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# 1 Innovation indicators and measurement: an overview

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## 1. INTRODUCTION

People want jobs, ideally good jobs, and some support when things go wrong. The fundamental policy question is how to deliver jobs and sufficient growth to provide the public services expected. Some would argue that innovation is part of the answer, if not the only answer, but innovation is a complex phenomenon and the implementation of an innovation policy is not straightforward. More needs to be known about innovation and how it connects to the economy and the society.

A step in this direction is learning how to measure the activity of innovation and its links to the innovation system. This handbook is a guide to how this is being done now and may be done in the future. It is written at a time when the domain of innovation studies is expanding and there are discussions about the definition of innovation for measurement purposes.

As the reader will find, the definition of innovation, for the purposes of statistical measurement, was codified 20 years ago in the *Oslo Manual*. Then, it included only technological product and process innovation in manufacturing. Over the years the technological restriction has been removed, recognizing that innovation can be achieved by changing business practices and the organization of the firm, and by finding new ways of developing markets or finding new ones. The coverage was extended from manufacturing to the entire market economy.

Now, there is a growing body of work on innovation in the public sector, in communities, and by individuals. Each of these developments is giving rise to calls for further examination of the definition of innovation for measurement purposes. The subject continues to grow and change, and this handbook is a guide for the reader who wants to understand, in practical terms, what is happening.

As this is a handbook on innovation, indicators and measurement, the next section discusses how those words are used. This is a short overview of the subject as the definition of innovation, its evolution and the legitimacy of the process are covered in Chapter 2. Chapter 3 examines the implementation of the definition through measurement activities, specifically

the use of surveys, especially the Community Innovation Survey (CIS) of the European Union (EU), which measures the activity of innovation. The questionnaire for CIS 2010 is provided in the appendix. Other chapters deal with the production and use of indicators. However, here the meaning of the term 'indicator' is considered, along with the importance of the formal language (Chapter 2) needed for the discussion of indicators.

Section 3 is a short guide for the reader who wants to treat the handbook as a toolkit and seeks direction on which chapters to read first in order to participate in discussions about developing or using innovation indicators.

Section 4 looks at innovation indicators as a technology that changes the behaviour of those who work with it and the consequences of that both for indicator development and for the use of indicators.

## 2. INNOVATION, INDICATORS AND MEASUREMENT

This section looks at the process through which innovation is defined, the sources of data, including statistical measurement, and definitions of indicators.

### **Defining Innovation**

For measurement purposes, innovation is defined in the third edition of the *Oslo Manual* (OECD/Eurostat 2005: 46; Chapter 2 in this volume) and that definition governs most of the five parts of the book. However, there are deviations. Chapter 5 raises a question about how to treat as innovators consumers who change or create goods and services for their own benefit, and Chapter 17 looks at definitional issues in public sector innovation. Chapter 18, which deals with social innovation, is the furthest removed from the *Oslo Manual* definition. The other chapters follow the rules.

'Rules' raise questions about how they are developed and used, and the openness of the process. Chapter 2 provides a history of the *Oslo Manual* but the question of rulemaking is discussed here as it is relevant to the entire book and, indeed, the book is part of the discourse that will influence such rulemaking.

The *Oslo Manual*, since the second edition, is a joint product of the OECD and Eurostat, the statistical office of the EU. The body that developed the manual and is responsible for its revision is the OECD Working Party of National Experts on Science and Technology Indicators (NESTI), where representatives of 34 member countries are present as well as the EU, including Eurostat, and observer countries and organizations.

As this is a working party, the participants are experts who are producers of innovation statistics and indicators, users of innovation indicators in the policy process, or who are active in the intersection of indicator production and policy use. The mix ensures that the indicators recommended for production and international comparisons are both feasible and relevant. NESTI is also a consensus organization, which means that the approval of the *Oslo Manual* has not been opposed.

NESTI members come from the governments of member or observer countries or from international organizations that participate. The statistics and indicators that are published by the OECD are produced by the participating countries, and the sources and methods are reviewed and documented by the OECD. Academics or interest groups are free to contact their national delegation if they wish to discuss any of the matters for which NESTI is responsible. That access can be arranged through the Permanent Delegation of member countries to the OECD.

In the case of the *Oslo Manual*, for non-EU member countries, there is no requirement to comply with the rules, but there is the incentive of having the statistics for their country reviewed and published by the OECD so that they can see how their country compares with others. For member states of the EU, not all of which are members of the OECD, the approach is different.

As discussed in Chapter 3, Commission Regulation (EC) No. 1450/2004 of 13 August 2004 implementing Decision No. 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on innovation, and its revisions, governs the provision of innovation statistics to Eurostat, the industrial coverage, the frequency of reporting of variables, the employment size classes of firms surveyed and various other breakdowns of variables. The provision of the innovation statistics 'shall be based on harmonized concepts and definitions contained in the most recent *Oslo Manual*'.

Countries are free to use sample surveys, administrative data and other sources to provide the required statistical data.

From the public law perspective, there are two quite distinct processes in place for the production of innovation statistics and indicators. Public law is used by von Bogdandy and Goldmann (2012) to develop a methodology for framing indicators and other information produced and disseminated by international organizations. Their example is another OECD project, the Programme for International Student Assessment (PISA). Additional material on indicators and their uses can be found in Davis et al. (2012).

One of the examples of von Bogdandy and Goldmann is the impact of the results of the PISA exercise on Germany. The first results were not good and there was an immediate reaction that transformed the education systems

in the *Länder*. This raised questions about the power of the PISA indicators and the governance process leading to their production. By contrast, when the first official statistics on innovation in the USA were published (NSF 2010), and they were low compared with the results of many other countries, there was little or no reaction on the part of the federal or state governments. For state governments the lack of reaction may have reflected the absence of state-level statistics, but this was not the case at national level. Chapter 12 provides examples of indicators changing the behaviour of governments, but they are not indicators of the activity of innovation.

### **Indicators and Measurement**

Many of the data used in the production of indicators come from sample surveys, of which the CIS is an example. The data can also come from administrative data, such as business registers or tax files. There are other sources.

For the purpose of this discussion, a 'statistic' is a numerical fact or datum, especially one computed from a sample. A statistic such as gross domestic product (GDP) can be discussed in the absence of data but when it comes to the use of the statistic it has to be populated with statistical data. 'Statistical data' refers to data from a survey or administrative source used to produce statistics (OECD 2008). Designing the survey or data acquisition process, including the control of the quality of the data produced, is part of 'statistical measurement'.

