

OECD FRAMEWORK FOR MAPPING AND QUANTIFYING GOVERNMENT SUPPORT FOR BUSINESS INNOVATION

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OECD framework for mapping and quantifying government support for business innovation

This document presents a measurement framework aiming to support the collection of comprehensive and internationally comparable quantitative and qualitative information on governmental innovation support programmes and instruments. It is proposed for application in the analysis of innovation support systems in countries. In an initial phase, these have been piloted through country pilots on mapping and measuring government support for business innovation. The framework will support an extension of these pilots to a more comprehensive reporting exercise.

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The preparation of this and related MABIS outputs have benefited from feedback from and interactions with the national experts participating in the pilot application of the work to five OECD countries, namely Australia, Canada, France, the Netherlands and Norway, as well as OECD colleagues involved in the Science and Technology and Innovation Policy (STIP) Compass and the Project on Quantifying Industrial Strategies (QUIS).

Executive summary

This document presents a proposal for a framework to map and quantify government support for business innovation at the level of programmes and associated support instruments. Prepared in the context of the OECD project “Measurement and Analysis of Business Innovation Government Support” (MABIS), this framework seeks to provide a sound basis for quantifying support for business innovation beyond what existing measurement mechanisms currently allow for, particularly in an internationally comparative context.

While very important from several policy viewpoints, obtaining a comprehensive picture of support for business innovation has proved evasive for both political and practical issues. Despite these challenges, action is needed to address strong demand from OECD member countries and partners to provide a comparative picture of their innovation support portfolio as a basis for understanding directionality, conducting impact and value for money analysis and exploring reform options.

The framework provides taxonomies for several key inter-connected dimensions for characterising and measuring support attempting to address the following questions:

- What innovation activities or outputs are supported?
- What are the policy objectives of support for business innovation?
- Who in government provides the support and by whom is it delivered?
- Who is eligible to receive support and who is the ultimate beneficiary?
- On what basis is support provided? What does government provide and does it get back anything in return?
- How is support measured? What do monetary figures represent?

The dimensions reflect multiple facets of support directionality, indicating concrete choices made by governments when assigning resources in support of innovation:

- Distinguishing between activities eligible for support and those excluded, as well as indicating which activities benefit from preferential terms of support.
- Indicating what are the policy objectives of support for business innovation, distinguishing between specific government objectives and generic objectives to enhance innovation in general.
- By revealing which government authorities are responsible for funding and providing the support, valuable information is also conveyed about potential directionality.
- Discriminating between actors eligible to benefit and excluded from innovation support, in a direct or indirect fashion, as well as indicating which types of beneficiaries can claim preferential levels of support.
- By deciding on which mechanisms for support, specifying what government provides and what firms, if anything, need to provide in return. The choice of a support mechanism itself shapes the capacity of governments and its authorities to direct support to activities and beneficiaries, as well as align it to objectives.

Whilst not designed as a definite compilation guide, this framework provides considerable detail on the aims, methods and challenges of measurement so it can support and provide direction to future measurement initiatives. The application of the initial version of the framework on a pilot basis to five OECD countries has shown that each country's data infrastructures present unique strengths and limitations when it comes to facilitating a reasonably exhaustive mapping of innovation support along key dimensions. The pilots have demonstrated that the measurement of innovation support and its directionality is very much driven by data availability and the administrative procedures that shape the existence and features of these data. It is anticipated that implementing this framework in other countries will equally require a considerable degree of adaption and customisation.

Measurement efforts must manage the practical reality that there is a de-facto monitoring bias against innovation support with features such as having a non-R&D innovation and diffusion focus, being provided and operated by ministries and agencies outside the core set of ministries of science, research and innovation, and pursuing innovation demand objectives such as through procurement actions. As whole-of-government approaches towards innovation policy become more common, it is important to have in place coordination mechanisms to monitor support for innovation, particularly when it comes to challenge-oriented policies. Programmes with a major diffusion component, supporting new-to-firm only innovations, needs to be explicitly acknowledged as being innovation support since such programmes may otherwise not be accounted for.

The pilots have also vindicated the framework's emphasis on the interlinkages between the different components of the taxonomy, particularly those that allow to trace how support is channelled across different actors, as this shapes the measurability of the different elements of the taxonomy as well as their interpretability in international comparisons.

While countries have a shared interest in measuring government support for STI and business innovation, they often find themselves applying and investing in relatively uncoordinated, highly country-specific monitoring approaches, which renders international synthesis and comparison overly complex but not entirely impossible. Whilst some of the measurement challenges might appear to be unsurmountable, the measurement pilots suggest that there is room for greater international coordination towards common representation approaches such as those proposed in this framework.

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1 Introduction

This document presents a proposed framework for mapping and quantifying government support for business innovation at the level of programmes and associated financial support instruments. This framework has been prepared in the context of the OECD project Measurement and Analysis of Business Innovation Government Support (MABIS), under its SUPRINNO work package (Support for Innovation), with the initial aim of providing a basis for a series of mapping and measurement pilots of support for innovation in a selected group of countries, to be subsequently revised and extended. One of the main objectives is to explore and potentially provide a sound basis for quantifying support for business innovation beyond what existing mechanisms currently allow for, particularly in an internationally comparative context. While very important from several policy viewpoints, obtaining a comprehensive picture of support for business innovation has proved evasive for both political and practical issues (OECD, 2021^[1]). Despite these challenges, there is strong demand from OECD member countries and partners to provide a comparative picture of their innovation support portfolio as a basis for understanding directionality, conducting impact and value for money analysis and exploring reform options.

1.1. Definitions and scope for government support for business innovation

The object of measurement for the framework laid out in this report is that of government financial support for business innovation, representing direct or indirect flows of resources to firms oriented towards enabling or rewarding innovation activities and outcomes.

The following definitions in the Oslo Manual (OECD/Eurostat, 2018^[2]) provide the basic foundations for establishing the link to innovation.

Innovation activities include all developmental, financial and commercial activities undertaken by a firm that are intended to result in an innovation for the firm.

A business innovation is a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm.

An innovation is "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)".

The Oslo Manual distinguishes between innovation as an outcome (an innovation) and the activities by which innovations come about (innovation activities). The broader definition of innovation listed in third place is particularly relevant as it also comprises innovations for units in the government or other sector in which the business sector may play a role for which it might receive some form of support from government.

The framework provides taxonomies for several key inter-connected dimensions for characterising and measuring support attempting to address the following questions:

1. What innovation activities or outputs are supported?
2. What are the policy objectives of support for business innovation?
3. Who in government provides the support and by whom is it delivered?
4. Who is eligible to receive support and who is the ultimate beneficiary?
5. On what contractual basis is support provided by government? Does such support entail a transfer or subsidy component?
6. How is support measured? What do monetary figures represent?

These questions also play an important role in defining the boundaries of the measurement exercise which operates mostly at the level of programmes.

- Support must be provided with the explicit or implicit intention of supporting innovation, as previously defined, and revealed by information under taxonomy elements 1 and 2. Innovation need not be the primary motivation.. References to innovation as objective may be explicit or only implicit but this connection should be identifiable from the alignment of programme design and implementation features with the OECD definition of innovation.
- Support for innovation can be focused on specific underpinning activities, such as R&D, its outputs, or the companies that engage intensively in innovation. This calls for a search of relevant programmes beyond the strict policy ownership of science and innovation ministries given the horizontal nature of innovation policy and potential support mechanisms.
- In line with the basic Oslo Manual requirement for an innovation that it must be significantly different from the firm's previous products or business processes, there is no presumption that all business innovation support has to be geared towards encouraging the development of brand new technology.
- Support must be provided by domestic government institutions [revealed by taxonomy element 3] from their own internal budgetary resources– directly or through an intermediary institution (e.g. national funding agency, development bank) –, although there may be funds provided by third parties including supranational governmental authorities like the EU.
- Businesses have to be among the ultimate beneficiaries of support insofar as innovation activity is concerned [informed by evidence on taxonomy element 4], even if the outcomes of innovation may be of direct benefit to the users of the innovations, e.g. government and public at large in the case of procurement of innovative solutions.
- There is no presumption that support is in the form of transfers or concessional forms of financing. Beneficiaries may be required to provide something in return to government or to a third party [informed by taxonomy element 5]. Support may be provided in-kind in the form of goods and services and can be provided via intermediaries.
- Support needs to be monetarily quantifiable on the basis of the economic value of resources devoted by government [informed by evidence on taxonomy element 6].

1.2. Unit of analysis – the innovation support programme

The intended unit of analysis is the **government “programme”**, which can be defined¹ as an organised set of financial, organisational and human resources mobilised to achieve an objective or set of objectives in a given lapse of time. Programmes deliver outcomes through changes in services effected by government. In contrast, a **Project** is a temporary organisation designed to produce a specific predefined output at a specified time using predetermined resources. Programmes and projects may be structured as strategic portfolios to deliver a strategic objective or objectives that contribute to policy delivery.

