
1. Introduction: Making sense of innovation policy

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1.1 AIM OF THIS HANDBOOK

‘Wouldn’t it be good if we knew what works in innovation policy, to inform future policy making and be more efficient and effective in designing future innovation policy instruments as a result?’ This earnest request was made recently by a senior UK politician. Yet, in the last 20 years, hundreds of evaluations and academic studies have been conducted on a wide variety of interventions that, by various means, have an impact on innovation input, output, processes, practices and capabilities. So why is there still uncertainty about this area and what does this new volume add to our understanding of the impacts of innovation policy?

Previous studies have mainly focused on specific policies, programmes and projects – to assess their past performance and, in some cases, to improve their future design and implementation. The editors and authors of this book have themselves performed numerous evaluations, and have also tried to learn from existing evaluation evidence. Over the years, however, we have realised that, in the policy making community, learning from existing evidence has its limits. It can often be introspective, drawing lessons from one’s own activities and evaluations or from a limited number of narratives labelled as ‘best cases’. Less common in the academic and policy making communities are systematic attempts to take advantage of the numerous existing evaluations of innovation policy instruments. Furthermore, academic studies tend to highlight the specific contribution that their method or data makes, rather than producing systematic comparisons or syntheses of the effects of policy instruments. For these reasons the idea of a structured effort to learn from the extensive array of evidence on innovation policy impact both fills a gap and offers promising opportunities for new insights.

Supported by Nesta,¹ an international team of innovation policy experts, led by the editors of this book, turned our politician’s request into something tangible. Between 2011 and 2013, we conducted a study to gather and synthesise the most relevant and recent evidence on the impact of innovation policy measures. The study was titled the *Compendium of Evidence on the Effectiveness of Innovation Policy*.² This *Handbook* presents the result of that study. In line with practice in the international evaluation and academic literature, in this *Handbook* we use the terms policy ‘instrument’, ‘intervention’ and ‘measure’ interchangeably.

The contributions to the *Handbook* present a unique and systematic analysis of secondary evidence on the impact of interventions in innovation policy. Such analyses are not new – they are found in the areas of education, health and international development amongst others. Recently these have been further reinforced with systematic attempts such as the UK government's 'What Works?' centres, which aim at analysing and sharing existing evidence (Halpern et al., 2014). While the practice of systematically collecting and analysing existing evidence is well established in other policy areas, it has been underdeveloped in innovation policy.

The idea of comprehensive secondary analyses in innovation policy was first proposed in the late 1990s (Georghiou, 1999). It took a further decade to elaborate an operational framework (Edler et al., 2008). This framework distinguishes two types of secondary analyses. The first is *meta-analysis*, whereby primary data from different studies is pooled and analysed, improving robustness and validity. Given the idiosyncrasies of policy interventions, their contexts and uneven data availabilities, it remains difficult to undertake meta-analysis in innovation policy. The second approach is *evaluation synthesis*, which systematically compiles, qualitatively analyses and interprets the *findings* of existing studies, taking into account differences in contexts and methods, thus allowing in-depth, yet contextualised, learning.

To provide contextualised learning from existing evidence, this *Handbook* pursues an evaluation synthesis approach³ which allows the reader to obtain a thorough overview of a broad range of policy instruments and their effects. The main aim of this book is to provide the opportunity for critical reflection and – we hope – enlightened policy learning for policy makers, academics and all innovation policy stakeholders. It offers an entry point for those who seek specific support in designing and implementing innovation policy instruments and aims to foster academic debate about policy rationales, intervention logics and the opportunities and limits of analysing and understanding impact.

In order to introduce the reader to the wealth of evidence in this *Handbook*, and to provide some guidance for the interpretation of its findings, this introduction presents our understanding of innovation policy (section 1.2) and rationales (section 1.3). This does not, however, include the *specific* intervention rationale for each instrument or the mechanisms by which they exert impact – this is done in the individual chapters. Since most of the existing evidence and analysis is based on individual instruments, section 1.4 reflects on the nature of policy instruments and their impact. We present a typology of innovation policy instruments to systematise the evidence and allow distinct entry points for readers interested in different kinds of instruments. A short explanation of our methodology is then provided (section 1.5). This is followed by an explanation of the structure of the book (section 1.6). The introduction closes with reflections on what we believe are important conditions for the interpretation of the findings of this book (section 1.7).