A 'statistical indicator' is a statistic or combination of statistics that provides information on the state of a system or its change over time. GDP or GDP/capita provides information on the economic state of a country and both can be considered statistical indicators along with their change over time. Negative growth of GDP for two consecutive quarters is considered by some as indicative of a recession. Of course, statistical indicators do not tell the whole story and should never be used in isolation. As an example, two countries may have the same GDP/capita but quite different income distributions. If GDP/capita is used as an indicator of welfare, the actual welfare of the people will be quite different in the two countries.

In this handbook, the terms 'indicator' and 'measurement' are used without the term 'statistical'.

### **Language**

By now it should be clear that the terms used to discuss the subject of innovation indicators and measurement are well defined and the *Oslo Manual* is the lexicon for the users of the language. It also provides the grammar.

For example, a member of the community of practice that uses the *Oslo Manual* cannot write the sentence: 'The tax incentive was an innovation of the government' or 'Painting the product green was an innovation'. Neither sentence conforms to the agreed rules codified in the *Oslo Manual*. In the first case the tax incentive is a framework condition for innovation, it is not a product placed on the market. In the second, the product is not new and neither is it significantly improved. Neither example is an innovation.

As in the case of other technologies, indicators and their standards are converging and innovation is no different. The *Oslo Manual* uses the language of the system of national accounts (EC et al. 2009), a simple example of which is that a product is a good or a service. In discussion of these concepts, the use of 'goods and services', or 'products and processes', can occur, but not 'products and services'.

The determined reader, by reading the *Oslo Manual* ([www.oecd.org/sti/oslomannual](http://www.oecd.org/sti/oslomannual)), and discussing the subject with members of the community of practice, will quickly become fluent in the language.

Next follows an introduction to the handbook chapters, with enough information to help the reader to choose a path through the handbook.

### 3. THE HANDBOOK

This is a handbook of innovation indicators and measurement. The chapters are written by experts who make measurements and produce indicators, or by other experts who are users of the indicators, or are on the boundary between production and use. The chapters provide the reader with knowledge of what works, what does not, and what could, or should, work in the future. The knowledge provided should be sufficient for the reader to ask informed questions about both the production and the use of indicators, and to understand the answers. The chapters are grouped into five themes: definition of innovation and implementation of the definition; measurement practices; the development and use of indicators; using innovation indicators in innovation strategies; and chapters that address the future of the subject, some of which go beyond the definitions and guidelines used elsewhere in the book.

#### **The Subject is Difficult**

As mentioned in the introduction, innovation is a difficult subject and so is the study of innovation indicators. There are several reasons for this. The first is that innovation is not an isolated event. A firm may put a

new product on the market, becoming, as a consequence, an innovative firm, but to understand that one event, there must be measures of sources of information, organization and business practices, production processes and market development that influence the activity of innovation. Questions should also be asked about whether the knowledge needed for the innovation was generated within the firm (or multinational enterprise), purchased, acquired by hiring people with the knowledge, or from outside the firm in other ways. For example, a user of the product of the firm could present to the firm a prototype of an improved product.

Time scale is an issue in understanding innovation. New software products can be conceived and produced in months, new biotechnology products for human health can take more than a decade to go through pre-clinical and clinical trials and there is no innovation until the product enters the market. Once products are on the market, they can have a rapid impact on users, or it could take decades before the impact is seen.

This leads to a systems approach to classifying the actors and activities in the system, the linkages between them and the outcomes and impacts of putting a new or significantly improved product on the market (Gault 2010).

### **Change is Happening**

The very concept of the 'market' is an issue. The current state of innovation measurement is governed by an internationally agreed set of rules presented in the *Oslo Manual* (OECD/Eurostat 2005; Chapter 2 in this volume). The *Oslo Manual* makes clear that for there to be innovation, the product must be introduced to the market or changes made in how the firm functions to get the product to market in ways that serve better the business strategy of the firm. This approach to connecting to the market has governed innovation indicators and measurement for decades, but now questions are being asked about consumers who change goods or services to improve their own welfare (Chapter 5) or public sector organizations that improve service delivery, although this is not necessarily delivered to a market (Chapter 17), or communities that find ways of solving problems that improve the welfare of the community (Chapter 18). Where do these cases fit in the study of innovation indicators and measurement? The authors of these chapters review the most recent work and indicate where the subject is going and the implications for the *Oslo Manual*.

To prepare the reader for these discussions, Chapter 2 reviews the history of the *Oslo Manual*. This is only partially a historical exercise to provide context for the rest of the handbook. Many of the issues that were present in the early discussions of the *Oslo Manual* are reappearing

as more experience is gained of measuring innovation and of developing and using indicators. Chapter 3, which provides a history of the EU CIS (Community Innovation Survey), also brings to the fore issues that were discussed in the past and are now being reconsidered. Change is indeed happening and the handbook offers a guide to the key issues to the point where the reader should be able to contribute to the debate.

### **The Rules must be Implemented**

For measurement to be made and indicators to be developed, the rules must be implemented. Since 1992 the most extensive implementation of the rules in the *Oslo Manual* has been the CIS, along with similar surveys conducted in many other countries (Smith 2005). Chapter 3 provides a history of the CIS, which, like the *Oslo Manual*, now in its third edition, is an ongoing learning process of collecting data, using the data to populate statistics, and then selecting statistics or combinations of statistics to produce indicators, the subject of this handbook. More historical material is found in Smith (2005).

However, not all respondents understand the survey questions in the same way, and this becomes a larger problem when the questions are in different languages and asked in different countries. Chapter 4 looks at the evidence for the robustness of international comparisons of innovation indicators, derived from CIS or CIS-like questionnaires. Chapter 8 reviews the situation in Japan and Chapter 9 addresses the issue and discusses an OECD project on cognitive testing of questions to ensure comparable answers. Cognitive testing and survey design are not just issues for innovation surveys, but they are important at a time when the definitions and survey questions are evolving.

### **Approaches to Measurement are Different**

Three chapters deal with measurement in the context of a CIS approach and, in addition to measurement issues, each chapter introduces a related topic: the role of panel surveys (Chapter 6); arguments for and against combining innovation surveys with R&D surveys (Chapter 7), also discussed in Chapter 3; and the differences resulting from conducting an innovation survey in a country with a non-European language and culture (Chapter 8).

When statistical surveys are conducted, decisions are made about the coverage (industry and geography) and the level of detail (see the appendix in Chapter 2). As innovation surveys are business surveys (but read Chapters 5, 17 and 18 for different approaches), a statistical sample is

drawn from a business register and the survey is conducted. The result is a set of statistics that provides a cross-sectional view of the industries being studied for the reference period of the survey. For the CIS, this process is repeated, currently every two years, and the result is a series of cross-sectional observations. The resulting statistics can exhibit change over time, for example the propensity of firms in a particular industry in a particular region to innovate, which may or may not be correlated with other observables, such as economic recession, the presence of good universities or trade agreements. While trends are interesting, and have many uses, these statistics cannot be used to identify causal links between a policy intervention or an economic shock and the behaviour of a firm. For that, a panel survey is needed where the same firms remain in the sample year after year. An example of a panel survey, and its applications, is described in Chapter 6.

