

# 1 Avenues for public actors to enable and promote innovating and innovation

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## Introduction

The ways and means for public actors to promote innovation and innovating remain uncharted. This concerns issues such as the actual capability of public organizations to promote innovations, the utilization of external knowledge in public actions, and the means to co-create with private actors (e.g., Bason 2018; Clausen et al. 2020). Therefore, in this chapter, we set up the scene for public involvement and avenues to create the best possible innovation environment for public and private innovators alike. For this purpose, we present four interfaces through which public involvement in innovating can happen, six roles representing the different means for public actors to support innovations, and some future, yet easy, avenues to improve public support for innovating.

As both societal and economic activities affect innovation actions and the perceived value of innovations (Russo-Spena et al. 2017), it is crucial for private and public actors to consider how they can shape, change, and adapt to the innovation environment. In this chapter, *innovation* refers to a new idea, process, or practice and an object that the actors identify as new (Rogers 1995, p. 11). In turn, *innovating* concerns development functions and innovation actions, i.e., practice-based learning and co-creation between the actors of an innovation ecosystem (e.g., Russo-Spena et al. 2016). When creating a favourable environment for innovation, public actors can participate with administrative or executive instruments. As the instruments are versatile, public actors can also be represented by various entities such as a municipality or city, public officer, public corporation, or public development company.

Innovating is rarely the act of just one private or public actor. Therefore, in this chapter, the focus is on an innovation ecosystem that is a network of actors (public and/or private) with an innovative mindset and resources (such as knowledge, competences, technologies, or physical materials) that enable a favourable environment for innovations to emerge. An innovation ecosystem as such is a multifaceted concept that can refer to “collaborative arrangements” (Adner 2006) or integrating mechanisms (Valkokari 2015), multi-level knowledge sharing clusters (Carayannis & Campbell 2009; Valkokari 2015), or new value creation through innovation (Autio & Llewellyn 2016; Yin et al. 2020). Moreover, Granstrand and Holgersson (2020) define the innovation ecosystem as “the evolving set of actors, activities,

and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors”. This kind of innovation ecosystem is intended to function through “a multilevel structure of interdependent organizations from different industries that trade several resources in an ‘energetic flow’ from an organization to another, through symbiotic and dynamic relationships” (Ferasso et al. 2018). In innovation ecosystems, the network of different actors is centred around value creation and characterized by social aspects (Russo–Spena et al. 2017) as the ecosystems are all about interconnected actors (e.g., Valkokari 2015).

From the public governance and policy development perspective, the “national innovation systems” create frames for social interaction related to innovation activities. As Lundvall (1985) stated, “[R]egional innovation systems are formed by key organizations intensive in research and development like universities, research centers, financial systems, supported by a governance structure”. For now, the public and private sectors need to collaborate due to the scarce resources they have if operating alone. Public actors especially can open up their processes and practices to the private sector, which can offer new technologies, solutions, and information that creates new value for the public sector (e.g., in terms of enhanced products or optimized public services that ultimately benefit the citizens and customers). However, public–private co–creation, promoting innovation, and facilitating new innovative openings demand an active innovative attitude and practices from public actors. This means the public actors need to recognize, define, and possibly even redesign their approach to promoting innovations and innovating. Therefore, it is relevant to consider the best practices for public actors to enable and promote innovating. This chapter, therefore, considers the following questions: (a) *Through which interfaces and actor roles do public involvement in innovating and innovations happen?* (b) *What means does a public actor have/use for creating and facilitating avenues for innovation?*

## **Roles of public actors in promoting innovating**

For now, the array of public actors and their means to promote innovating are unclear and uncharted (e.g., Bason 2018; Clausen et al. 2020). However, public actors have earlier been recognized as adopting different roles and means when participating in promoting sustainability. For this purpose, Usikartano et al. (2020) presented six public actor roles – namely organizer, operator, financer, policymaker, regulator, and supporter. These roles represent the means that public actors have for influencing the actions of a certain industrial ecosystem covering a wide range of different areas of business, from organizational to managerial and financial issues. To shed light on the public involvement in innovations, the aforementioned roles are adapted in the following sections to the context of publicly supported innovating.