The analysis of innovation support programmes thus loosely defined provides a basis for understanding and interpreting a key dimension of government policy in this area. The **focus on government funded programmes or functional equivalents as observational units for measuring government support for innovation** stems from the necessary compromise between the availability of budgetary and expenditure information, which is not necessarily readily accessible at the level of individual projects² or activities, and the potential availability of **information about the intended effects and beneficiaries** through the prism of business innovation promotion, which can be difficult to elucidate at higher levels of aggregation, e.g. in terms of ministerial, agency or departmental budgets.

Because of the focus on government policy making and its **directionality**, the framework is oriented towards drawing upon budgetary and related administrative data, rather than self-reports from R&D or other innovation-active enterprises who are support recipients, which are the subject of separate NESTI efforts and guidance³. This funder perspective may thus be considered as the basis for a tool supporting a potential extension of the Government R&D budget statistics (OECD, 2015^[3]) from the perspective of business innovation (OECD/Eurostat, 2018^[2]), while it also pursues the collection and dissemination of information in a more granular detail than currently offered by such statistics.

The implementation of data collection, reporting and analysis at the level of government programmes or equivalent observation units is closely related to the perspective of the OECD STIP Compass (EC-OECD, 2020^[4]), which is equipped with a broad-based taxonomy for reporting on all government STI policy initiatives, the instruments underpinning them, and their indicative budget allocations. The STIP Compass is however at present not designed to provide an additive characterisation of government support for STI and does not yet offer guidance on quantification aspects, as its focus is on the qualitative characterisation of policies with a minimum level of generality across the entire STI policy domain.

The OECD work on measuring R&D tax incentives⁴ that has been led by NESTI provides an initial indication of the specificities of government support instruments from the perspective of building relevant taxonomies as well as capturing on a regular basis internationally comparable indicators of government support. In-depth experiences in measuring specific innovation support instruments also guide the definition of a broader taxonomy for mapping business innovation support.

1.3. Intended application and review of the framework

The measurement framework in this document is a central element of the **OECD roadmap for effective monitoring and measurement of public support for business innovation support**, helping provide ground concepts and taxonomies to reflect highly idiosyncratic practices across OECD countries and partners. It was initially developed as the basis for a pilot measurement exercise. This exercise, conducted for five OECD countries (OECD, 2023^[5]), was an activity also foreseen under the OECD MABIS project that adopted a simplified reporting framework compared to the more comprehensive taxonomy in this document. The experience of such pilots has informed the revision of the first version of the draft into the current one, which is intended for public dissemination with a view to collect additional external feedback, identify measurement priorities within the framework, and motivate follow-on measurement work.

The pilots have shown that countries' data infrastructures on public support present unique strengths and limitations when it comes to facilitating a reasonably exhaustive mapping of innovation support along key dimensions. The pilots have demonstrated that the measurement of innovation support and its directionality is very much driven by data availability and the administrative procedures that shape the existence and features of these data. Experience shows that there is a de-facto reporting and monitoring bias against innovation support with features such as:

1. having a non-R&D innovation and diffusion focus,

2. being provided and operated by ministries and agencies outside the core set of ministries of science, research and innovation, and
3. pursuing innovation demand objectives such as through procurement actions.

As whole-of-government approaches towards innovation policy become more common, it is important to have in place coordination mechanisms to monitor support for innovation, particularly when it comes to challenge-oriented policies. Programmes with a major diffusion component, supporting new-to-firm only innovations, need to be explicitly acknowledged as being innovation support since such programmes may otherwise not be accounted for.

The experience of the 2022-23 innovation support measurement pilots also underscores the importance of international collaboration in the application and fine-tuning of this framework. The different components of the framework have required some practical simplification and country-specific adaptations to be implementable with the data resources currently available for each country. The mapping pilots for each country triangulated multiple sources of information to classify government business innovation support programmes according to the measurement taxonomies proposed in the mapping framework and quantified the level of support. While the quantification of business innovation support relied largely on administrative data (e.g. budgetary documents) and information from institutional sources (e.g. annual reports of funding agencies), expert feedback was crucial for the classification and tagging of heterogeneous programmes, highlighting that tacit, non-codified knowledge is key in the initial stages of capturing and describing the landscape of government support for business R&D and innovation.

1.4. Background and related OECD work

The proposed framework is informed by the experience of previous OECD conceptual, measurement and policy reporting frameworks and mechanisms, including in the area of industrial policy (OECD, 1995). The importance of government support for business innovation within industrial policy led to more specific work on measuring support to “industrial technology” (OECD, 2001^[6]). These OECD initiatives virtually came to a standstill in the mid 2000s as coherent reporting by countries failed to achieve critical mass and the work was ultimately deprioritised. Cross-country monitoring of support to industry came to be almost entirely driven by treaty and regulatory compliance mechanisms, for example in the context of the World Trade Organisation agreements and the EU’s State Aid regulations for the European single market.

Within the area of innovation policy, work continued within the OECD Working Party of National Experts to measure government support for R&D using established reporting mechanisms reliant principally on national surveys of R&D performers and comparative analysis of government R&D budgets. This strand of work was extended in the late 2000s/early 2010s with dedicated efforts to qualitatively characterise and quantify support for business R&D through tax incentives (Appelt et al., 2016^[7]) and ad hoc projects on measuring the link between procurement and innovation (Appelt and Galindo-Rueda, 2016^[8]).

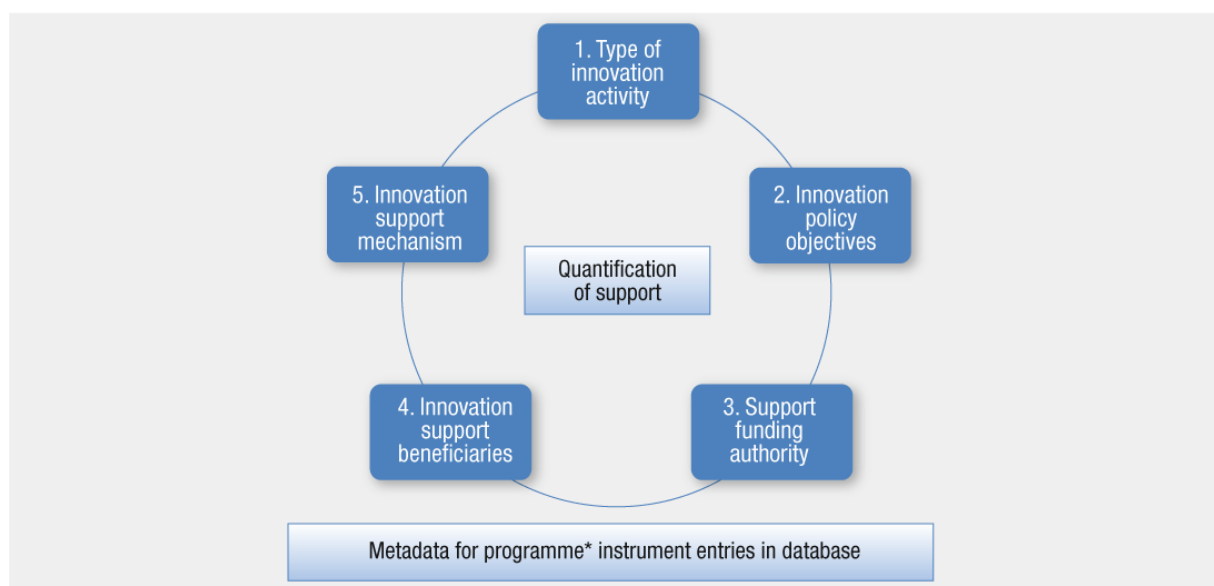
More recently, renewed interest in industrial policy has triggered work within the OECD Committee for Industry Innovation and Entrepreneurship, which concurrently to MABIS launched a project on measuring industrial policy support, resulting thus far in the publication of an approach for quantifying industrial strategies (QUIS) (Criscuolo, Lalanne and Díaz, 2022^[9]) and its initial application to nine countries (Criscuolo et al., 2023^[10]).⁵ The OECD Trade Committee has recently started exploring how to document subsidies to selected manufacturing industries (OECD, 2023^[11]) building on previous work on agriculture, fisheries and fossil fuels. Within the OECD Directorate for Science, Technology and Innovation, there is also long-standing work on documenting subsidies to the steel producing and shipbuilding industries⁶, under their respective official bodies. These multiple initiatives are highly reinforcing since they provide additional means for verifying and contrasting multiple data sources.

2 Measurement taxonomy for innovation support

2.1. Overall structure

Having described scope and the intended units of observation in the previous section, the proposed taxonomy to underpin measurement and quantification is based on the core questions laid out in the introduction and summarised in Figure 2.1.

Figure 2.1. Overview of the innovation support measurement taxonomy



Source: OECD

The dimensions reflect multiple facets of support directionality, indicating concrete choices made by governments when assigning resources in support of innovation:

- Distinguishing between activities eligible for support and those excluded, as well as indicating which activities benefit from preferential terms of support.
- Indicating what are the policy objectives of support for business innovation, distinguishing between specific government objectives and generic objectives to enhance innovation in general.

