

Audit Report on Smart City Development Project

I. Audit Background

The construction of smart cities was initiated alongside the second-phase of the Housing Site Development Project in 2003, with an aim to facilitate urban management and resolve civic issues. At the beginning, the project mainly centered on building smart city infrastructure equipped with cutting-edge information and communication technologies, but recently, the focus has gradually expanded to creating new industries and developing data-driven platforms.

Unfortunately, however, a KDI (Korea Development Institute) survey gauging public awareness of the smart city project found that a mere 27.3 percent of the respondents were aware of what the project was about. This indicated that the government's constant efforts to build smart cities were not effective enough to deliver substantial results and arouse public interest. Meanwhile, the media has constantly brought to notice the issues that arose during the past smart city projects, such as subpar levels of service and building the same basic facilities more than once.

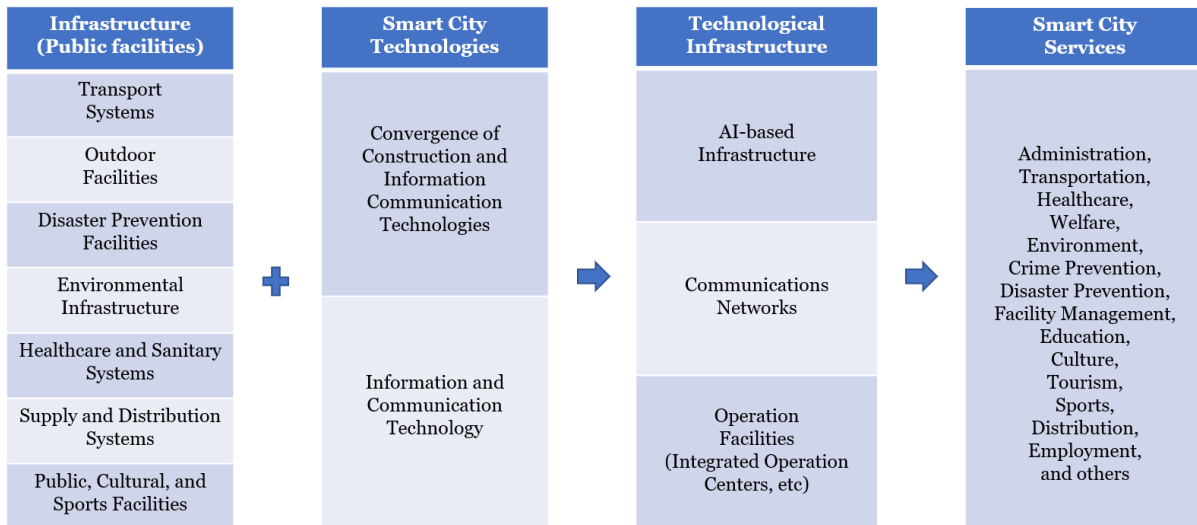
In this regard, the Board of Audit and Inspection (BAI) conducted an audit from December 7, 2020 to January 29, 2021 to investigate the smart city development project and identify the causes of the issues that arose in the past, so as to come up with the solutions which can be applied to the third-phase of the Housing Site Development Project.

II. Overview: Audit Subjects Related to the Smart City Project

1. Concept and Structure of Smart Cities

The definition and function of smart cities tend to vary according to a country's level of economic development and its urban environment. In Korea, the Act on the Promotion of Smart City Development and Industry (hereinafter referred to as "Smart City Promotion Act") defines smart cities as follows: A sustainable city wherein various city services are provided based on city infrastructure constructed by converging and integrating construction technologies with information and communication technologies to enhance the city's competitiveness and livability. That is to say, the concept of a smart city is the convergence of smart city technology, smart city infrastructure, and smart city services.

Structure of the Smart City



2. Legal Background and Operating System of the Smart City Construction Project

Article 8 of the Smart City Promotion Act defines the smart city construction project as a project to build and operate smart city infrastructure and other facilities to provide smart city services according to a relevant smart city plan. The Act additionally stipulates that various housing site development projects can be carried forward by the state, local governments, Korea Land & Housing Corporation (LH), and other stated persons as a smart city construction project.

The three main parties involved in the project are the Ministry of Land, Infrastructure and Transport (MOLIT), local governments, and project implementers. For smooth implementation of the project, each party plays a different role. MOLIT, for example, establishes a comprehensive plan for smart cities every five years, based on which it provides necessary support to relevant local governments for efficient development, management, and operation of smart cities. As for the local governments, they draw up a more specific establishment plan, making sure that the city fits the characteristics and conditions of the region. Lastly, the project implementers develop and carry out the individual project.