### ***Interfaces for public involvement in innovating***

The public actor roles mentioned by Usikartano et al. (2021) can be applied to the context of publicly supported innovations and innovating that take place in the interface with private organizations and are executed by, e.g., public development

companies, policy programmes, projects, eco-industrial parks, publicly facilitated networks, workshops, regulation, and research collaboration. The six roles presented next represent financial, organizational, political, and legal means that are utilized through four different interfaces named as follows:

- *Ownership* – services provided or offered by different public organizations, ranging from management practices to public premises, innovation education, and regulation
- *Financing* – actions that are publicly funded or indirectly financially supported through, e.g., collaboration platforms, public innovation funders, publicly financed projects, and taxation
- *Authority* – means based on the authoritative power a public actor has, e.g. creating a demand or need for new innovations through public policies, laws, incentives, or marketing
- *R&D support* – actions creating prospects for innovations, including innovating by public organizations, investments in new technologies, and legal assistance.

### ***Roles of public actors for involvement in innovating***

Through these four interfaces, public actors can influence and be involved in innovating. Based on the public actor roles introduced by Uusikartano et al. (2020, 2021), the means of public involvement in innovating are presented as six roles, representing a set of innovation-related actions and means.

- The *organizer* supports innovating through different organizing actions aimed at creating an innovative setting, i.e., favourable conditions for innovations to happen. This can include bringing together facilities, know-how, and the expertise of diverse actors for new experiments. Moreover, the public actor can innovate by itself (such as public research institutes (co-)developing new solutions) or offer tools for other actors (private R&D actions financed by public institutes).
- The *operator* manages innovation practices such as research collaboration. The means include publicly provided sharing and collaboration platforms, as well as workshops and training sessions arranged for developers and innovators. Also, the operator may create demand for innovations through policies calling for new solutions for a specific need.
- The *financer* supports the innovation process actions with public funds. Direct funding instruments include publicly financed research projects and innovation institutes, investments in new technologies, and themed incentives for pilots in new specific areas. Indirect financial support can take place in the form of free-of-charge services for R&D (e.g., publicly owned testing equipment).
- The *policymaker* works through policies and political programmes that support, steer, or initiate innovative experiments. This may include public research institutes guided by a publicly set agenda, innovation funding based on certain thematic policies, or programmes and road maps pushing actors in new directions.

- The *regulator* is responsible for guidelines, standards, laws, and other guiding or coercive imperatives that affect innovations or related practices. This encompasses the limits set for innovation actions by legislation, taxation steering the actions performed by innovators, as well as legal help and support such as patenting procedures.
- The *supporter* promotes innovators in a consultative or collaborative manner with various services and support for innovation practices. This includes research collaboration, educating a new workforce, opening public data and infrastructure up for innovators, and marketing and promoting new innovative openings nationally and internationally.

The aforementioned roles, interfaces, and their linkages are presented in detail in Table 1.1.

*Table 1.1* Public actor roles for enhancing innovations and interfaces for public involvement in innovating in the 2020s

<i>Interface</i>	<i>Role</i>	<i>Description</i>	<i>Examples</i>
Ownership	<b>Organizer</b>	Organizational structures for innovating	<i>Arranging opportunities for R&amp;D such as bringing different types of know-how together</i>
	<b>Operator</b>	Innovation management	<i>Facilitating and managing collaboration on innovating</i>
	<b>Financer</b>	Free-of-charge services for R&D	<i>Publicly owned equipment and know-how available free of charge</i>
	<b>Policymaker</b>	Operational programmes including R&D	<i>Public organizations guided by political programmes and control</i>
	<b>Regulator</b>	Regulation guiding the innovation actions	<i>Public organizations operating within the legislative limits</i>
	<b>Supporter</b>	Education and training regarding innovation practices	<i>Educating new workforce, research collaboration with public institutes</i>
Financing	<b>Organizer</b>	Public innovation funders	<i>Public institutes financing R&amp;D actions</i>
	<b>Operator</b>	Publicly funded platforms for innovating	<i>Publicly provided sharing and collaboration platforms</i>
	<b>Financer</b>	Publicly financed projects/ pilots/ organizations	<i>Publicly financed or supported development projects/ organizations</i>
	<b>Policymaker</b>	Political programmes for innovation funding	<i>Political agendas and thematic programmes for innovation funding</i>
	<b>Regulator</b>	Taxation	<i>Tightening taxation pushing the boundaries, eased taxation for new openings</i>
	<b>Supporter</b>	Indirect subsidies for innovating	<i>Public data, services, and goods available for innovators</i>

