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OUTCOMES-ORIENTED INNOVATION POLICY DESIGN
An analytic-diagnostic framework

Sami Mahroum

Introduction: the need for multi-level innovation policy

Over the last two decades, the world has witnessed a proliferation of innovation strategies. Innovation policy has emerged as a distinct area offering a portfolio of instruments to achieve socio-economic goals ranging from raising productivity, to rejuvenating economic regions, through to advancements in environmental, defence and health-related fields. The rise of innovation policy as a distinct policy domain has been the direct result of the popularisation of the concept of a ‘knowledge based economy’, wherein economies derive competitive advantage through their generation and exploitation of innovations. As a consequence, governments around the world have drafted ambitious plans to spur innovation in their respective economies, pursuing distinct objectives in information and communications technology (ICT), education, infrastructure, finance, and other areas that enable innovation to occur. The ultimate aim of innovation policy is to foster innovation by removing the obstacles that could otherwise hinder its ability to flourish. Innovation policies are, therefore, instruments of government intervention that effectively solve two ‘problems’. First, broad socio-economic challenges such as economic growth, and second, barriers and constraints to achieving specific socio-economic goals. For example, an innovation policy instrument that targets the lack of venture capital by making funds available for potential innovators, aims to remove a barrier, which in this case is the lack of funds as well as spurring innovation. This instrument is thus based on an assumption that there is a link between the provision of funds and innovation activity, whereby the lack of the former results in a dearth of the latter.

But all too often such theoretical links are not founded in evidence and innovation policy gets carried away with a focus on what I will call here the ‘intermediate problem’. For example, while funding is required for almost any economic activity, funding constraints may improve the quality of policy ideas by driving up competition for limited funds. Furthermore, the shortage of well developed business plans is sometimes a bigger problem than the shortage of funding, where the former drives the latter. In this case, it may be more effective to develop programmes for enhancing skills in preparing business plans.
Thus, such constraints represent ‘intermediate problems’ that prevent the achievement of socio-economic goals, such as economic growth. Once such intermediate problems have been identified, standard economic analysis is often deployed to design instruments of intervention, such as subsidies, tax breaks or direct funding. In this respect, innovation policy makers have a plethora of funding tools ranging from the mandatory (i.e. stick) to the inducers (i.e. carrots). Some of these instruments are designed to target the supply-side of innovation activity, such as skills, funding and infrastructure, and others target the demand-side such as subsidies, regulations and public procurement.

But if there is a need for innovation why do we need government intervention?

All innovation policies have as their raison d’être a problem that may be solved through innovation. The rationale for any government intervention is based on the premises that a ‘problem’ first exists; which second, ‘innovation’ may solve, and thirdly that the private sector isn’t able to solve the problem on its own. If these three conditions are not present, policy intervention is unwarranted in principal (Edquist 2009). In practice, however, innovation is often held to be a ‘public good’ where the government is called upon to make a corresponding intervention (Balalaeva 2012).

Yet more often than not, things go wrong where a problem, or its underlying premise, is not well framed, and government intervention cannot be well targeted to make the difference that it intends. For example, it is often incorrectly assumed that economic growth in advanced economies is more of an innovation problem than an efficiency problem (Abramovitz 1956; Solow 1957). However, unlike developing economies, advanced ones have high existing levels of resource mobilisation and utilisation so that they cannot easily achieve greater economic growth by the further mobilisation of resources alone (for a discussion see Fagerberg et al. 2010). To improve economic growth it is assumed that these countries need to innovate in order to extract more value from their resources, i.e. their labour, capital or land. This assumption is however only partially true. While internal innovation in this way may achieve marginal gains in productivity, mature economies may achieve higher growth by acquiring and implementing innovations developed beyond their borders (Mahroum et al. 2008; Bhidé 2009). The premise that a country needs to innovate in order to grow does not represent an accurate framing of the real problem, which is the need to improve efficiency and productivity. These in fact can be achieved through a variety of means of which innovation is only one. Another such example of a problematic premise that often follows on from the first premise is that insufficient venture capital is a major obstacle to innovation. The prescribed solution is invariably to have more venture capital overlooking an old chicken and egg problem of whether venture capital follows innovation or innovation follows venture capital?

