. 74.

Substitution

How Significant is Substitution?

The evidence is that “*overall substitution is not seen as a significant issue*”³. The same source, drawing on the evidence from 286 evaluations (of which 54 were from Scottish Enterprise, although not all necessarily commissioned by SE) reported that:

- For the Business Development and Competitiveness Theme (covering the types of activity that SE is involved in such as support for internationalisation and sector/cluster support) substitution values ranged from 0% to 87.5%. However, the upper end of the range would seem to be so atypical that it should perhaps have been excluded. More relevant were the findings that the mean value was 3.4% whilst the median was 0%; and
- Similar findings were seen when the values for the Regeneration through Physical Infrastructure (again the type of activity that SE is involved in) were considered: a mean value of 2.2% and a median of 0%.

Given this, it seems that substitution is a minor factor in any additionality adjustments. One reason for this may be the fact that it is difficult to identify it with any degree of precision. For example, asking beneficiaries if they have changed their activities to take advantage of public sector support is likely to elicit a negative response.

How should substitution be dealt with?

In most of SE’s support projects substitution is rarely likely to be an issue. Accordingly, the general advice is that it should be ignored when making the additionality adjustments. For example, the 2013 evaluation of account management⁴ assumed that it was zero based on the evidence from a number of face-to-face company consultations. If, however, there is firm evidence that a company’s activities are being changed solely to take advantage of public sector support then some adjustment should be made. If such evidence is not available, then substitution should be ignored.

³ <http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=530>, p.23, para. 6.4.

⁴ <http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=530>

Multiplier Effect

Multiplier effects refer to the impacts associated with additional purchases of inputs from suppliers based in Scotland (supply chain effects) and the additional consumption of goods and services because of increased employment generated by the support and in the supply chain (income multipliers).

Why is it important?

The gross direct effects of an support capture the employment and GVA impacts for beneficiaries but do not include any additional or “knock on” effects that might accrue to those who are not the direct beneficiaries. However, when beneficiaries are helped to improve their performance this can also generate benefits for others through what are termed multiplier effects.

There are two main types of multiplier effects:

- **Supplier linkage** effects (sometimes referred to as indirect effects or **Type I multipliers**) arise as beneficiaries increase their demands for goods and services from supplier businesses based within Scotland. These businesses in turn increase their demands for goods and services and so on down the supply chain: and
- **Income multiplier** effects (sometimes referred to as induced multipliers or **Type II multipliers**) arise from the additional spending by those employed through direct or supplier linkage effects, on goods and services from suppliers based in Scotland.

This can be easily demonstrated through an example of a business which is supported to improve its relative competitiveness and therefore wins new orders and increases its turnover. In turn this means that it has to recruit more staff (**direct employment effect**) and purchase more inputs from suppliers. The beneficiary’s suppliers will also need to use more labour and will also increase their purchases from other supplies, and so on.

Accordingly, the initial improvement in the beneficiary’ performance sets in train a series of effects (termed the first-round effect, the second-round effect, and so on) as the impact spreads to other businesses in the supply chain. Summing across all “rounds” will give the **total supplier linkage effect**.

Multiplier Effect

Similarly, those employed directly by beneficiaries and through supplier linkage effects will use their wages and salaries to buy goods and services. This sets in train another series of “rounds” as the supplying businesses increase their use of labour and increase their purchases from suppliers, and so on. In this case, the sum across all “rounds” will give the total **income multiplier effect**.

This is shown in Diagram 1.

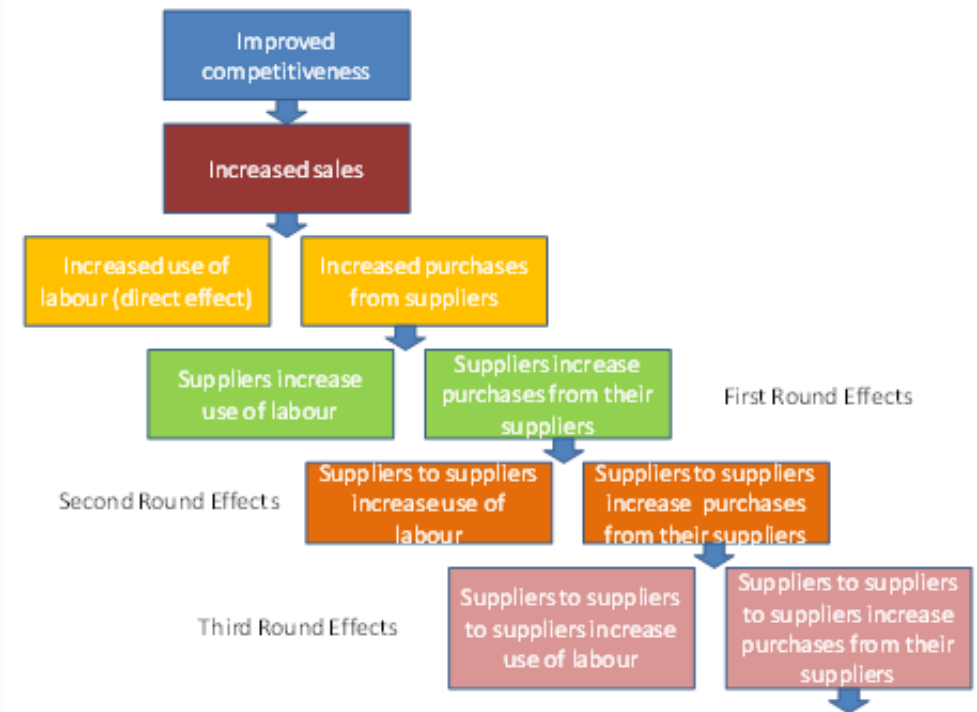
As there is progress through the various “rounds” the size of the impact of each subsequent round will be smaller than the one before. This reflects such factors as a proportion of the expenditure “leaking” to suppliers based outside of Scotland and the fact that not all of the increase in demand will translate into increased purchases.

Multiplier effects must be considered when converting gross to net impacts. Failure to do so can mean that net impacts are understated, and this would bias the assessment of both relative performance and value for money by making the support impacts look lower than they are.

When should multipliers be used?

Multipliers must be considered in the impact assessments undertaken in every appraisal and evaluation as they are a core element in the process of converting gross to net impacts. There are a variety of multipliers available: output, income, employment and GVA. However, generally only two are used: those for employment and GVA.

DIAGRAM 1 Multiplier Effects



Multiplier Effect

What multipliers should be applied?

It is normally beyond the scope of any impact assessment to examine in detail the extent of supplier linkages and income multiplier effects that might have come about because of support¹. Instead, the most common approach is to use secondary data on multipliers provided by the Scottish Government. These are derived from the Scottish Input Output Tables. The Tables provide a snapshot of the economy and have been used to calculate supplier linkage and income multiplier values for each of 104 Industry Groups. A detailed discussion of Input Output Tables, their uses and the Tables themselves can be found here: [Input Output Tables](#)

The multipliers available distinguish between:

- Different industrial sectors;
- Different types of impact, although the focus is upon GVA and employment rather than income and output; and
- Type I (supplier) and Type II (supplier and income) effects.

The multipliers are provided for 98 Standard Industrial Classification (SIC) Divisions and Sub-Divisions using the 2007 SIC. The latest version (published in 2022) has the multipliers for 22 years: from 1998 to 2019.

There is wide variation in multiplier values across sectors, which highlights the importance of making sure the appropriate sectoral multipliers are applied. For example, using the 2019 data (2019) the Type I employment multipliers vary from: 1.0 for SIC 80 (Security and Investigation) to 3.1 for SIC 65 (Insurance and Pensions). Likewise, the Type II show a similar range: 1.1 for SIC 80 and 3.7 for SIC 65.

¹ Detailed purchasing information for beneficiaries (including the increased value of purchases attributed to any performance improvement) and where these extra supplies are sourced from is only part of the information required.

Multiplier Effect

Using Multipliers

To demonstrate how multipliers can be used we will consider an example: a brewing company (SIC 11.05-06, Beer and Malt) that SE has supported.

Looking at the relevant tables we can identify the Type I and Type II multipliers for GVA and Employment (Table 1).

TABLE 1: Multipliers for SIC 11.05-11.06 Beer and Malt

Multiplier	Employment	GVA
Type I	2.0	1.4
Type II	2.5	1.7

Note:

1. These are sourced from the Scottish 2019 Input-Output Tables.

The net impacts of SE’s support to a company (without the multiplier) have been estimated to be:

- Additional GVA of £5 million; and
- The creation of an additional 100 jobs.

The multipliers can then be used to estimate the “knock-on” impacts of the support.

Multiplier Effect

To use employment as an example:

- The impact on suppliers to the company in terms of additional employment (for example through the supply of glass bottles, and barley) can be estimated by multiplying the 100 jobs by 2.0 (the Type I employment multiplier). This gives the total direct and indirect jobs created as a result of the support as 200 (100 x 2.0). If the direct jobs (100) are then subtracted from these it can be seen that 100 jobs are created in the supply chain.
- The Type II multiplier can then be used to look at the impact on employment in the economy of increased spend by those who have been provided with both direct (100) and supply chain jobs (100). Again, this is estimated by multiplying the direct jobs (100) by 2.5 (the Type II employment multiplier). The resultant figure (250) is the total additional impact of the support on employment: direct, indirect and induced. The 250 can then be broken down into: 100 direct jobs, 100 indirect and 50 induced (250 – 200).

This type of calculation enables the impact of the support to be fully explored and could be used, for example, to better target support and to set up supply chain support. Exactly the same approach can be used to “unpick” the GVA impacts. Table 2 summarises the various elements of the employment and GVA impacts.

The Scottish multipliers are averages for the various SICs. As such they may not adequately reflect the particular circumstances for specific companies. If there is evidence that a company may, for example, be making less use of Scottish based suppliers than the average for the Industry Group then it may be justifiable to change the multipliers to reflect this. If this is done the change and the justification for making it should be clearly outlined.

TABLE 2: Direct, Indirect and Induced Impacts of Support

	Direct impact	Indirect (supply chain) impact	Induced impact	Total impact
Employment	100	100	50	250
GVA	£5 million	£2.0 million	£1.5 million	£8.5 million

Multiplier Effect

The Process

To make use of the multipliers the following process needs to be gone through, with, for simplicity, the example used being of a single company:

- Calculate the net impacts of support, excluding the multipliers;
- Identify the appropriate SIC into which the company falls. This can be done by:
 - Identifying the SIC under which the company is registered at Companies House.. Note that the SIC a company is listed under is not always the best descriptor of company activity, so discretion should be used to select the appropriate SIC or range of SICs. The published multipliers provide tables for matching SIC codes to these Groups;
 - If the SIC classification is not known then, by looking at the activities that the company is involved in estimate which SIC seems the best match:
- Select the appropriate GVA and employment multipliers; and
- Apply these multipliers to the calculated net GVA and employment impacts, using the methodology outlined above.

Should Type II Multipliers be Used?

Supplementary guidance to accompany HM Treasury's Green Book argues that Type II multipliers should not be calculated as any impacts arising from them are liable to be double counting. This arises as the resources used could be spent on alternative activities that would likewise produce multiplier impacts. However, to allow for comparability with past evaluations SE generally does calculate impacts with the Type I and II multipliers. It is recommended that the impacts with and without the multipliers be calculated and reported.

Estimating Regional and Local Multipliers

See separate guidance note on Spatial Impact for detail of how to estimate multiplier effects for regions and localities within Scotland.

Standard Impact Question Set

The question set given below should be used, as appropriate, in all appraisals and evaluations. This will ensure that there is consistency in the way that impacts are assessed so that the results of both appraisals and evaluations are comparable.

Why is it important

It is very important that the appraisals and evaluations SE undertakes use consistent approaches for assessing impact. A key element in this consistency is the questions that are asked of beneficiaries. Accordingly, SE has developed a Standard Impact Question Set (Appendix 1) that is to be used in all appraisals and evaluations.

What does the Question Set Contain?

The question set is intended to identify:

- The gross GVA and employment for a beneficiary;
- Information that will enable the key additionality metrics to be calculated, that is deadweight, displacement and leakage so that it is possible to move from gross to net impacts; and
- Other related information on, for example, the timing additionality, supply chain dynamics and the persistence of impacts that can be used when modelling impacts.

The questions generally are intended to be relevant to both forward looking appraisals and backward looking evaluations. However, the wording may need to be changed depending upon the type of activity being evaluated. This is noted in the preamble to each question. It is also the case that the questions are intended to be asked of company beneficiaries.

It should be noted that there are no questions on substitution. As the Guidance Overview makes clear, not only is the evidence that this is generally very insignificant, but there are also difficulties in identifying it with any degree of precision. Accordingly, it has been omitted and is assumed to be zero.

Standard Impact Question Set

It may also be the case that the questions can be omitted, modified or added to in particular situations. For example:

- If company accounts and forecasts are available then these should be used to calculate GVA rather than asking beneficiaries for financial information;
- The circumstances of an appraisal or evaluation may mean that certain sections of the Question Set may not be relevant so that there is justification for omitting them, albeit that this should be confirmed with SE's Appraisal and Evaluation Team; and
- Invariably other questions will be added that explore outputs and outcomes. These are likely to be specific to individual evaluations and have not therefore been covered in the questions here.
- The timeframes assessed for questions should be reflective of the anticipated impact period of the project and the timeframe over which it should be assessed.
- The questions and timescales should be proportionate to the scale of the project assessed – for example, it is not likely to be proportionate to ask such in depth questions for events attendance. These questions should be reserved for initiatives which are anticipated to have a tangible impact on company performance (e.g. employment, sales, productivity, etc).

Some of the questions may seem repetitive. The reason for this is that they are structured in such a way as to try to focus interviewees upon the topic being discussed, thus, the initial question is qualitative. This is then followed by a quantitative question which is attempting to elicit a more precise response. It may, however, not always be possible for interviewees to provide such a degree of precision. In such cases the qualitative responses should be used.

Standard Impact Question Set

Displacement

The displacement question is an attempt to assess the extent to which SE’s support may result in market share being taken from other Scottish-based businesses. Two sets of questions are asked:

- The first is a qualitative question asking interviewees where their competitors are based, followed by a more precise quantitative question. If it is not possible to get an answer to this question then a proxy value should be used to calculate displacement, as shown in Table 1. In using this it should be clear that, for example, a Proxy Displacement Value of 0.25 implies that displacement is 75%; and

TABLE 1 Proxy Displacement Values

Survey Questions	Proxy Displacement Value
All the businesses I compete with are based in Scotland	0.00
The majority of the businesses I compete with are based in Scotland	0.25
Around half of the <u>businesses</u> I compete with are based in Scotland	0.50
A minority of the businesses I compete with are based in Scotland	0.75
None of the businesses I compete with are based in Scotland	1.00
I have no direct competitors	1.00

- There is then a question about market conditions. The assumption is that if a market is growing then, even if the majority of a company’s competitors are based in Scotland, displacement may be more limited than if the market were either static or declining. Table 2 shows the market condition displacement weighting factors.

