



# From Competition to Cooperation - Development and Practices of Open Innovation Systems

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In this era of an innovation-driven knowledge economy, innovation is a key factor in the creation of enterprise competitiveness. With the pace of globalization gaining speed and market competition becoming more intense, an increasing number of enterprises have opted to look beyond their own laboratories and search for creativity in the outside world. In other words, the source of momentum for enterprise innovation is no longer limited to a corporation's internal organization but can be derived from the proper use of external knowledge and innovative resources. When combining internal and external creativity to foster the development of new technologies, we can create greater economic value. The rise of this form of open innovation thinking is driving the development of the innovation systems in specific countries or regions.

In the past, corporations have regarded R&D activities as crucial strategic assets—and these functions had to be kept within the organization. As the process of technological development became more complex and trended toward cross-sector integration, it became no longer feasible for a single enterprise to be involved in the development of each and every technological component and aspect of its products. Therefore, enterprises are beginning to contemplate how they can leverage external resources to help them achieve innovations in their R&D efforts. This collaborative mode of thinking is particularly essential to small and

medium-sized enterprises, which generally lack adequate capital, technical know-how and the talent pool of more established corporations. If an environment that encourages open innovation is available to small and medium enterprises, allowing them to take advantage of external R&D resources and competencies such as collaboration with academic or other research institutions, the problem of their insufficient R&D capabilities can be addressed and these newly accessible resources will allow them to escape this predicament.

The capability of a country to create, disseminate and convert value-added knowledge depends on the quality and extent of interaction between the industry, research organizations and universities, and the government. At the same time it is also affected by the country's industrial structure, education and training systems, human capital and labor markets, financial institutions and other society-specific factors, which will contribute to the vigor and robustness of activities in the country, the region and even the entire industrial innovation system. At the national level, a country's innovation system has a vital connection with its economic development and competitiveness, and it influences how members of that system interact with one another for the purposes of activating the innovative mechanism or maximizing its effectiveness. The emphasis is on the establishment of a means to integrate the innovative capabilities of the government, industry



and enterprises, allowing government policies and resources to drive enterprise innovations and to accelerate an enterprise's process of developing its own internal R&D capabilities. Apart from creating a proper research environment to foster innovation, a high-quality national innovation system should also be equipped with the ability to support the development of enterprises' innovative efforts. Under the concept of open innovation, national innovation systems are now transitioning from their closed-system roots of the past toward the new open system environment, with a focus on the integration of innovative capabilities among industry, government and the academia.

In recent years, the development has evolved from industry-academia collaboration to the current phase involving real-life scenarios, where the importance of user participation and the procedures of innovation are advocated, and users are systematically incorporated into the innovation process. Through the interactive process, users' knowledge can be acquired and their requirements can be understood so that new products, services and ideas can be developed. Chesbrough [1] believes that open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to effectively expand the markets through the integration of internal and external innovation. Simply stated, open innovation involves the use of external R&D capabilities to conduct collaborative research work, the approaches of which include strategic alliances, mergers and acquisitions, joint ventures, technology transfer and licensing. Other studies point out that the sources of inspiration for innovation are not confined to enterprises, research institutions and laboratories. They can also be consumers. Consumer requirements are the sources of innovation, and consumers occupy a vital position on the value chain. Products must first reach the possession of consumers before the "innovation" can be considered a success, which was the birth of the concept of Living Labs.

The concept of Living Labs was first introduced in 1995 by an architecture professor at MIT, William J. Mitchell, when he proposed it at a meeting sponsored by the European Union. Later, he established a laboratory (the MIT PlaceLab) that brought together interdisciplinary experts in a real-life environment for the purposes of developing and deploying new technologies as well as attempting to utilize these thoroughly

designed technologies and strategies to respond to changes in the environment. The laboratory is involved in an extensive range of research topics, including those from a single person to the scale of a city. After members of the R&D division of Nokia who attended the meeting came into contact with the ideas of Living Labs, they began to advocate the concepts at various EU meetings on research, development and innovation. Nokia was subsequently given support from the EU, which granted the concept's funding priorities in its scientific and technological research programs. This development also indirectly contributed to the widespread adoption and applications of Living Labs technologies in Finland and other EU member states.