In fact, the experience of many economies, at both national and sub-national, regional, city and state levels, show that higher levels of education sometimes accelerate certain social problems such as ‘brain drain’ as graduates seek to maximise the benefits of their talent (Molho 1986; Mixon and Hsing 1994; Caponi 2006 using data from Mexico). Graduates in smaller cities flock to larger ones, graduates from poorer states go to richer states, and graduates from poorer countries emigrate to richer economies. In other cases, graduates simply go unemployed or under-employed as a 2013 report by the UK Office of National Statistics shows (ONS 2013). The experiences of internal brain drain in England, Italy, Spain and Portugal attest to this phenomenon (Marinelli 2013), as does the migratory brain drain from Greece, Ireland or Mexico to Australia, Canada, Germany and the US (Caponi 2006).
The misplaced or inflated premises that characterise some innovation policies are too many to enlist here, but we will give one more example. Lack of sufficient research and development (R&D) activity is often seen as a major barrier to technological innovation by most governments around the world. Because R&D is costly, many assume that the marketplace has failed to provide adequate capital, and that governments must directly or indirectly intervene to fund R&D. The premise being that R&D will lead to innovations that in turn translate into new or better goods and services that boost economic growth. The sobering reality is however that R&D does not typically result in such innovations and when it does, most innovations do not culminate in new products and services and the few that do, do not survive on the shelves for more than a year (Cooper 2000). Very little in the way of cost–benefit analysis is usually undertaken to justify government interventions in this domain, when in fact such expenditure is especially vulnerable to free-riders and exploitation and appropriation of return by economic agents external to the home economy (i.e. other regions or countries). A policy to increase the number of graduates, R&D activity or venture funding in one place may in fact result in more value being created elsewhere, sometimes where the ultimate outcome is that a poorer economy subsidises a much richer one.

Too much focus on rationale for intervention and less on causality of factors

Existing studies in designing innovation policy have often been drawn from a single theoretical perspective, such as neoclassical economics (Lipsey and Carlaw 1998; Metcalfe and Georgiou 1998; Hauknes and Nordgren 1999), or systems of innovation (Etzkowitz and Leydesdorff 2000; Lundvall et al. 2002; Edquist 2005; Lundvall 2010) to justify government intervention. Some researchers have attempted to integrate these two different theoretical perspectives (e.g. Salmenkaita and Salo 2002; Chaminade and Edquist 2006; Laranja et al. 2008; Flanagan et al. 2011). These attempts however do not put socio-economic outcomes at the core of the analysis, but instead on the rationale for government intervention. It is like saying that once a problem has been identified as a problem of the market or systemic failure (as some would prefer to call it), then the rest of the policy design process becomes straightforward. However, regardless of the conceptual framework underpinning the policy, there remains a design problem wherein innovation per se is often held to be the ultimate desired outcome rather than its tangible benefit to society as a whole and the economy. In this regard, Etzioni (1985) suggests that a multi-variable incorporation should happen at the practical level of policy development and not at the theoretical–disciplinary level (Etzioni 1985: 388).

The following questions become essential for the design of innovation policy:

1. What is the ultimate desired outcome?
2. What are the constraints/barriers/problems preventing us from achieving that outcome?
3. Why does a solution for these problems require a government intervention?
4. What kind of intervention instruments may solve the problem?
5. What objectives should the intervention instruments have?
6. Does reaching the objectives get us closer to achieving the desired outcome?