Standard Impact Question Set

TABLE 2 Market Condition Displacement Weighting

Survey Questions	Displacement Weighting
What is happening to your market?	Factor
Declined strongly	0.50
Declined moderately	0.75
Are about the same	1.00
Improved moderately	1.25
Improved strongly	1.50

To illustrate the way that these two factors should be used, if we consider a company that indicated that:

- The majority of its competitors were in Scotland. Table 1 shows this would result in a displacement factor of 0.25; and
- Market conditions were improving moderately, a weighting adjustment of 1.25 (Table 2); and
- Then the displacement factor, as a percentage, would be;-

1.- $(0.25 \times 1.25) \times 100 = 69\%$

This is the approach used in the 2013 evaluation of account management¹. If however, an interviewee can give a precise response to the question as to the proportion of competitors based in Scotland then this value should be used in the calculation. This report also includes (in Appendix B) the telephone survey questionnaire.

¹ <http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=530> p. 134

Standard Impact Question Set

APPENDIX 1 Standard Question Set

Gross Value Added

The responses to this question should enable the Gross Value Added of the company to be calculated. The question is suitable for both appraisal and evaluation purposes with the timescale for which responses are sought being adjusted accordingly.

Please supply the following information for your Company’s Scottish operations.

Notes:

1. Operating profit is turnover minus the cost of sales, employee costs, depreciation and other overheads. See Footnote 2 in the Gross Value Added information sheet.
2. Employee costs should be the total costs to the company of employing staff. The cost should therefore include Employers’ National Insurance and pension costs as well as gross salary. See footnote 3 in the Gross Value Added information sheet.
3. It should be noted that operating profit and employee costs are “must haves” in order to calculate GVA. If depreciation figures are not available then this should not stop a calculation being made, given that depreciation will usually be far smaller than the other two factors.
4. Amortisation should ideally be included. However, as it is generally either negligible or very small it has been omitted for simplicity.

	Turnover	Operating Profit ¹	Employee Costs ²	Depreciation ^{3,4}
Year x				
Year x+1				
Year x+2				
Year X+3				
Year X+4				
Year X+5				
Year X+6				
Year X+7				
Year X+8				
Year X+9				
Year X+10				

Standard Impact Question Set

Employment

The responses to this question will identify the employment levels of the company over time. The question is suitable for both appraisal and evaluation purposes with the timescale for which responses are sought being adjusted accordingly.

What was the employment of your company in Scotland in Full Time Equivalentents in the following years?

Year	Employment
Year x	
Year x+1	
Year x+2	
Year X=3	
Year X+4	
Year X+5	
Year X+6	
Year X+7	
Year X+8	
Year X+9	
Year X+10	

Note:

1. See the Employment information sheet for a definition of Full Time Equivalent jobs.

Standard Impact Question Set

Deadweight

The responses to these two questions will enable an initial assessment to be made as to the extent of the impact of SE’s support on company turnover and employment. The questions are suitable for both appraisals and evaluations with suitable adjustments to the timescale and to the text.

What do you forecast the turnover of your business activities in Scotland will be over the last/next 10 years?

- With SE’s support; and
- Without SE’s support.

	Turnover with SE's support	Turnover without SE's support
Year X	<input type="text"/>	<input type="text"/>
Year x+1	<input type="text"/>	<input type="text"/>
Year X+2	<input type="text"/>	<input type="text"/>
Year X+3	<input type="text"/>	<input type="text"/>
Year X +4	<input type="text"/>	<input type="text"/>
Year X +5	<input type="text"/>	<input type="text"/>
Year X +6	<input type="text"/>	<input type="text"/>
Year X +7	<input type="text"/>	<input type="text"/>
Year X +8	<input type="text"/>	<input type="text"/>
Year X +9	<input type="text"/>	<input type="text"/>
Year X +10	<input type="text"/>	<input type="text"/>

Standard Impact Question Set

What do you forecast employment will be in your business in Scotland over the last/next 5 years?

- With SE's support; and
- Without SE's support.

	Employment with SE's support	Employment without SE's support
Year X	<input type="text"/>	<input type="text"/>
Year x+1	<input type="text"/>	<input type="text"/>
Year X+2	<input type="text"/>	<input type="text"/>
Year X+3	<input type="text"/>	<input type="text"/>
Year X+4	<input type="text"/>	<input type="text"/>
Year X+5	<input type="text"/>	<input type="text"/>
Year X+6	<input type="text"/>	<input type="text"/>
Year X+7	<input type="text"/>	<input type="text"/>
Year X+8	<input type="text"/>	<input type="text"/>
Year X+9	<input type="text"/>	<input type="text"/>
Year X +10	<input type="text"/>	<input type="text"/>
<hr/>		
Year X+4	<input type="text"/>	<input type="text"/>

Standard Impact Question Set

Displacement

The responses to these questions will enable an assessment to be made of the extent to which support to the business will result in there being a negative impact on other businesses operating in Scotland. This can then be adjusted by the market conditions question. The questions are suited to both appraisals and evaluations.

Thinking about competition in your main area of business, which of the following statements best describes your business?

- All the businesses I compete with are based in Scotland
- The majority of the businesses I compete with are based in Scotland
- Around half of the businesses I compete with are based in Scotland
- A minority of the businesses I compete with are based in Scotland
- None of the businesses I compete with are based in Scotland |
- I have no direct competitors

Approximately what per cent of your main competitors are based in Scotland?

Standard Impact Question Set

Thinking about the market conditions in your main area of business over the next five years, would you say that market conditions have?

- Declined strongly
- Declined moderately
- Are about the same
- Improved moderately
- Improved strongly

Leakage

These questions will enable an assessment to be made of the extent to which the economic impacts arising from SE's support results in areas outwith Scotland benefitting: that is the extent of leakage. The question is suitable for both appraisals and evaluations with suitable adjustments to the timescale and to the text. It may not be necessary to ask about employment leakage if the employment data provided relates only to Scottish jobs.

Of the jobs that will be/have been created or safeguarded with SE's support how many are based outside Scotland?

Time Additionality

These questions will enable an estimate to be made as to the extent to which SE support has resulted in things happening at a different rate than would otherwise be the case. These questions are only relevant if over the time being evaluated the interviewees have experienced turnover/employment growth. These questions are suitable for backward looking evaluations.

Has the turnover/employment growth in your company been quicker than would otherwise have been the case without SE support?

Standard Impact Question Set

Time Additionality

These questions will enable an estimate to be made as to the extent to which SE support has resulted in things happening at a different rate than would otherwise be the case. These questions are only relevant if over the time being evaluated the interviewees have experienced turnover/employment growth. These questions are suitable for backward looking evaluations.

Has the turnover/employment growth in your company been quicker than would otherwise have been the case without SE support?

Yes (Go to next question)

No

How has turnover/employment growth been affected?

Brought forward by up to a year

Brought forward by up to two years

Brought forward by more than two years

Standard Impact Question Set

Supply Chain

These questions can be useful in obtaining more information about a company's supply chain activities. This could then be used to make adjustments to the Scottish Government's multipliers if this was felt to be justified. These questions are suited to appraisals and evaluations.

Thinking about your business's main suppliers, which of the following statements best describes your business?

- All of our supplies, in value terms, come from Scottish-based suppliers
- The majority of our supplies, in value terms, come from Scottish-based suppliers
- Around half of our supplies, in value terms, come from Scottish-based suppliers

- A minority of our supplies, in value terms, come from Scottish-based suppliers
- None of our supplies come from Scottish-based suppliers

Approximately what percentage of your supplies (in terms of value) comes from Scottish based suppliers?

 %

Standard Impact Question Set

Persistence

This question tries to assess the extent to which the impact of SE's support will last. The question is suited to appraisals and evaluations, with suitable changes to the text.

You have identified that the support from SE has led to/will lead to benefits in terms of increased {turnover/jobs/skills/wages}. Over what period of time do you expect these benefits to last?

- <3 months
- 3-6 months
- 6-12 months
- 1-2 years
- 2-3 years
- 3-4 years
- 4-5 years
- 5-6 years
- 6-10 years
- More than 10 years
- No benefits
- Don't Know
- No Response / Refused

Standard Impact Question Set

Decay

This question tries to assess the extent to which the benefits of SE support decrease over time. It is suited to appraisals and evaluations.

How much do you expect the benefits arising from SE's support to decrease (decay) on an annual basis?²

- | | |
|-----------------------|--------------------------|
| Less than 20% | <input type="checkbox"/> |
| 21-40% | <input type="checkbox"/> |
| 41-60% | <input type="checkbox"/> |
| 61-80% | <input type="checkbox"/> |
| 81-100% | <input type="checkbox"/> |
| Don't Know | <input type="checkbox"/> |
| No Response / Refused | <input type="checkbox"/> |

² This question is taken from the Department of Business, Innovation and Skills question set. It may however, be too complicated so that it can either be simplified or omitted.

Project Income

Scottish Enterprise and other public sector agencies support projects which may return income to the public purse. Examples include loans, equity investments, land and property and payments for services (for example training events). This section describes how to deal with income in the assessment of project costs.

Why is it important?

It is important to use accurate project public sector costs to judge economic impact against. SE and the public sector invest in projects up front which may return an income to the public purse in the future which will offset initial costs. Examples include:

- Loans – on commercial terms which SE would hope to get repaid;
- Equity Investments – from which SE would hope to gain future income through, for example the sale of equity stakes, dividends and royalty or licensing deal payments;
- Land, property and rent – where SE would hope to gain an income from sales of its assets once it has delivered its infrastructure projects and proved the market, or ongoing rental income from tenants/users of its assets;
- Payments for services – where SE runs a project (such as a training event) for which users pay a fee; and
- Recoverable VAT – where on an SE-owned infrastructure project, VAT is recoverable against costs. This is therefore equivalent to a future income.

Project Income

What are the challenges?

The economic impact appraisal process is challenged by these potential income streams due to the uncertainty that surrounds them:

- Loans: SE intervenes where the private sector is not willing to provide finance. These are likely to be higher risk transactions which increases uncertainty around repayment scales and profiles;
- SE investments: similarly, SE invests where the private sector is providing no, or incomplete, financing for transactions involving high growth potential firms. Many transactions may return no income while the return on some could be very high;
- Land, property and rent: SE invests in infrastructure where the commercial market will not, for example in specialist use R&D or innovation premises, testing and demonstration facilities and sites which require heavy investment to prepare them for market (for example ports for offshore renewables or contaminated land). These are riskier projects which often aim to return income from the sale of land or property whose value has been enhanced by investment and the proving of market. There is, however, great uncertainty around when future sales might be made and at what value. Rental income from SE's properties is also uncertain due to fluctuating market conditions affecting rents and occupancy levels. Such income also needs to be considered net of uncertain future operating costs;
- Payments for services: SE runs projects which the market is not delivering because it cannot ensure profit due to uncertainty around whether, or how much, companies will pay. These include networking events, specialist training and supply chain opportunity days. Users may pay subsidised fees which provide income to the public sector; and
- Recoverable VAT: most VAT on SE projects is non-recoverable. However, on SE-owned infrastructure projects which have an associated taxable output on which SE has opted to pay tax, VAT will be recoverable against expenditure at the prevailing rate and its receipt back from HM Treasury is assured. This is, therefore, the type of income stream which has little or no risk associated with it, unlike the other examples outlined above.

Project Income

What is the approach?

The default approach on projects where future income is **uncertain** is to *exclude future income* from consideration in project costs. This is because it is too difficult to forecast such income years into the future with any accuracy. It is also the case that SE's main aim is to stimulate economic development, not to generate an income. As such any income is almost incidental. Attempting to include income also makes comparisons of Impact Ratios between projects difficult.

Accordingly, introducing this uncertainty to the costs side of an EIA, which is already estimating uncertain benefits, could reduce confidence in the forecast impacts.

The general approach should therefore be to outline future income streams in the appraisal as a potential benefit, giving some indication of the scale of these if at all possible. However, these should not be included in the impact calculations, given the uncertainties outlined above.

The following approaches are recommended to the project examples:

- Loans: use the total discounted loan amount as the project cost and *do not include* potential loan repayments in the impact calculations. These should, however, be outlined as a potential benefit;
- Equity Investments: use the total discounted SE investment as the project cost and *do not include* potential income from equity stake sales, dividends, royalties, licensing deals or any other potential income streams in the impact calculations. Again, any such potential income should be outlined qualitatively as a potential benefit;
- Land, property and rent: use the total discounted infrastructure investment as the project cost and *do not include* potential future income from land, property sales or rental income in the EIA, merely highlight this as potential income that may reduce project costs and increase impacts;
- Payments for services: potential private and public project investment should be justified and approved during project development and appraisal. In the impact calculations public investment should be used as the public sector costs. Estimated income from the private sector should not be included, although it can be mentioned as a potential benefit; and
- VAT: VAT should be included in project costs as it is non-recoverable on most projects. The exception is for *SE-owned infrastructure projects* which have an associated taxable output on which SE has opted to pay VAT. Such recoverable VAT should be either be:

Project Income

- Included as a future 'income' in the years it is expected to be recovered and discounted appropriately; or
- Deducted from project costs, so that the costs used are net rather than gross.

Project Income is looked at mainly from an appraisal perspective. From an evaluation perspective the actual amount of loans repaid, value from equity sales, value from payments, may be known and can be factored into impact assessments.

Research Income

Research income is income won by Higher Education Institutes (HEI) or Public Sector Research Establishments (PSRE) through a competitive process to carry out research activities in Scotland.

Why is it important?

Scottish economic development policy gives priority to encouraging more research, development and innovation (RDI) activity and to promoting more effective commercial exploitation of the outcomes. Underpinning this is the assumption that RDI can be an important driver of improved competitiveness and economic growth.

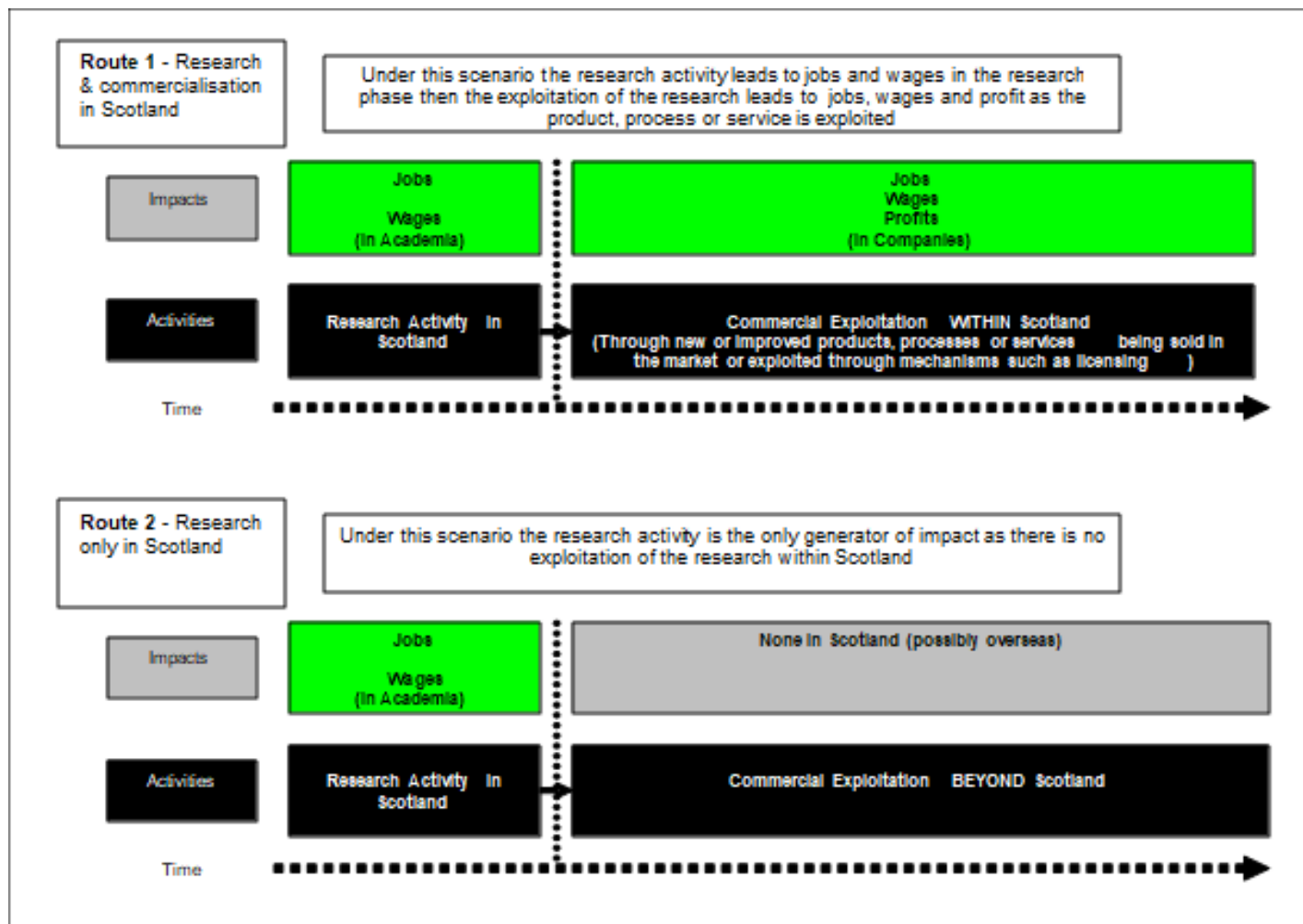
In the past there has been a tendency to ignore the economic impacts of RDI activity where this was conducted within the HEI or PSRE sectors. While this is justified in some cases, this approach ignores that RDI undertaken by such organisations can generate net additional economic impacts, as illustrated in Figure 1.