*(Continued)*

Table 1.1 (Continued)

<i>Interface</i>	<i>Role</i>	<i>Description</i>	<i>Examples</i>
Authority	<b>Organizer</b>	Vision and goals for new solutions	<i>Strategic visions and goals set for / by public organizations</i>
	<b>Operator</b>	Demand for innovations	<i>Public organizations searching for new innovative solutions</i>
	<b>Financer</b>	Incentives for new openings	<i>Themed, public financial instruments for new trials</i>
	<b>Policymaker</b>	Steering demand for innovations	<i>Political programmes pushing operations and businesses in a new direction</i>
	<b>Regulator</b>	Legal rights and responsibilities for innovation practices	<i>Laws and law proposals supporting/restricting innovation practices</i>
	<b>Supporter</b>	Marketing, communication	<i>Services for branding, export promotion, media</i>
R&D support	<b>Organizer</b>	Public research institutes	<i>Public research institutes innovating and co-developing with companies</i>
	<b>Operator</b>	Means for innovation processes	<i>Workshops, training</i>
	<b>Financer</b>	Investments in new technologies	<i>Public procurement directed toward innovative solutions</i>
	<b>Policymaker</b>	Creating strategy-based prospects for innovations	<i>Road maps and future visions that anticipate the future</i>
	<b>Regulator</b>	Legal help, patenting procedures	<i>Patenting services</i>
	<b>Supporter</b>	Support functions for innovating	<i>Public infrastructure as a test bed for piloting and building partnerships</i>

## Public involvement in innovating in practice

To illustrate how the indicated interfaces and public actor roles occur in a real-life setting, we present a case study based on empirical findings. The case is based on the combined results of longitudinal studies (taking place from 2018 to 2020) and qualitative analysis of primary and secondary data sources on four Finnish circular economy centres. These centres represent ecosystems where a variety of private and public actors collaborate with each other in order to gain economic, social, and environmental welfare by utilizing methods with the aim of closed resource loops. Therefore, a circular economy centre can be seen as a practical manifestation of an innovation ecosystem where public and private actors together aim for more sustainable practices through new ways, practices, processes, products, etc., i.e., innovations. Hence, the case is referred to later on as an innovation ecosystem.

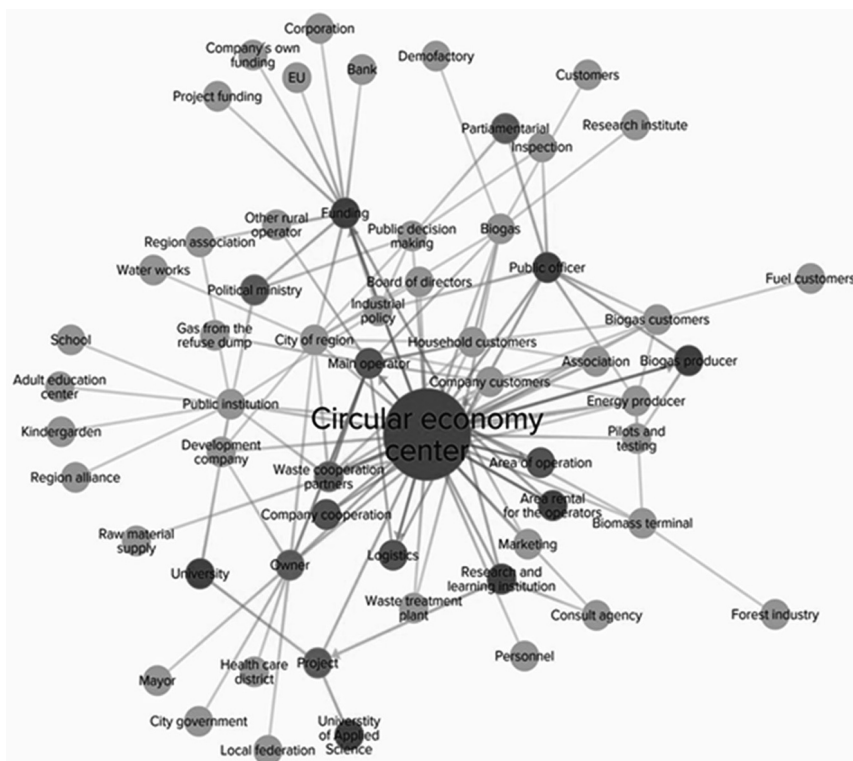


Figure 1.1 Illustration of the actor structure of the innovation ecosystem case. The most prevalent relationships and actors are shown in dark gray.