- By revealing which government authorities are responsible for funding and providing the support, valuable information is conveyed about directionality.
- Discriminating between actors eligible to benefit from innovation support, in a direct or indirect fashion, as well as indicating which types of beneficiaries can claim preferential levels of support.
- By deciding on which mechanisms for support, specifying what government provides and what firms, if anything, need to provide in return. The choice of a support mechanism itself shapes the capacity of governments and its authorities to direct support to activities and beneficiaries, as well as align it to objectives.

2.2. Type of innovation activity

The purpose of this dimension is to identify what type, if any, of innovation activity is the target of support and therefore is **eligible** under the terms of the programme as the basis on which support is provided at all and how much resource is made available. Support may be proportional to the monetary value of the eligible activity, with potential minimum or upper thresholds, or to specified units of good or services. This dimension is key to defining the scope of innovation support and checking whether a programme should be included in the reporting framework, in full or in part.

Eligibility versus preferential treatment

In addition to indicating the discrete choice of whether an activity is eligible for support or not under a programme, it is equally relevant to **capture whether the terms under which support is provided by that programme differ across different types of activities**. For example, R&D activity may be eligible for greater levels of subsidy than a more downstream innovation activity.

Activity versus output oriented support

The innovation literature commonly distinguishes between different stages of an innovation process, beginning with inputs (resources for an activity), activities, outputs (what is directly generated by activities), and outcomes (the effects of outputs) (OECD/Eurostat, 2018^[21]). For simplicity, the framework groups these into two broad categories:

- **Innovation inputs:** Innovation support programmes frequently focus on the underlying nature of the inputs used for and resource-consuming activities of the innovation process, in line with the definitions of innovation and innovation activity presented at the outset of this document. The usual focus of attention is on the value of expenditures incurred by companies as part of the innovation activity but can also focus on difference units such as staff headcount. Innovation activity is often characterised contrasting instruments based on expenditure-based activities. The eligible activities are focused on inputs of the innovation process.
 - Innovation activities along “linear” stage-based characterisations of the innovation process. These are alluded to in the Frascati Manual for the purposes of defining the boundaries between R&D and other scientific, technological and innovation activities, and include:
 - Research, which comprises basic and applied research.
 - Experimental development (part of R&D).
 - Technical demonstration beyond experimental development of technological solutions, often involving the operation of a prototype in operational use environment. This is an extension to R&D to comprise the broader category commonly described as RD&D.
 - Initial deployment at scale of technological solutions.

- Follow-on widespread adoption of existing technologies, resulting in broader diffusion. The innovation requirement still applies from the perspective of novelty to the party implementing a new product or process. Support programmes may apply restrictions in terms of the degree of novelty, e.g. in relation to a geographic area, an industry, market or the world.
- Innovation activities can be at times explicitly characterised by domain-specific categories denoting some form of readiness or maturity in relation to specific milestones, with their own classifications. Examples include the Technology Readiness levels, different Phases for Clinical trials and Commercial Readiness Levels.
- R&D versus other innovation activities in the terminology of the Oslo Manual, oriented towards the collection of data from businesses using statistical surveys.
 - Research and experimental development (R&D).
 - Innovation activities that may not qualify as part of R&D (i.e. if not part of R&D project). Under this group the Oslo Manual identifies Scientific data measurement/recording/cataloguing, Testing, Engineering, design and other creative work activities, Marketing and brand equity activities, IP activities, Employee training activities, Software development and database activities, Activities related to the acquisition or lease of tangible assets, Innovation management and advice.
- Innovation activities can be characterised on the basis of the inputs whose costs may be financially supported: Employment costs; intermediate goods and services, capital investment.
- **Innovation outputs:** Business innovation support programmes may target outputs of the innovation process. Examples include:
 - **Incomes attributable to intellectual property**, such as identifiable IP commercialisation revenue, or revenue or profits directly or indirectly attributable to IP assets, such as the part of revenues from goods and services of the company that authorities accept as ultimately attributable to the IP it holds. For instance, IP regimes allow income from the exploitation of IP to be taxed at a lower rate than the standard statutory tax rate.
 - Unit output-based incentives related for example to the **number of patents or IPR titles** the company develops or holds at a given time, or the **number of innovation output units** produced or delivered by the company, as in the case of public procurement of innovative solutions for payment is contingent on the number of delivered outputs.
 - Innovation support may be also **linked to other qualitative or quantitative properties of innovation outputs**, such as Greenhouse or particulate emissions reductions compared to some benchmark.
 - Some schemes may effectively support the **entire revenue or profit stream of a company deemed to be eligible** (i.e. qualified by innovation performance characteristics of the beneficiary)
 - The support instrument may explicitly connect the support to the pursuit or accomplishment of a **given type of innovation**, following the Oslo Manual terminology that distinguishes between **product and process innovations**. Processes include policies that provide an overall strategy that drives a unit's activities, activities that transform inputs into outputs, and procedures that govern the detailed steps for activities to transform inputs into outputs.
 - Support may also be oriented towards the **consumption / acquisition of innovation outputs**, as explained below under the dimension of Beneficiaries.
- The **boundary between innovation input and output-focused programmes** may be at times fuzzy and difficult to establish.

- The linking of support to innovation inputs or outputs is associated to the allocation of risk and uncertainty on the part of the actors incurring the necessary investments to realise the former.
- Innovation output-oriented programmes may include substance activity (input) requirements, for example in the case of special IP tax regimes, to minimise risks of Base Erosion and Profit Shifting (BEPS) as indicated under OECD BEPS Action 5 minimum standard against regimes that have the potential to unfairly impact the tax base of other jurisdictions. Action 5 requires substantial activity for any preferential regime. The “nexus approach” is the substantial activity requirement developed for IP regimes. It requires a link between the income benefiting from the IP regime and the extent to which the taxpayer has undertaken the underlying R&D that generated the IP asset.

Behavioural requirements of innovation activities

Support eligibility may be defined in connection with specific behavioural requirements in the conduct and transformational features of innovation activities and outputs. Commonly found requirements that are not mutually exclusive include the following:

- Collaboration or knowledge exchange between parties
 - Collaboration
 - Outsourcing
 - Knowledge transfer
 - Joint ventures and other forms of co-innovation
- Digitalisation (relating to features of products and processes). Under this highly recurrent dimension, there may be more specific dimensions such as the adoption of AI systems within companies, internet of things or blockchain to cite only a few.
- Entrepreneurship and business growth, such as start-up, consolidation and scale-ups.
- Internationalisation / inward investment
- Green transformation, relating to the transformation of features of products and processes.
- Knowledge dissemination (knowledge outputs being made accessible on open access basis or related, e.g. FRAND terms for licences)
- Several other behavioural requirements and qualifiers of innovation activity may also apply.

These behavioural requirements will be closely interlinked to the definition of innovation policy objectives, as indicated in the following section.

Functional domains of innovation activity or output

Examples of potential classifications to be applied include:

- Fields of R&D (FORD) for R&D domains
- International Patent Classification (IPC) for technology domains
- ISIC code or related Central Product Code (CPC) for economic activity supported. This is particularly relevant for government procurement initiatives for innovative solutions, e.g. functional procurement. This item needs not match the main economic activity of the beneficiary, which is described under the taxonomy dimension for eligible beneficiaries (D).

Geographic location of innovation activity

- Geographic restrictions may apply to the location of eligible activities, favouring specific regions for multiple policy reasons.

Organisational level of supported activity

Innovation support may focus on the beneficiary institution's (see dimension 4) overarching activities or focus on specific projects, requiring a distinction between what is commonly described as project and institutional foci of support. This sub-dimension helps understand the level at which the support instrument operates and the degree of discretion that the beneficiary can exercise in complying with the rules of support, especially for organisations that may specialise in conducting innovation activities. The proposed tagging items for this subdimension characterise the level at which innovation activity is supported.

- General activity of the eligible beneficiary. This may include institutional funding support for technology organisation supporting business innovation, or general start-up investment support with no specific project requirements to be eligible, although it is possible that there are features of the beneficiary that proxy for the intended activity, as it may apply for example in the case of equity investment in so-called deep-tech business ventures in selected areas of technology.
- Project-based activity, with set objectives to be accomplished within a defined period. Only clearly demarcated project-based activity is considered eligible for support.
- Government programmes including multiple elements, to be applied only in case of lack of sufficient underlying detail to separate between those different component parts.

In some instances, the information will be too aggregated to separate between these components, and initiatives may be classified as operating at a programme level when there is a complex mix of elements.

2.3. Innovation policy objectives

The scope of this framework and its application concerns government “programmes” and their instruments as defined by the **intention to promote innovation**, as previously defined. This overarching objective is however instrumental, serving as means towards potentially broader or more specific policy goals. Widespread interest in mission-oriented innovation policy (MOIP) is additional motivation for this measurement perspective. The key purpose of this dimension is to **elicit what underlying policy objectives underpin the funding corresponding to the unit of analysis, supporting the analysis of directionality of support**. This needs to acknowledge that there may not be any specific direction intended other than the aim to enhance innovation capability within the business sector.

The categorisation of policy objectives is driven by the **functional intention of government** as defined in the design, budgeting and implementation of its programmes and supporting instruments. It should therefore be connected to the objectives of government activity. The objective perspective is closely related to and can be difficult to disentangle from the element of the taxonomy that describes the **nature of the STI activities that are eligible for support, since there should be a minimum degree of coherence between one and the other**.