Research Income

FIGURE 1: Routes to Impact from Research Income

The Figure shows that there is a broad distinction between RDI attracted to Scotland which leads to subsequent commercialisation activity within Scotland, and RDI attracted to Scotland where commercial exploitation happens elsewhere, or indeed where there is no exploitation anywhere. However, in all cases there will generally be economic impacts associated with the RDI phase, regardless of where commercialisation takes place. The exception to this is when the research is funded by income which is not additional to Scotland. For example, research funding from the Scottish Funding Council (SFC) is ring fenced to be spent in Scottish-based institutions. Accordingly, if one university, for example, is successful in attracting SFC support this reduces the funding that is available for others. There is therefore no **additionality** in such a situation.

If the impacts associated with the attraction of research income are not assessed then any impact assessment will understate the true benefits from an support.



Research Income

What is to be treated as research income?

Figure 2 summarises the different sources and types of research income and provides guidance on what **must not** be included (marked in red, essentially support that is ring fenced for Scotland) and what **must** be included (marked in green, support that could be attracted to Scotland or elsewhere in the UK or Europe)) in an impact assessment.

In general terms, what should be counted as research income in impact assessments includes:

- Income for research or at least other services rendered, such as use of equipment or technical testing and analysis;
- Income from organisations, such as companies, charities, research councils and Innovate UK that could be spent in Scotland or elsewhere; and
- Research funding that is competitively mobile at the UK level (as mentioned earlier competitive money only available to Scottish HEIs and PSREs through, for example, the SFC, should not be included as this money would be available in Scotland regardless).

All research income which satisfies these criteria should be captured, and the impact assessment should report the value of research funding attracted:

- Broken down by source and year; and
- Given in **constant prices** over time, and **present values**.

FIGURE 2: Types and Sources of Research Income to Scottish HEIs and PSREs

	Funding Council Grants	Research Grants and Contracts	Other Services Rendered
Scottish Public	Scottish Funding Council	Scottish Funding Council Scottish Government Scottish Enterprise NHS	Scottish Funding Council Scottish Government Scottish Enterprise NHS
Scottish Private	N/A	Scottish based companies Charities	Scottish based companies Charities
Rest of UK Public	N/A	Innovate UK	Innovate UK
Rest of UK Private	N/A	Companies Charities	Companies Charities
International Public	N/A	European Union	European Union
International Private	N/A	Companies Charities	Companies Charities

Research Income

The economic impact of research income

To estimate the net additional economic impacts of research income a number of broad steps need to be followed¹:

- Step 1: develop estimates of the gross impact of research income;
- Step 2: adjust for additionality; and
- Step 3: assess cost and impacts over time.

Step 1: Develop estimates of the gross impact of research income

Understanding the gross impacts of research income requires a number of core questions (and a small number of sub-questions) be answered:

- What is the value of the research income?;
- How many jobs² will be supported by the research phase and how long will they last?; and
- What will be the value and phasing of spend on wages associated with the RDI activity³;

This will provide the gross impact for the research phase, with economic impact being essentially an estimate of the wages associated with the research activity, rather than the other GVA metrics which are unlikely to be relevant for work undertaken in publicly funded HEIs or PSREs.

Where there is to be commercialisation of the research outputs within Scotland, this should, be appraised in the usual way.

¹ Where the gross effects are being assessed there would be no adjustment for additionality (step 2 below) or assessment of costs over time (step 3 below).

² Jobs can be broadly defined to include all jobs linked with the research income – from postdoctoral researchers, research technicians to academic staff

³ The focus is specifically on wages as this is a component of GVA, the other main component being profit which may be too difficult to articulate at the department level on a consistent basis or, more likely, may just not be relevant.

Research Income

Step 2: Convert from Gross to Net Impacts

The next step is to adjust for **additionality**, which will be relevant where an assessment of the costs of public support against impact is needed. This means taking account of the usual additionality adjustments:

- **Deadweight:** to what extent would the research income be achieved without the support; how many jobs, and wages, would exist without the research income?;
- **Displacement:** how many jobs, and wages, will be at the expense of other HEIs, PSRE or private businesses in Scotland?;
- **Leakage:** how many jobs will be created outwith Scotland?; and
- **The appropriate multipliers:** the positive downstream effect of spending on wages, equipment and other supplies in the delivery of the research in Scotland.

There are four key areas (in particular around the research activity impacts) that will require careful evidence covering:

- What difference has the support being appraised or evaluated made to the value and/or timing of research funding that has been secured. For example, is it delivering absolute additionality (e.g. without support no research income would have been achieved), scale additionality (e.g. it has helped to increase the value of research funding, for example, by identifying a new funding stream which resulted in additional funding), or time additionality (e.g. by supporting more rapid access to research funding than would otherwise have been possible);
- The number of jobs that are genuinely being created or safeguarded as a result of the research income. It is likely that many departments will have a core size and this would need to change for additional jobs to be counted. This could be either through an increase in size because of the research income or a decrease in size in the absence of the research income (this will help to answer the deadweight question);
- Any new staff recruited from other HEIs, PSREs or private companies in Scotland, or funding secured that could have gone in all, or part, to another Scottish HEIs or, PSREs (this will help to answer the displacement question); and
- In the absence of the research income being secured, would staff be working on other public sector contracts? For example, would they just be working on a publicly funded collaborative R&D project if they weren't working with a private company? (This will help to answer the substitution question).

Research Income

It is likely that in many cases there must be some adjustment for each of these factors, and it is only where there is clear evidence around this that additional impact will be generated.

Step 3: Costs and Impact Ratio

Having developed an estimate of the net additional impacts over time, arising from the research income funded RDI activity, this will then provide an estimate of net additional impact of the research income over time. This will be laid out in an impact investment calculator to show the impact against any Scottish public sector cost of support (where relevant), and key impact metrics should be presented for milestone years (years 1, 3, 5 and 10). This will show the cost effectiveness of support.

As highlighted earlier, the research only activities are likely to generate a smaller and shorter return than projects where commercialisation is expected in Scotland.

Employment Densities for Property Projects

Employment densities are benchmarking data on the average number of employees who can be accommodated per unit of floorspace provided. These benchmarks can then be used to estimate the gross employment and GVA impacts of physical developments.

Why is it important?

Employment density data can be used to estimate the level of gross employment that can be accommodated within new or refurbished accommodation. This information can then be used to derive an estimate of the likely gross GVA impact.

When do we need to use floorspace densities?

It is always preferable to use actual information on the number of employees that could be accommodated, obtained through consultations with beneficiaries and/or partners. However, this information may not always be available: for example, for speculative developments there may be no detailed information on the end users who might occupy the premises. In these circumstances, employment density ratios provide an alternative means of estimating indicative gross impacts.

Employment Densities for Property Projects

How do you apply floorspace densities?

The key source for benchmark data is ***Employment Densities Guide, 3rd Edition, 2015***¹ (Homes and Communities Agency). This provides average density ratios, expressed in terms of the square metres of floorspace needed to accommodate one FTE job, for a variety of end uses/industrial classifications, including:-

- Industrial;
- Warehouse and distribution;
- Office;
- Retail; and
- Leisure and visitor attractions.

However, the figures are very general and do not cover some of the activities that SE is increasingly asked to support. An example is the renewables industry, especially those elements of it that involve large scale fabrication activities. For large scale fabrication activities (such as wave generation and wind turbines) it is estimated that some 300 square metres of space are required per employee. This covers buildings and yard space which often forms a large proportion of total site area². Using company specific data on employment and site floor areas, SE is gradually developing more realistic densities.

¹ https://www.kirklees.gov.uk/beta/planning-policy/pdf/examination/national-evidence/NE48_employment_density_guide_3rd_edition.pdf

Employment Densities for Property Projects

As more sector specific employment density data is generated then this guidance will be updated. Where project or sector specific employment density levels relevant to the project in sector can be sourced, these should be used instead of broad HCA guidance. For some construction projects, developers may have target audiences and considerations of the employment levels which can be supported which can inform calculations. To reflect uncertainties, it may be helpful to model a range of employment densities, for example, where there is uncertainty regarding the exact use of a space.

To calculate the gross employment impact, the area of floorspace is simply divided by the employment density ratio. Consider the following example for a mixed-use development. Using data from the Employment Densities Guide the total gross employment that the development can accommodate is 570 employees.

TABLE 1: Gross Employment Impact Calculation

Function	Floorspace (m ²)	Floorspace density	Gross FTE's
Call centre	2,000	8	2,000/8= 250
Light industrial use	10,000	47	10,000/47= 213
Final Mile' Distribution Centre	7,500	70	7,500/70=107
TOTAL	19,500	N/A	570

Employment Densities for Property Projects

Having calculated this information an estimate can then be made of the gross GVA impact. This is done by:

- Using figures from the latest version of Scottish Annual Business Statistics, the GVA per employee for the relevant activities can be identified. Given that annual GVA figures can be volatile good practice is to take a five year average; and
- This can then be multiplied by the relevant number of employees to derive a gross GVA figure.

This is illustrated in Table 2. The annual gross GVA estimated to be created by the employees housed in this space is some £29.6 million.

TABLE 2: Gross GVA Impact Calculations

A	B	C	D
Function	GVA per employee (Five year average 2017 to 2021)	Gross FTEs	Annual Gross GVA (B x C)
Call centre (SIC 82)	£49,000	250	£12,250,000
Light industrial use (SIC 32)	£ 66,000	213	£14,058,000
General warehousing (SIC 52)	81,000	107	£8,667,000
TOTAL	N/A	570	£34,975,000

Note: GVA per employee figures are rounded.

Employment Densities for Property Projects

Caveats

The approach outlined above needs to be heavily caveated:

- The figures are gross and make no allowance for the normal additionality adjustments, especially deadweight and displacement;
- The figures are based on 100% occupancy levels which are unlikely to be the case. For smaller units the vacancy rate is likely to be higher than for larger units. These rates are also likely to vary according to local property market conditions. Given this, if vacancy rates need to be factored in it may be best to seek guidance from property specialists; and
- The data used is very general (Business Park, General Industrial Use, for example) as is the GVA data (unless better evidence is available). Thus, the estimates of both employment and GVA may deviate significantly from the actual figures once end users can be identified.

How is floorspace defined?

When calculating gross employment, different types of end use/industrial classifications apply to different floorspace areas, including::

- Gross External Area (GEA) - the area of a building measured externally at each floor level;
- Gross Internal Area (GIA) - the area of a building measured to the internal face of the perimeter walls at each floor level; and
- Net Internal Area (NIA) – the **usable** area within a building measured to the internal face of the perimeter walls at each floor level. This includes such communal space as kitchens and entrance halls.

The ***Employment Densities Guide*** provides more detail on each of these and guidance on which is the appropriate floorspace area to apply. Care therefore needs to be taken that the relevant floorspace area is used when making the impact estimates.

Employment Densities for Property Projects

Hotels and other accommodation

For hotels and other accommodation employment density is based on the number of rooms and star rating of the accommodation. Again, further detail is provided in the ***Employment Densities Guide***.

Other useful information and links:

Employment Densities Guide, 3rd Edition, 2015 (Homes and Communities Agency)

https://www.kirklees.gov.uk/beta/planning-policy/pdf/examination/national-evidence/NE48_employment_density_guide_3rd_edition.pdf

Converting square feet to square metre's

<http://www.metric-conversions.org/area/square-feet-to-square-meters.htm>

Construction Impacts

SE, through its business infrastructure expenditure and other financial measures such as Regional Selective Assistance, provides support for construction and related infrastructure. The objective of doing this is to secure sustainable economic development so that this activity is a means to an end rather than an end in itself. SE's practice in appraisals or evaluations is to report the economic impacts of this activity separately.

Why is it important?

SE is not a construction or infrastructure company. However, it often funds, either directly or indirectly, construction and supports public realm works of various kinds. SE, however, does not support construction projects *per se*, but funds them as they are a way of securing other, more long lasting, downstream benefits, for example as companies occupy the space that SE has created or companies use buildings part funded by, for example, Regional Selective Assistance, to undertake manufacturing. Thus construction is a means to an end, this being sustainable economic development

Given this, it is important to show the totality of the impact of any support. These projects do create jobs and GVA both directly and indirectly and are often a very visible sign that something is being done, with the associated positive publicity for SE and other partners. Accordingly in any appraisal or evaluation that involves SE supporting construction or related activity, the economic impact of this needs to be reported. However, this should be reported separately from the overall impact calculated for the support and reported in gross rather than net terms. The reasons for this are:

- The economic impacts of construction activity are essentially a by-product of the support: useful to have but not the main purpose;
- The impacts are temporary, lasting only as long as the construction works take. To combine them with impacts that are likely to be profiled over a longer period is misleading;
- Those employed, especially on specialist works, may not be resident in Scotland so that the benefits may leak out of the Scottish economy; and

Construction Impacts

- Displacement (both labour and product market) may be high for SE supported projects. For example, skilled labour may move to take advantage of SE supported opportunities perhaps for higher wages or just for a change. This may then have an adverse impact on the contract they leave so that GVA may be reduced or delayed. Similarly, if the competing companies for a contract are Scottish then there may be considerable product market displacement, with one Scottish company winning the work at the expense of another.

Estimating Construction impacts

To estimate the impact of construction activity the key data needs are:

- The construction cost of the development;
- The time that it will take to be built; and
- Turnover and GVA per employee in the relevant part of the construction sector.

The first two factors should be provided by the project manager.