First, an ecosystem mapping of all recognized actors involved in an innovation ecosystem is presented in Figure 1.1, combining four subcases. The figure shows what types of public actors take part in the innovation ecosystems and which of them are the most prevalent (the dark gray links in Figure 1.1) in terms of public involvement in innovating. Second, to examine how public involvement occurs within the actor structure of the innovation ecosystem, the case is examined against the presented four interfaces and six public actor roles.

In the studied case, the innovation ecosystem is represented by a circular economy centre, a hub for the regional management of waste material flows operated by a public waste management company (hereinafter referred to as the central organization) accompanied by private companies. The central organization of the innovation ecosystem is responsible for the overall development of the ecosystem, giving it diverse roles ranging from organizational to managerial and financial business issues. The main resources of the central organization are allocated to waste management, which can leave the resources reserved for R&D rather scarce. Moreover, the tightening waste management regulation and increasing understanding of the extended possibilities of materials once considered waste call for new technologies and innovative solutions, which underlines the importance of

public and private partners in the innovation ecosystem. Regarding these partners, local city representatives are the ultimate decision-makers as owners of the innovation ecosystem area and central organization. In this respect, they also provide the necessary funding for the main operations of the central organization. Research institutes co-create new knowledge and offer development resources in the innovation ecosystem. Moreover, R&D actions can be funded and executed through externally funded projects that include several public and private sector partners. Companies join the innovation ecosystem if they see that membership in the ecosystem would provide them with economic benefits (e.g., new customers through the ecosystem members or decreased production costs through joint practices). The public actors of the innovation ecosystem interact with other organizations through the interfaces of ownership, financing, authority, and R&D support (as can also be seen in Figure 1.1). Next, a detailed consideration of the public actor roles and interfaces occurring in the case is presented.

**Ownership** relates to public involvement in innovating that happens through publicly owned resources. The *operator* comprises the central organization, the operation partners (e.g., transportation companies or waste treatment companies), the area rental unit, and other operators in the innovation ecosystem area (e.g., biogas producer, part of the waste flow operations). The *organizer* of the innovation ecosystem is a local public development company that offers a network, new knowledge sharing, or cooperation possibilities for the innovators. Research institutions and universities may also have overlapping roles. They can be *organizers* (e.g., via projects) but *supporters* as well. Therefore, the research and learning institutions may offer means for cooperative innovating and knowledge creation. *Policymaker and regulator* are the roles that make the framework for the waste management operation. On the other hand, the parliamentary actors formulate the legislation as the national framework, and the local public officers and municipalities (as the owners of the innovation ecosystem) supplement the area regulation and official development programmes for the operators, organizers, and supporters of the central organization. Politicians and ministries direct funding for the research and innovation instruments through various development programmes. In the innovation process, the policymaker and regulator define what the role of the public actor in the innovation process can be. So, the *financer* role affects simultaneously the other five identified roles: it enables the operator to operate and the organizer and supporter to create and modify innovation networks or development actions in the innovation ecosystem; furthermore, it enables the policymaker and regulator to direct funding for the innovation ecosystem.

**Financing** directs public resources to different innovation practices and development phases through different funding instruments. In our case, public financing concerns the *organizer*, *financer*, *policymaker*, and *regulator*, represented by politicians, ministries, and public officers who design the regional innovation programmes affecting the innovation ecosystem; the innovation actions or projects are dependent on external funding instruments. The *operator* offers the companies a physical platform for piloting and testing innovations but not direct financial support. The *supporter* of the innovation ecosystem (e.g., a public development

company or university) helps in contacting and facilitating information flows between the ecosystem members, and arranges various joint events.