One of the more striking examples of the difference between repeated cross-sectional surveys and panel surveys is found in Saunders (2010). The author describes 'arrival cities' in various parts of the world where immigrants from villages come to seek work. Some thrive and move into the life of the city; others do not. However, if the arrival city were surveyed every year using a cross-sectional survey, the findings would reveal poverty and other related issues. A longitudinal survey, which followed a cohort, would show evidence for reduced poverty and a growing change in social status within the cohort. Clearly the policy implications following from the two sets of results are different. How measurement is made matters and how results are interpreted also matters.

Another issue is the combining of business R&D and innovation surveys. The argument in favour is that both are business surveys and the same approach can be used for both. Norway has done both separate and combined surveys, and Chapter 7 presents the problems involved. Combining these surveys could work in some countries where both the R&D and innovation survey were based on random samples drawn from a business register. In the USA, the National Science Foundation added innovation questions to their R&D survey as part of its redesign to become the Business R&D and Innovation Survey (BRDIS). The innovation results for reference year 2008 (NSF 2010) were low compared with CIS results for other countries and the reasons are still being discussed (Jankowski 2013). There are other statistical issues to consider, such as the fact that the performance of R&D is a rare event and the expenditures (and personnel) are highly concentrated in a few firms in an industry and in a few industries in the economy. Innovation is a more common event, less concentrated and more pervasive. These different distributions have to be taken into account in a combined R&D and innovation survey. In

Chapter 3, the concern is raised that a combined survey reinforces a link in the minds of analysts and respondents that innovation must be tied to R&D. This is an important issue as the empirical evidence is that more firms innovate than do R&D (OECD 2009), suggesting the need for more policy interest in innovation.

Combining innovation and R&D surveys is not a new issue, as paragraph 193 from the first edition of the *Oslo Manual* shows:

Innovation surveys supplement the picture of R&D given by R&D surveys. Though it is conceivable that they might ultimately be combined, there are two arguments against this:

- (i) A combined survey would be long and rather complicated, which might well reduce the response rate;
- (ii) Different people in the company may well be responsible for answering questions on R&D and questions on innovation. (OECD 1992: 47)

This quotation illustrates the dominance of R&D in the thinking about innovation 20 years ago, the concern raised in Chapter 3.

Chapter 8 provides the experience from Japan of conducting an innovation survey. The principal issues are the evolving understanding of the concept of innovation and the words needed to refer to it, the limited presence of innovation in government policy that treats innovation as an extension of science and technology policy and the consequences of using voluntary surveys. Chapter 8 also notes difficulties in using the data on innovation for analytical purposes, a point that is discussed further in Chapter 19.

### **Developing and Using Indicators**

Whatever the measurement process used, whatever the other sources, such as administrative data, the end result is a set of statistics that can be used, or combined and used, as indicators for international comparison and comparison over time. Chapter 9, and Chapter 11, discuss the process for the collection of statistics and indicators and the validation and publication of internationally comparable results. As already mentioned, there is an OECD cognitive testing project, in consultation with Eurostat, to ensure that the data resulting from survey questions are indeed comparable (see Chapter 3 on this issue). Chapter 9 makes the point that not everything can be learned from aggregate statistics and there is much to be gained from analysing the data of individual firms (OECD 2009). One of the observations already made is that more firms innovate than do R&D, and this observation recurs both in Chapter 9 and in Chapter 12 on the OECD Innovation Strategy.

Data on individual firms, or microdata, are also necessary for analysing the link between innovation activities, such as R&D and investment in machinery and equipment, and the activity of innovation and productivity (Hall 2011; Mairesse and Mohnen 2010). Cohen (2010) provides a review of empirical studies over the last half-century and Verspagen (2005) reviews the link between innovation and economic growth.

With the third edition of the *Oslo Manual* (see Chapter 2) the definition of innovation was expanded beyond product and process innovation to include organizational change and market development. Chapter 10 looks at harmonized measures of organizational change and develops indicators for the activity. It is clear that it has taken time for organizational change to enter the measurement domain and this is not because the idea is novel. There were earlier projects on the overlapping subject of knowledge management (OECD 2003) that influenced the revision of the *Oslo Manual*, but organization and business practices are still not as prominent in CIS as product and process innovation (see Chapter 3 for more on this point).

Chapter 11 provides a comprehensive overview of the ways in which indicators are presented to users through reports, scoreboards and databases. It makes the distinction between the use of direct measurement of innovation and the use of proxy measures, and compares the rankings of the various scoreboards.

### **Innovation Strategy**

Innovation indicators are produced to provide information to decision makers and, if used in context, they may provide knowledge and confer a capacity to act<sup>1</sup> to change the situation that gives rise to the values of the indicators. If indicators are not used, a question immediately arises why they are being produced, as innovation indicators and measurement are costly undertakings. Three chapters address the place of indicators in the policy process and Smits et al. (2010) provide contextual information on the theory and practice of innovation policy.

Chapter 12 covers the OECD, which is an international organization with a mission to 'promote policies that will improve the economic and social well-being of people around the world'. Innovation is linked to economic growth, and promoting innovation is part of improving economic and social well-being. The chapter presents key indicators, related to innovation, that form part of evidence-based policy advice consistent with the mission of the OECD. It also provides indicators on innovation activities such as R&D and the use of intellectual property instruments, as well as on the activity of innovation.

Chapter 13 looks at Finland, a small open economy that has used

policy, including institutional change, to add to its resource-based activities a significant ICT (information and communication technology) sector and is now dealing with the next step. The example in the chapter is health-care as a means of supporting an ageing population but also as a platform for developing new technologies and adding them to the product range of the country.

Chapter 14 reviews innovation policy from a US perspective and discusses the role of indicators. The chapter provides a historical perspective on the involvement of US researchers in indicator development, which is also discussed in Chapters 2 and 3. It goes on to explain the political and administrative difficulties of introducing new policies and indicators into the activities of the US government. Political and administrative difficulties are also discussed in Chapter 8 for the case of Japan.

### **Going Further**

The handbook, in Parts I to V, keeps to its objective of showing the reader what works and what does not for innovation indicators and measurement, including the use of indicators to support public policy. However, the point has been made that this is an evolving subject so the next step is to look at what is being done to move the subject forward, to look at other actors and other sectors of the economy, and at the consequences of these activities. There are four chapters on new directions, of which two would fit within the definitions of the current *Oslo Manual* and two would not.