The turnover and GVA data can be sourced from the Scottish Annual Business Statistics. The report provides data for 3 categories of construction activity:

- Standard Industrial Classification (SIC)¹ 41, Construction of Buildings;
- SIC 42, Civil Engineering; and
- SIC 43 Specialised Construction Activities.

The one judged to be most relevant to the specific activity should be selected or failing this the average for the three combined.

¹ The Standard Industrial Classification is an international system for classifying business establishments according to the type of economic activity they are involved in. It is periodically revised, with the most recent

Construction Impacts

Given that there can be annual “one-off” changes caused by events that are unlikely to be repeated, the data should be averaged over a five year period years to remove these fluctuations.

As an example, if the figures for SIC 41 are taken then, over the period 2017 to 2021:

- Total employment in the sector over the five years was 189,200²;
- Total turnover over the same period was £42,290.5 million;
- Dividing the one into the other gives an average turnover per employee of £223,523 each year;
- Total gross GVA per employee (over five years) is £353,392 giving average GVA per employee per year of £70,679

These figures can now be used in a simple worked example. If it is assumed that SE is to:

- Spend £10 million on property;
- The project will take two years to complete. It is assumed that spend will take place equally over this period (However, if annual construction spending data is available a more accurate estimate for each year may be made).

Using the figures above:

Total employment created will be:

$£10,000,000$ (development cost) / $£223,523$ (turnover per employee) = 45 (person years to construct the development)

Jobs supported in each year of construction:

45 (person years to construct the development) / 2 (years to construct the development) = 23 (jobs supported in each of the 2 years)

² The data distinguishes between total employment and total employees. Employees do not include those who are self employed nor worker owners who are not paid through the PAYE system. The employment figures cover employees and worker owners.

Construction Impacts

Gross GVA created in each year of construction is:

23 (jobs supported in each of the 2 years) x £70,679 (GVA per employee) = £1,625,617 (annual GVA impact of the development)

It can therefore be reported that the gross impact of SE's £10 million of construction spend is to create:

- 23 jobs lasting for two years;
- £1.6 million of gross GVA each year: £3.3 million over the two-year construction period.

If needed the appropriate Type II multipliers³, ⁴could be applied to these figures. For example:

- The employment multiplier is 2.8 so the total impact on employment per year is to support 78 jobs (28 x 2.8); and
- GVA has a multiplier of 2.4 so the annual GVA impact is £4.4 million (£1.82 x 2.4), giving a total two-year impact of £8.8 million.

These are the gross impacts (making no allowance for the additionality factors outlined above) and derived from sector averages that, although the latest available data, are now several years old.

³ <https://www.gov.scot/publications/about-supply-use-input-output-tables/pages/user-guide-multipliers/>

⁴ The Type II multiplier measures the “knock on impacts” of economic activity, in terms of the supply chain and the spend of wages.

Impact Period, Impact Delivery, Build, Persistence and Decay

Consideration must be given to how impacts are anticipated to accrue, persist, and decline over time.

The impact period refers to the time period over which an economic impact assessment is calculated and presented.

When public sector economic development support is implemented their impacts can be affected by, four temporal factors:

the time between resources being spent and benefits arising

- 1. the period over which the benefits build before they peak;**
- 2. how long these benefits last, that is their persistence;**
- 3. the rate at which the benefits decrease, that is decay, over time.**

Why is it important?

To gain as full an understanding as possible of the economic impact of support it is important to consider a period that covers:

- The time needed to implement a project; and
- The time to capture its impact across the lifespan of the new/improved products/services sold in the marketplace or processes implemented because of the support.
- How impacts might be expected to accrue over the time period measured, when they might peak, how long they will persist, and at what rate they will decline.

Impact Period, Impact Delivery, Build, Persistence and Decay

Some types of support, such as support for an event, might have a short, but immediate, impact, which may not continue to deliver benefits beyond the results of the event itself. For other support, for example a large grant administered over a number of years, it is not uncommon for considerable periods to elapse before significant impacts emerge, but, such impacts may then last for a long time.

An example might be when a period of intensive Research & Development is required as part of the product development phase of a project, where regulatory hurdles need to be overcome before a product can be launched. However, once launched then the impacts may **persist** for many years, albeit that over this time there may be a gradual year-on-year **decay** of the impacts attributable to the support.

The extent to which there is evidence-based information on which to base impact persistence and decay is limited, with many evaluations and appraisals making no explicit mention of the timing factors that affect impact delivery. However, it is important that these factors should, at a minimum, be recognised as they can have a significant effect on impacts. For example, one of the few evaluations that considered the impact of the timing of the delivery of benefits¹ found that, for Business Development and Competitiveness Support:

- Increasing the assumption about the time benefits lasted for individual enterprise and sector/cluster support (their persistence) from three to four years resulted in the Net Present Value (NPV) of the cumulative benefits increasing by 29%; and
- If the rate of decay was assumed to be 0% rather than 10% per year then the NPV of the benefits of individual enterprise and sector/cluster support increased by 10% and 21% for inward investment.

Therefore, changing these assumptions only slightly can have a considerable effect upon impacts.

Consistency of presentation is fundamentally important: given that the elapsed time to achieve initial impacts will vary across support, as will the period over which attributable impacts will be accrued. Accordingly using a consistent timeframe over which economic impact assessments are undertaken aids consistent data collection and reporting and allows for better comparison of the performance of support.

¹ <https://webarchive.nationalarchives.gov.uk/ukgwa/20090609003228/http://www.berr.gov.uk/files/file50735.pdf>

Impact Period, Impact Delivery, Build, Persistence and Decay

What impact period must be used and how should economic impacts be reported?

The following elements are required to ensure that a consistently accurate assessment of economic impact is derived:

- Defining the year of support for each beneficiary as year ‘1’;
- Seeking, where possible, to construct a 10-year impact assessment profile² capturing all required data to calculate gross and net GVA on an annualised basis, accruing from the first year of expenditure (i.e. 10 years in total from support year ‘1’). It needs to be stressed that using a 10-year time frame does not mean that all support will have impacts for 10 years: some will have impacts for less, others more. Ten years is a compromise³ between support that will give short terms impact, which have short persistence and decay very rapidly, and support, such as infrastructure, which may take more than 10 years to implement and which may then **persist** for a long period; and
- Cumulative net additional GVA should always be reported at the following key ‘milestone’ years⁴: years 1, 3, 5 and 10.

There will also be a need to adjust forecast impacts for policy persistence and decay. This is dealt with below.

² Ten years is the SE standard for many appraisals, such as large R&D grant assessments, however, as noted above, the timescales can be modified to reflect the impact period over which benefits are anticipated to accrue and persist. This may mean shorter impact periods for some support, and longer impact periods for others (for example, infrastructure projects). Please see separate guidance note on Impact Period, Persistence and Decay.

³ and a guideline, as a suitable working assumption for support in the Green Book - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063330/Green_Book_2022.pdf

⁴ Presented in present values and constant prices for the given base year

Impact Period, Impact Delivery, Build, Persistence and Decay

What should be taken account of for exploring the variability of impacts over time?

The meta-evaluation of the Regional Development Agencies (RDA) mentioned above⁵ highlights four factors that should be taken into account when looking at the effect that time can have upon the delivery of impacts. These are derived from marketing, being essentially the basic stages in the product life cycle⁶. The stages are:

1. The length of time between spending resources and the benefits beginning to appear. For some support, especially infrastructure, this could be a lengthy period;
2. Once benefits begin to appear then it will take time before they reach their full potential. Using an infrastructure example, once a building is completed then tenants are likely to move in gradually so that it will only be when the building is full that the full economic benefit is realised;
3. Once this peak is reached then how long will the benefits of the support persist? For example, if SE helps a company to develop a new product what is this product's life cycle, that is the time that it can command a market before new products are introduced that displace it?; and
4. Over time, various other factors change, for example economic conditions, market demands and changes in competitors. The initial benefits will therefore start to decay over time in so far as the proportion of the benefits that can be attributed to SE's support will gradually decrease.

⁵ Ibid. pp. 89-90.

⁶ In its simplest form this has four stages: development, growth, maturity and decline.

Impact Period, Impact Delivery, Build, Persistence and Decay

Thus, SE may support a company to develop a new product. This may take a year to get to market. Over this time money is paid out but there are few benefits in terms of the standard impact measures such as GVA. The product then gradually wins market share and after four years this reaches its maximum. Over the intervening period the benefits of the support have gradually increased. The life cycle of the product has been assessed as being ten years in total. However, after the five-year peak there is a gradual decline in sales (and attributed benefits) that has been forecast (based on experience of other product life cycles) to be 20% a year. At the end of this time (ten years after SE began to support the company) the benefits as a consequence of SE's support are negligible. Thus the profile of costs and benefits lasts for a total of ten years:

- One year when there are few benefits as the product is being developed;
- A further four years over which time the product increases market share and produces benefits, which peak at the end of this period (year five); and
- A further five years over which time the product gradually loses market share (and economic benefits decrease). At the end of this period (year ten) there are no more impacts as a consequence of the support and the product is no longer sold, having been superseded by alternatives.

Support that involves helping companies to introduce new products may be relatively easy to profile in terms of the trajectory of impacts in that marketing literature may be able to provide useful indicators of probable life cycles. It may be far more difficult to assess the life span of support that are not directly product focussed.

Impact Period, Impact Delivery, Build, Persistence and Decay

Infrastructure Projects

As the economic life of a physical asset is much longer than that of a product, process or service, it is important to capture economic impact over the lifetime of the asset. For example, if new business accommodation is expected to have a minimum lifespan of 20 years, then the economic impact assessment should examine impacts over that time period. The special challenges of **appraising infrastructure projects** are dealt with elsewhere.

Persistence Effect Adjustments

The impact of a public sector support will not persist for ever. Over time it is recognised that extrapolating economic impact for a cohort of businesses is likely to over-estimate the real levels of activity. This reflects a range of macro and micro-economic factors that can influence the cohort of supported companies over time. For example, adverse trading conditions may reduce the size of the cohort through company closures, or consolidation within an industry may result in attractive growth businesses becoming acquisition targets and perhaps leaving Scotland. These businesses will, therefore, not necessarily add long-term value to the Scottish economy.

In order to avoid over-counting persistence effects, the following adjustments should be made, and applied to annual totals from year '1' as follows:

- **Business failure rates** – estimated to be 10% per annum⁷. Accordingly, 10% of the mean total value GVA and employment should be subtracted for the annual totals each year over the available impact period for activities that are supporting multiple companies. For support to one company, or a small number, such an adjustment may not be appropriate and a suitably caveated judgement should be made based on the characteristics of the beneficiaries; and

⁷ <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/businessdemography/2022#business-birth-and-death-rates-2017-to-2022>

Impact Period, Impact Delivery, Build, Persistence and Decay

- **Acquisition rates** – Inward acquisition is the acquisition of a Scottish-based/headquartered business by a business that is based/headquartered outside of Scotland. Intra acquisition is the acquisition of a Scottish-based/headquartered business by a business that is based/Headquartered within Scotland. SE research suggests that from 2003-2021, of almost 1,300 inward acquisitions examined it is estimated that 67% remained active and present in Scotland. Of almost 600 intra acquisitions examined it is estimated at 61% of companies remained active and present in Scotland⁸.

Accordingly a further 2% of the mean total value GVA and employment should be subtracted from the annual totals each year over the available impact period $((30 \times (1-0.33))/10)$. However, the characteristics of the companies being supported need to be taken account of before making an adjustment. For example, if they are small, high growth companies then the acquisition rate may be higher.

⁸ Training and Employment Research Unit (2005) *Corporate Headquarters in Scotland, their Nature and Contribution to Scotland's Economic Development*, Scottish Enterprise. The remainder of these businesses becoming shell companies, cost centre or significantly reduced operations

Impact Period, Impact Delivery, Build, Persistence and Decay

When evaluations are undertaken, and the net impacts identified are based on those attained to date, it can be assumed that they include the four stages identified above. The problems arise when, in either an evaluation or an appraisal, the impacts are forecast into the future. There is then a need to factor in these stages. However, the evidence base on which to do this is limited. In some SE evaluations questions have been asked about the likely persistence of the impacts consequent upon SE's support. For example:

- The 2020 evaluation of SE account management activity⁹ asked companies how long they expected the benefits of SE's support to last. Half said five years or longer. However, the question was a general one, not specifically related to GVA or employment

Given the lack of evidence then **the approach suggested is three fold:**

1. If there is evidence, e.g. for specific product life cycles, then this should be used and clearly sourced;
2. In the absence of any such evidence then consideration should be given to using the adjustments based on SE's account management evaluation.
3. Regardless of what is done (or not done) this needs to be clearly explained and any assumptions outlined.

In practice, it may be either overly ambitious or inappropriate to capture data over a 10-year timeframe: beneficiaries may either not have the visibility of business performance for medium to long term forecasts, or the life cycle of a product may simply be less than this.

⁹ <https://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=712>, p.85.

Impact Period, Impact Delivery, Build, Persistence and Decay

Where economic impacts will be realised over a legitimately shorter time frame, perhaps because of shorter product life-cycles, impact should be reported on a cumulative basis to the last available year: for example, years 1, 3, 5 and 6, with year 6 indicating the full-time span of impact within the economy. However, the impacts can then be reported over 10 years with the impacts in years 6 to 10 being 0.

Alternatively, where it can be determined that there are genuine gaps in the data, on account of the difficulty in forecasting over a 10-year period, it is important to consider data adjustments based on the **time path** of the support. In such cases it is recommended that as a rule of thumb a 20% per annum **decay rate** be applied to impacts for those years beyond which data is forecast. However, should there be, for example, survey evidence as to the decay rate then this should be used.

Consider the following example (Table 1). Here it is felt that the support will last for 10 years (if not longer). However, it has not been possible to calculate these beyond Year 7. For the remaining years of impact to Year 10 the impacts have been decayed by 20% a year.

TABLE 1: Decaying Impacts When Data is Not Available

	Year				
	1	2	3	4	5
GVA (£000s) in current prices	500	550	650	700	850
	Year				
	6	7	8	9	10
GVA (£000s) in current prices	900	900	-	-	-
Policy decay at 20%			900*(1-20%) = 720	720*(1-20%) = 576	576*(1-20%) = 461

Impact Period, Impact Delivery, Build, Persistence and Decay

Estimating persistence and decay can be challenging in the absence of robust and relevant evidence specific to the support. Finding up-to-date information can also be a challenge where persistence and decay are not always reviewed in evaluations and stakeholders may find it difficult to estimate persistence and decay. While these are challenging factors, what is most important is that consideration regarding the time period over which impacts will be delivered (build, persist, decay) is considered and assumptions around this are made clear.

APPENDIX 1 The Life Cycle of Economic Development Support on GVA

Type of Support	Time to deliver (years)	Period over which benefits build (years)	Persistence of benefits (years)	Annual benefit decay (%)
Individual enterprise support	1	1	3	10
Sector/cluster support	1	1	3	10
Promotion and development of science, R&D and innovation	1	3	3	10
Inward investment promotion	1	1	5	10
Bringing land back into use	5	3	10	10
Public realm	3	2	10	10
Image events and tourism	1	1	2	10

Source: <https://webarchive.nationalarchives.gov.uk/ukgwa/20090609003228/http://www.berr.gov.uk/files/file50735.pdf> , P. 90, Table 53.

Constant Prices

Expressing values in constant prices involves adjusting prices to correct for inflation so that they are expressing purchasing power, or value, on a 'constant' or comparable basis between years. This enables an assessment to be made of the true benefits of an support.