**Authority** occurs on an individual, organizational, and/or institutional level. The *organizer* is represented by the central organization, local city government, and their personnel with whom the municipalities as owners formulate the strategic vision and goals for development. Public decision-making and public officers as *policymakers* are the ones who steer and promote sustainable innovations. Similarly, the public actors operating as *regulators* can restrict or support innovation pilots and processes with legislation. The central organization actors, individuals, and company staff are *operators* responsible for the practices and technology solutions in the physical area of the innovation ecosystem. The *financer* may be a personal contact of a member of the innovation ecosystem from a European Union institution or from the banking sector who informs the central organization's actors about the innovation funding instruments or programmes. Active individuals in the development company, associations, funding bodies, research and learning institutions, or even public officers can be significant *supporters* of marketing and communication in order to receive visibility for the innovation pilots and realize results in the ecosystem.

**R&D support** concerns the network of cooperative actors related to companies' innovation practices. Publicly funded universities and research and learning institutes are *organizers* that challenge and invite industries and companies to solve problems and create innovative solutions in cooperation with them. The central organization – namely, the *operator* – can identify the needs and offer means for innovations. The *financer* may be determined by the subject area of the innovation. For example, technology investments of an innovation ecosystem company can originate from a local bank while more general production or organization practices can be developed with external project funding. *Policymaker* and *regulator* are roles adopted by the politicians, ministries, public officers, and funders whose actions affect the innovation environment on the national level. The *supporter* role can be represented by actors who are part of the central organization's innovation practices through supporting, co-creating, or co-operating with the central actor.

### **Future avenues for public support for innovating**

After presenting the recognized interfaces and roles for public involvement in innovating in theory and practice, we will now describe some concrete future avenues for public actors to support innovations even better. Each of the presented avenues can be applied through any of the indicated four interfaces (ownership, financing, authority, R&D support), offering therefore a wide range of options to support innovating in new ways. Moreover, the offered avenues are meant to be easy to implement. In other words, when public actors are looking for new avenues to support innovating, the authors suggest building on the existing competence and resources the public sector already possesses.

Opening up and offering the *public data sources* that various public organizations collect and produce can offer crucial information for other actors to develop



and create innovations. Moreover, it increases the transparency of public decision-making and reporting. Offering public data sources for companies to utilize may even encourage private actors to develop new products or services for the public sector. However, quite often private sector actors are not aware of the existence of open public data sources. So, more active and visible promoting of the existing available open public data sources is required.

*Public procurements and calls for tender* can guide the direction of innovating and facilitate the emergence of innovations. Namely, pursuing certain themes or presenting requirements for new kinds of innovations also steers the direction of innovating. This is something currently seen in societies aiming for more sustainable development as their local, regional, or national governments call for new solutions regarding, e.g., smart city design, electric mobility (both vehicles and public transport), or public-sector e-services (i.e., technology-based services).

*Cross-operational collaboration* between public and private companies with their practices and technological solutions can offer new insights into established industry practices. Furthermore, new solutions for totally new industries can be found. As an example, Sulapac Ltd. (see Sulapac 2020) manufactures packaging for the cosmetics, candy, and jewellery industries that are made of a combination of bio-materials and wood fibre. The process is scalable to other industries and accessories as well and the products are plastic-free and recyclable. Another example is the signal and sensor industry that can offer know-how and technology solutions, e.g., for the space industry (components or sensors) or for the health industry (measurement tools for self-monitoring, patient data analysis by artificial intelligence, picture-based machine learning for disease identification).

The existing *public resources and platforms* can offer new openings for public and private innovating if they were only made explicitly available to the actors. In general, public actors have a wide range of resources that could be opened up, offered, shared, or rented for innovators. These include the following. *Data* on the mechanisms and protocols of public decision-making, public financial statements and budgets, and the research results of public research institutes to support the development and commercialization of innovations. *Infrastructure* that includes public buildings that are underutilized or even totally empty, publicly owned land areas, and public research or processing facilities and equipment to be used in the piloting, testing, and production of innovations. *By-products* such as waste streams collected by municipal waste management to be used as inputs or raw material for new products. *Know-how and services* that public-sector personnel working in different fields have, including policies, legislation, research, administration, health-care, governance, defence, security, and taxation to support and assist the private actors along the different phases of innovating. The tacit and explicit, location-specific *knowledge* that public actors have regarding business life, the age structure of a certain area, the workforce of an area, local natural resources, and regional development differences help to determine the needs and potential of a certain population. The aforementioned resources can be made available through public platforms, including publicly organized workshops and seminars, city districts, public organizations such as waste management organizations, research institutes, education providers, city governments, and public places such as cultural facilities,

libraries, sports venues, and parks. All the above-mentioned resources and platforms for activities are such that public actors already possess in some form. Now they should be made available for private and public innovators so that these public assets are not underutilized, i.e., it is a question of seeing public resources as elements of a possible and controlled test environment for innovations and innovating.