In 2006 Finland launched the Open Living Labs-European Network of Living Labs (ENoLL). The objectives for establishing ENoLL included providing enterprises and innovative products and services with a testing platform, and implementing these new technologies into communities, campuses, public areas, government agencies, institutions, or even entire towns or metropolitan areas. This allowed technological innovations to be tested in real-life environments by actual citizens, such as office workers, students, tourists and ordinary consumers, and the network offers a means of developing new technologies in a user-centric manner. The emergence of these concepts has provided small and medium-sized enterprises with excellent support in the areas of architectural innovation and radical innovation. For example, Sweden's Halmstad Living Lab has partnered with a group of small businesses in the field of medical technology, and through the Living Lab environment, these companies were able to exchange knowledge and expertise with other corporations, academic institutions and consumers. They successfully developed new technology platforms through the interaction with and the acquisition of knowledge, technical know-how and assistance from partners, and by responding to consumer requirements. Judging from the operational experience of Halmstad Living Lab, many success stories were examples of breakthroughs in radical innovation, although there were also cases of failure where the partnerships came to an abrupt end due to disputes over the ownership of intellectual property rights.

Living Labs is an environment and an approach to conducting research, but it is also a system that distinguishes itself from the conventional user participatory approach by the fact that it provides a context with real experience. How Living Labs differ from system development is that they focus on joint participation of customers, manufacturers and suppliers over the entire vertical value activities. Living Labs is a

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user-centric open innovation system. In particular, the system incorporates enterprises, government-owned organizations and businesses, colleges and universities, research institutions and partnerships that are comprised of users in the public and private sectors as well as the public community, and collaborations are carried out in real-life scenarios (e.g. cities, villages, rural and industrial areas) in order to facilitate the creation of new products and services, prototype development and validation. With respect to the development of a country or region's innovation system, one needs to contemplate how Living Labs can contribute to the creation of user participation in the innovation process, what types of activities can be conducted through Living Labs, what roles and functions Living Labs can play in the innovation system, and how Living Labs can be adapted to various industries or types of products and services. Therefore, it is a tool for fostering innovation in the public and private sectors, and it will set in motion the innovation activities of institutions and the interaction between different organizations, thus enabling their production, improvement and diffusion of new technologies.

Nevertheless, apart from Living Labs, many other countries have developed different types of innovative and collaborative models to foster innovation under their respective open national innovation systems. Examples include the integration of enterprises and laboratories in France, and the collaboration between industry and academia on innovative projects in Switzerland. The purpose of these systems is to help enterprises rapidly commercialize their products from the results of innovations, patent development and inventions. Once these products have reached the consumers and enterprises have achieved profitability, additional investment can be injected into R&D, thus creating a virtuous circle that will enhance a country's overall competitiveness.

In summary, providing a platform that encourages the integration of innovations, knowledge and resources is the original intention for creating an open innovation system. Its advantages include fostering opportunities for intra-system and inter-system collaboration, and providing support to enterprises within the system in locating their necessary complementary resources so that they can enhance their overall innovative and R&D capabilities and perhaps even the entire industry. In

other words, the benefits of innovation are no longer limited to a single enterprise. On the other hand, the ability for an enterprise to extract benefits from collaborative innovation models depends on its absorptive capacity, which is an ability accumulated from the enterprise's past collective knowledge and experiences. Therefore, when seeking partners, an enterprise must also continue to build up its own innovative and R&D capabilities. In addition, the degree of openness of intellectual property rights is the key to the continued success of collaborative innovation systems. Taiwan is currently experiencing a period of adjustments in the country's industrial structure. In addition to learning from the innovation systems of advanced countries around the world, Taiwan should carefully consider how the mechanism of an innovation system can be applied to make adjustments and improvements, and how enterprises can be driven to establish collaborative platforms in order to integrate internal and external technological and human resources available to them, as well as utilizing open testing sites to validate their products, services and innovative business models. The purpose is to enhance their understanding of market demand, which can ultimately lead to success stories. Through this approach, we will be able to stimulate and activate further innovative and entrepreneurial capabilities of enterprises to achieve the development objectives of industrial transformation and upgrade.

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