1.2 INNOVATION POLICY – DEFINITION AND DELINEATION

For the purpose of this *Handbook*, we define *innovation policy* as public intervention to support the generation and diffusion of innovation, whereby an innovation is a new product, service, process or business model that is to be put to use, commercially or non-commercially. Innovation policy, as we delineate it, is intervention that is designed and administered by government, including multiple agencies at various spatial levels. We do not include private, corporate policies or strategies for innovation within this definition, although organisations that originate these are often the targets of innovation policies.

Our definition includes *innovation generation*, *market introduction* and *diffusion*. The generation of innovation involves the production of underlying knowledge, artefacts and practices that are needed to produce something novel. Thus innovation policy overlaps with and is linked to science, research and technology policy. Often the distinction is not straightforward, and some of the instruments discussed in this book would also qualify as technology or research policy. However, measures are included under our umbrella definition if they are designed to develop artefacts and models for the marketplace, rather than being restricted to the production of underlying knowledge or technology. We also include the introduction and diffusion of innovation in our definition, since the bottleneck for innovations is often not their design and development, but their absorption by users. Therefore, what qualifies a ‘policy intervention’ as an ‘innovation policy intervention’ is its purpose to provide support to the process of the generation, introduction, diffusion, adoption and use of novelties.

In our understanding, the *target groups* of innovation policies are in principle all those actors who generate innovations from the supply side and also those who ask for, absorb and use innovations from the demand side. As discussed further below, we realise that this distinction is somewhat artificial; while the target groups of innovation policy instruments on the supply side will mainly be companies as the prime generators of innovations, supply-side policy instruments often also incentivise companies to link with public sector organisations or other users of innovations. Equally, demand-side measures often support the linkage between supply and demand and have systemic effects on markets more broadly.

The locus of the design and implementation of innovation policy is varied. Innovation policy is frequently designed and implemented through ministries or agencies explicitly responsible for the ‘economy’ or for ‘innovation’, whereby the division of labour between such bodies differs according to national and regional contexts. However, two additional important points must be highlighted. First, as already mentioned, the delineation between innovation policy and science, research and technology policy is blurred. Second, many of the measures that support innovation are designed and implemented by functional ministries or agencies (such as energy, health, or transport) and as such are not labelled innovation policy

measures; rather they serve the purpose of supporting innovation as a means to achieve an ultimate policy goal. This we label *functional innovation policy*. An example would be a subsidy for photovoltaic installations which catalyses the absorption and diffusion of this technology to contribute to a reduced national carbon footprint. Most of these functional innovation policies target the diffusion of innovative solutions and thus address the demand side. As this *Handbook* considers the demand side as an important dimension of innovation policy, we have included numerous examples of such functional innovation policies. Similarly, industrial policies that aim to support selected sectors of the economy also use a raft of *sectoral innovation policy* measures. Consequently, this book does not apply a strictly institutional approach to innovation policy; that is, while it focuses on measures that are labelled 'innovation policy measures' and which are designed and implemented in dedicated innovation ministries or agencies, it is not limited to these. We pursue a functional understanding and thus include policy instruments that fall within our definition of innovation policy.

1.3 INNOVATION POLICY RATIONALES AND THEIR LIMITS

Why should public policy intervene in the process of producing and diffusing innovation? Academics and policy makers have developed and adopted various ways to conceptualise and justify intervention in the innovation process.⁴ Each chapter of this *Handbook* outlines the intervention rationale for the specific group of instruments it covers. However, among the plethora of instrument-specific intervention rationales, we can identify three broad clusters that set the theoretical scene for this *Handbook*.