These six questions represent key essential components of innovation policy design – Outcomes, Constraints, Rationale, Instruments, and Objectives – that link different theoretical underpinnings in innovation policy at a practical level.
The process of innovation policy design begins with identifying the desired outcome before identifying the problem. Problem framing should emerge in the context of appreciating the desired outcome and not in a vacuum as a standalone exercise. For example, a country with a high proportion of STEM graduates may not define this as a problem, whereas in the policy context of lowering youth unemployment, an over-supply of graduates given the particular labour force needs of a country may be defined as a problem. Deciding on whether there is a justification for government intervention should come third and in light of the desired outcome and the nature of the problem. First, policy makers need to establish what their desired outcome is – e.g. cleaner air – and whether the solution resides with a specific innovation – e.g. cleaner engines. Then, it needs to establish what the roots of the problem are, which for example, could be manifold: too many motorists with dirty engines, alternative cleaner engines do not exist or are expensive, cleaner means of transport are not available, and/or too many people living and working in a location. When this is established, an innovative solution can be sought in the form of a cleaner engine, alternative transport, a new economic strategy to reduce population concentration etcetera. Depending on the solution chosen, it can then be decided whether there is a role for government. For example, if the most feasible solution is to adopt cleaner engines, the government may have little leverage if the country does not already have an industrial legacy and infrastructure in mechanical engineering. But a government can help to promote the adoption of alternative lower-tech means of clean transport, including collective transport and bicycles.

The instrument of government intervention is too often determined by what is familiar, with policy makers adopting ineffective instruments because these were the only ones that the government believed it was capable of delivering. In practice, the market failure is matched with a government failure, when in fact no action would have been better than poorly conceived action. This is an important consideration in policy design as it ties the choice of and setting of objectives for policy instruments to what should be achieved in order to reach an ultimate desired outcome.

**Designing the policy design**

Despite the existence of various frameworks for conducting policy analysis, very few have made their way into innovation policy. While a detailed review of the various available public policy analysis tools lies beyond the scope of this chapter, it is useful to provide a quick overview of some broad categories. First, there are process-based models that attempt to analyse policies as a series of steps (e.g. Bardach 2000). These models have been criticized for being overly linear and simplistic (Graham 1993) and most tend to take a problem as their starting point. Second, there are policy analysis tools designed specifically to determine what is needed to achieve specific targets (i.e. service or function oriented policies), such as minimising ecological impact or reducing traffic fatalities (Simon and Barnard 1976). These are often based on rationalistic (micro-economic) models that define problems as types of market or government failure and then link the problems to sets of possible solutions (e.g. Weimer and Vinning 1999). The problem with the latter is that they become very instrument-target oriented and less comprehensive. As such, instruments may be designed to achieve a target effectively and efficiently, but the choice of target may be wrong. Likewise, a shortfall in achieving the desired outcomes often occurs due to implementation problems that are usually unaccounted for in such analyses.

In many of these analyses, it is also not clear how policy outcomes will be achieved; and explicit consideration of the outcomes is often relegated to the final evaluation stage of the process (Earl et al. 2001). While evaluation is important for determining whether or not policies
have been successful, they are sometimes not feasible to perform in a robust manner due to the practical problem of monitoring complex causal chains, but more commonly because of implementation problems (McLaughlin 1987). The result is that many policy analyses end up having little if any impact on future policy prescriptions (Salmenkaita and Salo 2002).

Where innovation policy research has been particularly lacking is in the development of analytic frameworks devoted to socio-economic outcomes. This is despite the efforts made by some innovation economists (such as David and Foray 2009) to demonstrate the link between innovation and economic growth, with the latter being defined as a socio-economic problem. Defence, environment, health, security and other varied societal concerns also constitute important objectives in innovation policy. In fact, most government supported mission-orientated innovation programmes fall into one of these categories, albeit with much of the focus of debate around the link between innovation and economic growth being centred on R&D and technology (Ulku 2004). Yet a growing body of research is pointing to economic growth resulting from learning and the exploitation of learning, rather than from original innovations (Lundvall 2007; NESTA 2007; Bhidé 2009). The next section will introduce the theory and literature behind the OCRIO framework to illustrate its applicability to practitioners.