Chapter 15 deals with how emerging and enabling technologies can be measured. These may be rare events, but the objective is to give rise to indicators that can be used to influence policy related to these new technologies. This chapter links to discussions of measuring technologies and practices in Chapter 2 and Chapter 5, and its objective is to promote a standard practice for technology measurement, building on work done over the years on ICT, bio- and nanotechnologies.

While Chapter 15 deals with what is present but is difficult to measure, Chapter 16 addresses what is going to happen and the role of indicators of innovation in the foresight process. Foresight has never been part of the *Oslo Manual*, but there is much empirical work (e.g. Miles et al. 2008) and the OECD has engaged in foresight studies (OECD 1997, 1998, 1999). In keeping with the purpose of the handbook, Chapter 16 discusses what is working in foresight. The chapter is included to provoke thought about indicators and the future, and where foresight belongs in discussions about innovation indicators and measurement.

Public sector organizations can do most, if not all, of the activities of innovation described in the *Oslo Manual* and in Chapter 2, but the

resulting good or service is not necessarily delivered to the market, but to potential users of the good or service. This point is discussed in Chapters 2 and 5. Chapter 17 shows what has been done to measure public sector innovation and to provide guidelines for measurement that give rise to indicators. The question for the rulemakers is whether public sector innovation should be incorporated into the next revision of the *Oslo Manual*, treated separately as the first new member of an 'Oslo' family of manuals, or left to others to deal with.

Chapter 18 deals with social innovation. This is as far from the *Oslo Manual* definition of innovation that the handbook gets, but it merits serious consideration as part of the development of the subject. In social innovation, communities solve problems that increase the welfare of the members, in some ways like a firm (community) that improves its production process, organization or use of business practices, or market development in order to achieve the objectives of its business strategy (welfare) discussed in Chapter 2. The firm does not sell processes; it sells products. It uses, as a user innovator, the innovation it produces, just as a community uses the 'innovation' it has produced to improve its own welfare. There is also a parallel with the individual (community) that changes a good or a service (solves a problem) for his or her own benefit (welfare) discussed in Chapter 5, and there are links with Chapter 17 in public sector innovation.

Finally, Chapter 19 lays out a work programme for those engaged in innovation indicators and measurement. This is the only chapter in the handbook that does not present what works or what does not. It goes directly to what could work and why it should. It should be seen as providing topics for discussion as only the OECD, in consultation with Eurostat, can revise the *Oslo Manual*.

#### 4. INDICATORS AS TECHNOLOGY AND AS INTERVENTIONS

This section examines two topics: indicators as a technology; and indicators as interventions that have economic and social consequences. The first is based on Gault (2010, 2011a, 2011b, 2011c) and the second on Davis et al. (2012). The intention is to make clear that the development of measurement and indicators is a social process, with social and economic consequences. While this is a more general discussion than in Section 2, it matters for the broader understanding of what the handbook is about and suggests both pitfalls and benefits of ways of moving forward.

## **Indicators are a Technology**

Innovation indicators are developed as a result of a perceived need of the community that wants to use them, and both the development process and the eventual use of the indicators have social impacts. The development process involves consensus building and the establishment of a common language, with an agreed vocabulary and grammar, that facilitates the discourse that is part of the development and evolution of the indicators. These activities have an impact on the community of practice that sets the standards as it learns to use the language and to advance the subject. Once the indicators are produced, their use and the use of the language that describes them have economic and social impacts. This is not just a unidirectional activity. Feedback from the users of the indicators to the producers contributes to further evolution of the indicators.

There is a similarity in these activities with those in an organization, or firm, that produces new or significantly improved products (goods or services) or processes (transformation or delivery processes, organizational processes or those resulting from the use of business practices, or market development). The producer of indicators for public use is usually an international organization or supranational organization such as the OECD or the EU in the case of innovation indicators. There are also organizations that seek international impact through the production of indicators on various subjects and their use in ranking (Chapter 11).

Users of indicators are just about every organization in society, including individuals. As a result of using the indicators, users may change their behaviour and may provide a motivation for revision of the indicators. It is in this sense that indicators act as a technology or practice (Gault and McDaniel 2002). Consider the impact of the iPhone, the social insurance number, or the web.

The role of the user is fundamental in this process and is similar to that of the user in any innovation system. The user can provide information that leads the producer to improve the product, the user can collaborate with the producer on new products, or the user can create a new product and transfer it to the producer. The user can also produce the new product independently or publish the methodology for any organization to use.

In the case of user innovation involving consumers (Gault 2012; Chapter 5 in this volume), there is a fourth possibility, which is that the user who has created a new product or modified an existing one does nothing but benefit from its use and the knowledge is not transferred to the broader community of practice. This fourth case does not arise in indicator development for public use, as indicators are developed to be used by a community. Indicators that are not used are not indicators.

Measurement and indicators of innovation are governed by sets of rules in manuals, which are the guidelines for the collection and interpretation of data and for international comparisons of data, statistics and indicators. They are codified knowledge, knowledge that can be written, learned and applied. This is discussed further in Chapter 2 in the case of the *Oslo Manual* (OECD/Eurostat 2005). Cowan et al. (2000) warn of the possibility of 'lock-in' to obsolete conceptual schemes as a result of codification, but this is avoided by regular revision of the manual.

This is the view from the perspective of innovation indicators, but there are other approaches to indicators, and Davis et al. (2012) provide examples of indicators that are not necessarily the result of user–producer collaboration. Examples are the Doing Business Indicators, The Control of Corruption and the Rule of Law, the Millennium Development Goals (MDGs) indicators, the Corruption Perceptions Index, the Human Development Index and the Trafficking in Persons indicators (Davis et al. 2012: 3). Davis et al. also treat indicators as a technology, but the sense is different from that discussed earlier. They regard a means or mechanism of governance as a technology of governance. They also adopt a more elaborate definition of an indicator (Davis et al. 2012: 6), which focuses on the use of indicators for comparison and evaluation, and fits with the applications of indicators that they wish to examine.

They go on to discuss the economic and social results of using indicators to rank countries, or law schools, and then consider the regulation of indicators that exert considerable influence on decision making. As with the meaning of indicators as a technology, this is a different approach from the development of innovation indicators by NESTI, which is an open process, governed by consensus, leading to published guidelines. Nonetheless, Davis et al. (2012) provide interesting examples and useful thoughts on what happens when indicators have a strong influence on the measured, on the policies that governed the measured, and on decisions by international organizations and firms. If the release of innovation indicators ever has the same impact as PISA indicators had on Germany, there may be more interest in how NESTI develops the rules for producing indicators of innovation.