The first rationale is based on market failure. This assumes the existence of a market equilibrium and optimal level of inputs, outputs and activities, with technology being an exogenous factor (Laranja et al., 2008). Policy, in this thinking, has to intervene if market failures occur that would lead to sub-optimal levels of knowledge and innovation generation to achieve that market equilibrium (see for example Metcalfe, 1995; Metcalfe and Georghiou, 1998). This is the classical justification theoretically underpinned by Nelson (1971) and Arrow (1962). The main argument rests on appropriation asymmetries, that is, that the benefits of scientific knowledge, as a major input for innovation and as a public good, can and will be used, not only by the knowledge generator, but by other actors (externalities). The creator of knowledge cannot appropriate all its benefits alone, which leads to a disincentive to optimal knowledge production, as private returns are lower than public returns. The need for public policy, therefore, is to provide for knowledge production in public organisations, to financially support knowledge production and innovation activities in firms and start-up activities and to help protect intellectual property to incentivise private knowledge production and exploitation (the

temporary monopoly function). Further, market failure occurs through information asymmetries, while innovation follows from – and leads naturally to – information asymmetries, which can also hamper investment in innovation generation and absorption (Metcalfe, 1995). Market failures can occur on the supply side (generation of basic knowledge) and on the demand side (e.g. learning externalities in early adoption) and at the interface of the two (information asymmetries).

The second dominant school of thought follows an innovation systems approach that is rooted in evolutionary economics. This is not reliant on the existence of an equilibrium in the market, but rather conceptualises innovation as an interplay of system components within specific framework conditions, whereby the generation of knowledge and innovation is characterised by constant interaction and learning (Lundvall, 1988, 1992; Smits et al., 2010). This has been more recently linked to the idea of ‘functions’ of innovation policy (Bergek et al., 2008; Hekkert and Negro, 2009) and ‘policy problems’ in innovation systems (Edquist, 2011; Borrás and Edquist, 2013). A key assumption of these approaches is that policy must intervene in order to support those system functions that do not perform to a level regarded as sufficient. To that end, policy needs to be supported through an analysis of ‘problems’ (Edquist, 2011) in the system, and policy intervention follows an assessment of whether a certain problem can actually be tackled through policy intervention. Therefore, in this volume we speak of system failures as a policy intervention rationale if the functional performance of the system to create and use innovation at a rate that is deemed socially desirable is limited through:

- existing legal, regulatory and financial conditions for generating and diffusing innovation;
- inadequate capabilities in a system;
- insufficient exchange, interaction and cooperation (Klein Woolthuis et al., 2005).

Under these conditions, the system and its actors need to be provided with appropriate legal and financial framework conditions and with support to overcome the capability and cooperation failures. The main idea of innovation policy is thus to support broad capabilities, exchange, cooperation and interaction so that complementarities and specialisation can be brought together, for the production of knowledge and innovation as well as for their uptake by producers and users. It also needs supportive and stable framework conditions. Again, system failures occur not only in the production of innovation (on the supply side), but on the demand side as well (e.g. ability and willingness to adopt an innovation, to cooperate with producers or to signal a need to the market).

A last rationale is based on the idea that science and innovation can contribute to addressing societal missions and challenges. In some countries, this has conditioned the organisation of innovation policy.

A major example is the USA, where innovation policy is often linked to specific policy objectives and designed and implemented by departments responsible for those specific missions. Thirty years back already, Ergas (1987) has labelled such systems as 'mission-oriented' in contrast to 'diffusion-oriented' systems in which innovation policy is organised to upgrade the innovation capabilities and system conditions for innovation horizontally, across the system.⁵ In the last ten years or so, the strategic discourse and orientation in innovation policy across the OECD countries have somewhat shifted towards more mission or challenge orientations (Gassler et al., 2008; Mahroum, 2012; Weber and Rohracher, 2012). The underlying argument is that it is a primary duty of the state to provide direction for technological development and innovation in order to satisfy state needs (e.g. defence, security) and citizen needs (health, education, etc.), take risks and help to create the kinds of markets that are societally preferable (Mazzucato, 2011). Thus, policy support incentivises actors to invest in knowledge and innovation production in targeted areas with a specific need in mind.