Why is it important?

When prices paid for things in the past are remembered, or past company turnovers looked at, these are expressed in values relating to that particular year, that is **current prices**. To compare these values with today's there is a need to adjust for price inflation or deflation, which will have altered prices in the intervening years. This enables comparisons to be made on a like-for-like basis.

It is important to adjust for such inflationary effects in price data in order to ensure that values are being compared on a consistent, comparable basis. Most past data will be quoted without such an adjustment: for example, consider company turnovers of £100m, £101m and £102m over three years. These suggest that turnover rose slowly over the period (by around 1% a year). However, if inflation had been 2% per year, the real value of turnover has actually reduced, giving a different interpretation of performance.

In appraisals and evaluations, therefore, it is important to adjust prices between years for inflationary effects, so that real rather than nominal values are being compared.

Converting to constant prices must not be confused with **discounting** which is a separate process. This adjusts for the "rate of time preference" to produce calculations of present values. This reflects the fact that, all other things being equal, human beings place greater value on benefits delivered now rather than in the future. This also enables comparisons to be made between costs and benefits that are delivered over different time periods. Calculating constant prices, by contrast, is a procedure which focuses on "real" changes over time, controlling for the effect of price inflation. Generally both adjustments will be made to impacts. An example of this is shown below.

Constant Prices

Adjusting future prices

If necessary, the effect of inflation should be removed by deflating future cash flows, and inflating past cash flows, using the relevant deflator.

The operative words are “*if necessary*”. Experience within SE highlights the inconsistency with which future impacts are reported. For example, if impacts are forecast into the future from a base year, such as 2013, then more often than not these will be in constant, rather than current, prices.

For example, impacts at 2017 will be given in 2013 prices rather than current prices derived by factoring in notional annual inflation rates. If these future impacts are then deflated, as the Green Book suggests could be done, then effectively they will be reduced. However, there is no justification for making such an adjustment as the values are already in constant prices.

Unless it is clear as to the price base being used for reporting future impacts then it should be assumed that these are expressed in today’s prices. Accordingly they should not be adjusted in appraisals or evaluations.

However, where it is clear that annual rates of inflation have been factored into forecast values then it is appropriate to deflate these to the appropriate price base.

When do we need to convert to constant prices?

All EIAs involving data from **past** years need values to be adjusted to constant prices. Future values are not adjusted as these will be given in constant prices with no inflation being factored in.

Constant Prices

How do we convert to constant prices?

Monetary values expressed in current prices can be converted to constant prices using the formula:

$$V_{\text{cox}} = V_{\text{curi}} * (P_x / P_i) \quad (1)$$

Where:

- V_{cox} is the value expressed in **constant prices** for the year for which constant prices are to be calculated (Year x), the base year;
- V_{curi} is the value expressed in the **current prices** applying in Year i; and
- P refers to the price index applying in Years x and i, with x being the base year of 100.

For example, using the above formula (1) if:

- $V_{\text{curi}} = \text{£}250,000$;
- $P_x = 100$; and
- $P_i = 102$ (reflecting 2% inflation over the period x-i).

Then:

$$\begin{aligned} V_{\text{cox}} &= \text{£}250,000 \times (100/102) \\ &= \text{£}245,098 \end{aligned}$$

Thus the value to be used, expressed as constant prices at the base year x, is £245,098 rather than the current value of £250,000.

Constant Prices

Where do we get the data on past price levels?

The Office for National Statistics publishes time-series data for GDP deflators¹. These quote past prices in relation to a current base year of 100.0.

Calculating Constant Prices

Table 1 shows the current price estimates of GVA arising from the evaluation of one of SE's support over a 5 year period. The price index for the base year is 100 and the relevant indices for the earlier years (reflecting inflation) are shown.

To calculate the value of the current price GVA impact of £500,000 in Year -4 in constant prices (at Year 0), these relevant values can be substituted into the formula:

$$V_{\text{cox}} = V_{\text{curi}} * (P_x / P_i)$$

Where:

$$V_{\text{curi}} = \text{£}500,000$$

$$P_x = 100$$

$$P_i = 90.982$$

Thus V_{cox} the constant price value (V) of the impacts at year -4 (i) is:

$$\text{£}500,000 \times (100/90.982) = \text{£}550,164$$

¹ <https://www.gov.uk/government/collections/gdp-deflators-at-market-prices-and-money-gdp#full-publication-update-history>

Constant Prices

With all GVA values adjusted in the same way, the cumulative GVA total becomes £3.388 million, rather than the £3.25 million when expressed in current prices. Thus the effect of calculating the impacts in constant prices, taking account of past deflation, is to increase the cumulative GVA impact of the support. This example demonstrates that, when there is price inflation, then:

- Past current values increase when expressed in constant prices at a base year; and
- Were future current prices to be expressed in constant prices, then they would decrease.

TABLE 1: Current and Constant Price Impact of an Support

	Year					Cumulative GVA
	-4	-3	-2	-1	0	
GVA (current prices (£000))	500	550	650	700	850	3,250
Price index	90.982	93.745	94.979	97.606	100.00	-
GVA (constant prices (year 0) (£000))	550	587	684	717	850	3,388

Constant Prices

Applying Constant Pricing and Discount Rates

When impact values are discounted to a base year to account for social time preference, this is done after adjusting for constant prices.

A Worked Example

It is assumed that the example used above (Table 1) was based upon the evaluation of a company support programme which looked at impacts over a 5 year period. Table 2 models these in more detail. It can be seen that the programme started in year -5, spending £0.300 million, with a further £0.1 million being spent in years -4 and -3. As part of the evaluation the companies in the programme have been asked to estimate the impacts of the support over the next 5 years. This data will then be used in SE's impact model.

Table 2 looks at the metrics and the calculations that have been undertaken in a number of stages:

- The first stage is to rebase the GVA and cost data to constant prices in year 0 (now year 5 of the impact appraisal)². Notice that all past prices have been adjusted but that future GVA estimates are not adjusted. The impact, as can be seen, is to increase both the past impacts and the costs; and
- These constant costs and GVA values have then been discounted back to year 0 of the appraisal period when the first project costs were incurred.

² Thus if we consider the Year 2 GVA current price impact of £0.550 million (Column 5, row 3). This becomes a constant price (at the Year 5 base year) of £0.587 million ($550 \times (100/93.745)$).

Constant Prices

TABLE 2: Constant Price and Discounting Calculations (£000)

	Total	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
		-5	-4	-3	-2	-1	0	1	2	3	4	5
GVA	7950	0	500	550	650	700	850	880	900	950	980	990
GDP price deflator		89.015	90.982	93.745	94.979	97.606	100	100	100	100	100	100
GVA at constant prices	8088	0	550	587	684	717	850	880	900	950	980	990
Discount Rate		1	0.9662	0.9335	0.9019	0.8714	0.842	0.8135	0.786	0.7594	0.7337	0.7089
PV GVA at constant prices	6602	0	531	548	617	625	716	716	707	721	719	702
Cost	500	300	100	100	0	0	0	0	0	0	0	0
Cost at constant prices	554	337	110	107	0	0	0	0	0	0	0	0
PV Cost at constant prices	543	337	106	100	0	0	0	0	0	0	0	0

This shows how constant pricing and discounting adjustments would be performed in the same EIA. In the GVA assessment, the order of calculation would be:

- Adjust gross GVA to constant prices;
- Apply gross to net effects, that is the additionality adjustments (this has not been done in the above example);
- Then apply the discount rate to get net PV GVA at constant prices; and
- This would then be divided by net PV cost at constant prices to give the net benefit:cost ratio. In this case (accepting that this is gross impact) this would give a ratio of 12:1 (£6.602 million GVA / £0.543 costs).

Discounting and Present Values

Discounting is an adjustment to the monetary costs and benefits of a support, that occur at different time periods. This then enables alternative support to be compared. The principle underpinning discounting is that more value will generally be placed on benefits that arise now than at some time in the future. The reverse applies to costs. Discounted values are known as present values.

Introduction

In both appraisals and evaluations the flow of monetary costs and benefits, over time, associated with support, needs to be discounted and then expressed as present values. Discounting is distinct from adjustments that may be made for price inflation and the use of constant prices.

Why is it important?

The importance of discounting is perhaps best shown through an example. If someone is given a choice of:

- Having £10 (measured in 2012 prices) to spend today; or
- Having £10 (measured in 2012 prices) to spend in one year's time,

then most people would prefer the first option because it would give them immediate access to the money. Picking the second option means they would still have the same purchasing power (the £10 being expressed in constant prices) but they would have to wait a year before being able to enjoy the goods and services they could buy. Thus, in general terms, greater value is placed on benefits that arise sooner rather than later.

Discounting and Present Values

In an economic development context, money is spent on projects over varying times whilst the monetary impacts likewise accrue over varying periods. Given this, even if the various values are expressed in constant prices, comparisons are very difficult mainly as there is preference for consumption sooner rather than later. This concept is known as the **social time preference rate**, this being the “rate at which society values the present compared to the future”¹ (p. 26). By making this adjustment different values at different times can be compared. This then gives the true cost and benefits of a project so that alternative options can be compared prior to a decision being made. This can then aid decision making. The rate that HM treasury currently recommends is 3.5% a year² (p. 26).

When do we need to convert to present values?

Present values should be used for any appraisal or evaluation in which the monetary values of costs or benefits (after converting to constant prices) are given for more than one time period, or refer to some point in the future or past. For example, SE seeks to estimate the GVA impacts of support over a ten year period and discounting of both costs and benefits is needed to enable reporting of cumulative impacts, the calculation of value for money indicators and comparisons with other support.

How do you convert to present values?

Appendix 1 outlines the detailed method for the calculation of present values. For most purposes it is not necessary to understand the detail of this, albeit that it is not very complex. The Treasury Green Book, contains a Table that gives the appropriate discount factors that are to be applied for different rates³. An extract for the recommended rate of 3.5% is given in Appendix 2. If this is referred to then it can be seen that future values will be lower when expressed in present value terms. For example a benefit of £100 in 30 years time has a present value of £35 when the discount rate is applied ($£100 \times 0.3563$).

¹ http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

² Ibid.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

Discounting and Present Values

Table 1 shows how the discount factors can be applied to get present values. It is a simple process:

- The GVA impact of the support is expressed in constant prices for the relevant years;
- For each year the discount factor is identified from the Table in Appendix 2 (with the first year of the support (Year 0) having a factor of 1); and
- The impact is multiplied by the factor to get the present value.

In this instance it can be seen that the cumulative present value of the impact falls from £400,000 to £380,000 as the impacts in later years are valued less than those in the earlier ones.

TABLE 1: Calculating Present Values

	0	1	2	3	Total
GVA (£000s) in constant prices	100	100	100	100	400
Discount factor	1.000	0.9662	0.9335	0.9019	
Present values	100	97	93	90	380

Discounting and Present Values

What are net present values?

Some support will incur implementation costs over more than one year, while generating impacts which also span more than one year. When future costs and benefits are presented in present values then the difference between the two is the **net present value** which “is the primary criterion for deciding whether government action can be justified”.

Table 2 shows an example of the calculation of net present values. The impacts and costs of the support are profiled from the start (year 0) until year 3 in constant prices. Each has then been multiplied by the appropriate discount factor to give present values. The difference between the two is the net present value which in this example is £281,850. This is the “value” of the support over the 4 year impact period, or the extent to which the impacts exceed the costs when account is taken of the preference for seeing impacts sooner rather than later.

TABLE 2: Calculating Net Present Values

	Year				
	0	1	2	3	Total
GVA (£000s in constant prices)	100	100	100	100	400
Support costs (£000s in constant prices)	50	50			100
Discount factor	1.000	0.9662	0.9335	0.9019	
Present values of GVA (£000s)	100.00	96.62	93.35	90.19	380.16
Present value of support costs (£000s)	50.00	48.31	0.00	0.00	98.31
Difference in present values (£000s)	50.00	48.31	93.35	90.19	281.85
Net present value (£000s)	281.85				

Discounting and Present Values

What about values in the past?

Monetary values in the past should not be inflated to allow for time preference. Rather, they should simply be expressed in terms of constant prices in the base year.

So, what were the steps?

To summarise the stages needed to calculate present and net present value:

- The costs and GVA impacts of support are identified and profiled over time;
- These are expressed in constant prices at the base year which will generally be the first year in which spend is incurred;;
- Apply the 3.5% discount factor to discount all costs and impacts to the base year; and
- Deduct the costs from the impacts to get the net present value of the support at the base year.

Discounting and Present Values

APPENDIX 1

Calculating Present Values

Monetary values expressed in constant prices can be converted to constant prices using the formula:

$$P = A/(1 + r)^n$$

Where:

- P is the present value of an amount A which will accrue n years in the future; and
- r is the time preference rate/discount rate. The term $(1+r)^n$ is commonly referred to as the “*discount factor*”.

Consider the following example. Table A1 shows the estimates of GVA for each of four years, where these are expressed in constant prices, and the same values when expressed in present values using a discount rate of 3.5% per annum.

TABLE A1

Calculating Present Values

	0	1	2	3	Total
GVA (£000s) in constant prices	100	100	100	100	400
Discount factor	1.000	1.035	1.071	1.109	
Present values	100	97	93	90	380

Discounting and Present Values

Here the discount factors are calculated as follows:

$$\text{year 0} = (1+r)^0 = (1+0.035)^0 = 1$$

$$\text{Year 1} = (1+r)^1 = (1+0.035) = 1.035$$

$$\text{Year 2} = (1+r)^2 = (1+0.035) \times (1+0.035) = 1.071$$

$$\text{Year 3} = (1+r)^3 = (1+0.035) \times (1+0.035) \times (1+0.035) = 1.109$$

Hence, the present value of the GVA impact in year 3:

$$P = \text{£}100,000 / (1.109) = \text{£}90,000$$

Or in other words, £100,000 of GVA generated in year 3 is worth £90,000 in present, year 0, values.

It should be noted that the discount factors in Appendix 2 provide a recommended short cut to the calculation of present values. As is shown in the main text, all that needs to be done is to multiply the estimated impact by the appropriate factor for the impact year.