Government objectives as laid out in the design of instruments may not fully match the ex-post relevance of the sponsored activities to objectives. Policy objectives are defined by intent at the level in which the policy is designed, and its measured budgetary expenditure approved. Public statements of purpose as defined in budgetary approval procedures should provide the basis upon which to make the allocation.

A support programme may be of a generic nature in terms of its objectives but the majority of its funding may ultimately contribute to a specific purpose depending on choices made by those delegated with

allocation responsibilities as well as the underlying demand for support. This explains for instance why IEA measures of R&D budgets *related to energy or for the energy sector* may not match OECD measures of R&D budgets *with energy as the primary explicit policy objective*. While different government departments will own specific objectives, the allocation to objectives should be robust to purely organisational changes within the machinery of government.

Another practical aspect, also found for many other classifications presented in this document, concerns **the assignment of a particular objective on a mutually exclusive basis versus the potential multiple assignment to all potentially relevant and stated objectives**. Several innovation support programmes may pursue multiple objectives hence the choice of a primary objective is never entirely straightforward and may contribute to hiding potential confluence of objectives. The challenge of multiple tagging is the management of additive information on funding, with some apportionment ultimately required. It is recommended to collect as much information as possible on primary and secondary objectives whilst allowing different coherent representations. For programmes funded by multiple ministries each representing a different primary objective, the preferred scenario is to apportion the programme to primary objectives on the basis of the presumed objectives of each of the underlying contributions.

There is at present no specific classification of objectives of innovation support programmes. Therefore, it is initially necessary on a practical basis to draw upon other classifications that are sufficiently conceptually close. The widely used NABS classification of socioeconomic objectives and the classification of Functions of Government (COFOG) provide reasonably well understood reference frameworks that can be applied on an interim basis whilst consensus does not emerge on alternatives.

Socio-economic objectives

The *Nomenclature for the analysis and comparison of scientific programmes and budgets* (NABS) is a functional classification used for the analysis of public financing of R&D on the basis of the **socio-economic objectives** pursued by governments or stated by them in drafting their budgets and programmes (Eurostat, 2008^[12]). It is recommended in the OECD Frascati Manual (OECD, 2015^[3]) for presenting breakdowns of government R&D budgets and also intramural R&D expenditure but can be considered and applied to a broader range of innovation support activities. This classification is meant to be used from the perspective of a funder – not the beneficiary – and its instrument design. The instrument needs to be restricted in its orientation or direction so that they can be assigned to any particular objective. The items included in the latest available NABS classification are as follows:

1. Exploration and exploitation of the Earth
2. Environment
3. Exploration and exploitation of space
4. Transport, telecommunication and other infrastructures
5. Energy
6. Industrial production and technology
7. Health
8. Agriculture
9. Education
10. Culture, recreation, religion and mass media
11. Political and social systems, structures and processes
12. General advancement of knowledge: R&D financed from general university funds (GUF)
13. General advancement of knowledge: R&D financed from sources other than GUF
14. Defence

A key challenge with using this classification is the assignment of non-discretionary support for business R&D that is not ex-ante selective of any specific socioeconomic objective. For innovation support that pursues general knowledge generating purposes, this can be resolved through allocation to SEO13 – general advancement of knowledge, sources other than GUF. However, this practical allocation option is less meaningful for support that is mostly oriented towards experimental development of new solutions (under R&D) or support towards their adoption beyond R&D, as in the case of much of business innovation support. General advancement of knowledge does not emerge as an appropriate description of intention despite potential knowledge generating effects. The classification does not speak about business competitiveness as a socioeconomic objective for R&D.

The category of “Industrial production and technology” (SEO6) is a potential proxy for allocating non-directed business innovation support. However, that choice also entails some assumptions and reveals some of the conceptual limitations of the SEO classification because of the ambiguity of the term “industrial”, which can and is often be confused with manufacturing and its opposition to business interests in the other thematic SEOs.

The problem is compounded by the growing size of non-directed R&D tax incentives. The implementation of the measurement pilots has raised a question on how most R&D tax incentives should be classified, with the option to classify them as belonging to SEO 13; SEO 6 or leave not allocated. Apportioning undirected business supporting based on an ex-post breakdown of the tax subsidy by the economic activity of the beneficiary would potentially misguide the interpretation of the category “Objective” and the measurement of ex-ante directionality. A clearer convention is needed since all government support for R&D (and innovation) should be ultimately characterised by at least one objective.

These considerations and several others such as the way in which they objectives are formulated, their relationship with economic activities, and several others, are factors driving calls for a potential re-examination of this classification in relation to government funding for R&D but also in view of its potential application for characterising broader government expenditure in support of science, technology and innovation.

Classification of the functions of government (COFOG)

The Classification of Functions of Government (COFOG) is a detailed classification of the functions, or socioeconomic objectives, that general government units aim to achieve through various kinds of expenditure (United Nations, 2000^[13]). This is the generic UN/OECD standard for classifying the activities of government, and the basis on which public expenditure is often presented. Incidentally, R&D items are explicitly identified in a second-tier classification under the different top-level objectives. Similar ambiguities apply as in the case of NABS, with the possible allocation of non-directed business innovation support to the category of “Economic affairs”. The following are the top-level categories under COFOG with their subcomponents.

- General public services: Executive and legislative organs, financial and fiscal affairs, external affairs; foreign economic aid; general services; basic research; R&D related to general public services; general public services n.e.c.; public debt transactions, transfers of a general character between different levels of government.
- Defence: Military defence; civil defence; foreign military aid, R&D related to defence; defence n.e.c.
- Public order and safety: Police services; fire-protection services; law courts; prisons; R&D related to public order and safety; public order and safety n.e.c.
- Economic affairs: General economic, commercial and labour affairs; agriculture, forestry; fishing and hunting; fuel and energy; mining, manufacturing and construction; transport; communication; other industries, R&D related to economic affairs; economic affairs n.e.c.

- Environmental protection: Waste management; water waste management; pollution abatement; protection of biodiversity and landscape; R&D related to environmental protection.
- Housing and community amenities: Housing development; community development; water supply; street lighting; R&D related to housing and community amenities; housing and community amenities n.e.c.
- Health: Medical products, appliances and equipment; outpatient services; hospital services; public health services; R&D related to health; health n.e.c.
- Recreation, culture and religion: Recreational and sporting services; cultural services; broadcasting and publishing services; religious and other community services, R&D related to recreation, culture and religion; recreation; culture and religion n.e.c.
- Education: Pre-primary, primary, secondary and tertiary education, post-secondary non-tertiary education, education non definable by level, subsidiary services to education, R&D; n.e.c.
- Social protection: Sickness and disability; old age; survivors; family and children; unemployment; housing; R&D; social protection and social exclusion n.e.c.

Other categories

The list of all potential objectives laid out in innovation support programmes is too broad to attempt to capture in this document. Interest in these categories is often expressed in the framework of attempts to implement a non-exclusive characterisation of objectives with a whole of government perspective. Quite often this includes extended formulations based on categories covered by NABS but lacking in some precision or adding any relatedness, e.g. as secondary objectives.

Examples based on several “single-focus” or mission-oriented measurement initiatives include:

- Promotion of green transformation, with commonly referred topics on carbon neutrality, circular economy, biodiversity, to cite a few.
- Promotion of innovation and technologies related to the production, storage, transportation, distribution and rational use of all forms of energy, the definition of energy relatedness used by the IEA for its measurement of RD&D.
- Promotion of health-related innovation.
- Promotion of digitalisation.
- Promotion of access to finance and entrepreneurship.
- Official Development Assistance (ODA) (to developing countries).
- Regional development and cohesion.
- Security, encompassing the defence objective and other forms of domestic security.

Many of these potential objectives of innovation support programmes have a close connection with the behavioural innovation requirements subdimension under the “Innovation activity” dimension under this framework.

Furthermore, the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 (United Nations, 2015^[14]), comprises 17 Sustainable Development Goals (SDGs) representing an urgent call for action by all countries. Innovations support programmes may be targeted to or at least mapped onto one or more of the 17 SDGs.

Measurement with programme or instrument-level units of analysis will rarely be suitable for highly granular objectives, for example in relation to support for innovation on specific diseases or different facets of digitalisation. Their measurement best attempted at the level of sponsored projects and activities.

2.4. Government innovation support funding authorities

This dimension responds to the question on who in government provides the support and by whom is it delivered? It seeks to characterise the government ultimate funder's key features as well as those authorities on which it relies. The identity of these funding actors is potentially revealing of objectives and directionality from the stated missions of those organisations.

Government units are unique kinds of legal entities established by political processes that have legislative, judicial or executive authority over other institutional units within a given area.

As for many other dimensions, there may be more than one funder involved within any given instrument, as it would be the case when different authorities join forces to fund a programme.

Budgetary funding authority

This category refers to the level of government from which governmental budgetary funding authority originates. In many countries, monitoring may only be feasible at the level of central government given potential dispersion of information at subnational level.

