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Measures to Operate and Manage Sustainable Smart City Services

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An objective of a smart city is to improve the quality of life by providing services that apply smart technologies. Therefore, successful implementation and operation of city services provided in smart cities will increase and spread the value of smart cities. Since most of smart city services in South Korea (hereafter, Korea) have been introduced through public competitions, most of such services are of a public nature. Therefore, it is not easy for such services to have a profitable service structure, and there is a high chance to experience difficulties in the management and operation in a sustainable manner as it is not possible to secure operating and maintenance costs.

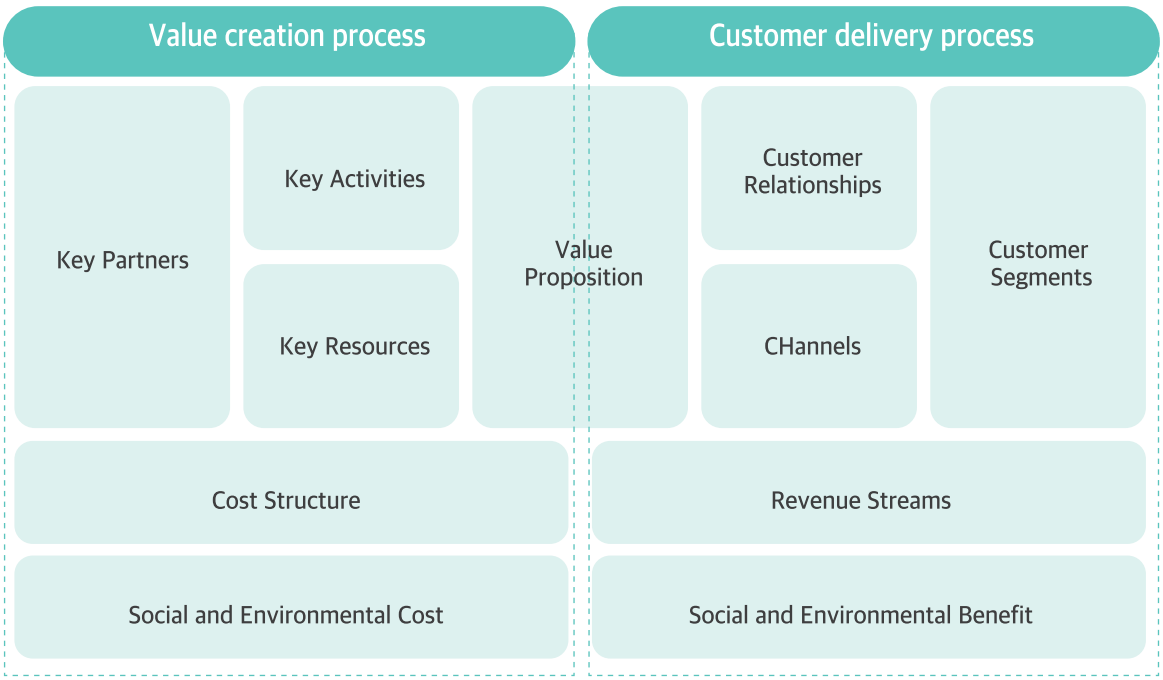
In a survey of smart city business operators and officials of the association of the smart city business operators, they answered that they have experienced many problems in securing the market, raising funds, and hiring professional manpower. In addition, in the 'U-City Service Evaluation' conducted in 2017, the average annual operating cost per project district was 15% of the construction cost, indicating that a considerable amount of cost has been spent as operating expenses. As witnessed in Google Sidewalk Lab's 'Sidewalk Toronto' project, which received international attention, economic uncertainty caused by the global economic downturn was cited as one of the reasons for the smart city services to withdraw. Hence, to operate such services

requires not only to prepare an appropriate cost and benefit structure, but also to strive for stable operation.

The purpose of this study is to identify the characteristics and problems of smart city services in Korea, and to find a systematic way for smart city services to have a stable operation structure from the planning stage. Accordingly, business model analysis was conducted targeting the services of major smart city plans in Korea to check the status of smart city services in Korea.

The smart city service analyzed in this study was limited to services related to the public among smart services applied with smart technologies. The analysis was performed through the CANVAS business model to understand the planning and operation status of smart city services. The CANVAS business model explains the logic of a business that creates and provides value to generate revenue, and consists of 9 items,: Key Partners, Key Activities, Key Resources, Value Proposition, Customer Relationships, Channels, Customer Segments, Cost Structure, and Revenue Streams. The analysis of the government and non-profit organizations can be conducted by adding Social and Environmental Cost and Social and Environmental Benefit.