## **Impacts**

As the innovation indicators expand and policy makers recognize that innovation is not an isolated event, more attention is being given to the framework conditions and the policy mix that helps the system to work better. As more microdata analysis is done, the important result that the propensity to innovate in firms is higher than the propensity to do R&D will have more influence on policy. An R&D tax benefit is of no use to an

innovative firm that does no R&D, but support for capital investment in ICTs may be, or a voucher or granting programme allowing the firm to access knowledge from universities and colleges to help in the solving of problems related to innovation. Such policies, based on the empirical evidence provided by the indicators, change the behaviour of people, and of firms, and how they learn.

### **Indicators as Interventions**

Indicators are a technology and technologies change behaviour. Indicators described in this handbook are developed so that they can be used to change behaviour; the implicit assumption is that the behaviour will be beneficial to the economies and societies for which the indicators have been developed (see Chapter 9 and the mission of the OECD). However, there is a cost.

Statistical offices are aware of, and in some cases measure, the burden on the respondent of a survey. In this respect, a business survey is no different from a tax as it uses the resources of the respondent, and frequently highly skilled resources, and it can be seen as a policy intervention that justifies the collection of the data, the production of the resulting indicators and their use in the policy process. This public-good aspect is the justification for making many business surveys compulsory. Tax is also compulsory.

There are benefits. In developing a survey of the use and planned use of knowledge management practices, the team at Statistics Canada found that it was difficult to produce a survey instrument that would survive cognitive testing with respondents. Respondents tested could not understand the questions sufficiently well to answer them. When the testing team prepared to leave, there was more than one request for a clean questionnaire. This was a surprise in view of the less-than-successful testing exercise, and the response to why the questionnaire was wanted was that it contained a description of a number of practices that the firm should be looking at. It was clear that the survey team was an agent of knowledge transfer and a similar cognitive testing exercise six months later would yield a different result. In the end, after much revision, the testing worked, a successful questionnaire was used for the survey and the results contributed to an OECD project on knowledge management (OECD 2003).

This raises the question of surveys being used as a deliberate means of transmitting information or knowledge as part of a teaching initiative or as a promotion. For a statistical office that should be at arm's length from the policy process, these are difficult issues to resolve as all questionnaires have the capacity to teach. However, the deliberate use of a questionnaire to transfer information about a new government programme would raise

ethical questions. Of course, not all statistical offices are at arm's length from government, and that raises another set of ethical problems.

Davis and Kingsbury (2011: 10) also suggest that 'Interventions that involve indicators should also be compared to interventions that go beyond providing data. If the ultimate purpose of intervention is to effect social change then indicators should be compared to familiar interventions, such as direct provision of money, goods or services, capacity-building, regulatory change, litigation etc.' Most official statisticians would agree. From the perspective of this handbook, the intended impact of the indicators is a consideration for the reader and for future revisions of the rules that govern the development of the indicators.

## 5. CONCLUSION

This chapter provides definitions of key terms in the handbook and an introduction to the process of developing innovation indicators. There is a guide to reading the book and treating it as a toolbox for practitioners or would-be practitioners. To provide a broader context, there is a section on indicators as technology and as interventions. The other chapters in the handbook, with the exception of Chapter 19, are self-contained and can be read independently.

## NOTE

1. 'Knowledge as a capacity for action' is a recurring theme in the business of developing indicators. It was the title of the opening address (Stehr 1996) for the 1996 OECD Blue Sky Forum (OECD 2001), which discussed the development of new indicators for science, technology and innovation and the importance of the systems approach to innovation. Knowledge fits into a hierarchy that begins with data and moves to information, which is data in context, and then to knowledge, which is information in context, and provides a capacity to act. This hierarchy has been in use for many years, as a review of T.S. Eliot's *Choruses from the Rock* (1934), will demonstrate (Eliot 1954: 107). Eliot and others continue the hierarchy to knowledge in context, which is wisdom. The subject of innovation indicators and measurement, and its communities of practice, may be moving towards wisdom. At the very least, it should be an objective.

In the text, there is a discussion of data that populate statistics, which may be combined or used independently to provide information about the state of the system under review. That information, in the context of policy priorities, provides the policy maker with the capacity to act, to change the state of the system.

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## APPENDIX: CIS 2010

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### **The Community Innovation Survey 2010 (CIS 2010)**

THE HARMONISED SURVEY QUESTIONNAIRE

### **The Community Innovation Survey 2010 FINAL VERSION July 9, 2010**

This survey collects information on your enterprise's innovations and innovation activities during the three years 2008 to 2010 inclusive.

An innovation is the introduction of a new or significantly improved product, process, organisational method, or marketing method by your enterprise. The innovation must be new to your enterprise, although it could have been originally developed by other enterprises.

Sections 5 to 8 only refer to product and process innovations.

Please complete **all** questions, unless otherwise instructed.

Person we should contact if there are any queries regarding the form:

Name: \_\_\_\_\_  
Job title: \_\_\_\_\_  
Organisation: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

**1. General Information about the Enterprise**

Name of enterprise \_\_\_\_\_

Address<sup>1</sup> \_\_\_\_\_

Postal code \_\_\_\_\_ Main activity<sup>2</sup> \_\_\_\_\_

**1.1 In 2010, was your enterprise part of an enterprise group?** (A group consists of two or more legally defined enterprises under common ownership. Each enterprise in the group can serve different markets, as with national or regional subsidiaries, or serve different product markets. The head office is also part of an enterprise group.)

Yes  In which country is the head office of your group located?<sup>3</sup> \_\_\_\_\_

No

**If your enterprise is part of an enterprise group:** Please answer all further questions about your enterprise only for the enterprise for which you are responsible in [your country]. Exclude all subsidiaries or parent enterprises.

**1.2 In which geographic markets did your enterprise sell goods and/or services during the three years 2008 to 2010?**

|                                                                | Yes                      | No                       |
|----------------------------------------------------------------|--------------------------|--------------------------|
| A. Local / regional within [your country]                      | <input type="checkbox"/> | <input type="checkbox"/> |
| B. National (other regions of [your country])                  | <input type="checkbox"/> | <input type="checkbox"/> |
| C. Other European Union (EU), EFTA, or EU candidate countries* | <input type="checkbox"/> | <input type="checkbox"/> |
| D. All other countries                                         | <input type="checkbox"/> | <input type="checkbox"/> |

**Which of these geographic areas was your largest market in terms of turnover during the three years 2008 to 2010?** (Give corresponding letter) \_\_\_\_\_

\*: Include the following countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Ireland, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Slovakia, Switzerland, Turkey, Spain, Sweden and the United Kingdom.

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<sup>1</sup> NUTS 2 code.  
<sup>2</sup> NACE 4 digit code.  
<sup>3</sup> Country code according to ISO standard.