Discounting and Present Values

APPENDIX 2

Discount Factors for a 3.5% Discount Rate

Year	Discount Factor	Year	Discount Factor	Year	Discount Factor
1	0.9662	11	0.6849	21	0.4856
2	0.9335	12	0.6618	22	0.4692
3	0.9019	13	0.6394	23	0.4533
4	0.8714	14	0.6178	24	0.4380
5	0.8420	15	0.5969	25	0.4231
6	0.8135	16	0.5767	26	0.4088
7	0.7860	17	0.5572	27	0.3950
8	0.7594	18	0.5384	28	0.3817
9	0.7337	19	0.5202	29	0.3687
10	0.7089	20	0.5026	30	0.3563

A discount factor of 1.00 is applied to all spending incurred in the base year

Pre-Revenue Impacts

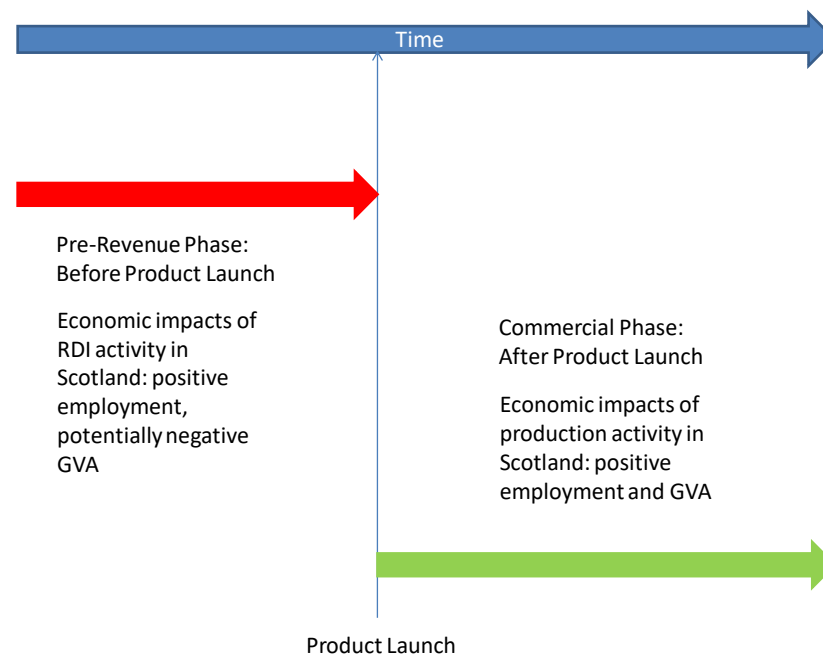
Pre-revenue impacts are the impacts attributable to a support which are generated by beneficiaries prior to the receipt of sales income.

Why is it important?

Much public sector economic development activity is targeted at encouraging greater research, development and innovation (RDI) activity by the Scottish business base. This recognises both the importance of such activity in sustaining and growing economic activity, and the relatively poor performance of corporate Scotland in comparison to UK and international averages.

Support to encourage RDI and its subsequent commercial exportation is illustrated in Diagram 1.

DIAGRAM 1: The RDI Impact Journey



Pre-Revenue Impacts

The Diagram suggests that, broadly, there will be two phases following from the provision of support for RDI and its commercialisation. The first is the pre-revenue phases during which RDI activity (including all preparations for product launch) is undertaken in Scotland. This will have a positive employment impact measured in terms of the annual Full Time Equivalent employee labour input to the RDI process. GVA may, however be positive or negative. One definition of GVA is:

$$\text{Operating Profit} + \text{Employee Costs} + \text{Depreciation} + \text{Amortisation}$$

Using this definition (and interpreting the terms as the changes that are attributable to the support received), one would expect the final three values (Employee Costs, Depreciation and Amortisation) to be positive (or at least not negative). However losses will be incurred during this phase: in other words Operating Profit will be negative given the absence of sales revenue at a time when costs are being incurred. The net result will depend on whether the negative Operating Profit is greater than the positive impacts of Employee Costs, Depreciation and Amortisation.

During the second phase, following product launch, and assuming that at least some of the production activity occurs in Scotland, the GVA impacts should be positive. Again, however, there is the possibility that for some periods the impact could be negative, especially in the earlier stages when revenues flows are building up. Indeed, if support is poorly targeted, there is the possibility that unsuccessful products generate sufficient losses to outweigh other GVA components.

Pre-Revenue Impacts

What do we report?

For any support to encourage RDI and its subsequent commercial exploitation the following should generally be separately reported on as relevant;-

- Total employment and GVA impacts;
- The employment and GVA impacts of the pre-product launch phase; and
- The employment and GVA impacts of the post-product launch phase.

However, when reporting impacts for the pre-product launch phase common sense needs to be used. For example, although GVA may be calculated as being negative, the losses incurred are likely to be covered by investment capital that has been raised. This has been provided in anticipation of future returns in exactly the same way that the public sector has provide support, albeit in this latter instance the anticipated returns are for the wider economy.

Thus, to say that there are negative economic impacts at this stage may be simply a reflection of the stage in the product life cycle that is being considered. However, if there is, for whatever reason, a desire to report impacts at this stage it might be preferable to base these on employee costs alone as they will clearly be having an impact on the local economy, rather than any GVA calculation that produces negative, and misleading, figures.

Cost Centres

A cost centre is a division of a company that adds to the costs of an organisation but only indirectly adds to its profit, for example R&D centres, marketing departments, customer service centres or manufacturers of components for final assembly elsewhere. In the context of appraisals such centres are normally stand alone physical units that do not have separate profit and loss accounts.

Why is it important?

Cost centres can present a challenge when measuring the impact of public sector support. This is because, on their own, they do not generate profit, which is traditionally captured in the collection of GVA components. This means the impact needs to be measured in a different way from the more traditional GVA approach.

The issue is further complicated in that many domestic and overseas companies located in Scotland have complex flows of money, depending on where goods are produced or services are delivered, which means understanding of a division is a cost centre can be complicated.

It is therefore important to know under what circumstances the impact of cost centres can be measured and what should be collected to measure impact as accurately as possible.

When can impact be measured?

Generally the gross GVA impact of a cost centre will be based on the wage impacts and possibly depreciation measures alone. These are the impacts (especially wages) that will affect the Scottish economy, regardless of any profit element. Employment can be measured in the usual way. These metrics need to be collected from the company for the impact time period. The normal additionality adjustments can then be made.

This approach may underestimate the impact of a cost centre, in terms of its GVA impact and the impact ratios. However, if the other metrics are not available this is something that has to be accepted.

It is possible to make far more complex calculations. However, the merit of doing this may be debatable and it is therefore probably best to err on the side of simplicity.

Sunk Costs

Sunk costs are the past public sector costs which have been incurred as part of an support and which cannot be reclaimed.

Why is it important?

Often support will have been funded over a number of years, not necessarily as part of a planned series of investments but as a reflection of changing circumstances that necessitated more public sector support. At the time the additional investment is made the past investments are the sunk costs.

Green Book guidance¹ (Para. 5.15) is that sunk costs should be ignored as what matters “*are costs about which decisions can still be made*”.

However, we need to be clear that:

- Sunk costs are identical to the total amount of public sector funding that a company may have received as support towards a specific activity, as different support may have been provided which may have had separate and distinct impacts;
- Sunk costs refer to the costs incurred in support of the same support project which has, it must be assumed, the same objectives over time;
- There may be instances when more expenditure on the same support is forecast to result in additional benefits. In such instances the sunk costs should be ignored in any impact calculations. These calculations should focus on the additional costs and the additional benefits only that these bring about;
- In some instances it may be appropriate to include sunk costs in an appraisal when calculating such metrics as impact ratios and cost per job created. This might be as it is judged that the extra costs are not bringing about additional benefits but are needed to enable the benefits that have already been identified to be realised. To exclude these may therefore overestimate such metrics as the impact ratio (value for money) of the current support and result in decision makers taking action based on erroneous assumptions; and

¹ http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

Sunk Costs

- Generally sunk cost will be included in an evaluation which will be looking at the totality of support inputs and will then set these against the identified impacts.

What should be clear from the above is that, before making any decision on how to treat sunk costs, there should be a careful examination of the support and an assessment as to whether:

- It needs to be undertaken to realise the benefits of past investments and past forecast impacts, so without this additional support this past expenditure will not generate the anticipated benefits; or
- If it is bringing about additional impacts that have not already been counted in the appraisals of past support.

In the former instance the sunk costs should be **included** in the impact calculations whereas in the latter they should be reported, but not used in the impact calculations.

What should we report?

In an appraisal of the proposed extension to existing support, the following should be reported:

- The total costs of the support to date, including sunk costs. Given that these will have been incurred over a number of years these should be expressed as constant prices to aid comparability;
- A justification, based on the guidance given above, as to whether the reported sunk costs are to be included or excluded from the impact calculations;
- The gross and net impacts of the support (including the impact ratios) based on whatever costs (including or excluding sunk costs) are deemed to be appropriate; and
- Where the sunk costs are included the impacts should be reported with and without these costs. This will allow decision makers to make comparisons. It is also sound practice to be transparent about this, given that there may be disagreements as to whether sunk costs should be included.

In an evaluation all costs should be identified and used in the impact calculations as it will generally be the totality of support that is being assessed.

Spatial Impact

Spatial impact relates to the calculation of impact estimates for different geographies. SE usually estimates impacts only at a Scottish level given that it is a Scottish economic development agency. However, there may be times when estimating impacts at a local, sub-Scotland level is required.

Why is it important?

SE's remit is to help achieve the Scottish Government's overarching purpose and objectives for the Scottish economy. However, there may be instances when SE is involved in support that is targeted at specific parts of Scotland. These are most likely to be ones aimed at the regeneration of particular localities. In such instances the prime rationale for support may be on equity grounds. One implication of this is that issues that may limit the net impact of support at a Scotland-wide level (for example displacement) may be less of a factor at a local level.

This suggests that at times the impacts of support may need to be estimated at:

- A “local”, sub regional level which is likely to be of interest for spatially targeted support, for example a local authority area;
- The “regional” level, for example the Highlands and Islands or “Lowland” Scotland ; and/or
- The national, Scottish level, which tends to be the case for the vast majority of SE's support.

How can different spatial impacts be calculated?

In general, the principles and techniques of impact assessment are consistent regardless of the level of spatial impact of interest. Indeed, some component estimates will remain constant regardless. The main issues lie in the calculation of:

- **Leakage.** Care is needed to ensure that the definition of leakage applied is consistent with the level of spatial impact. So, for example, if examining the impact of a business support on a specific local area then the focus should only be on the gross and net impacts for businesses based within that area. The smaller the area then the greater the probability that impacts will benefit areas outside of it as, for example, employees may live and spend their wages elsewhere;

Spatial Impact

- **Displacement.** The extent of displacement will depend on the level of spatial impact. It is generally the case that displacement will be higher for larger geographical areas as it is likely that competition will be greater in these areas. For example, whilst a biotechnology firm based in Dundee may have few competitors in the city, it could have many more elsewhere in Scotland. Hence, separate displacement assessments will be required for each level of spatial impact presented; and
- **Multiplier effects.** The value of both supplier linkage and income multipliers will vary depending on the level of spatial impact, with it generally being the case that they are higher for larger areas as suppliers are likely to be spread over a wider area whilst induced spend will likewise be more dissipated.

Of these issues, a lack of area-specific multipliers is the main data constraint that will be faced in spatial impact assessment. Secondary data on multipliers are generally only available at the Scottish level (although there are some “local” multipliers available from *ad hoc* studies of specific local economies).

The impact of adjusting multiplier

Some indication of the impact of different spatial scales on multiplier values can be found in the work commissioned by the Department for Business Innovation and Skills from Cambridge Economic Associates¹. Table 1 shows the differences in Type II multipliers at the sub-regional and regional levels. What can be seen is that although there are differences, these tend not to be great and are not always in the same direction, depending upon the type of support being considered.

¹ <https://webarchive.nationalarchives.gov.uk/ukgwa/20090609003228/http://www.berr.gov.uk/files/file53196.pdf>

Spatial Impact

TABLE 1 Differences in Multiplier Values at Different Spatial Scales

Type of Support	Spatial level median multiplier	
	Sub-regional	Regional
All categories	1.21	1.43
Business development and competitiveness	1.20	1.50
Regeneration through physical infrastructure	1.32	1.39
People and skills	1.40	1.30

Source: Tables 7.1 and 7.2, op. cit

More recently the Treasury Green Book has provided updated guidance on Place Based Employment Multipliers² based on What Works Centre for Local Growth Toolkit: Local Multipliers³, based on 18 studies meeting their evidence standards. These multipliers differ from traditional input-output multipliers and are applied at the ‘sub-UK’ level, however, it is unclear how they would vary at say country level (e.g. Scotland), sub-region (e.g. HIE), and local level (e.g. local authority). As Input-Output data for Scotland is published⁴, these are generally used for Scotland level activities instead, particularly as they provide greater granularity for sectors.

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf - Annex A2

³ <https://whatworksgrowth.org/resources/toolkit-local-multipliers/>

⁴ <https://www.gov.scot/publications/about-supply-use-input-output-tables/pages/user-guide-multipliers/>

Spatial Impact

How can multipliers be “adjusted” for spatial impact?

There are various approaches for adjusting multipliers, and most will require a degree of judgement. It is also the case that although the Scottish multipliers are Industry/Product Group averages and are Scotland-wide (all of which may limit their relevance to particular companies or geographical areas) they are based on the full complexity of the economy with the relationships being modelled through many interaction “rounds” This is rarely the case with local multipliers which, at best, are likely to be based on one “round” so may underestimate the indirect and induced effects of support.

However, if it is felt that these should be adjusted then, unless there is more specific evidence on which to base these adjustments, one approach is to make a pro rata adjustment based on the proportion of the Scottish business base that the area of interest contains. Appendix 1 outlines how this can be done using a worked example.

Spatial Impact

Appendix1

Adjusting Multipliers

What is outlined here is a simple way of adjusting multipliers based on the proportion of the Scottish business base that the geographical area accounts for. The assumption is that the smaller this proportion is then the greater the likelihood that the indirect and induced benefits of an support will accrue to areas elsewhere in Scotland.

The approach is demonstrated for the Type II GVA multiplier. Exactly the same adjustments can be made for any other multipliers. The approach is:

- Select the appropriate Type II GVA multiplier for the relevant Industry/Product Group;
- For the geographic area of benefit calculate its share of the Scottish business base; and;
- Apply this “share” to the Scottish level multiplier using the following formula:

$$SL_{i,a} = [(SL_{i,s}-1)*(BB_a/BB_s)] + 1$$

Where:

- $SL_{i,a}$ is the supplier linkage multiplier for sector “i” in area “a”;
- $SL_{i,s}$ is the Scottish level multiplier for that sector; and
- BB is the business base ($_a$ for area $_a$ and $_s$ for Scotland).

Spatial Impact

To show how this could work we will look at a furniture manufacturing company (Industry/Product Group 44). The Type II GVA multiplier for this Group in 2011 was 2.1⁵. The company is based in Glasgow. In 2011 there were 18,010 active enterprises in the City and 155,653 in Scotland⁶.

Thus:

- $SL_{i,s}$ is 2.1;
- BB_a is 18,010; and
- BB_s is 155,653.

We can then substitute these values in the formula:

$$SL_{i,a} = [(2.1-1)*(18,010/155,653)] + 1$$

$$SL_{i,a} = 1.13$$

In this example the Type II multiplier to be used would be 1.13, rather than 2.1.

Clearly this is a very simplistic adjustment, albeit it has the benefit of being based on the full Input Output tables. If the geographic distribution of the sector is known then these figures could be substituted for the business base which might provide a sectoral adjustment of greater relevance.