The general government sector consists of all units of central, state or local government and all non-market NPIs that are controlled by government units. The sector does not include public corporations, even when all the equity of such corporations is owned by government units. Two main levels of reporting at the domestic level can be conceived.

- Central government Ministry, department, etc., designations used by first-level executive bodies in the machinery of governments that manage a specific sector of public administration. Central government support for innovation tends to be relatively more specialised on support for R&D activities.
- State and local government. Collecting data on government programmes and their instruments at subcentral levels of government can be more challenging especially for international studies. It is not expected for this level of government to be systematically captured in innovation support mapping efforts. However, the omission of the subnational level of government will likely entail an additional bias against capturing innovation support mechanisms focusing on downstream innovation activities.
 - State or equivalent regional level. State governments, when they exist, are distinguished by the fact that their fiscal authority extends over the largest geographical areas into which the country as a whole may be divided for political or administrative purposes (EC et al, 2019). It is recommended that efforts are made to capture state level support for innovation, particularly in federal countries.
 - Local government. Local government units are institutional units whose fiscal, legislative and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes. The scope of their authority is generally much less than that of central government or state governments and tends to be more dependent on transfers from higher levels of government.
- Supranational organisations. Some countries may be part of an institutional agreement that involves monetary transfers from the member countries to the associated supranational authority and vice versa. The supranational authority also engages in non-market production. The international statistical standards treat supranational authorities as non-resident institutional units that are part of the rest of the world and may be classified in a specific subsector of the rest of the world. Because the supranational authority is fulfilling the functions of a level of government but

distinct from the domestic government, it is recommended to itemise separately what innovation support is provided, especially if the level of support provided is considerable.

Intermediary authority passing through/allocating funds to beneficiaries

The previous category does not necessarily reflect which is the authority actually in charge of implementing innovation support. It is recommended to characterise the government bodies involved in the delivery or allocation of support.

- Central government
 - Central government ministry
 - Central government agency or other non-departmental public body
 - Non-profit organisations controlled by central government
- Subnational government
 - Subnational government department or agency
 - Non-profit organisations controlled by subnational government
- Other (may be expanded in more detail), including financial corporations in the public sector.

This dimension could be further enriched with additional information on the provenance of funds available to the budgetary funding authority. This is particularly relevant for keeping track of non-budgetary funding sources, such as private subscriptions, royalties, etc.

Supranational organisations can also be active implementers of innovation support drawing on funds ultimately provided by their member countries. However, only when those funds are earmarked by the individual members for the intended innovation support within the territory of the country, can the budgetary funding authority would be attributed to the individual country and its government.

2.5. Beneficiaries of innovation support

Direct and indirect beneficiaries

Businesses can be direct or indirect beneficiaries of government support for innovation through multiple channels, according to the support mechanisms to be described under dimension number 5 immediately after this one. For this reason, it is necessary to enable a broader characterisation of innovation support beneficiaries beyond businesses, since other actors can play a role in the propagation of innovation support. Information on which actors are eligible to become direct or indirect beneficiaries of support is particularly important for understanding the **direction and selectiveness of innovation support**. This can also help with effectively mapping flows of funds, which may straddle multiple institutional sectors.

Table 2.1. Characterising beneficiaries of innovation support programmes

Direct beneficiary	Indirect beneficiary	Examples
Businesses	None explicit	Grant for business R&D – there may be indirect benefits through spillovers but not explicit
Businesses	Businesses	Vouchers to obtain inputs for innovation activity from other firms
Businesses	Other actors	Government procurement of R&D innovative solutions Tax credit for subcontracting R&D to universities
Other actors	Businesses	Consumption subsidy to households to buy products using new technologies

	Funding for a research institute to conduct R&D or provide access to testing infrastructures for business
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Eligibility versus preferential treatment

In addition to this, while several innovation support programmes may be open to a wide range of businesses, the terms and conditions that apply to them may vary. It is therefore necessary to distinguish between eligibility and availability of more favourable terms by type of beneficiary.

Table 2.2. Characterising beneficiaries of innovation support programmes

	Eligible for innovation support under programme (A)	Favourable conditions may apply to a subgroup of A (B)
Direct beneficiary	Types eligible	Type within A
Indirect beneficiary	Types eligible	Type within A

Taxonomy of types of beneficiaries

For these characteristics, the classifications of the System of National Accounts (EC, IMF, OECD, UN and the World Bank, 2009^[15]) and the OECD Frascati Manual provide a wide range of attributes that are sufficient for a consistent characterisation of programmes according to who is eligible to benefit directly or indirectly, as well as indicating specific subgroups benefiting from more favourable terms within a programme.

- By Frascati institutional sector and subcomponents
 - Businesses (typologies underneath)
 - Size (e.g., based on employment, turnover, balance sheet total)
 - Age since establishment
 - Industry/main economic activity (ISIC)
 - Public/ private including non-profit organisations serving businesses
 - R&D performing status
 - There may be additional features relating to foreign control relationships
 - Government institutions
 - Higher education institutions
 - Public/private
 - Other non-profit organisations
 - Households – Individuals (typologies underneath)
 - Perspective: Consumers / workforce / self-employed / entrepreneurs / investors.
 - Specific groups PHD students or researchers
 - Age
 - Seniority/experience
 - Other households
- Location of beneficiaries' economic activities. All the categories above may be domestic or in the rest of the world. It is important to characterise these. Geographic restrictions may apply in terms of eligibility or support conditions.

2.6. Innovation support mechanism

This broad component of the framework attempts to characterise the transactional basis through the innovation support is provided to firms, identifying what government provides to firms as well as whether what companies must to provide anything (and if so what) in return for the support provided. These elements ultimately typify the instrument(s) of support of a government innovation support programme, addressing questions such as “On what contractual basis is support provided?” or “Does support entail a transfer / subsidy component?”.

Transfer or concessional nature of innovation support mechanism

This is qualifying element of great importance for understanding the nature of innovation support provided and quantifying it in a comparable fashion: All these instruments can be variably tagged as representing:

- **Transfers:** A transfer from government is a transaction in which one government institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return as a direct counterpart. Transfers are separated in the System of National Accounts into current transfers and capital transfers. Transfers may be described as representing concessional or unrequited transfers of resources. While several conditions may apply for the transfer to take place, including clawback clauses, the party providing a transfer cannot expect to receive anything directly in return for itself.
 - **Grants.** In the case of capital grants, these are transfers made by governments to other units to finance all or part of the costs of their acquiring fixed assets, including R&D and several other intangibles. Current grants in contrast may cover the costs of other activities. These may sometimes be described as awards.
 - **Subsidies.** While often referred to as synonyms of all transfers⁷, subsidies are more precisely defined in the System of National Accounts as current unrequited payments that government units, including non-resident government units, make to enterprises on the basis of the levels of their production activities or the quantities or values of the goods or services that they produce, sell or import.
- **Exchanges**, namely transactions defined in opposition to transfers, where resources are provided by government units in return for some product or asset. Programmes that fall under this category may be characterised by the nature of **what government contractually stands to receive in return for the support**.
 - **Financial assets.** If government provides a firm with a repayable loan, government acquires a financial asset representing the flow of future payments. Firms may provide governments with cash in return for in-kind services supporting their innovation activity, such as use of testing facilities. Different financial assets can be combined within a given instrument in the form of hybrid financing.
 - **Goods or services.** These may be concurrently provided or represent economic rights on assets, such as intangibles. In the case of **public procurement**, a business undertakes to provide rights on the knowledge generated in the case of R&D procurement, or a fully functioning system with some defined specifications in the case of procurement of innovative solutions.
- **Combination of transfer and exchange.** Any given transaction may comprise a combination of both elements, for example in the case of finance (e.g. repayable loans, repayable advances) or support in-kind provided by government at rates or conditions below those considered to be “market” rates. The transfer component is often referred to in common language as the “subsidy” part of the transaction. Risk and uncertainty are integral elements of support mechanisms since

governments may assume contingent liabilities and accept assets whose value, while in some cases may increase, might also easily dissipate. For example, the ultimate goal of a procurement action may fail to result in the expected solution because of technical risk. Pricing risk and uncertainty is extremely complex in the area of innovation and, as result, the borderline between transfer and exchanges not easy to determine.

This taxonomy is not oriented towards compliance monitoring purposes, and therefore recognises that a degree of ambiguity will often exist when it comes to separating between transfer and exchange-based programmes or components thereof. The list of potential transfers (OECD, 2023), especially indirect, is a rather long one and beyond the means of statistical data compilers to elucidate.