The OCRIO analytic diagnostic framework

As discussed earlier, governments around the world are increasingly adopting broad policies that foster innovation and enhance its economic impact. For example, the EU’s Lisbon Agenda, established in 2000, and the ‘Innovate America’ strategy in the United States of America (USA) in 2005, are initiatives grounded in the rationale that innovation activities contribute positively to socio-economic goals at the macro level (OECD 2007, 2010). As mentioned earlier in the chapter, this widely held belief has meant that innovation policy makers have not felt much need to examine the veracity of the actual linkages between various innovation policy instruments and actual socio-economic goals, especially at the meso-level, i.e. between high level policy making and delivery/implementation agencies.

In the remainder of this chapter, we will describe how the OCRIO structured framework can be used by meso-level policy makers to navigate the multi-layered nature of problem formulation and policy development. The acronym OCRIO stands for the following sequence of steps in an analytic diagnostic framework: Outcome, Constraint, Rationale, Intervention and Objective (OCRIO):

**Outcomes** refer to the desired ultimate outcome of a policy.

**Constraints** refer to obstacles and barriers that may prevent or hinder achievement of a desired outcome.

**Rationales** refer to the justification for governmental intervention, as opposed to other players in an innovation system.

**Interventions** refer to the type and nature of the policy intervention, e.g. regulatory, financial, etc.

**Objectives** refer to the change needed to make progress towards the desired ultimate outcome.

The framework takes ‘outcomes’ as its starting point, rather than ‘problems’. This is because the desired outcomes tend to be easier to identify and agree on than problems. Also problems may be hidden, whereas desired outcomes are a matter of subjective expression, collective consensus, or established by vote. More important perhaps, orienting policy development towards outcomes rather than problems leads to different types of policies with different results. The
OCRIO framework is an attempt to constructively sway (innovation) policy discussions away from an orientation towards the intermediate problem (constraints) towards one that is aimed at the ultimate outcome. While at the level of policy instrument (the micro-level) a problem orientation might be a needed exercise that helps design effective policy instruments, at the policy level a greater orientation towards economic and social value creation is needed.

**Outcomes**

There are numerous examples where the disjoint between innovation policy and socio-economic goals has had a negative impact on actual policy outcomes. For instance, an innovation policy intervention might be successful in removing specific barriers (e.g. high market price) to the adoption of a desired solution (e.g. fuel cell vehicles), but the solution itself does not achieve the ultimate desired outcome (e.g. urban pollution). A more obvious example perhaps is the widespread rise of technology incubators to foster regional economic development. Here the desired ultimate policy outcome is regional economic development, which may be measured by a range of indicators including rapid economic growth, higher employment, increased productivity and improved living standards. While many of these incubators are held up as successful endeavours, only a few can claim to have been successful in delivering a desired level of sustainable economic development (European Communities 2007).

Outcomes can be determined in a number of different ways. Depending on the political system, policy outcomes can be determined democratically, ‘technocratically’, or by some other consensus. Where outcomes are determined in a democratic system, policy makers are interested in re-election, which influences the choices that they make in the policy process (Burstein 1991). In technocratic political systems, socio-economic goals are determined on the basis of their technical merit in the eyes of expert bureaucrats and others (Forester 1993). Lastly, some socio-economic outcomes are determined in conjunction with high-level committees or planning commissions that engage with the electorate and governments to find consensus about the direction of outcomes.

However, given the plethora of policy analysis approaches available to policy makers, understanding why governments adopt a specific method is still somewhat an enigma. In order to cope with complex problems, policy makers often choose policy instruments that have shown promise in other countries (Walker 1969). Hence, due to the difficulty of rationalising some decisions, policies are sometimes adopted without a clear rationale (Lindblom 1965). Ideology instead plays an important role in determining the kinds of instruments that policy makers adopt. However, aside from replicating policies, policy makers also select policies based on their previous experience. Lastly, ideology also plays a role in influencing policy choices. Governments often seek policies that closely match the preferences of the state. This ideological compatibility is important because it helps governments predict how the electorate will respond to new policies and subsequently helps politicians assess their chances of re-election (Grossback et al. 2004). All these factors influence the policy process, starting from policy selection and through to evaluation. Hence there is a pressing need for an innovation policy tool that compels policy makers to link innovation policies, socio-economic outcomes and to justify their policy rationales.

