

Living Labs based on IT utilization and development of local community

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Abstract

Living Lab is one of open movements regarding social innovation, which mainly utilizes scientific technology to improve local residents' life value. Even though various attempts have been made, Living Lab projects that deal with actual life-related problems of local communities are not sufficiently being made. This study aims at organizing existing Living Lab studies and to draw political issues in perspective of solving regional problems and developing local communities. Above all, policies should be proceeded in a way that fully understands and reflects local problem since communication with local residents or end-users will be increased. It is required to support certain products or solution development that fits specific local situation based on their resource and demands. In addition, local small businesses or start-up companies should be given opportunities to conduct experiment and revise new technology, product or service on the spot. It would be a useful example to utilize ICT technology and contents such as local cable TV network, for Living Lab. Living Lab can establish itself as an effective reformation process only if it remains to function for the sake of solving issues of local community and residents. Practical undertones would be able to be obtained once this exploratory study turns into empirical case study.

Keywords: *Living Lab, Solving regional issues, Development of local communities, Reformation process, End-users, Local residents*

1. Introduction

1.1 Characteristic and Meaning of Living Lab

Living Lab as a term technically means 'Laboratory of everyday life', which stemmed from observing a certain user through IoT sensor installed within the user's living space [5]. Living Lab is a real-life setting laboratory where user and producer together can create an innovation and is a platform on which active interactions are made between innovative subjects as a model of open-form reformation network [1,10]. The participants are composed of R&D researcher, company, authority and end-user, etc. and they share the common objective and cooperate [3,7]. Above all, the main characteristic is that Living Lab actively takes local residents into consideration and that local community plays a supportive role as a facilitator or enabler

of Living Lab along with administrative organization. Living Lab has its significance in having suggested possibility of social reformation model that contributes to solving social problems by utilizing participation of end-user or local residents, cooperation of diverse parties, study activities that corresponds with actual life environment and scientific technology.

Another distinct character of Living Lab is that it is user-oriented and covers comprehensive interaction between users, developers and diverse related parties and that it can be applied to various field, which in other words is different from existing test bed, a linear innovation model that focuses on technology developers [8,247-249].

1.2 Study Objective

In Europe, Living Lab activities are concentrated on real-life related fields such as safety, residence, traffic, environment or welfare and so on. This implies that Living Lab well corresponds to the objective of “Local problem solving” and “Local residence or user oriented” [8,253]. Unlike other innovative models, Living Lab has information technology-based cooperation, user participation and private partnership which enables to counteract to solve local problems seamlessly. It also focuses on solving problems that are closely related with everyday life, which therefore is in line with justification of securing local capability. Since Living Lab was introduced in Korea, interests have been increased and attempts from various aspects have been made. Up until now, however, they have rather focused on experimenting development process by users’ participation and therefore Living Lab projects that deal with real-life problems seem insufficient [8,254-255]. This study has purpose of organizing existing Living Lab studies in terms of regional problem solving and development of local communities, and to draw a point at issue. Moreover, it aims to propose what should be done in order to utilize Living Lab platform effectively for regional problem solving, local economics activation and reformation.

2. Precedent study reviews

Table 1 below shows summary of existing Living Lab studies categorized by subjects. One could see studies that applies Living Lab are being attempted in various fields and themes [2]. However, while majority are related to social innovation or social problem solving which are high-dimensional and wide-scope, discussions about local community issues or local business are still seem made in a relatively insufficient way.

Table 1. Summary of existing Living Lab studies’ subjects

Study Fields	Subject of Study Cases
Introduction and Overview	Origin and current status of Living Lab, Methodology, Operation process and example, Classification and categorization
Social Innovation	Living Lab as a platform of social innovation, User-driven innovation and system transformation, Tools of social reformation
Smart City	Smart city Living Lab, Value of city innovation regarding IoT district, Smart highway lighting.

Development of product or service	Utilization of scientific technology for welfare product development, User-oriented design plan in VR environment, Living Lab cases of domestic and foreign countries' healthcare system, Fire-proof hood design, Utilization methods of countermeasures to disaster.
Means of solving social problems	Scientific technology which relates to solving social problem, Social issue solving by digital technology, Research and development for social issue solving, Ways to invest on scientific technology related to social issue solving, Living Lab as a means of local issue solving
Application of R&D process	National R&D process, Living Lab between research projects, Implementation ICT R&D system, R&D on disaster countermeasures

Domestic cases of Living Lab projects for solving local problems are typically known as Bukchon IoT living lab, Seong-Daegol energy transition living lab, Daejeon Geonneoyu project living lab, etc [4,65-98] as shown in table 2.

Table 2. Characteristics of three examples

	Bukchon Living Lab	Seong-Daegol Living Lab	Geonneoyu project
Project background and regional issue	-Commercialization of IoT technology -Introduction of Living Lab as a means of investigate and solve issues in cities	-Consciousness of crisis was raised due to Fukushima Daiichi nuclear disaster and blackout crisis -Civic consciousness has been raised about energy conversion	-Expansion of user participation in process of innovating scientific technology -Increased demand on solving everyday life-related problems
Project Objective	-Solving issues of city with IoT and promote convenience of tourists	-Finding technological alternative for self-sufficient energy and related experiments	-Solution of residents' discomfort and enhanced convenience by using stepping stones
Governance Infrastructure	-Government-provided infrastructure (Free access to Wi-fi network and public information)	-Institutional, financial support for civil society-driven movement of energy conversion	-Civil society finds the problem by itself and suggests an alternative

Source: [3,92]

But other cases from those mentioned above are rather rare, even though some are being tried in metropolitan area including Seoul, Busan, etc.