Nature of government support for innovation

This category describes **what government support consists of**, or in other words, what economic resources are made directly or indirectly available to companies, irrespective of whether and what companies must provide something in return for it. The following categories are foreseen:

- **Financial support.** The support is in this case effected through the provision by government of financial assets, from cash to any other form of financial assets, which help business finance their innovation activity. Different forms of financial support can be characterised by the relevant class of financial assets.
 - **Financial support may be provided directly** by government to the business beneficiary.
 - **Financial support may also be provided indirectly, i.e. via a third party**, to the business beneficiary. Government authorities may provide financial support to any potential third-party engaged in financial transactions with the business, such as a potential user of business innovations or the provider of financing to the company that may receive equity or debt investments from government to undertake such role.
- **Relief from tax or other compulsory payments** from business to government, such as social contributions, levies, or fines and punitive fees, is a significant class of transfer-based business innovation support, that involve a reduction in business liabilities towards governments. In these cases, government foregoes current or future tax revenue from companies and may, within the tax system, also provide net transfers to companies as lump sum payments in the case of insufficient tax liability to realise the full extent of eligible relief (more fitting the previous item). As characterised in OECD work on R&D and innovation tax incentives, tax relief may be characterised along several dimensions, including the type of tax vehicle used for implementation of support and the calculation mechanisms (allowances, credits, deferrals, etc...).⁸
- **Goods, services or other non-financial assets provided in-kind.** The support facilitates the provision of goods and services, including usage of knowledge-based non-financial assets, that contribute to the innovation activity of businesses. Under this category, the government may, for instance, provide financial support to third parties to provide services to firms or approve the internal use of government resources to provide in-kind support (e.g. paying for the government researchers salaries and the facilities made available to business users).
 - Initiatives that place obligations on third parties to provide support to businesses for innovation without accompanying resources are considered strictly regulatory measures and therefore outside the scope of the study and its budgetary focus.
 - For an R&D institute entirely devoted to providing innovation support to companies, the overall government budget allocation for the organisation may be considered as support for innovation. For organisations with mixed mandates, the overall allocation will need to be adequately apportioned.

- Programmes providing vouchers to companies to receive innovation related services from third parties may fall under this category.
- Table 3 shows how the two previous categories can be combined to represent the most typically considered business support instruments, as also used in the STIP Compass and QuIS frameworks (see box 2.3).

Table 2.3. Examples of innovation support mechanisms

	Transfer	Hybrid	Exchange
Financial support			
Directly provided	Grants		Repayable loans; Equity injections Government purchase of innovative solutions
Indirectly provided via third parties	Vouchers to receive services from other actors		Equity into funds of funds, VC, etc.
Relief from tax or other compulsory payments			
Directly provided	Tax credits Exemption of levies		Exemption of levies for companies that provide services to others/govt in return
Indirectly provided via third parties	Tax credits to providers of innovation services to firms Tax relief for users/buyers of business innovative solutions		
Goods, services or other non-financial assets provided in-kind			
Directly provided	Free of use of government owned IPRs or facilities.		Access to government R&D facilities at a market usage rate Loan guarantee to third party with market fee paid by beneficiary (financial service)
Indirectly provided via third parties	Subsidised access to independent R&D facilities		

Box 2.1. Related instrument taxonomies in the EC-EU STIP Compass and the QuIS initiative

EC-EU STIP Compass

This reporting framework is structured around so-called themes and areas. The one most closely connected with business innovation support is that of “Innovation in firms and innovative entrepreneurship”. It comprises several subtopics including “Financial support to business R&D and innovation”, “Non-financial support to business R&D and innovation”, and other subtopics that relate to aspects relating to objectives, activities and beneficiaries in the SUPRINNO measurement framework, such as access to finance for innovation, stimulating demand for innovation and market creation, digital transformation of firms and targeted support to SMEs or young innovative enterprises

The primary unit of analysis is the “policy initiative”, given its broader policy coverage. Similar descriptors at the level of a policy initiative include:

- Objectives* (multiple free text fields, one per objective)
- Direct beneficiaries* (multiple choice selection)
- Name of responsible organisation(s)* (multiple free text fields, one per organisation)
- Estimated budget expenditure range per year* (discrete range multiple choice selection)
- Type(s) of policy instruments* (multiple choice selection), from a range specific to each subtheme.
 - Financial support allows for the following instruments: Institutional funding for public research; Project grants for public research; Grants for business R&D and innovation; Centres of excellence grants; Procurement programmes for R&D and innovation; Fellowships and postgraduate loans and scholarships; Loans and credits for innovation in firms; Equity financing; Innovation vouchers.
 - Indirect financial support allows for: Corporate tax relief for R&D and innovation; Tax relief for individuals supporting R&D and innovation; Debt guarantees and risk sharing schemes

Policy initiatives may be associated to more than one instrument. Each type of instrument has its own set of possible attributes, including an “activity” related dimension common to SUPRINNO.

Quantifying industrial strategies (QuIS)

QuIS considers 5 types of instruments or mechanisms, namely Tax expenditures; R&D Grants; Other Grants; Loans or loan guarantees and Venture Capital. Demand instruments are considered out of scope and so are other forms of indirect support instruments. The reporting framework captures general features of horizontality and selection procedures, as well as having a list of dedicated, non-exclusive markers for what it describes as eligibility criteria in relation to combined categories of activities and types of firms, namely Digital; Green; Sectoral; SMEs and R&D. Innovation as such is not defined as a category.

Source: EC-OECD (2020^[4]) and Criscuolo, Lalanne and Díaz (2022^[9])

Discretionarity in the allocation of innovation support

Discretionarity on the part of government or government agency providing support is defined, at the level of the programme and instrument (support mechanism), based on whether the responsible authorities with responsibility for the allocation of support can exert discretion in deciding a) which entities among notionally

eligible entities can benefit; b) for which activities beneficiaries can ultimately receive support; c) how much support can be provided. Two possible cases are considered:

- Discretionary selection. A mechanism is characterised as discretionary if the government authority can use its own discretion to interpret “merit” according to the features specified in the support programme’s design, deciding on a potential beneficiary’s opportunity to bid and the provision of support, including whether support, its amount and under what specific conditions.
- Non-discretionary – support decisions are entirely shaped programme design objective criteria to bid and/or qualify are automatically entitled to support based on a pre-defined formula.

This feature is distinct from the extent to which the support provided under the programme is *a priori* defined to be restricted to specific actors or activities, which are features captured elsewhere in this measurement framework. A programme may have zero implementation discretionarity but its eligibility design rules may still make it rather selective.

Initiation and solicitation process

Programmes can also be characterised on the basis of the initiation and solicitation mechanisms in place that shape the initiation of support provision. Programmes can therefore be described as:

- Call-based, whereby the government authority initiates with announcement of opportunity. Non-competitive calls like single tenders should be interpreted as calls adopting discretionary selection mechanisms, using the category described above.
- On-demand / on-request, whereby potential beneficiaries initiate the procedure.
- Other cases may apply.

3 Quantification of support for innovation under selected instruments and additional metadata

3.1. Economic quantification

The quantification of public support is one of the most challenging elements for compiling internationally comparable data. The objective of economic quantification is to provide reliable measures of the economic resources used by the innovation support measures. This is a complex and potentially sensitive task depending on the measurement concept of interest. The estimation of the value of support needs to take reflect what is the preferred and more feasible concept to measure.

Gross measures of support versus grant-equivalent measures

Different measurement options entail advantages and disadvantages.

- Gross measure of support – conveys information about the total resource flow and is typically more easily reported or retrieved, but the variety of instruments and heterogeneity with which they are designed renders the information difficult if not impossible to compare in a meaningful fashion. This magnitude is more suitable for comparison across programmes endowed with more similar instruments.
- Net grant/subsidy-equivalent measure – the measure of the transfer element is one possible approach for normalisation across different instruments, but it is not typically available and its calculation several assumptions to be made. Responsibility for conducting such calculations would be best left to the reporting country but the challenge is how to ensure that they follow similar procedures to indeed ensure comparability.

Table 1 below provides a description of the transfer/concessional components and quantification aspects concerning the gross and net elements of different financial support instruments.

It is essential that any reported figures for any instrument are correctly classified according to the type of quantification method that has been implemented and additional details are provided as necessary. Budgetary and derived documents can be rather obscure in this regard. The same support instrument may feature in different parts of the budget:

- Resource budgets. Incorporating the cost of carrying a financial asset (e.g. a loan)
- Capital budgets. Expenditure on capital for a financial asset.

Table 3.1. Potential quantitative measures of support, by type of instrument

	Subsidy / concessional element	Transactional component	Observations	Quantification – gross measure of support	Quantification – grant equivalent measure of support
Grants	Entire concessional	None	Grants and contributions may incorporate clawback arrangements	Total value of new grants received in a given year	Total value of new grants received in a given year less value of grants reimbursed during a given year
Loans (subsidised rate programmes)	Subsidised interest	Reimbursement and interest paid		Total value of new loans leveraged through subsidy	Interest rate subsidy
Loans (preferential access)	Difference between what firm pays on the government loan and what it would pay on a comparable commercial loan on the market	Effective repayments	Contingent loans that do not attain the criterion or do so in part are equal to debt forgiveness	Total new credit and loans obtained from government	Loan write offs plus interest paid less benchmark
Loan guarantees and insurance programmes	Implied subsidy in rate paid or insurability of risks	Fee/ premium paid to govt in return for assuming risk	The firm may have limited information	Total new guarantees received during a given year	Comparable commercial guarantee fee/premium in market minus effective fee/premium paid
Tax incentives – tax deferral and accelerated depreciation	Entirely concessional	None	Needs comparing with domestic baseline depreciation profile	Same as net	Net present value calculations
Tax incentives – exemptions, enhanced allowances, reliefs and credits	Entirely concessional	None	Needs comparing with effective benchmark	Same as net	Income excluded from tax base * tax rate or Enhanced deductible amount * tax rate or Eligible income * difference in tax rate or Deductible tax liability
Equity investments / infusions	Unlike loans, the firm has no commitment to make any repayment.	Where the firm's shares are publicly traded, one could estimate the market value of the shares given to the government agency in exchange for the infusion.	When a government agency contributes to the equity of a firm, the policy could be considered equivalent to anything ranging from a cash grant to a subsidised loan	Value of equity capital injection	The difference between equity infusion and market value and can then be treated as equivalent to a cash grant. May be adjusted for dividends paid
Payments for goods and services / Procurement	Excess profits accounting for risks and assets held by firm	Cost of providing goods and services, including risk and normal profit margin	Excess profits are hard to calculate. Competitive procedures seek to reduce value as much as possible	Total value of goods and services procured or purchase commitment	Excess profit measure (hard to calculate)

Source: OECD, adapted from OECD (1995_[16]).