While we have outlined three general rationales for innovation policy, reality is typically more multifaceted. Clearly, the linkage of rationales to policy intervention is complex and policy interventions will often draw on a mix of these rationales. For example, the decision on which instruments should be employed to steer innovation (mission orientation) will be based on considerations about the existence and nature of underlying system or market failures. In addition, the concept of intervention rationales suggests a mechanistic understanding of diagnosis and therapy based on a theory that applies only to a limited degree in a complex and dynamic innovation policy context (see also Laranja et al., 2008). Rationales are based on models of innovation systems and innovation processes that are necessarily simplifications and standardisations of complex, idiosyncratic processes, and thus can never entirely fit a given situation. Furthermore, policy makers have bounded rationalities; they are often unable to obtain the information and knowledge needed to comprehensively contextualise the instrument and define the failure or problem they seek to address (Linder and Peters, 1989, p.41). We also cannot be sure that policy makers who take certain rationales for granted and use them to justify their intervention fully grasp their meaning or have the necessary data and strategic intelligence to be able to assess whether certain rationales are justified for their situation. Innovation policy rationales, therefore, are often *ex-post* rationalisations of interventions or simplified *ex-ante* justifications in the face of complexity. This is exacerbated by the fact that policy design and implementation is a collective process, and the understanding of appropriate rationales, even the understanding of the theoretical nature of a rationale, tends to differ between actors (political decision makers, designers, implementers) and may change over time. As Laranja et al. (2008) convincingly argue, policy design and implementation are driven by a number of factors beyond a theoretically derived intervention rationale.

1.4 THE NATURE OF POLICY INSTRUMENTS AND THEIR IMPACT

1.4.1 Different Understandings of the Nature of Policy Instruments and Biases in Existing Evidence

As this *Handbook* is organised around sets of actual policy instruments, we need to critically discuss the concept of a policy instrument. The existing evidence underpinning this *Handbook* is itself based on particular constructions of what a policy instrument is, how it is designed and implemented and what effects it has. To assist readers in interpreting the synthesis and lessons we provide, we need to briefly step back and reflect on the nature of policy instruments and their role.

The political science literature has defined – broadly speaking – three dominant understandings of instruments over time (van Nispen, 2011). In the 1970s, the ‘classical’ (van Nispen, 2011, p.1) approach conceived of instruments as policy mechanisms for goal-attainment. This included ‘traditional functionalist’ perspectives which defined instruments as ‘the set of techniques by which government authorities wield their power in attempting to ensure support and effect or prevent social change’ (Vedung, 1998, p.21). In this top-down view, governmental actors have the information and absorptive capacity to identify the gap, understand the cause, design the appropriate instrument and implement it without distortion. Governmental actors are in charge at every step of the process, instruments are selected on the basis of their specific characteristics to tackle the gap and their implementation is largely a technical and mechanistic matter and largely context insensitive once the specific gap is identified. Finally, if designed and implemented appropriately, the instrument will be effective; that is, it contributes to achieving its aim, which is to close the identified gap.

This school of thought was subsequently modified, based on the realisation that it is not the characteristics of the instrument alone that determine the effectiveness of the instrument, but the context and process of its implementation (‘the instrument-context approach’; van Nispen, 2011, p.2). In other words, while an instrument is still understood as a technical device or a tool that can be applied to tackle problems, its performance will differ strongly from context to context. Therefore, one instrument with a similar delivery structure, tackling a problem of the same nature, might still perform very differently in different contexts, given the variability of actor landscapes and capabilities and the interplay with other existing instruments, broader framework conditions or broader socio-political dynamics.

A more recent, sociological school of thought takes it one step further (Lascoumes and Le Gales, 2007). According to this approach, an instrument is, by definition, only one of a whole range of variables that intervene in the system and affect target groups. Here, the implementation structure and process of the instrument are seen as major factors, with implementation agents creating their own specific understanding of the problem, the target

group and the mechanisms of the instruments. In this sociological view, instruments are not technical, neutral devices that can be selected and implemented to solve a 'given' problem. Rather, they are to be conceived as 'institutions' (Lascoumes and Le Gales, 2007) that structure collective action and that must be actively constructed or adapted. In this understanding, instruments represent certain normative and causal ideas, as part of a broader policy (Borrás and Edquist, 2013), that are changeable in the process of adoption and implementation (Linder and Peters, 1989; Lascoumes and Le Gales, 2007). In this social and interactive process, problems may be redefined and instruments adjust their nature and create their own dynamics that necessarily are different with each application, between contexts and over time. Moreover, in this perspective, instruments and the way they are implemented are a result of political processes, with the instrument being ultimately a manifestation of a dominant worldview and influence. These political processes are thus not independent of power and interest. They involve the principal (the owner of the instrument, with ultimate responsibility), the agent (responsible for implementing), individuals and specific groups representing principal and agent, and interested stakeholders more generally, all with their own initial views and interests. In sum, instruments are not understood simply as neutral tools to be used for specific, clearly defined problems, but as social constructs that are often contested and highly context dependent, that are linked to the dominant problem definition and which develop their own dynamics over time.