## 2. Product (Good or Service) Innovation

A product innovation is the market introduction of a **new** or **significantly** improved **good** or **service** with respect to its capabilities, user friendliness, components or sub-systems.

- Product innovations (new or improved) must be new to your enterprise, but they do not need to be new to your market.
- Product innovations could have been originally developed by your enterprise or by other enterprises.

A **good** is usually a tangible object such as a smart phone, furniture, or packaged software, but downloadable software, music and film are also goods. A **service** is usually intangible, such as retailing, insurance, educational courses, air travel, consulting, etc.

### 2.1 During the three years 2008 to 2010, did your enterprise introduce:

|                                                                                                                                | Yes                      | No                       |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| New or significantly improved goods ( <i>exclude the simple resale of new goods and changes of a solely aesthetic nature</i> ) | <input type="checkbox"/> | <input type="checkbox"/> |
| New or significantly improved services                                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |

**If no to all options, go to section 3, otherwise:**

### 2.2 Who developed these product innovations?

*Tick all that apply*

|                                                                                                                       | <b>Goods<br/>innovations</b> | <b>Service<br/>innovations</b> |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------|
| Your enterprise by itself                                                                                             | <input type="checkbox"/>     | <input type="checkbox"/>       |
| Your enterprise together with other enterprises or institutions*                                                      | <input type="checkbox"/>     | <input type="checkbox"/>       |
| Your enterprise by adapting or modifying goods or services originally developed by other enterprises or institutions* | <input type="checkbox"/>     | <input type="checkbox"/>       |
| Other enterprises or institutions*                                                                                    | <input type="checkbox"/>     | <input type="checkbox"/>       |

*\*: Include independent enterprises plus other parts of your enterprise group (subsidiaries, sister enterprises, head office, etc). Institutions include universities, research institutes, non-profits, etc.*

**2.3 Were any of your product innovations (goods or services) during the three years 2008 to 2010:**

|                               |                                                                                                                                                                   | Yes                      | No                       |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| <b>New to your market?</b>    | Your enterprise introduced a new or significantly improved product onto your market before your competitors (it may have already been available in other markets) | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Only new to your firm?</b> | Your enterprise introduced a new or significantly improved product that was already available from your competitors in your market                                | <input type="checkbox"/> | <input type="checkbox"/> |

**Using the definitions above, please give the percentage of your total turnover<sup>4</sup> in 2010 from:**

|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                        |   |   |   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| New or significantly improved products introduced during the three years 2008 to 2010 that were <b>new to your market</b>                                                 | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> </tr> </table>                                                                |   |   |   | % |
|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                        |   |   |   |   |
| New or significantly improved products introduced during the three years 2008 to 2010 that were <b>only new to your firm</b>                                              | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> </tr> </table>                                                                |   |   |   | % |
|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                        |   |   |   |   |
| Products that were <b>unchanged or only marginally modified</b> during the three years 2008 to 2010 (include the resale of new products purchased from other enterprises) | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> <td style="width: 30px; height: 30px;"></td> </tr> </table>                                                                |   |   |   | % |
|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                        |   |   |   |   |
| <b>Total turnover in 2010</b>                                                                                                                                             | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 30px; text-align: center;">1</td> <td style="width: 30px; height: 30px; text-align: center;">0</td> <td style="width: 30px; height: 30px; text-align: center;">0</td> </tr> </table> | 1 | 0 | 0 | % |
| 1                                                                                                                                                                         | 0                                                                                                                                                                                                                                                                                                      | 0 |   |   |   |

**2.4 Were any of your product innovations during the three years 2008 to 2010:**

|                           | Yes                      | No                       | Don't know               |
|---------------------------|--------------------------|--------------------------|--------------------------|
| A first in [your country] | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A first in Europe         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A world first             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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<sup>4</sup> For credit institutions: interests receivable and similar income; for insurance services: gross premiums written.

### 3. Process Innovation

A process innovation is the implementation of a **new** or **significantly** improved production process, distribution method, or supporting activity.

- Process innovations must be new to your enterprise, but they do not need to be new to your market.
- The innovation could have been originally developed by your enterprise or by other enterprises.
- Exclude purely organisational innovations – these are covered in section 9.

#### 3.1 During the three years 2008 to 2010, did your enterprise introduce:

|                                                                                                                                                            | Yes                      | No                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| New or significantly improved methods of manufacturing or producing goods or services                                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| New or significantly improved logistics, delivery or distribution methods for your inputs, goods or services                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| New or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing | <input type="checkbox"/> | <input type="checkbox"/> |

**If no to all options, go to section 4, otherwise:**

#### 3.2 Who developed these process innovations?

*Tick all that apply*

|                                                                                                               |                          |
|---------------------------------------------------------------------------------------------------------------|--------------------------|
| Your enterprise by itself                                                                                     | <input type="checkbox"/> |
| Your enterprise together with other enterprises or institutions*                                              | <input type="checkbox"/> |
| Your enterprise by adapting or modifying processes originally developed by other enterprises or institutions* | <input type="checkbox"/> |
| Other enterprises or institutions*                                                                            | <input type="checkbox"/> |

*\*: Include independent enterprises plus other parts of your enterprise group (subsidiaries, sister enterprises, head office, etc). Institutions include universities, research institutes, non-profits, etc.*

**3.3 Were any of your process innovations introduced during the three years 2008 to 2010 new to your market?**

- Yes
- No
- Do not know

**4. Ongoing or Abandoned Innovation Activities for Process and Product Innovations**

Innovation activities include the acquisition of machinery, equipment, software, and licenses; engineering and development work, design, training, marketing and R&D when they are *specifically* undertaken to develop and/or implement a product or process innovation. Also include basic R&D as an innovation activity even when not related to a product and/or process innovation.