Estimation of innovation support content of instruments

The internal heterogeneity of government programmes with innovation support features requires the identification of relevant innovation support content. This involves two main steps:

- Undertaking an initial selection of a longlist of initiatives with a sufficiently acceptable fit into the category of government support for business innovation. This requires active engagement across government to prevent biases:
 - towards programmes under the “ownership” of one or few designated ministries;
 - innovation support initiatives not grouped under an explicitly defined innovation support programme;
 - against programmes focusing on downstream dimensions of the innovation chain, especially those supporting technology adoption and diffusion;
 - against programmes involving multiple stakeholders and not only businesses;
- The actual estimation of the relevant content. In the case of programmes with multiple components and eligible activities beyond the scope of this exercise, the identification of the relevant innovation support content becomes necessary using available sources and potentially reasonable and explainable heuristics. The detail with which the budget is constructed plays a very important role, as it does the consistent use of terminology across government for characterising budget expenditures. Estimation can in some circumstances be aided by more detailed administrative data that can provide a proxy for the measurement concept. This is an area that will certainly require considerable future development and practice via trial and error, particularly with the aim of rendering results comparable.

The criteria and sources used to apportion support content within programmes should be as explicit and clearly document as possible for replicability.

Quantifying support within a given programme across different qualitative dimensions

In some cases it may be possible to obtain estimates of support within a single heterogeneous programme across the different qualitative categories, for example when multiple instruments, objectives, types of beneficiaries or eligible activities are involved.

Nature of budget estimates

It is of absolute importance to record and understand the nature of estimates.

- Budget forecasts: Public expenditure estimates of funding for support before beginning of budget discussion.
- Budget proposals: figures presented to the parliament for the coming year).
- Initial budget appropriations: Public expenditure figures as voted by the legislature for the coming year, including changes introduced in the parliamentary debate). In this context, an appropriation is defined as the act of setting aside money or other resources for a specific purpose, as authorised by the legislature to be spent on a particular programme or line item.
- Final budget appropriations: Public expenditure figures as voted by the parliament for the coming year, including additional votes during the year.
- Obligations/commitments: Money actually committed for expenditure during the year)
- Expenditures, as accrued in the accounts or as effectively paid in cash/money.

Revisions

These different categories may apply to difference reference periods (see category below) for a given instrument, for example for year T+1 estimates available may represent budget forecasts while for T these may be initial budget appropriations and for T-1 these may be obligations or even expenditures.

Comparisons over time may be biased because of systematic differences between forecasts/proposals and any of the other constructs. Whenever possible the different series should be maintained so as to be able to compare the evolution of budgetary plans over T, T+1, T+2 as well as compare plans in T with the other ex-post concepts for the same reference year.

Reference period

The reference period is the year to which the estimates refer according to the concepts laid out under the previous categories. In some cases, amounts reported may cover budgets or expenditure for multiple years. In order to produce meaningful estimates that can be compared over time, it is key to understand to have as granular as possible understanding of multi-year programmes as well as of the procedures used to annualise estimates.

- Allocation of reporting amounts to years
 - Annual vs Multi-year – period and number of years
 - Annualised estimates (derived)
- Use of financial/fiscal year vs calendar year as reference

Currency

- National currency – current prices, in millions
- PPP dollars – current prices, millions – Conversion generated as part of OECD data processing
- PPP dollars – constant prices (2015), millions – Generated as part of OECD data processing

3.2. Additional metadata

The following items are considered particularly relevant for comprehensive recording and interpretation of the information collected.

Name

The name of the programme is to be registered whenever possible in English and the original language. A code will be assigned to each new entry.

Short text description

- Brief text description on the programme and its key features, to allow to compare with the manual coding and eventually allow a more automatised set of checks and pre-filling.
- Link to Internet site on the programme or alternative authoritative source.

Supporting legislation.

- Provide information on the generic and specific legislation under which supported is legally provided by authorities. This may be multidimensional, covering acts that authorise to use public money for specific purposes to the legislation that provides the financial resources to be used for the said purpose.

Programme lifecycle features

- Activity status
 - In planning.
 - Active as of reporting reference period.
 - Inactive status or closure.
- For every new entry:
 - Year of announcement
 - Time horizon for approval if still in course. This information is particularly helpful for interpreting the available estimates of expenditure.
 - Time horizon for implementation. The metadata should clarify whether the programme:
 - Has an indefinite/permanent vocation.
 - Is timebound / temporary, in which case the time horizon should be specified, with possible reporting brackets: [1-3] years; [4-6] years; More than 6 years.
 - Potential connections to pre-existing programmes (see category below)

Connection to other programme entries in database

There are significant potential relational elements in the database that need to be accounted for, both longitudinally over time and within the current innovation support landscape.

- Connection to programmes previously in place.
- Connection to new programmes.
- Affiliation or parenting links to other “living” programmes, e.g. “is part of”, or “used to be part of”.

For all these potential connections, the identity of the connected programme should be provided. In case of potential double counting, this should also be noted.

Additional OECD processing notes

- **Information and budget expenditure data source(s) used.** Please provide complete list of sources and indicate if ad hoc calculations have been implemented to apportion specific components within broader programmes.
- Indicate whether the initiative is **included in STIP Compass** and its respective identifier (if available). Refer the programme to STIP Compass team for potential update.
- **Additional comments and observations**, including on the quality of the estimates and potential comparability issues.

4 Remarks on the application of the framework

This framework provides an initial basis for coordinated quantification of innovation support at the programme or equivalent level. Whilst not designed as a definite compilation guide, it provides considerable detail on the aims, methods and challenges of measurement so it can support and provide direction to measurement efforts.

The application of the initial version of the “SUPRINNO” framework on a pilot basis to five OECD countries (OECD, 2023^[5]), has shown that each country’s data infrastructures present unique strengths and limitations when it comes to facilitating a reasonably exhaustive mapping of innovation support along key dimensions. The pilots have demonstrated that the measurement of innovation support and its directionality is very much driven by data availability and the administrative procedures that shape the existence and features of these data. It is anticipated that implementing this framework in other countries will equally require a considerable degree of adaption and customisation.

Measurement efforts must manage the practical reality that there is a de-facto monitoring bias against non-R&D, demand-driven support for business innovation operated by ministries and agencies outside the core set of ministries of science, research and innovation. As whole-of-government approaches towards innovation policy become more common, it is important to have in place coordination mechanisms to monitor support for innovation, particularly when it comes to challenge-oriented policies. Programmes with a major diffusion component, supporting new-to-firm only innovations, needs to be explicitly acknowledged as being innovation support since such programmes may otherwise not be accounted for.

The pilots have indicated how important it is to map the mechanism for channelling support towards its ultimate beneficiaries, as this shapes the measurability of the different elements of the taxonomy as well as their interpretability in international comparisons. The use of intermediaries like funding agencies or investing partners may represent a reduction in government directionality through the partial delegation of directing responsibilities.

Robustness and replicability of innovation support mapping outputs can be enhanced through transparent communication of decision rules, heuristics, tagging and coefficients applied at programme level, as well as by providing information on innovation-connected programmes excluded from the scope for practical reasons. The pilot measurement experience has revealed that countries have a shared interest in measuring government support for STI and business innovation, but find themselves applying and investing in relatively uncoordinated, highly country-specific monitoring approaches, which renders international synthesis and comparison overly complex but not entirely impossible.

Whilst some of the measurement challenges might appear to be unsurmountable, the measurement pilots suggest that there is room for greater international coordination towards common representation approaches and better use of available data resources, whilst making progress towards higher quality and interoperable underlying administrative data. These will be the goals of future OECD work in this area.

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Annex A. Draft proposals for measuring government support for innovation using innovation surveys

Innovation surveys conducted under guidelines provided by the “Oslo Manual” (OECD/Eurostat, 2018^[2]) are the main vehicle for collecting information on innovation activities and outcomes for businesses, going beyond R&D. As recognised in previous editions of the manual and its latest edition published in 2018, to meet the objective to serve policy evidence needs, which include contributing to the assessment and evaluation of innovation public policies, the manual provides extensive guidance on several aspects of government policy, especially on measuring internal and external factors influencing business innovation. Government financial support programmes represent direct or indirect transfers of resources to firms. The Oslo Manual dedicates a subsection within Chapter 7 to their measurement, highlighting key dimensions of interest for measurement.