This more complex and less technical or functional understanding of instruments as institutions has become more relevant, it appears, with shifts from hierarchical, top-down governance to interactive, collective governance (Borrás and Edler, 2014) and the enormous growth in the number of instruments. In what Salamon (2000, p. 1612) calls a 'revolution', the number and variety of policy instruments in all fields have greatly increased and, more importantly, their associated delivery structures and logics have changed. Governmental action to design and implement instruments has been complemented by governance processes whereby the design and implementation not only are often the collective actions of a principal (e.g. a ministry) and an agent (e.g. a funding agency), but also involve other stakeholders, such as interest organisations, private consultancies, network managers, firms and universities. These stakeholders take greater responsibility for instrument design and implementation and increasingly, in the case of public-private instruments, for the co-funding of collective action. While many instruments covered by this *Handbook* are still dominated by governmental actors, an increasing number are implemented in concert with stakeholders (e.g. clusters, networks, pre-commercial procurement, and foresight exercises). This, in turn, makes a critical appraisal of the mechanisms by which those instruments are designed and implemented more compelling, and the increase in complexity and idiosyncrasy at the same time confounds the transferability of findings regarding their impact.

While many analysts, evaluators and policy makers would agree that this is an overly simplified model of how things actually work (e.g. Borrás and

Edquist, 2013), the majority of evaluations and impact analyses examined in this *Handbook* follow a conventional, somewhat functional approach, looking at the effects of instruments as technical, neutral devices for intervention by state actors. Often, this is done in a sensible way involving a contextualisation of the analysis and a commentary on the importance of context. However, there are multiple cases in which the contextualisation is implicit, and seldom do we see studies that elaborate on the actor constellation and the power games that influence instrument design and implementation, on the changes in its meaning during implementation or on the role of non-state actors in design and implementation.

1.4.2 Limitations of Impact Analyses

We also have to stress limitations as regards the notion of impact. Modifying the concept of Reale et al. (2014, p.37), we can define the impact of an instrument as the change that can be wholly or partially attributed to it. Conceptually, impact can be intended or unintended and it can be expected or unexpected (Reale et al., 2014). Much of the existing evidence on impact, especially from the evaluation studies examined in our analyses, focuses largely on intended and expected impacts, that is, on assessing performance against the initial goals of an instrument. In other words, while this *Handbook* strives for a broad understanding of innovation policy impact, existing impact evaluations (and many academic studies) are often reduced to the examination of goal attainment, albeit differentiated for different types and levels of goals. While the chapters in this book report on and analyse impact as broadly as the underlying data allows, there frequently remains a certain restriction to goal attainment. This is a conclusion we discuss in the final chapter but which needs to be stressed already here in the introduction.

1.5 INSTRUMENT CLASSIFICATION, DATA AND METHODS

1.5.1 Our Classification of Innovation Policy Instruments

One of the first challenges in compiling a synthesis of evidence on innovation policy is to organise the evidence base systematically into manageable and logical subsets through a classification process. There are numerous logics for classifications of policy instruments (Salamon, 2000; Hood, 2007; Lascoumes and Le Gales, 2007), and each classification must be appropriate to the analytical purpose it is intended to serve (Salamon, 2000; Hood, 2007). While a number of typologies exist for innovation policy based on political priorities or other ad hoc considerations, they are not suited to the purpose of this *Handbook*, which is to give academics and policy makers an overview of existing evidence to enable them to learn about the impact of instruments according to their own specific *policy objective*. Existing typologies of innovation policy instruments did not fit our objective-oriented purpose and

tended to be overly complicated, mainly because they reflect the complex political priorities at the time they were devised. For instance, the European Commission's (EC) ERAWATCH and Trend Chart policy framework presents 37 types of innovation policy instruments at three levels.⁶ Not all categories were relevant for our purpose, and some appear very specific and represent a small niche of instruments, typically reflecting prior political priorities. Other typologies are not organised according to intervention goals or target groups, but according to the different modes by which they influence their target group. For example, the three-fold typology of Borrás and Edquist follows a well-established tradition in political science that distinguishes between regulatory instruments, economic and financial incentive instruments, and 'soft' instruments. Since this does not allow the classification of instruments according to policy goals, the authors create an elaborated matrix of 'policy problems' and instruments in their three-dimensional classification (Borrás and Edquist, 2013).