[Table 1] Business model canvas analysis criteria



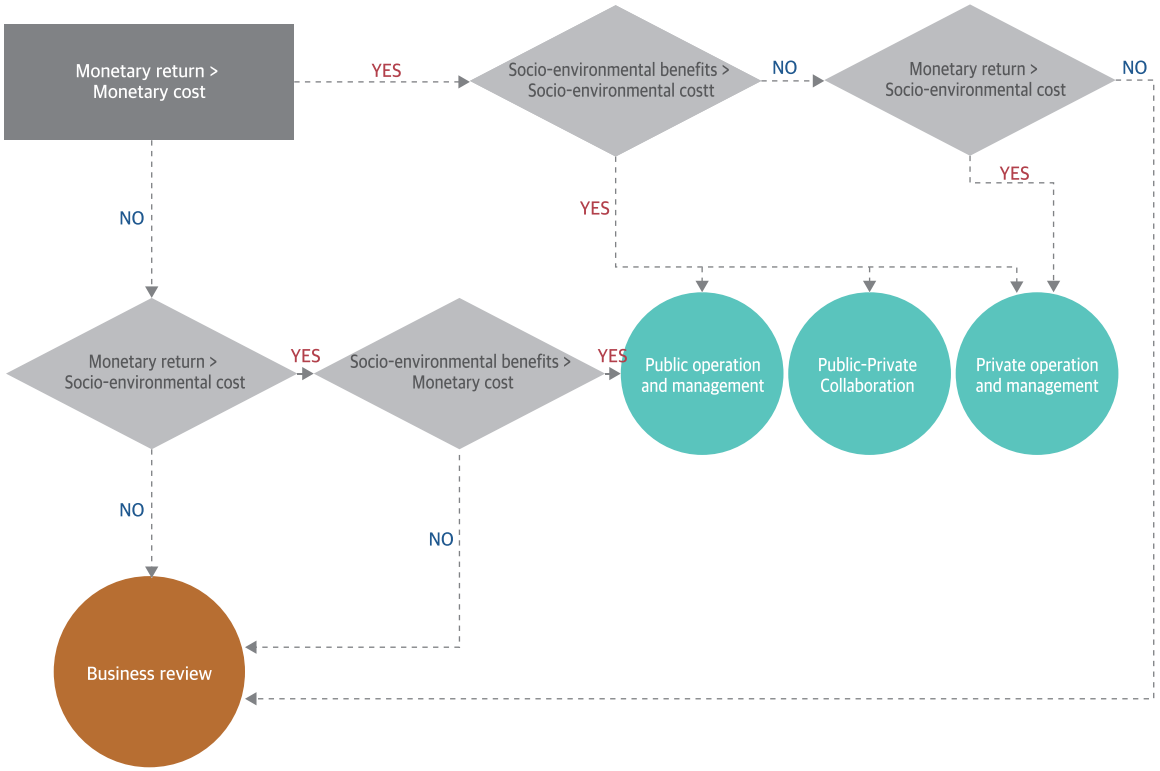
We analyzed the business model CANVAS of services planned or provided in five target sites of the national pilot cities (Busan and Sejong) and the smart challenge project cities (Daejeon, Bucheon, and Incheon) and identified stakeholders of smart city services for interviews.

Implications for the planning, management, and operation of domestic smart city services are as follows. First, it is not easy to discover differentiated services with superior costs and benefits or higher satisfaction than the existing city services and smart services, which satisfy the needs of citizens. Second, when a single service affects multiple fields, the subject of the service operation and management is not clearly identified or distributed to multiple identities, which causes difficulties in the continuous maintenance and management of the service. Third, it is difficult to secure operating costs for the services since they are perceived as free. Most of the currently promoted smart city services can be operated only with the support of the central government such as public offering projects and cannot be operated only with the budget from the local governments. Fourth, it is difficult to secure the expertise and sustainability of the personnel in charge of the services within each local government due to the rotational position system.

[Table 2] Development of smart city service planning, management, and operation

	Problems in planning, managing, and operating smart city services	Developments of smart city service planning, management and operation
Plan	Difficulty in finding new business models	Support in business model review process
Planning and operation	Difficulty in sustainable maintenance Ambiguous responsibility in service operation management	Support in maintenance plan review Development of the consultation process with the operation management entities
Operation	Difficulty in securing operating costs	Securing continuous operating costs for public services
Organi-zation	Lack of management manpower	Support plan to have professional management personnel within the dedicated team

At the planning stage, a differentiated approach between public and private services can be implemented through a business model review to solve these problems. Second, a consultation process can be prepared to clarify the responsibility for service operation at the planning stage, and a maintenance plan can be established for sustainable operation. Third, excessive emphasis on the profitability of the business itself is not appropriate in the case of smart city services of public nature, considering the benefits to the public. Therefore, it is necessary to have a plan to secure operating expenses in indirect ways, such as securing profitability by utilizing the additional value. Fourth, dedicated organizations and manpower in charge of smart city-related tasks are required. It is necessary for the organizations to operate so that they can solve problems related with laws and regulations that hinder the operation of smart city services by local governments.



[Figure 1] Evaluation using the business model canvas in the business planning stage

In order to understand the characteristics of smart city services and to clarify the responsibility of operation and management, institutional devices are needed to analyze the economic, social, and environmental benefits of smart city services. To this end, an evaluation system should be prepared to objectively examine the operability of the planned smart city service and the efficiency of the smart city service in operation, and to check the necessary requirements for improving the sustainability of the services. Evaluation of the

business model at the planning stage can help to select the operating and management entities of the smart city service and to prepare an operation plan according to the entities. To operate such an evaluation system, an evaluation committee can be formed as an organization in charge of evaluation, and the evaluation committee can be operated by using smart city service support organizations and smart city business councils, or by establishing a new committee. Afterwards, it is necessary to secure professional manpower and to operate a dedicated organization for the consistent management and operation of smart city services.

Through these results, we intend to avoid excessive planning and establishment of smart city service, and to support the creation of economic, social, and environmental benefits through continuous and stable operation of the service in order to contribute to the spread of smart cities.

Keywords : Smart City Service, Business Model Canvas, Smart City Service Evaluation

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