Qualitative measurement of support

The diversity of experiences in survey implementation of questions in this area was described in detail for several countries in an internal document [DSTI/STP/NESTI(2021)2]. The comparative analysis that it is currently very difficult to ensure that even a single indicator on public support for innovation can be readily compared across OECD countries, especially beyond the EU which has a higher degree of inter-country harmonisation.

The choices faced in a process of international harmonisation have to do with prioritising among a range of key attributes for measurement and deciding whether any of them represent a necessary initial filter to narrow down the scope and reduce response burden.

- Business experience in applying for and receiving support.
- Recording whether said support is for innovation.
- Identifying on what basis support is provided and through which instruments.
- Identifying where government support originates, e.g. levels of government involved.

Measurement experiences indicate that:

- It is important to identify whether support provided is for innovation, but there is a risk of significant imprecision in the response. The implication is to allow respondents to separately indicate broad support and, if appropriate, support linked to innovation activity.
- At a domestic level, evaluation assessment needs often require a comprehensive understanding of the full array of support mechanisms a given company benefits from. From an international comparative perspective, the instrumental basis of the support is also a key priority for policy learning (i.e. comparing how countries go about supporting business innovation). Types of instruments should be aggregated as much as possible to avoid burdens provided these do not

mix entirely different support approaches. Furthermore, the focus should not only be in concessionary forms of support like subsidies and grants.

- Information on the source of government support appears to be a high domestic priority, particularly in politically decentralised systems where regional authorities play an important role. Local and supranational also need to be taken into consideration. Furthermore, in a globalised world, a company may receive support for innovation from governments in other countries. A three-level categorisation can be most effective as a minimum standard when the separation can be meaningful: Local combined with regional government; Central government; Supranational authorities and international organisations.
- The combination of instrument and origin of support can give rise to several possible combinations resulting in an excessive number of response items, especially since for any given country many combinations may not be relevant. A combination approach can allow to collapse some categories into a common one when there is no major concern of information loss.
- Issues of awareness, application, and successful award of support are indeed relevant although probably not worth considering for all different combinations. It is therefore advisable to focus on the effective award of support, clearly referring to that in the question statement.

The resulting proposals for a comparable indicator would entail a single, multi-item and response questions with the following elements:

- Question statement focused on whether the firm has been the recipient of public funds or services funded by public funds.
- Items focused on the generic type of instrument and level of authority combination.
- Discrete responses identifying whether the firm received funds and illustrating the connectedness of the funds to innovation activities.

Box A.1. Innovation survey question proposed for testing

During [reference period], did your enterprise receive any funds or financial support from government authorities under the following categories?

1. Tax relief (foregone taxes, social contributions or refunds) from local, regional or national government authorities in [country name]
2. Grants or other subsidies, including financing under preferential terms, from the national government
3. Grants or other subsidies, including financing under preferential terms, from local or regional government authorities
4. Grants or other subsidies, including financing under preferential terms, from governments in other countries* or international organisations like EU programmes
5. In-kind support and services, provided by government-supported entities and delivered to your firm under preferential terms **
6. Funds for goods or services that your firm provides to (or commits to) government authorities in your country ***
7. Financing or services provided by government authorities at market equivalent rates and conditions

[For each item] If your enterprise received public funds or other support, was this provided as inducement for R&D or other innovation activities?

Yes/No

Notes: * Recall that a firm can operate in more than one country, receive support from other national governments. ** In kind support, incl. received indirectly. Survey designers may wish to identify specific providers of in-kind assistance and service, for instance, public or just publicly funded research and technology centres, etc. *** Ensure that government procurement is captured. This might be done through a separate question relating to customers, but might potentially miss out on the innovation component.

The proposals have the following features as they seek to implement the principles listed above:

- Include 5 concessional support items and 2 non-concessional elements, allowing the collection of information on these different forms of support.
- Grants, subsidies and subsidised finance are captured in items 2-4, split in order to support interest in identifying the provenance of concessional support (level of government).
- A similar breakdown is not suggested for item 1 on tax relief, since this mode is principally made available at national level, but nothing prevents countries from pursuing greater granularity on this point.
- Item 5 responds to policy interest in in-kind, partly concessional support, often provided by dedicated research and technology organisations which may or may not be in the public sector but receive funding from government.
- Items 6-7 capture rather broad forms of non-concessional support, including services, financing and public procurement.

Quantitative measurement. Estimation of value of support

A major practical question is to what extent companies have information on the financial support received. Firms' own accounting data should include grant income, income from sales to government organisations as well as financial liabilities in relation to them. International Accounting Standards place some reporting obligations on firms that can provide a basis for measurement. IAS 20⁹ applies to all government grants and other forms of government assistance. The benefit of a government loan at a below-market rate of interest is treated as a government grant. Government grants do not include government assistance whose value cannot be reasonably measured, such as technical or marketing advice. [IAS 20.34].

A government grant is recognised only when there is reasonable assurance that (a) the entity will comply with any conditions attached to the grant and (b) the grant will be received. [IAS 20.7]. The grant is **recognised as income** over the period necessary to match them with the related costs, for which they are intended to compensate, on a systematic basis. If a grant becomes repayable, it should be treated as a change in estimate. Where the original grant related to income, the repayment should be applied first against any related unamortised deferred credit, and any excess should be dealt with as an **expense**.

Disclosure rules require the following being disclosed: [IAS 20.39]: accounting policy adopted for grants, including method of balance sheet presentation; nature and extent of grants recognised in the financial statements; unfulfilled conditions and contingencies attaching to recognised grants; disclosure of hard to measure benefits is also required. [IAS 20.39(b)]

Concerning public procurement (selling goods or services), revenue should be measured at the fair value of the consideration received or receivable. [IAS 18.9] An exchange for goods or services of a similar nature and value is not regarded as a transaction that generates revenue. However, exchanges for dissimilar items are regarded as generating revenue. [IAS 18.12]

Accounting support measures may not be necessarily tagged in relation to a particular activity such as innovation. Therefore, it is more plausible for companies to be able to report financial flows received from government without specific reference to innovation.

One possible approach, which is backed up by accounting standards, would be to elicit the impact on the firm's bottom line from concessions separately from other transactions. A strict focus on the concessional aspect might be based on some suitable variation of the following question:

Please estimate the impact on your business bottom line in YYYY of the tax relief and grants or other subsidies, including financing under preferential terms, received from national, supranational or local or regional government authorities _____ [national currency] on that year [See accounting standard IAS38]

A broader view to record all flows from government institutions would also request respondents to report:

*Please provide an estimate of total **revenue for sales of goods and services to government institutions** recognised in your accounts in YYYY _____ [national currency] [IAS18]*

*Please provide an estimate of the **cumulative value of new financial liabilities and equity instruments** contracted with government institutions in YYYY. _____ [national currency] [IAS32]*

Surveys may attempt to derive the innovation component out of any of these amounts either in absolute or relative terms, e.g. as proportion of the amount declared for the relevant support estimate, or some of other elicited figure. A request to provide an absolute amount may be met with some degree of suspicion, while a share may be the object of more approximate heuristics.

Endnotes

¹ This notion of programme should not be confused with the broader notion of a holistic government programme as the articulation of an elected government's policy manifesto, covering policies and legislation that the government intends to implement during its period in office, which may be updated and refined on some regular basis.

² This is the focus of the OECD Fundstat initiative, which is demonstrating the use of project level microdata on government funding of R&D and innovation.

³ See Galindo-Rueda and López-Bassols (2022^[18]) for guidance on business R&D surveys and the Annex section in this report for innovation surveys.

⁴ See <https://oe.cd/rdtax>

⁵ As part of the next update, QUIS aims to cover additional countries and possibly a broader set of policy instruments.

⁶ See <https://www.oecd.org/sti/ind/steel.htm> and <https://www.oecd.org/sti/ind/shipbuilding.htm>

⁷ The Agreement on Subsidies and Countervailing Measures (Subsidies Agreement) of the World Trade Organization (WTO) defines a subsidy as a “financial contribution” by a government which provides a benefit. The forms that a subsidy can take include: a direct transfer of funds (e.g., a grant, loan, or infusion of equity); a potential transfer of funds or liabilities (e.g., a loan guarantee). This WTO definition is closer to the statistical notion of transfer from government used in the SNA.

⁸ Tax relief can take the form of a tax allowance, an exemption, a deduction or a tax credit. Tax allowances, exemptions and deductions are subtracted from the tax base before the tax liability is computed. A tax credit is an amount subtracted directly from the tax liability due by the beneficiary household or corporation after the liability has been computed. Tax credits can sometimes be payable, in the sense that any amount of the credit that exceeds the tax liability is paid to the beneficiary. In contrast, some tax credits are non-payable (sometimes called wastable) and are limited to the size of the tax liability. Tax relief assets for innovation may be subject to trade with third parties, for example in the form of securities.

⁹ See <https://www.iasplus.com/en/standards/ias/ias20>