For the classification⁷ used in the *Handbook*, we start from the understanding that many readers will enter from the perspective of a *policy problem* or a *policy goal*; that is, policy makers and other stakeholders would wish to look at prior experience and evidence to better understand how they could achieve a specific policy goal. Thus, we identified seven major *innovation policy goals* within the realm of our innovation policy definition.⁸ On the basis of these, we identified and allocated instruments that are perceived, in the existing literature and evidence, as being the most typical and critical for achieving these goals.

We then distinguished between those instruments that target preliminarily producers of innovation (i.e. intervene at the *supply side*) and those that target (potential) users of innovation (i.e. intervene at the *demand side*).⁹ Innovation policy is geared towards generating and diffusing innovations, but, as also discussed earlier, this can be done by supporting or influencing the supply side, the firms themselves, or the demand side and the context in which firms operate (Edler and Georghiou, 2007). In the former, those generating innovation are supported to do things differently, that is, to innovate more quickly, be more interactive, or do so with different kinds of partners. In the latter, public and private actors are supported in order to formulate demand for innovations and be in a better position to apply them. We realise that the distinction between supply- and demand-side policies can be a crude one, as many interventions are based on policy failures (see below) that arise out of a lack of interaction between demand and supply and stem from coordination problems in the interplay of demand and supply, across markets (Bleda and Del Rio, 2013). However, we have chosen to categorise policy interventions along demand and supply side because most interventions initially target actors in their primary function to either generate or demand and use innovation. Therefore, this *Handbook* includes both instruments to support the supply side and those supporting (potential) demanders for innovation and – as far as the available evidence permits – the deliberate combination of the two. Table 1.1 depicts our taxonomy.

Table 1.1 Instruments, orientation and goals

Chapter number and instruments	Overall orientation			Goals						
	Supply	Demand	Increase R&D spend	Skills	Access to expertise	Improve systemic capability, complementarity	Enhance demand for innovation	Improve framework	Improve discourse	
2 Fiscal incentives for R&D	●●●		●●●	●○○						
3 Direct support – firm R&D and innovation	●●●		●●●							
4 Policies for training and skills	●●●			●●●						
5 Entrepreneurship policy	●●●			●●●						
6 Technical services and advice	●●●			●●●						
7 Cluster policy	●●●					●●●				
8 Policies to support collaboration	●●●		●○○		●○○	●●●				
9 Innovation network policies	●●●					●●●				
10 Private demand for innovation		●●●					●●●			
11 Public procurement policies		●●●	●○○				●●●			
12 Pre-commercial procurement	●○○	●●●	●●●				●●●			
13 Innovation inducement prizes	●○○	●○○	●●●				●○○			
14 Standardisation and standards	●○○	●○○					●○○	●●●		
15 Regulation	●○○	●○○					●○○	●●●		
16 Technology foresight	●○○	●○○					●○○	●●●	●●●	

Note: ●●● = major relevance, ●○○ = moderate relevance and ●○○ = minor relevance to the overall orientation and stated innovation policy goals of the listed innovation policy instruments.

This goal-driven approach also allows the inclusion of a range of instruments that are not *primarily* geared towards improving innovation capabilities and activities, but – as introduced above – are designed for other policy goals and can also affect innovation behaviour and performance at the same time. This is especially true for instruments that are geared towards improving the skills base and demand conditions for innovation. Although such policies were rarely designed for or evaluated against their impact on innovation activities per se, it is important to discuss innovation policy in such a broader, inclusive approach, to overcome any narrow compartmentalisation. In addition several instruments may serve multiple goals. Thus, while the individual chapters deal with broad groups of instruments and goals, the allocation of instruments is generally based on their primary goal and their discussion is limited mainly to a single chapter. Since this taxonomy cannot take account of the potentially important role of the interplay of instruments, the book contains a specific chapter on policy interrelationships and mixes of instruments.