**Constraints**

Once outcomes have been determined, policy makers can move on to identifying any foreseeable constraints to their achievement. Understanding the constraints for achieving desired outcomes
is a crucial aspect of the solution finding process. Identifying the constraints implies understanding the restrictions that may prevent a solution from working as planned. Since ultimate outcomes can be broad and involve many actors, institutions and policy sub-sectors, the nature of constraints will vary in accordance with the perspectives of the various stakeholders (Yanow 2000). What is a problem for some is not necessarily a problem for others. The nature of what constitutes a problem thus becomes more fluid. Policy makers may make use of various evidence-based techniques to support their understanding of the relevant constraints and to try to ensure that their policy is grounded in evidence.

However, there are two key challenges that policy makers face when breaking down complex problems. First, agreeing on the nature of the ‘problem’. That is, the way in which a potential barrier to the proposed solution is initially described is critical because it shapes later efforts in the policy action process. Policy makers often have to decide on a variety of issues within a short space of time. They often lack the time and resources to thoroughly investigate the apparent barriers at hand. Furthermore, given that the nature of the ‘problem’ is defined differently by different groups (Yanow 2000), data collection may be biased by these perceptions and therefore does not ensure that good decisions are made (AbouZahr et al. 2007). ‘Problems’ are often framed in the media, lobby groups, various political forces, or on the basis of an immediate crisis (Dovers 1995; Young and Mendizabal 2009). Problems vary not only in definition, then, but also in perceived seriousness and tractability (McLaughlin 1987). Not all problems merit government attention and nor can all problems be solved by government.

Many innovation initiatives fail because they are either not linked to the broader socio-economic outcomes that they were meant to help to achieve or because they were not linked to any outcome per se. For example, a government may seek to build infrastructure, invest in education and reduce bureaucracy among other outcomes. While each of these outcomes can function as independent goals, policy makers sometimes lack the resources to develop a coherent portfolio that addresses these outcomes in a linked way to maximise the economic contributions. The OCRIO framework is an attempt to help policy makers forge these linkages and frame policy constraints to maximise economic impact, as opposed to value or efficiency based problem framing. By linking desired outcomes to discussions of the nature of constraints, the OCRIO framework emphasises the link between socio-economic goals and the subsequent interrelated decisions that need to be taken (Quinn 1980).

**Rationale**

In addition to problems with linking innovation policies and socio-outcomes, policy makers also need to switch between different rationales in order to achieve different outcomes. While there is consensus that progress in science and technology is essential for innovation and productivity growth in both the public and private sectors (OECD 2007), there is considerable debate about the role of government in ensuring scientific and technological innovation. Moreover, frameworks for analysis of innovation policy in the academic literature distinguish between two rationales for government intervention: systemic or market failure. However, neither place adequate attention on broader socio-economic goals in the justification for intervention.

According to mainstream neoclassical economics, a government should only intervene in the economy when markets are not efficient, with the underlying assumption that the intervention will improve the efficiency of that national economy. For example, firms won’t invest in R&D unless they believe they can recuperate costs and achieve economic gains through the sale of new products or cost savings due to improved production processes.
On the other hand, analyses of systemic failures are better at capturing problems associated with the collective underpinnings of innovation (Edquist 1997; Lundvall et al. 2002). According to this systems view, innovation occurs through the interactions among a set of institutions that influences the innovative performance of individual actors (Nelson 1993). These actors include universities, research institutions and corporate research centres as well as firms. A systemic failure is said to occur when the practices, incentives and priorities of these various organisations are incompatible, resulting in a lack of interaction and coordinated activity (Carlsson and Jacobsson 1997; Edquist 1997; Woolthuis et al. 2005). The OECD (1997) was among the first to popularise the idea that a systems of innovation framework could provide a new rationale for government intervention. Here, governments intervene in order to facilitate knowledge transfer between organisations in the different phases of the innovation process to help prevent systemic failures arising from the lack of interaction and coordination among institutions.