3. Living lab and development of local community

While there are many ways to categorize Living Lab studies, table 3 below shows summary chart categorized by lead authority and organization type of participants.

Table 3. Summary of existing Living Lab studies by lead authority and organization type of participants

Organization by central or local government	Organization and network are made up focusing on local community issues and development. Supports establishing Living Lab foundation and its activities.
Organization led by research institute such as university / laboratory	As a form of R&D, focuses on utilizing developed technology. Main purpose is to utilize technology and establish innovation platform.
Organization by companies	Develop new product or service that users (consumers) need. Lacks of continuity but makes fast achievements.
Organization by civil society itself	Defines points at issue within civil society in order to solve local problems, and seeks technology to solve them.

Source: [3,8-9], [1,17-19]

As shown on above four types, main characteristics are found as local community issues and regional development, seeking technology for solving regional issues, products needed by residents and consumers, utilizing technology and establishing innovative platform in order to provide required products or services. All of them are related to local community issues and business.

It can be further specified into following discussion points.

First is related to stronger rights to speak about local communities' current issues. As more frequent interactions are expected between formal or informal communities according to Living Lab's subject, more opportunities will be made to vitalize communities. Also the chances are that social cohesion between residents' organization or communities are enhanced and that their volume is increased. At the same time however, not only cooperation between community members but also signs of conflicting between interests should also be paid attention to. As more opportunities will be made to communicate between central / local government organization, local organization or residents, more thorough understanding will be made about current issues that residents or users are experiencing. Opportunities to express individual's opinion about current issues will naturally grow. Then, it will be more likely that local residents or organization would participate more actively in political or social aspects and exercise their rights to speak in the process of policy formation. It is required to utilize activation of local community by Living Lab and opportunities to communicate between local residences productively [6].

Second, Living Lab can set the objective of developing products or service that fits with local situation based on their resource or demand. It is also possible to explore local resident and consumer's activity patterns, knowledge capability and associate them with activities being conducted by company or research organizations [3,9-10]. It could promote higher satisfaction of diverse parties including business operator and local resident, and especially would be efficient for local-based small medium business, individual business operators or start-up companies. This is related with community business. If Living Lab provides space for local venture companies to be able to experiment technology or solution at the spot and develop accordingly, it could contribute to activation of local economics. This also opens possibility of discussion on specialized industrial complex or cluster of certain region. Higher achievements could be made by cooperation between government organization, residents' community and users within the cluster where industrial facilities and

research organizations are concentrated. This could establish as local innovative platform, being a useful process in the perspective of specialized communities.

Third, there should be ways to induce companies, another party concerned, to participate in adequate manner. In order to support both two aspects of Living Lab (i.e. local problem solving and business perspective), participation of a company that is capable of providing adequate amount of technology and financial support are required in order to be provided with continuous resource supplies and higher possibilities of projects. In the position of a company, Living Lab offers various benefits which include shorter process of development, product improvement, more precise understanding about innovation process, user commitment, and about the market itself, how to expand their business [7,63]. As important as it is to industrialize the establishments of Living Lab, one should still try to avoid conflicting with the possibility of Living Lab's contribution to the public.

4. Discussion

In order to expand Living Lab, its focus should not only be restricted to abstract discussion but also cover real-life related subjects such as current local issues or local economics as well as new technology, product or service which will eventually support everyday life of local residents or consumers. In this critical perspective, Living Lab execution model should be established that deals with practical and detailed life issues such as safety, residence, traffic, environment or health [3,33]. Table 4 below suggests a series of execution phases.

Table 4. Execution phases of local-based Living Lab model

Phase 1	Establishment of cooperation system between residents and other involved parties, as well as problem-solving process
Phase 2	Establishment of platform that creates common value within the area and fits local demands
Phase 3	Composition of circulating model that leads to regional development, consumption promotion and activation of local economics by providing IT-based products and solutions
Phase 4	Continuous excavation of customized business opportunities that take local characteristic into account

As subjects of Living Lab, maintenance of living accommodations, installation of amenities with IT technology or projects to activate regional culture, etc. could be suggested. In more detailed level, installation of smart streetlight, utilization of regional cable network and contents, promoting new technology-based regional venture projects could also be considered. As an example, Living Lab that utilizes local cable TV network could be proposed when it comes to establishing a platform to solve regional problems by customizing the concept of smart city to a certain area. Activities stated in table 5 below could be conducted.

Table 5. Contribution activities to developing local society by utilizing cable TV

Utilization of Cable TV network	Establishing multi-dimensional control system e.g.) parking-lot monitoring, traffic control, systems to promote pedestrians' safety and prevention of crime or other disasters
Utilization of cable TV contents	Production of a broadcasting program that covers policies and current issues related to regional society Production of disaster broadcast or urgent news program Provision of regional ICT solution such as Internet, phone, CCTV, Home IoT, etc. CSR (Corporate Social Responsibility) activities with local system operator in close-relation with the local district

As seen above, cable TV network could function as enabler and coordinator that supports solving regional issues and could contribute to increasing business opportunities in cooperation with business operators or start-up companies from that region.

The bottom line is that Living Lab should continue to stand by the perspective that it exists to solve issues of local communities, residents and end-users, and only then it would be able to function effectively as a methodology and a means to trigger regional innovation as a result. In addition, systems to support realization of this perspective and political support are also required.

This study organized precedent Living Lab studies' reports and thesis and proceeded discussion in the perspective of 'Local problem solving and Development of local community', which was followed by drawing a point at issue and suggesting further policy making directions. However, there is a lack of accumulated empirical studies. Therefore, detailed and historical case studies are required regarding actual procedures and outcomes of Living Lab, through which implications can be deduced and contribute to expanding Living Lab.

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