1.5.2 Approach and Underlying Data

This *Handbook* consists of 18 chapters, including this introduction. Fifteen chapters are devoted to syntheses of the evidence on categories of innovation policy instruments, one chapter considers evidence on policy mixes and interactions, and a concluding chapter synthesises the findings and reflects on the quality, availability and appropriate use of evidence. The chapters that consider specific innovation policy instruments all follow the same basic structure: they start with a broad discussion of scope of the instruments, continue with an overview of their specific rationales, comment on the underlying data sources, provide a detailed synthesis and analysis of the existing evidence and finally reflect on the specific lessons that can be learned about the evaluation of the instruments and on the performance of the instruments and – as far as evidence was available – the context-specific requirement for performance.

The chapters in the *Handbook* draw on existing available evidence. After a broad scanning exercise, sources were selected based on expert judgement of both relevance and quality. We reviewed formal evaluation reports, academic analyses of innovation policy impact¹⁰ (primarily from peer-reviewed journals), and other relevant documents. Each chapter presents details on the search strategy used. In total, more than 1200 items were reviewed, 725 of which provided evidence (216 evaluation reports and 509 academic publications providing evidence), while 600 provided other conceptual and empirical background to better understand the nature and setting of the specific instruments. (Table 1.2 summarises the evidence used by core chapters in the *Handbook*.)

1.6 THE STRUCTURE OF THE HANDBOOK

The book is structured around the innovation policy goals outlined in Table 1.1. Chapters 2 and 3 cover evidence on the effectiveness of indirect and

Table 1.2 Handbook evidence sources

Chapter number and instruments	All sources (including background and context analyses)	Academic articles (evidence-giving)	Evaluation reports
2 Fiscal incentives for R&D	49	29	17
3 Direct support – firm R&D and innovation	132	67	26
4 Policies for training and skills	107	50	14
5 Entrepreneurship policy	66	25	6
6 Technical services and advice	64	22	32
7 Cluster policy	112	38	17
8 Policies to support collaboration	104	43	21
9 Innovation network policies	46	15	13
10 Private demand for innovation	138	35	14
11 Public procurement policies	51	4	7
12 Pre-commercial procurement	54	15	14
13 Innovation inducement prizes	28	10	2
14 Standardisation and standards	68	19	3
15 Regulation	131	106	12
16 Technology foresight	37	11	4
17 Innovation policy mix	47	20	14

direct support instruments which primarily aim at increasing R&D spending. Evidence on the instruments for increasing non-financial capabilities are analysed in Chapter 4 (policies for training and skills), Chapter 5 (entrepreneurship policy) and Chapter 6 (technical services and advice). The next set of chapters, Chapter 7 (cluster policy), Chapter 8 (policies to support collaboration) and Chapter 9 (innovation network policies), cover instruments that target systemic capabilities and complementarities. Instruments that enhance the demand for innovation are discussed in three consecutive chapters (Chapters 10–12) analysing instruments to stimulate private demand for innovation, public procurement policies and pre-commercial procurement, respectively. Instruments covered in Chapter 13 (innovation inducement prizes) encompass a number of different policy goals ranging from increasing R&D spending to enhanced demand for innovation. Evidence on the instruments related to framework conditions shaping both supply and demand are addressed in Chapter 14 (standardisation and standards) and Chapter 15 (regulation). Chapter 16 (technology foresight) discusses the evidence on instruments that design and apply discourse approaches to define innovation policies and support the communication between supply, demand and policy. The penultimate chapter (Chapter 17) concerns the relatively scarce explicit evidence on policy mixes. Despite the scarcity of evidence, we regard this as a crucial chapter because it highlights the importance of further developing an understanding of the interplay of instruments, both for attempts to deliberately design and coordinate a mix of instruments and to understand

the inevitable influences of an instrument on others in the system. Finally, Chapter 18 synthesises the evidence and critically discusses the implications of our findings.

1.7 INTERPRETING RESULTS AND DRAWING LESSONS

Systematically collating and analysing the available evidence on the performance of policy instruments is a useful basis for policy learning. However, it will be of limited use or even counter-productive if its limitations are not understood. Three caveats should be kept in mind when interpreting the results discussed in the *Handbook*.