5 To identify multipliers at the Scotland level see here - <https://www.gov.scot/publications/about-supply-use-input-output-tables/>

6 The number of businesses in Scotland and in the local authority area can be identified using Scottish Annual Business Statistics - <https://www.gov.scot/collections/business-and-innovation-statistics/>

Wider Benefits to the Economy

While the ultimate measure of the success of an support is economic growth, the way each benefit accrues to the economy is not always transparent. This may reflect the difficulties in quantifying some impacts or the inability to place a monetary value on some identified benefits. Nevertheless, these benefits should be captured, in qualitative or non-monetary quantified terms if necessary, in order to fully describe the effect of support

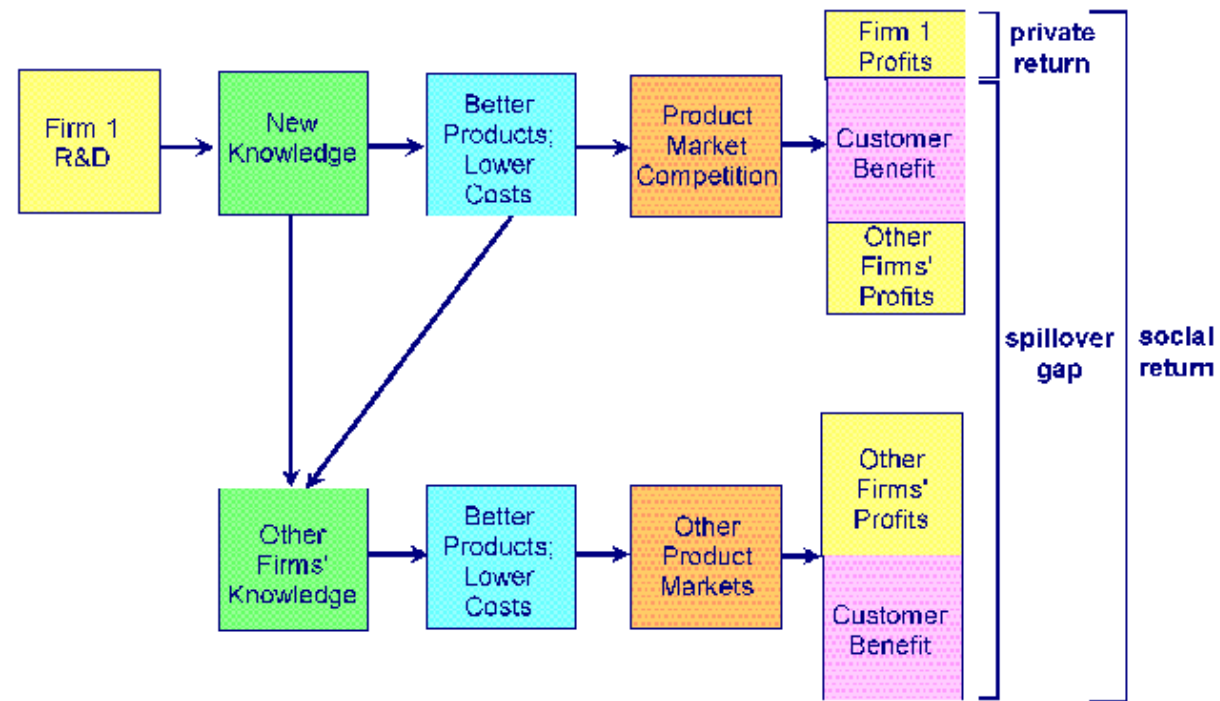
Why is it Important?

To ensure effective support, *and* value-for-money, public sector organisations need to try to understand how project activity leads to economic and other benefits and the exact nature of these benefits. The Logic (or Theory of Change) Model provides a way of conceptualising the route from project inputs to impacts. However, it is often the case that not all of the benefits can easily have a monetary value (for example GVA) placed on them whilst others, who may not be the direct targets of the support, may receive benefits.

This is illustrated in Figure 1 which shows how support to one company (in this case for Research & Development) can result in other benefits to the wider economy thereby enhancing overall economic performance. Typically, these benefits may include: improved capacity and capability, transfer of technical knowledge to competitors, and up-skilling of staff who may move within the economy thereby re-distributing knowledge. Support may also result in spillovers, or positive externalities, that impact upon the wider economy, affecting those who have had no part in the support. These also need to be captured.

Wider Benefits to the Economy

FIGURE 1: Wider Economic Impacts as a Consequence of Supporting One Company



Source: Jaffe, Adam B. "Technological Opportunity and Spillovers of R&D." *American Economic Review* 76, December 1986.

Wider Benefits to the Economy

Key Considerations

There are established econometric approaches for trying to assess the impact of the more intangible benefits. For example, the H.M. Treasury Green Book¹ sets out methodological approaches for Non-market Valuation and Unmonetisable Values”. These are complex, time-consuming and expensive approaches that are beyond the scope of SE’s impact assessment approaches.

Despite these methodological difficulties, it is important to try to identify (and report on) all of the benefits arising from support, although this is unlikely to be able to be done quantitatively. If this is not done then the benefits are likely to be underreported.

Reporting Wider Benefits - Direct Tangible and Intangible Benefits

When reporting on impacts of support attempts should be made to capture all of the tangible and intangible benefits, as set out in the logic model, as well as unintended impacts which were not set out in the logic model.

Figure 2 illustrates one example of the benefit flow for a project of a more technical nature. This highlights the benefits at the last three stages in the logic model (outputs, outcomes and impacts). These are split into three categories:

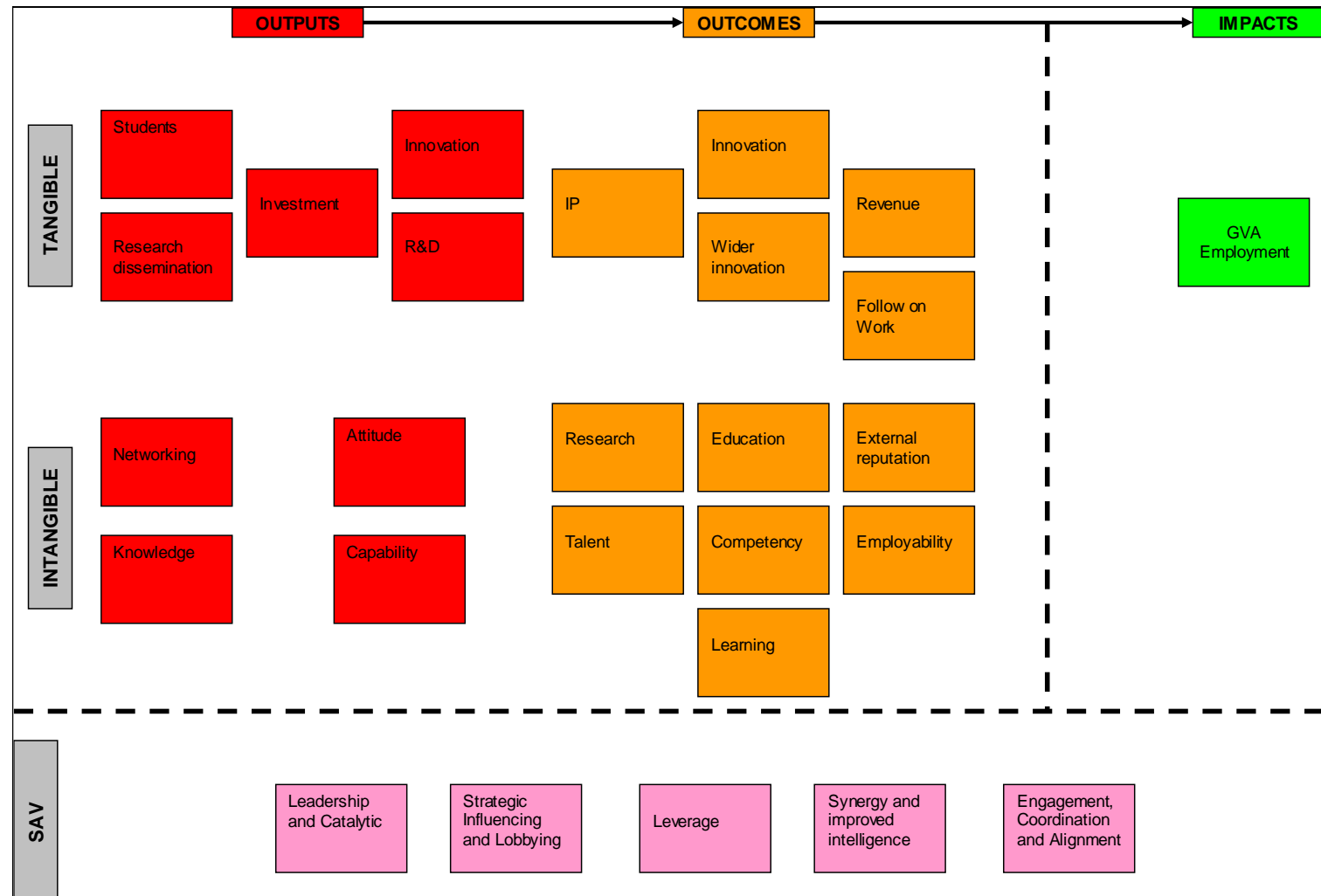
- The **tangible** benefits: essentially those benefits that can be quantified culminating in GVA and employment;
- The **intangible** benefits to the beneficiary, which is things such as changes in attitude or the enhancement of a company’s reputation with potential customers and suppliers. These are things that would be very difficult to quantify yet might, in the longer term, result in enhanced impacts. As such they need to be identified qualitatively; and
- **Strategic Added Value** (SAV) which covers: strategic leadership and catalysts, strategic influence, leverage, synergy and engagement². These are the wider intangible benefits that, although they occur as a consequence of the interaction with the beneficiary, are often the result of changes in things such as behaviours in non-beneficiaries, albeit that these are often players involved in some way with the support such as partners, funders and other stakeholders.

¹ <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

² <https://webarchive.nationalarchives.gov.uk/ukgwa/20090609003228/http://www.berr.gov.uk/files/file21900.pdf>, Figure 2.3, p. 20.

Wider Benefits to the Economy

FIGURE 2: Illustrative Benefit Flows Arising from Technical Support



Wider Benefits to the Economy

Spillovers or Externalities

The benefits outlined in Figure 2 impact on support beneficiaries and partners. Such support can also result in other impacts that need to be captured. These are the externalities arising from support that can have an effect on those who are not involved in the support in any way. These are also known as the spillovers and can be negative or positive, albeit the focus here is upon identifying the positive spillovers.

Literature commonly categorises externalities as:

- Market spillovers (benefits to the consumer and non-innovating companies);
- Knowledge spillovers (the availability of knowledge to other businesses so that they can change their approaches and processes); and
- Network spillovers (whereby clusters of activity may benefit from the developments made by one member of this cluster).

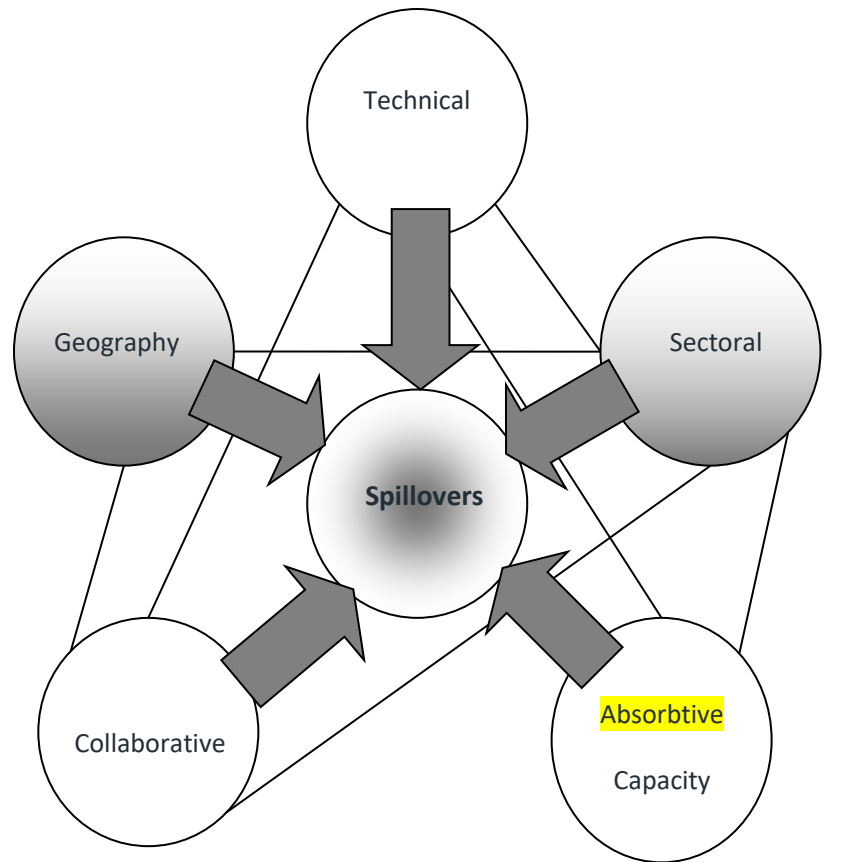
Figure 3 illustrates the set of *inter-related* factors that influence the extent to which spillovers may be prevalent within the economy. These are split into ‘bigger-picture’ structural factors reflecting wider macro-effects and micro (firm) level influencing factors. These elements are complex and often co-dependant, and must be considered on a project-by-project basis. For example, if a beneficiary is part of a geographical cluster of similar activities then it may be that there is a greater probability of their being positive spillovers than if the beneficiary were geographically isolated.

Likewise it may be that some sectors have better networks than others so that innovations in one company as a result of public support are more likely to have an impact on others in the sector. At the micro-level it may be that some companies have greater absorptive capacity³ than others perhaps reflecting the characteristics of the owners or managers.

³ This is generally defined as the ability of a business to recognise the value of information, have the ability to assimilate it and to then apply it within the business in a way that brings commercial benefits.

Wider Benefits to the Economy

FIGURE 3: Key Factors Influencing Spillovers



The spill over effects of support are likely to be project specific and may be more difficult to identify than the earlier tangible, intangible and SAV impacts. However, attempts should be made to do this, using the typology (markets, knowledge and networks) outlined above.



Estimating the Income Tax Contribution of Supported Projects

Scottish Enterprise (SE) is an economic development agency whose purpose is to grow the Scottish economy. The main measures of its effectiveness are Gross Value Added (GVA) and employment. However, as the Scottish Government assumes greater fiscal responsibility, these measures may be seen as only a partial reflection of SE's economic impact. Fiscal measures such as income tax are now devolved. As such the tax impact of SE's support is increasingly a matter of interest.

Employee Taxation

The direct tax contribution made by employees consists of:

- Scottish Income Tax which now goes to the Scottish Government; and
- National Insurance which is, as yet, not devolved so goes to the UK Government.

Estimating Employees' Scottish Income Tax and National Insurance

To calculate the Scottish Income Tax and National Insurance paid by the employees whose jobs are created because of SE's support Her Majesty's Revenue and Customs has a ready reckoner that can be used:

<https://www.tax.service.gov.uk/estimate-pay-take-home-pay/your-pay>

Estimating the Tax Contribution Made by the Employees of Companies Supported by Scottish Enterprise

To use this, you need to know the employees' annual gross salary (not including any oncosts such as Employers National Insurance or pension contributions). When accessing the ready reckoner there are 4 things to be input:

- The annual salary;
- **NO** to the State Pension age question;
- **NO** to using your tax code; and
- **YES**, to the Scottish Income Tax question.

As an example, for an annual gross salary of £30,000 the calculator shows that:

- Scottish Income Tax is £3,698;
- Employees' National Insurance is £2,620; and
- Total deductions are £6,318.

Similar calculations can then be done for all of the jobs to be created and the results presented in the form of a table as in the example below.