3. Enactment and Amendment of Related Law

With the establishment of the Act on the Construction, etc. of Ubiquitous Cities¹ (hereinafter referred to as Ubiquitous Cities Act) in March, 2008, the government made it mandatory for a new city to be built as “ubiquitous,” when its size reaches 1.65 million square meters or larger, kick-starting the construction of smart cities in earnest. Later, the government formulated several guidelines that served as legal grounds for the project, for instance, guidelines for planning ubiquitous cities and operating guidelines for ubiquitous city

¹ “Ubiquitous city” was originally the name given to the smart city concept.

construction projects.

Then, in August, 2017, MOLIT decided to replace the term “ubiquitous” with “smart,” amending the title of the law from Ubiquitous Cities Act to Smart City Promotion Act. This decision was mostly driven by two reasons. First, ubiquitous is not a widely known expression in Korea, hence it was difficult to expect the general public to understand its meaning. Secondly, some pointed out the limitations of the initial act as it did not cover enough to catch up with the rising global trend of the smart city and to provide adequate support to related industries.

4. Different Policies for Each Development Phase

Following such shift in the legal environment of smart cities, related policies have also gradually evolved and expanded.

Development Phases of the Smart Cities in Korea

	Phase 1 (2009-2013)	Phase 2 (2014-2018)	Phase 3 (2019-2023)
Related regulations	Ubiquitous Cities Act, 1st-phase smart city comprehensive plan	Ubiquitous Cities Act, 2nd-phase smart city comprehensive plan	Smart City Promotion Act, the Fourth Industrial Revolution Committee, Smart City Implementation Strategies
Agencies in charge	Central government (MOLIT)	Individually working government departments + cooperation with few local governments	Jointly working government departments + cooperation with multiple local governments
Cities subject to development	New cities (1.65 million m ² or larger)	New cities + a small number of existing cities	New cities + a large number of existing cities
Projects conducted	Construction of Infrastructure such as Integrated Operating Centers and communications networks	Establishment of an integrated public platform → standardizing and securing its compatibility	Construction of national pilot smart cities; Other various projects carried out through public competitions

In June, 2019, MOLIT came up with the third-phase comprehensive plan for smart cities. This plan went beyond the previous concept of the ubiquitous city as it focused on constructing smart city infrastructure and designed the following four implementation strategies with the aim to build smart cities as innovative platforms that transform people’s daily life: 1) building customized models for each developmental stage; 2) laying the groundwork to promote smart cities; 3) creating innovative ecosystems for smart cities; and 4) strengthening global initiatives.

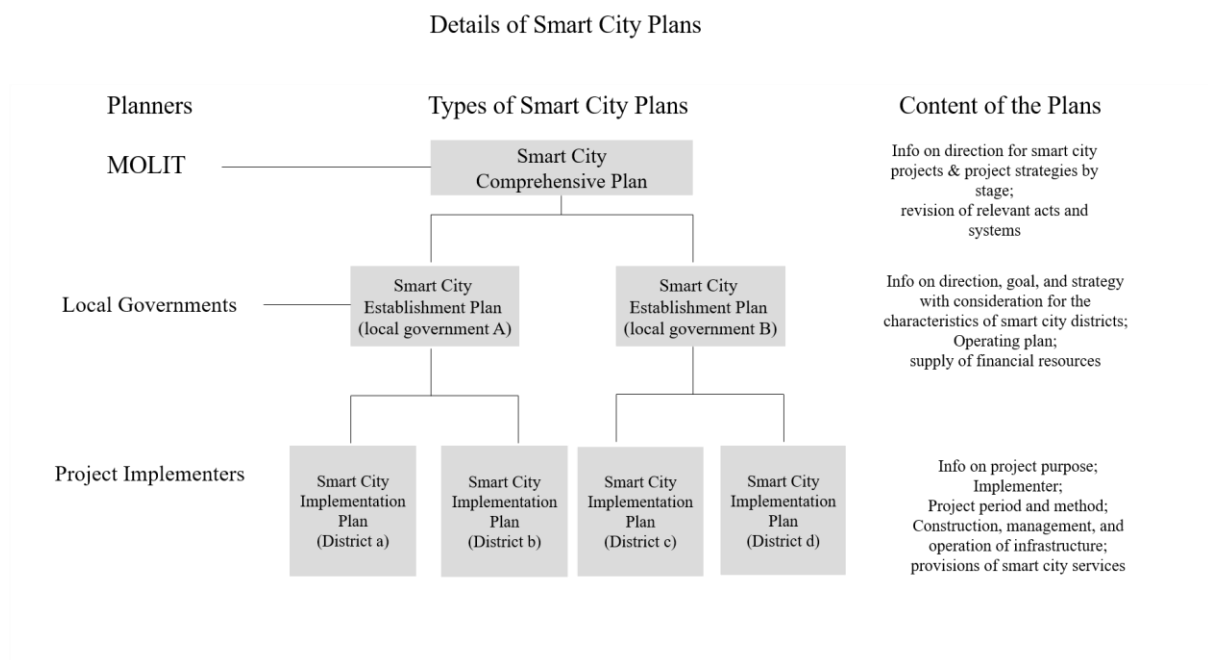
Spurred by such efforts of the government, the project is currently in full swing. As of December, 2020, approximately 120 local governments have either completed a smart city project or are in the process of building one.