**4.1 During the three years 2008 to 2010, did your enterprise have any innovation activities that did not result in a product or process innovation because the activities were:**

- |                                          | Yes                      | No                       |
|------------------------------------------|--------------------------|--------------------------|
| Abandoned or suspended before completion | <input type="checkbox"/> | <input type="checkbox"/> |
| Still ongoing at the end of the 2010     | <input type="checkbox"/> | <input type="checkbox"/> |

**If your enterprise had no product or process innovations or innovation activity during the three years 2008 to 2010 (no to all options in questions 2.1, 3.1, and 4.1), go to section 8. Otherwise, go to section 5**

**5. Innovation Activities and Expenditures for Process and Product Innovations**

**5.1 During the three years 2008 to 2010, did your enterprise engage in the following innovation activities:**

- |                         |                                                                                                                                                                                                               | Yes                      | No                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| <b>In-house R&amp;D</b> | Creative work undertaken within your enterprise to increase the stock of knowledge for developing new and improved products and processes (include software development in-house that meets this requirement) | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                         |                                                                                                                                                                                                                          |                          |                          |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
|                                                         | If yes, did your enterprise perform R&D during the three years 2008 to 2010:                                                                                                                                             | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>External R&amp;D</b>                                 | Same activities as above, but performed by other enterprises (including other enterprises or subsidiaries within your group) or by public or private research organisations and purchased by your enterprise             | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Acquisition of machinery, equipment and software</b> | Acquisition of advanced machinery, equipment (including computer hardware) or software to produce new or significantly improved products and processes                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Acquisition of external knowledge</b>                | Purchase or licensing of patents and non-patented inventions, know-how, and other types of knowledge from other enterprises or organisations for the development of new or significantly improved products and processes | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Training for innovative activities</b>               | Internal or external training for your personnel specifically for the development and/or introduction of new or significantly improved products and processes                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Market introduction of innovations</b>               | Activities for the market introduction of your new or significantly improved goods or services, including market research and launch advertising                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Design</b>                                           | Activities to design, improve or change the shape or appearance of new or significantly improved goods or services                                                                                                       | <input type="checkbox"/> | <input type="checkbox"/> |

**Other**                      Other activities to implement new or significantly improved products and processes such as feasibility studies, testing, routine software development, tooling up, industrial engineering, etc.                         

**5.2 Please estimate the amount of expenditure for each of the following four innovation activities in 2010 only.** (Include personnel and related costs)<sup>5</sup>

*If your enterprise had no expenditures in 2010, please fill in '0'*

|                                                                                                        |                      |
|--------------------------------------------------------------------------------------------------------|----------------------|
| <b>In-house R&amp;D</b> (Include capital expenditures on buildings and equipment specifically for R&D) | <input type="text"/> |
| <b>Purchase of external R&amp;D</b>                                                                    | <input type="text"/> |
| <b>Acquisition of machinery, equipment, and software</b> (Exclude expenditures on equipment for R&D)   | <input type="text"/> |
| <b>Acquisition of external knowledge</b>                                                               | <input type="text"/> |
| <b>Total of these four innovation expenditure categories</b>                                           | <input type="text"/> |

**5.3 During the three years 2008 to 2010, did your enterprise receive any public financial support for innovation activities from the following levels of government?** Include financial support via tax credits or deductions, grants, subsidised loans, and loan guarantees. Exclude research and other innovation activities conducted entirely for the public sector under contract.

|                                                                                                                               | Yes                      | No                       |
|-------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| Local or regional authorities                                                                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| Central government (including central government agencies or ministries)                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| The European Union (EU)                                                                                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| If yes, did your enterprise participate in the EU 7 <sup>th</sup> Framework Programme for Research and Technical Development? | <input type="checkbox"/> | <input type="checkbox"/> |

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<sup>5</sup> Give expenditure data in 000's of national currency units to eight digits.

**6. Sources of Information and Co-operation for Product and Process Innovation**

**6.1 During the three years 2008 to 2010, how important to your enterprise's innovation activities were each of the following information sources?** Please identify information sources that provided information for new innovation projects or contributed to the completion of existing innovation projects.

**Degree of importance**

*Tick 'not used' if no information was obtained from a source*

| <b>Information source</b>    |                                                            | <b>High</b>              | <b>Medium</b>            | <b>Low</b>               | <b>Not used</b>          |
|------------------------------|------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>Internal</b>              | Within your enterprise or enterprise group                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Market sources</b>        | Suppliers of equipment, materials, components, or software | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Clients or customers                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Competitors or other enterprises in your sector            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Consultants, commercial labs, or private R&D institutes    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Institutional sources</b> | Universities or other higher education institutions        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Government or public research institutes                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Other sources</b>         | Conferences, trade fairs, exhibitions                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Scientific journals and trade/technical publications       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                              | Professional and industry associations                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**6.2 During the three years 2008 to 2010, did your enterprise co-operate on any of your innovation activities with other enterprises or institutions?**

Innovation co-operation is active participation with other enterprises or non-commercial institutions on innovation activities. Both partners do not need to commercially benefit. Exclude pure contracting out of work with no active co-operation.

Yes

No  (Please go to question 7.1)

**6.3 Please indicate the type of innovation co-operation partner by location**

*(Tick all that apply)*

| Type of co-operation partner                                  | [Your country]           | Other Europe*            | United States            | China or India           | All other countries      |
|---------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. Other enterprises within your enterprise group             | <input type="checkbox"/> |
| B. Suppliers of equipment, materials, components, or software | <input type="checkbox"/> |
| C. Clients or customers                                       | <input type="checkbox"/> |
| D. Competitors or other enterprises in your sector            | <input type="checkbox"/> |
| E. Consultants, commercial labs, or private R&D institutes    | <input type="checkbox"/> |
| F. Universities or other higher education institutions        | <input type="checkbox"/> |
| G. Government or public research institutes                   | <input type="checkbox"/> |

\*: Include the following European Union (EU) countries, EFTA, or EU candidate countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Ireland, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Slovakia, Switzerland, Turkey, Spain, Sweden and the United Kingdom.

**6.4 Which type of co-operation partner did you find the most valuable for your enterprise’s innovation activities? (Give corresponding letter)**

---

**7. Objectives for your Product and Process Innovations during 2008 to 2010**

**7.1 How important were each of the following objectives for your activities to develop product or process innovations during the three years 2008 to 2010?**

*If your enterprise had several projects for product and process innovations, make an overall evaluation*

|                                                            | <b>High</b>              | <b>Medium</b>            | <b>Low</b>               | <b>Not relevant</b>      |
|------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Increase range of goods or services                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Replace outdated products or processes                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Enter new markets or increase market share                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Improve quality of goods or services                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Improve <i>flexibility</i> for producing goods or services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Increase <i>capacity</i> for producing goods or services   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reduce labour costs per unit output                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reduce material and energy costs per unit output           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reduce environmental impacts                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Improve health or safety of your employees                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**8. Factors Hampering Product and Process Innovation Activities****8.1 During the three years 2008 to 2010, how important were the following factors in preventing your enterprise from innovating or in hampering your innovation activities?**

|                                |                                                            | Degree of importance     |                          |                          |                          |
|--------------------------------|------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                |                                                            | High                     | Medium                   | Low                      | Factor not experienced   |
| <b>Cost factors</b>            | Lack of funds within your enterprise or group              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Lack of finance from sources outside your enterprise       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Innovation costs too high                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Knowledge factors</b>       | Lack of qualified personnel                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Lack of information on technology                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Lack of information on markets                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Difficulty in finding co-operation partners for innovation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Market factors</b>          | Market dominated by established enterprises                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | Uncertain demand for innovative goods or services          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Reasons not to innovate</b> | No need due to prior innovations by your enterprise        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                | No need because of no demand for innovations               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 9. Organisational Innovation

An organisational innovation is a new organisational method in your enterprise's business practices (including knowledge management), workplace organisation or external relations that has not been previously used by your enterprise.