Many innovation scholars consider the theory of market failure inadequate for the purpose of designing government interventions, as it tends to ignore the economic structure or institutional frameworks in which innovation policy arises (Edquist 2005; Woolthuis et al. 2005; Lundvall 2010). For example, an innovative solution can be hindered by a clash of cultures between academic institutions and commercial firms. This can happen in the clear presence of a market opportunity.

Neither the framework for analysing market failure nor systems of innovation are used to justify government intervention in innovation from the perspective of the ultimate desired outcome. They are both often used to justify (or object to) government intervention in innovation activities per se. For both frameworks to be useful analytic tools, they need to be applied to a broader context of policy analysis – one that takes into account that innovation itself is an intermediate tool to achieving ultimate desired outcomes. In this regard, the systems of innovation framework can be useful used as a mapping and scanning tool to identify the wider environment in which a barrier and a potential solution exist; whereas the market failure framework helps to identify whether the nature of the barrier requires government intervention, a private solution, or a combination of both.

**Intervention instruments**

Different policy instruments entail different assumptions about policy problems and their solutions. McDonnell and Elmore (1987) identify four such types of instruments. First, there are instruments based on mandates in which rules are designed to create uniformity and where the policy contains the necessary information for compliance. Here, achievement of the policy objectives can be measured in terms of the degree of compliance. For example, a government may legislate health and safety regulations for the production or consumption of a product that dictates how responsible actors are expected to behave. Such instruments can also be effective in mobilising resources to support policy objectives, such as attracting R&D investment to achieve a particular environmental standard. Second, there are inducements that encourage individuals and agencies to produce innovations when capacity exists but additional resources are needed to mobilise them. In this case, success in achieving objectives can be measured according to the innovation outcomes generated by a specific policy inducement. Third, there are capacity intervention instruments that are designed to build capacity, where knowledge, skills and competence are required to produce value in the future that would not otherwise exist. And finally, there are system changing instruments that are utilised to create new incentives that existing institutions cannot produce.
However, the successful delivery of a solution does not necessarily mean that the solution was the right policy intervention for the economy concerned, nor does success in solving a socio-economic problem necessarily reflect the successful choice of an intervention instrument. Moreover, it is not uncommon for policy intervention instruments to end up acquiring a raison d’être of their own, and to continue to exist in isolation of the original outcomes they were meant to help achieve. A successful policy outcome might arrive off the back of an unsustainable policy instrument. For example, tasking universities with supporting innovation activity in the wider economy could help businesses become more innovative, but subject universities to extra costs with little economic return (Abrams et al. 2009). Thus, what is needed is a comprehensive approach that links outcomes to constraints, to rationales and to instruments of intervention to ensure that these are interrelated aspects of one analysis rather than separate activities undertaken by different departments and at different points of time.

**Objectives**

Setting objectives is, fundamentally speaking, a process of identifying targets that when achieved in concert, deliver a desired outcome. Objectives can be linked both to the elimination of constraints and to the direct delivery of outcomes. If capacity is a constraint, then improving capacity by a given factor will arguably address and remove the corresponding constraint. An objective can also be linked directly to an outcome, e.g. reducing CO₂ emissions by a certain factor delivers the ultimate outcome of helping to mitigate climate change. Things become more complicated when objectives are not clearly linked to outcomes, even when constraints are removed due to wrong diagnosis of the problem or the restriction at hand, or when other implementation barriers come into play. In the next few paragraphs, I shed light on some of these implementation barriers.

While it lies outside the scope of this chapter, an OCRIO analytic framework necessitates thinking about the pitfalls of implementation that may derail the best objective-setting mechanisms and result in objectives superseding actual outcomes. In a paper reflecting on the US experience in the 1960s in implementing various social programmes under the Great Society Initiative of the Johnson Administration, McLaughlin (1987) concludes that ‘The consequences of even the best planned, best supported, and most promising policy initiatives depend finally on what happens as individuals throughout the policy system interpret and act on them’ (172). Policies adopted according to seemingly rational decision making processes can still be circumvented by the actors and conditions that govern their implementation. These include conditions that frame the institutional setting of the implementing system such as environmental stability, competing centres of authority, contending priorities or pressures and other aspects of the social–political milieu that can profoundly influence willingness to implement (Yin 1981). McLaughlin (1987) notes that ‘Policy at best can enable outcomes, but in the final analysis it cannot mandate what matters’ (188). A lack of buy-in from both policy implementers and the policy target community will inevitably derail implementation objectives and hence stakeholders need to be made aware of the link between objectives and outcomes, particularly the ultimate outcome that a policy intervention is seeking to achieve through its prescribed objectives. It is therefore essential that the macro-level of policy design and development be linked to the micro-level of policy implementation.