First, following from the above discussion on the nature of policy instruments, one has to be very careful to understand the sensitivity of context in its broadest sense. Meaningful lessons from particular policy and programme assessments can be drawn and transferred only if specific contextual circumstances are considered. Socio-economic and 'instrumental' contexts differ, as do political and administrative dynamics. As far as possible, this *Handbook* attempts to reflect on this context sensitivity, but the underlying evidence often lacks a thorough analysis of context and of implementation structures and processes. The evidence and insights about innovation policy impacts identified are most useful if used to prompt and inform reflection and to spark debate. While analysts and decision makers may draw many lessons from the significant body of work amassed in this *Handbook*, lessons on 'what works' will only be appropriate at the level of basic mechanisms and against an understanding of contextual differences. When interpreting insights gained from the *Handbook*, policy makers need to reflect upon their own context, the objectives they seek to achieve, and the capabilities available.

A second factor influencing the generalisation of lessons relates to methodology and conceptualisation. The use and interpretation of existing evidence are highly dependent on the methods used and the underlying theoretical assumptions of the studies synthesised. The chapters in this book illustrate that the same programme can be assessed in different ways depending on the kind of method used and the theoretical lens applied. This is a source of richness and reflection, but needs to be kept in mind when interpreting individual evidence on the effectiveness of policy interventions and in drawing more general lessons.

Third, the standpoint and absorptive capacity of the analyst and the reader may condition what is gleaned from existing evidence. Evidence can be interpreted differently as actors, often implicitly, apply varied theories and assumptions about policy intervention rationales and the mechanisms of interventions, and have different understanding of methods applied. Moreover, over time, new evidence and methods may be developed, and circumstances evolve, turning what once appeared to be a general lesson into a specific case of limited general value.

These three caveats are, of course, common problems in policy analysis and deliberation. However, we need to re-emphasise these cautions in the context of this volume precisely because we are convinced that it is a valuable reference for academics and policy makers. We position this *Handbook* as a source to prompt users to reflect on their own situation and problems, to foster appreciation about the relationships and varieties of contexts and instruments, and to consider the opportunities and limits of evaluation and learning from evaluation in innovation policy. We anticipate that, if readers approach this book with the necessary critical mind towards transferring lessons, this *Handbook* can make a major difference in their understanding of innovation policy.

NOTES

1. Nesta is a non-profit British innovation charity with 'a mission to help people and organisations bring great ideas to life'. See <http://www.nesta.org.uk/>.
2. More information about the project can be found at the project website (<http://www.innovation-policy.org.uk>). Preliminary versions of the documents along with annotated references can be found at the website, but the material produced in this *Handbook* is extended, updated and refined.
3. A prior effort to systematically collect and analyse evidence in innovation policy was the INNO-Appraisal project, which collected 171 evaluations in Europe in order to understand methodological features of innovation policy evaluations (Edler et al., 2012). This study focused exclusively on methodological issues and thus fell short of a full-fledged evaluation synthesis, as it did not interpret the actual findings. However, the study provided a useful dataset, which subsequently contributed to the evidence base included in this book.
4. See Laranja et al. (2008) and Mytelka and Smith (2002) for a broader discussion of the evolution of policy rationales and the relation between policy models and rationales and policy making.
5. Mission orientation has often been linked to very specific large-scale challenges supported by 'mission programmes' (Manhattan Project, Man on the Moon) (Foray et al., 2012).
6. See http://erawatch.jrc.ec.europa.eu/erawatch/opencms/research_and_innovation/.
7. We use the term 'classification' here because typologies should have mutually exclusive categories, while our goal-driven approach produces overlaps between categories.
8. The advisory board of the underlying study was helpful in commenting on initial choices and definitions made.
9. For a similar suggestion in the political science literature see Salamon (2000).
10. In the remainder of this *Handbook* we use the term 'evaluation' in a broad sense, encompassing commissioned studies to ascertain the effects and efficiency of policy interventions as well as broader, academic analyses which often focus on specific aspects of an intervention. Equally, we use the term 'evidence' when referring to the results of both commissioned evaluation and broader academic studies.

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