- It must be the result of strategic decisions taken by management.
- Exclude mergers or acquisitions, even if for the first time.

### 9.1 During the three years 2008 to 2010, did your enterprise introduce:

|                                                                                                                                                                                                                                                      | Yes                      | No                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| New <b>business practices</b> for organising procedures (i.e. supply chain management, business re-engineering, knowledge management, lean production, quality management, etc)                                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| New methods of <b>organising work responsibilities and decision making</b> (i.e. first use of a new system of employee responsibilities, team work, decentralisation, integration or de-integration of departments, education/training systems, etc) | <input type="checkbox"/> | <input type="checkbox"/> |
| New methods of <b>organising external relations</b> with other firms or public institutions (i.e. first use of alliances, partnerships, outsourcing or sub-contracting, etc)                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |

**If no to all options, go to section 10.  
Otherwise, go to question 9.2**

### 9.2 How important were each of the following objectives for your enterprise's organisational innovations introduced during the three years 2008 to 2010 inclusive?

*If your enterprise introduced several organisational innovations, make an overall evaluation*

|                                                      | High                     | Medium                   | Low                      | Not relevant             |
|------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Reduce time to respond to customer or supplier needs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Improve ability to develop new products or processes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                                                                               |                          |                          |                          |                          |
|---------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Improve quality of your goods or services                                                                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reduce costs per unit output                                                                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Improve communication or information sharing within your enterprise or with other enterprises or institutions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 10. Marketing Innovation

A marketing innovation is the implementation of a new marketing concept or strategy that differs significantly from your enterprise's existing marketing methods and which has not been used before.

- It requires significant changes in product design or packaging, product placement, product promotion or pricing.
- Exclude seasonal, regular and other routine changes in marketing methods.

### 10.1 During the three years 2008 to 2010, did your enterprise introduce:

|                                                                                                                                                                                                                    | Yes                      | No                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| Significant changes to the aesthetic <b>design</b> or <b>packaging</b> of a good or service ( <i>exclude changes that alter the product's functional or user characteristics – these are product innovations</i> ) | <input type="checkbox"/> | <input type="checkbox"/> |
| New media or techniques for <b>product promotion</b> ( <i>i.e. the first time use of a new advertising media, a new brand image, introduction of loyalty cards, etc</i> )                                          | <input type="checkbox"/> | <input type="checkbox"/> |
| New methods for <b>product placement</b> or sales channels ( <i>i.e. first time use of franchising or distribution licences, direct selling, exclusive retailing, new concepts for product presentation, etc</i> ) | <input type="checkbox"/> | <input type="checkbox"/> |
| New methods of <b>pricing</b> goods or services ( <i>i.e. first time use of variable pricing by demand, discount systems, etc</i> )                                                                                | <input type="checkbox"/> | <input type="checkbox"/> |

**If no to all options, go to section 11.  
Otherwise, go to question 10.2**

**10.2 How important were each of the following objectives for your enterprise’s marketing innovations introduced during the three years 2008 to 2010 inclusive?**

*If your enterprise introduced several marketing innovations, make an overall evaluation*

|                                              | <b>High</b>              | <b>Medium</b>            | <b>Low</b>               | <b>Not relevant</b>      |
|----------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Increase or maintain market share            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Introduce products to new customer groups    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Introduce products to new geographic markets | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**11. Creativity and Skills**

**11.1 During the three years 2008 to 2010, did your enterprise employ individuals in-house with the following skills, or obtain these skills from external sources?**

*Tick both ‘Employed in-house’ and ‘Obtained from external sources’ if relevant.*

|                                                                                    | <b>Employed in-house</b> | <b>Obtained from external sources*</b> | <b>Skills not used /not relevant</b> |
|------------------------------------------------------------------------------------|--------------------------|----------------------------------------|--------------------------------------|
| Graphic arts / layout / advertising                                                | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Design of objects or services                                                      | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Multimedia (combining audio, graphics, text, still pictures, animation, video etc) | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Web design                                                                         | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Software development                                                               | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Market research                                                                    | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Engineering / applied sciences                                                     | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |
| Mathematics / statistics / database management                                     | <input type="checkbox"/> | <input type="checkbox"/>               | <input type="checkbox"/>             |

*\*: Include freelancers, consultants, other independent enterprises, other parts of your enterprise group, etc.*

**11.2 During the three years 2008 to 2010, did your enterprise use any of the following methods to stimulate new ideas or creativity among your staff? If yes, was the method successful in producing new ideas or increasing creativity?**

|                                                                                                                                | <i>Method used and:</i>  |                          |                                |                          |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------------|--------------------------|
|                                                                                                                                | Success-<br>ful          | Not<br>Successful        | Don't<br>know if<br>successful | Method<br>not<br>used    |
| Brainstorming sessions                                                                                                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |
| Multidisciplinary or cross-functional work teams                                                                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |
| Job rotation of staff to different departments or other parts of your enterprise group                                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |
| Financial incentives for employees to develop new ideas                                                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |
| Non-financial incentives for employees to develop new ideas, such as free time, public recognition, more interesting work, etc | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |
| Training employees on how to develop new ideas or creativity                                                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>       | <input type="checkbox"/> |

**12. Basic Economic Information on your Enterprise**

**12.1 What was your enterprise's total turnover for 2008 and 2010?<sup>6</sup> Turnover is defined as the market sales of goods and services (Include all taxes except VAT<sup>7</sup>).**

|             |             |
|-------------|-------------|
| <b>2008</b> | <b>2010</b> |
|             |             |

<sup>6</sup> Give turnover in '000 of national currency units. *Leave space for up to nine digits.*

<sup>7</sup> For Credit institutions: Interests receivable and similar income; for Insurance services give gross premiums written.

**12.2 What was your enterprise's average number of employees in 2008 and 2010?<sup>8</sup>**

| 2008                 |                      |                      |                      |                      | 2010                 |                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> |

**12.3 Approximately what percent of your enterprise's employees in 2010 had a university degree?<sup>9</sup>**

- 0%
- 1% to 4%
- 5% to 9%
- 10% to 24%
- 25% to 49%
- 50% to 74%
- 75% to 100%

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<sup>8</sup> If administrative data are used and the annual average is not available, give results for the end of each year. Leave space for up to six digits for question 12.2.

<sup>9</sup> National translation: This includes ISCED 5a and 6. If administrative data are used, use the same time period as for question 12.2.