Estimating the Tax Contribution Made by the Employees of Companies Support by Scottish Enterprise

TABLE 1: Annual Scottish Income Tax and National Insurance Contributions when all New Staff are in Post

1	2	3	4	5	6	7
Job	Annual gross salary	Number of posts	Scottish Income Tax	Total Scottish Income Tax (3 x 4)	National Insurance	Total National Insurance (3 x 6)
Assistants	£21,000	30	£1,898	£56,940	£1,540	£46,200
Technical	£25,000	4	£2,698	£10,792	£2,020	£8,080
Manager	£28,000	4	£3,298	£13,192	£2,380	£9,520
TOTAL	N/A	38	N/A	£80,924	N/A	£63,800

Clearly the income tax figures are broadly indicative given that individual circumstances will result in differing tax codes that may result in less or more tax being paid. Given this:

- If there are many jobs, all of which are paid different salaries, then rather than entering each one into the ready reckoner the suggestion is that they are banded and the tax calculations undertaken for the average salary of each band; and
- Likewise, if all that is provided is an average salary then the tax payable should be calculated based on this, with a realisation that this will not be definitive.

Estimating the Tax Contribution Made by the Employees of Companies Supported by Scottish Enterprise

Once the annual tax contribution has been calculated then this should be:

- Profiled over the number of years that the appraisal covered. For example, in Table 1 this appraisal covered 5 years;
- Discounted by 3.5% to give a Present Value;
- Summed over the appraisal period to give the total gross Scottish Income Tax and National Insurance contribution, with each being reported separately;
- To calculate the net impact then the additionality metrics should be applied, that is deadweight, displacement and (if used) substitution and leakage. The multiplier should not be used; and
- When reporting, both the gross and the net Scottish Income Tax and National Insurance contribution should be noted along with some text that relates the tax contribution to the scale of SE's support. For example, something along the lines of:

“Over the 5 year appraisal period the total net employee tax contribution is £723,620, more than the amount of grant requested”.

Clearly these calculations only cover a proportion of the tax contribution that SE's support may create. In addition to the tax paid by employees there are four main sources of tax paid by companies:

- Business rates;
- Corporation Tax paid on profits at a general rate of 19% in 2017-18;
- Value Added Tax (VAT) that companies may incur; and
- The employers' National Insurance contribution (currently generally 13.8% of employees' gross salary)¹.

Of these only business rates are raised and distributed in Scotland. The other 3 are paid to the UK Government.

¹ <https://www.gov.uk/national-insurance-rates-letters/contribution-rates>

Optimism Bias

Optimism bias is the tendency for those involved in projects, as funders, managers or beneficiaries, to be too optimistic in terms of forecasting project costs, scale, timing and benefits. Accordingly, advice is that in any appraisal an optimism bias adjustment should be made. This will probably reduce the forecast benefits over the expected duration of the project. However, SE's experience is that this is a complicated issue with over-optimism not always being the norm. Accordingly optimism bias adjustments are not necessarily as straightforward as traditional guidance would imply. Advice should be sought from the Appraisal & Evaluation Team before making any such adjustments.

Why is Optimism Bias Important?

Appraisals, and many evaluations, include forecasts e.g. company turnover, employment and GVA over the impact period. There is a view (for example articulated in the Treasury Green Book¹) that beneficiaries and those involved in project development can:

- Underestimate costs;
- Underestimate the time taken to develop a project and for it to begin to deliver impacts; and
- Overestimate the net impacts.

There can be numerous reasons for projects not delivering according to plan. For example:

- There may be difficulties in raising the investment needed to deliver a project;
- There may be delays in recruiting appropriate delivery staff; and
- Increases in company turnover may be more difficult to achieve than predicted as the market for a new product or service may be more limited than thought. This can mean that the net GVA and employment impacts are lower than anticipated.

¹ See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf where it is stated that there is a “demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters”, p. 85.

Optimism Bias

It is important that decision makers are provided with evidence regarding the likelihood of forecast impacts being realised for all types of SE support. This then ensures a degree of consistency in the decision-making process and less risk that decisions are made on the basis of unrealistic impact forecasts.

Project Costs

Generally, projects are approved with a set budget. The absolute and relative impact metrics, such as the impact ratio and cost per job, are then calculated on the basis of these approved costs. If project costs exceed the approved budget then projects generally will apply for re-approval². If the increase in costs is judged to be sufficiently large then a reappraisal, recalculating the impact metrics, will be carried out. This means that the costs of a project are increased thereby accounting for optimism. It may also be the case that cost increases result in the impacts arising later than originally planned. In these cases the benefit timescales would also be adjusted. As the GVA and employment impacts will be adjusted in the light of changes to benefit timescales, this is explicitly taking account of changes to the time taken to realise project benefits.

Gross or Net Adjustments?

In most cases optimism adjustments are made to the net impacts: usually GVA and employment. If they are made to the gross impacts then, after the additionality adjustments have been made to arrive at net figures, the calculated impacts should be identical to the ones that would have been derived had optimism adjustments been made to the net figures. Thus, it should make no difference to the net impacts when optimism adjustments are made. However, there may be instances when it is felt worth highlighting the impact of potential optimism on the forecast impacts. In these cases optimism may most usefully be reported at the gross stage. This will avoid its potential effect being lost when included with the other additionality adjustments. Again, advice should be sought from the Appraisal & Evaluation Team before making any adjustments.

² Applicants' seeking further support may approach another public sector partners, meaning public sector costs go up but there is no reappraisal by SE. This emphasises the importance of taking into account all Scottish public sector costs, known or anticipated, at appraisal and in evaluation.

Optimism Bias

Company Impacts

SE's evidence show that dealing with individual companies, the extent to which there is optimism bias inherent in turnover forecasts is far more nuanced than might be expected. Some companies will be extremely over-optimistic and perhaps even unrealistic, while others will provide conservative estimates. Given this, the approach to assessing optimism bias for support to companies should, if at all possible, avoid using standard rule of thumb adjustments. Attempts should be made to draw on available evidence to compare the realism of what is being forecast with benchmarks and make adjustments as appropriate. Evidence includes:

- Any research and due diligence conducted on company business plans and commenting on the feasibility of financial projections
- Any risks which may impact on the scale of impacts achievable
- The Scottish Annual Business Statistics³ contains information by SIC Industrial Division on metrics including as GVA per employee. This, and the other comparative data, can be used to benchmark companies and make adjustments if it seems GVA and employment forecasts are out of line with the wider sector; and
- Evaluation and research evidence that SE may have access to such as SE or other benchmarking data on projected growth rate from other, preferably similar, companies and projects or published research and evaluation evidence regarding typical impacts and distribution of impacts relevant to the support given⁴.

Access to these sources is through the Appraisal & Evaluation Team.

³ <https://www.gov.scot/collections/business-and-innovation-statistics/#scottishannualbusinessstatistics>

⁴ Such as Evaluations Online - <https://www.evaluationsonline.org.uk/evaluations/Search.do?action=search&ui=basic&doctype=0>

Optimism Bias

If neither of the above are of use then, in order to err on the side of caution, adjustments of -20% and -40% should be made to net impacts and presented as scenarios. Estimating optimism bias is inherently subjective and similar to the application of sensitivities in that judgements are made regarding the extent to which projected impacts will be achieved. The use of a range of optimism bias scenarios can therefore be helpful in illustrating the potential impacts if impacts are delivered in line with projections, or if projections were 20% or 40% lower for example.

It should, however, be stressed that such rule of thumb adjustments should be avoided if at all possible, with appraisers applying their own best judgement regarding appropriate levels of optimism bias based on the evidence available to them. The preferred option should be to draw on sector and project support specific evidence. While results are generally made for optimism, if there was good evidence to suggest that projections were pessimistic, then an adjustment could be made to inflate outcomes. Whatever adjustment is made, the rationale for making such adjustment(s) should be clearly stated in the assumptions, with a view to transparency, making it easy to challenge and change them if better evidence is available.

It may also be the case that SE support in some areas may be but one of a large number of factors that influence eventual outcomes. For example, in offshore renewables the attainment of turnover projections will be dependent upon many factors that are outwith the control of the individual company. These include: international and national legislation on carbon; global energy prices; government price incentives; grid connectivity; port infrastructure; as well as the more traditional dependencies such as labour and access to finance. In these instances optimism bias adjustments of up to 75% have been applied to account for these unknowns.

Optimism Bias

Optimism Bias in Strategic Infrastructure Projects

Much of the discussion and evidence about optimism bias relates to infrastructure projects where costs and timescales are articulated at the start of the project and can therefore be easily monitored⁵.

Strategic infrastructure projects can be defined as large scale projects involving considerable resource commitment which are often intended to have a transformational impact either spatially or for a particular industrial sector or activity.

Optimism can relate to many factors that are often interrelated, including:

- Costs: generally underestimating project costs because of factors such as unforeseen remediation works or site assembly costs, resulting in higher public expenditure or reduced project scales;
- Scale and timing: overestimating the scale or speed of development and investment;
- Impacts such as jobs and GVA: overestimating economic outcomes as there has been over-optimism over, for example, project scale, timing and demand.

Some examples, drawn from a review of SE's strategic infrastructure projects, are discussed below. One important distinction to make in assessing optimism adjustments is between:

- Publicly financed buildings: where SE is paying for a building; and
- Privately financed buildings: where SE waits for the private sector to construct buildings, with SE having made initial investments for example in land assembly, remediation and site servicing.

⁶⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191507/Optimism_bias.pdf

Optimism Bias

Why can there be over-optimism with business infrastructure projects?

Common reasons for over-optimism include:

- Macroeconomic: not expecting economic changes e.g. downturns in growth and demand that can have a major impact upon companies, developers and economic development projects
- Sectoral: over-optimism about demand, often in sectors where the route to market can be very lengthy in part due to the need to get regulatory approval for products (e.g. life sciences). It may also be the case that the potential market opportunities for Scottish companies are poorly understood
- Private developers: overestimating the appetite of private developers for “non-standard” space such as incubators, R&D/innovation, and multi-occupancy properties; and
- Scale and complexity: while bespoke single building projects can be delivered to plan over short timescales, major complex programmes (typically involving the development of a strategic site with several commercial buildings and owners/partners and funders) can end up many years behind original schedules.

Optimism Bias

Optimism Bias Adjustments

Guidance on infrastructure optimism bias provided by the Treasury is now rather dated and tends to focus upon optimism related to the costs and timing of developments rather than the benefits⁷. Given this, SE's approach is to draw on its own experiences. Thus project appraisers should consider applying higher levels of optimism bias (over 50% and possibly up to 90% in some cases) to business infrastructure projects in cases where:

- The development is of a large scale and complex; ;
- There is a greater reliance upon private developers/investors to finance “non-standard” commercial developments; and
- There are uncertainties in the wider demand and economic context such as the sectoral demand underpinning the development, the macroeconomic outlook and the confidence of the private development sector.

Where projects are discrete and financed by the public sector, optimism adjustments of 0-40% are likely to be more appropriate. As with other optimism bias calculations, setting optimism bias levels is inherently subjective and dependent on the nature of the project, should be based on the best available evidence, and assumption made should be clearly stated (and subject to revision upon challenge where better information is available to inform adjustments).

Regardless of project specifics, the advice of the Appraisal & Evaluation Team should be sought before making any adjustments.

⁷<https://www.gov.uk/government/publications/green-book-supplementary-guidance-optimism-bias>

Benchmarking

Benchmarking is the process of comparing the impact of support to that of other support across a selected range of indicators. This then provides a comparative measure of relative performance.

Why is it important?

When appraisals and evaluations are undertaken, generally two types of impact figures are reported: absolute impacts (for example, £ million of net GVA and net additional jobs) and relative impacts: chiefly the Impact Ratio (net GVA impact per £1 of SE spend) and the Cost per Job created. In isolation these relative measures mean little. For example, is an impact ratio of 1:8 good, average or bad? If support has created a net additional job at the cost of £10,000 again, is this good?

The process of giving meaning to these relative performance figures (and other additionality metrics) is called benchmarking, and is a necessary element in the overall assessment of support's potential or actual worth. SE is interested in both the absolute performance of support and how it compares to other support with similar objectives.

Benchmarking in appraisals is also a valuable aid for assessing the realism of a project and its forecast benefits. For example, if benchmark data shows that performance elsewhere was much better or worse than is anticipated for new type of support, this may indicate a need to revisit the project and assess the appropriateness of assumptions underpinning it and perhaps have a more fundamental rethink about the support, its objectives and rationale.

Benchmarking

What benchmarking should be undertaken?

Generally benchmarking is used to compare the performance of a support project against that of other support having similar objectives. It will normally be undertaken on one or more of the following:

- Selected additionality indicators such as deadweight or displacement;
- Output indicators such as the cost per unit of floorspace created or costs per business assist;
- Key relative impact measures such as the net Cost per additional Job or the Impact Ratio.

Other benchmarks can also be considered dependent on the objectives and metrics of the support and the availability of data suitable for future benchmarking.

Benchmarking Issues

Although benchmarking is, in theory, very simple, in practice it can be difficult to do. There are a number of reasons for this:

- It can be very difficult to find a support project that has identical objectives;
- Even if support having identical objectives can be found, the activities undertaken may be very different, as may the resources allocated and perhaps the target beneficiaries so that comparisons of impact measures may be misleading;
- The methodologies used may not be transparent so that it may be difficult to know whether, for example, values have been discounted, expressed in constant prices or even if acceptable questions have been asked to derive the additionality adjustments. If it is not possible to ascertain these, then comparisons of impact and additionality findings should be treated with caution;
- There may be occasions when support may be very innovative so that there may be no valid benchmarks;
- Over time, appraisal and evaluation practices change as thinking and data sources evolve. This can mean that work can date quite quickly so that comparators are no longer valid; and

Benchmarking

- Underpinning many of the above factors is organisational practice and experience. Public sector agencies vary considerably in their understanding of impact methodologies so that an appraisal that may be perfectly acceptable to one may fail to pass the quality thresholds of another.

All the above factors mean that benchmarking needs to be undertaken with a degree of caution to ensure that the support projects being compared are broadly similar as are the methodologies used. This can often mean that benchmarking within a programme, where consistent metrics and processes are used, can be easier than comparison with other support, and especially support outside SE. For this reason, it is important to be as consistent as possible when collecting data, and consideration should be given to:

- Available data for benchmarking against any existing support, or previous iterations, and how to ensure consistency
- Using SE's Standard Impact Question Set for Economic Impact Assessment questions
- Use of SE's Standard Question Templates to consider what information to collect and how to structure applications, event feedback, and project completion and post-completion feedback

Benchmark data

It is now much more common for economic development organisations to share their impact evidence, especially evaluations. Within SE it is standard practice that all evaluations, unless they contain company specific or sensitive information, are published on the website [Evaluations Online](#).

The [What Works Centre for Local Economic Growth Centre](#) also has a range of evidence sources that may provide useful benchmark data.

Benchmarking

It should be noted however that impact metrics need to be comparable to be suitable for benchmarking. SE's impact ratio and cost per job metrics provide some assessment of value for money for SE investments, however, this is not comparable with Cost:Benefit Ratios which are commonly used in Government Business Case Assessments. Care should therefore be given to ensure that the project being appraised or evaluated can be benchmarked appropriately.

SE's own benchmarks

Whilst the sources outlined above are useful, SE is increasingly developing its own benchmark database. This draws on appraisal and evaluation work (undertaken to a consistent and transparent standard) and generates data on:

- The key additionality metrics, such as deadweight and displacement;
- The Impact Ratios for SE's themes and sectors; and
- Costs per net Job.

This benchmarking data has a number of advantages:

It relates to SE's own support;

- It uses methodologies that are generally consistent and comparable; and
- It is being continually updated and added to as new evidence becomes available.

Contact the [Appraisal & Evaluation Team](#) for further information.