Misalignment between a new set of objectives and existing ones or with the objectives of other government agencies can also derail or compromise the implementation of a policy as originally intended. Misalignment can arise from changing political and economic circumstances that give rise to new policy goals that make the original ones seem less relevant or important.
Such a change in circumstances can place pressure on policy makers to serve a new purpose (Beland 2007). The latter phenomenon is often referred to as policy ‘drifting’ (Hacker 2002). Mahroum et al. (2011) expand on the notion of drifting as a form of misalignment, pointing out two common situations, namely ‘tactical drifting’ and ‘strayed drifting’, where this occurs. The former takes place when governments are hesitant to undergo widespread policy reform and hence retrofit current policies to reactively meet demands of a new sociopolitical context. The latter occurs when structural or political issues, such as lobbying by a powerful interest group, causes policies to drift unintentionally.

The implementation of innovation policies thus takes place within a wider government apparatus where innovation per se is only a means towards the ultimate goal, which is socio-economic in nature. An innovation policy development process that does not take into consideration the wider institutional setting in which it exists, will likely face implementation problems that, at best, drift the nature of the policy and, at worst, render it irrelevant.

**Summary**

Innovation policy design should have ‘outcomes’ at its core and as its focus, rather than using the innovation process itself as a framework to tailor innovation policy around. Accordingly, we have proposed a framework for innovation policy design, geared explicitly around reaching desired outcomes. An innovation policy that is solution-orientated takes as its starting point the desired outcome, and from this creates a roadmap for achieving that outcome in the most efficient way possible.

In this chapter, we have argued that innovation policy is only relevant once (i) the desired outcome is agreed on, (ii) the problem requires an innovation, and (iii) a case for government intervention has been made. Accordingly, innovation policy design should be guided, developed and evaluated on the basis of the ultimate desired policy outcomes, be they in domains of defence, environment, economic development, health or security. The foundation for the case for or against government intervention has to first satisfy the question of whether intervention is actually justified; and second, to determine whether government has the means to intervene, and lastly to ascertain whether or not the options for intervention are likely to be effective in the particular context.

These three layers of analysis collectively form a broader policy development agenda, but they do not necessarily have to follow the same line of theoretical reasoning. Nor do they necessarily have to be conducted within the same departments or ministries in a government. As such it is understandable that these three layers do not typically feature in the policy analysis or rationale that precedes most government intervention in innovation policy, which often tends to skip one or more levels. For example, a case for government intervention in innovation activities might be made in isolation from the first layer of analysis, overlooking the question of whether such intervention is merited or justified. This disjuncture in conceptualisation is often a cause for contention between public policy analysts and scholars in innovation systems.

Furthermore, there is a need for innovation policy to be better linked with the wider policy implementation system and to encompass the range of activities that may play a part in solving the policy problem at hand. Linking innovation policy making to outcomes helps policy makers to identify the specific stakeholders and capacities that matter the most for the successful implementation of a policy intervention. This is important as many policy makers are under pressure to prioritise their efforts in the face of multiple priorities and scarce resources.

The OCRIO framework introduced in this chapter provides a sound structure for linking policy interventions to outcomes and various solution-generating mechanisms. Structuring the
design of innovation policy interventions around outcomes makes it easier to capture the relationship between investment in innovation policy instruments and their success in meeting policy objectives. Ultimately, through the OCRIO framework presented in this chapter, it is hoped that governments will be better equipped to ensure that policies not only engender innovation, but better succeed in contributing positively to the broader society and economy.

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