*Public administration* in principle affects all the entities and activities located within the borders of a country and therefore is a direct way to enable innovating. Here, public actors can *facilitate*, *create*, or even *push* public and private innovators. As a *facilitator*, public actors can offer and organize different forums for inter-organizational collaboration such as seminars, workshops, face-to-face discussions, web platforms, and competitions centred around distinct thematic issues. It is worth noting that public actors can facilitate public–public, public–private, and private–private cooperation (e.g., Meissner 2019; Brogaard 2021). In other words, instead of innovating everything by themselves, public actors should also *create* conditions for serendipity occurring among or through inter-firm cooperation. The means include at least financial, regulative, and administrative instruments. When public actors open up their resources and flows for companies, the administrative entities can *push* companies toward innovative openings, e.g., through public procurements that call for not-seen-before solutions. As an example, the current general global call for more sustainable societies is often initiated and pushed forward locally by public actors. The means here include financial incentives, national and regional targets for CO<sub>2</sub> emission reductions, and regional urban development planning.

*Regulation* is one of the most prevalent ways for public actors to affect the societal environment in which all innovating takes place. Regulative means can both cause intentional *push toward*, *demand for*, or *facilitation of* innovative openings or, in the worst case, *limit* the emergence of potential innovations. To create demand for innovative openings and to avoid the regulation from being too limiting on society for new pilots and tests, public actors need to reconsider their role in terms of public–private collaboration and innovating, which means considering what kinds of partners public actors want to be. Through their regulative actions, the public actors also control how promoting and flexible the existing societal environment is for the new tests and pilots that precede innovations. Especially during times of crises such as a pandemic or cataclysm (e.g., environmental or political cataclysm), the ability of the existing regulation to allow quick pilots and implementation of innovations is tested. This often requires close collaboration between public and private actors (as an example, the fast development of vaccines can be seen as a result of innovations created by private medical companies and strongly supported by public resources). The authors would like to see public actors participating even deeper in collaborative endeavours with companies, e.g., in the form of joint ventures. In this regard, the public actors should actively consider and decide on their role and act accordingly. Most importantly, it is worth reflecting on whether public actors have utilized their available opportunities to the full extent and created the best possibilities for involvement instead of unintentionally restricting their opportunities for supporting innovating. For example, the authors have witnessed a

situation where, related to possibilities for public–private collaboration, the same regulation on the duties of public waste management has been interpreted as limiting in one municipality and enabling in another. In another example, one city was reluctant to operate with private companies, as it wanted to avoid any possibility of being accused of favouring a particular industry or company.

## **Discussion and conclusions**

To summarize the main takeaways regarding public involvement in innovating, we can highlight the following three perspectives. First, it is essential for public actors to fully acknowledge the wide range of means and roles they have for promoting innovating. In order to promote positive conditions for innovations to emerge, public actors do not usually lack the necessary resources but are underutilizing or even ignoring their existing ones. Therefore, it is a question of recognizing the possible roles (organizer, operator, financier, policymaker, regulator, supporter) a public actor can have for supporting innovation and utilizing a balanced mix of different means.

Second, there are tools such as the presented ecosystem mapping and visualization that help to recognize and make visible the existing actors, resources, and relations within the innovation ecosystem and to further harness the underlying potential within the ecosystem. From a visual ecosystem mapping, possible unused resources, opportunities for collaboration, and even new business potential can be identified. However, ecosystem mapping and visualization are just one tool for examining innovation ecosystems and their resource reserves. There are many tools for recognizing the critical relations and functions of the ecosystem.

*Finally, it is important to acknowledge that public involvement in innovating can happen through several avenues.* In other words, public support can be targeted for public and private innovating and innovations that are a result of public–public, public–private, or private–private co-creation. Moreover, even if the public actor is not itself interested in innovating, the private organizations located within its sphere of influence always operate within the boundaries and limits set by the society and public actors. Therefore, public involvement, at least indirectly, in innovating is inevitable.

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