With regard to this, BAI conducted an audit on 74 smart city projects implemented by the LH, in which a total of KRW 952.2 billion or KRW 12.9 billion was invested in each project.

III. Audit Findings and Recommendations

1. Establishment of Plans

When conducting smart city projects, MOLIT, local governments and project implementers are each responsible for establishing the following different plans; comprehensive plans, establishment plans, and project implementation plans.



1) Absence of Smart City Construction Plans and Consultative Council

Article 8 of the Smart City Promotion Act requires local governments to develop plans for the construction, management, and operation of a smart city, and smart city services, before setting out to build a smart city in their jurisdiction. The Act allows them to make adjustments in the plans when the need arises due to changes in conditions surrounding the project.

Meanwhile, Article 24 of the same Act mandates local governments that carry out a smart city construction project to form a consultative council comprising project developers and experts in smart city services to discuss the following matters: 1) the management and operation of smart city infrastructure; 2) the procurement of financial resources 3) final inspection on completion of the construction

The purpose of designing the plans and the consultative council is to decide the extent of smart city infrastructure and its reasonable allocation, as well as to prevent investing in the same infrastructure and stopping conflicting issues from arising. This explains why it is essential for local governments to establish the plans and organize the council, when performing the project.

Nevertheless, out of 36 local governments responsible for 58 districts² where smart city projects were based, 12 local governments, responsible for 13 districts, did not draw up construction plans due to ignorance of their obligation to do so. Not only that, three local governments in charge of five districts continued with their projects despite having experienced changes in the project conditions, and followed their initial plans without making any adjustments.

Moreover, 19 of the 36 local governments in charge of 22 districts failed to form consultative councils for their projects, citing lack of particular departments to take care of the work.

2) Absence of Implementation Plans and Failure to Specify Ownership of Newly Built Smart City Infrastructure

Article 14 of the Smart City Promotion Act stipulates that a project implementer should formulate an implementation plan that covers the purpose, period, and method of the smart city project, as well as the construction, management, operation, and ownership of the city's infrastructure.

That is to say, the ownership of smart city infrastructure is decided by the implementation plan. Therefore, the project implementer, such as the LH, should not only make sure to set up the plan from the beginning, but also to specify in the plan upon the final inspection on completion the local government to which the ownership of the relevant smart city infrastructure would be transferred (or gratuitously vested in³).

However, the LH, the project implementer of the previously mentioned 58 smart city districts has failed to establish implementation plans for 34 districts. In addition, it proceeded with several city construction projects without specifying anything in the plan about the ownership transfer of automatic collection facilities for domestic waste which are classified as smart city infrastructure. This omission, along with the facilities' expensive operating costs, has caused long-term delays or refusal of transfer from local governments, for example in the district of Jung-gu, Incheon city, leaving the equipment unused and wasting away.

Audit Recommendation

(Warning) BAI requested that MOLIT tighten its supervision to make sure local governments establish smart city construction plans and organize consultative councils, and project implementers come up with implementation plans before carrying forward smart city projects. BAI also notified the LH to ensure that the ownership transfer of smart city infrastructure such as automatic waste collection facilities are stated in the implementation

² The LH was the project implementer who practically performed the smart city construction for the 58 districts.

³ Article 65 of the National Land Planning and Utilization Act (National Land Act) states that the ownership of newly installed public facilities should be transferred to (gratuitously vested in) a managing government agency (a local government) when the final inspection on completion is over. The local government is not allowed to refuse ownership.

In addition, Article 18 of the Smart City Promotion Act stipulates that the project implementer (the LH in this case) should specify the ownership transfer of a public facility in a smart city implementation plan to make sure the transfer happens as stated in Article 65 of the National Land Act.

plans.

2. Infrastructure

1) Inappropriate Selection and Construction of Smart City Services

While conducting smart city projects, the LH builds systems for smart city services⁴ and transfers their ownership and operation to relevant local governments. During the initial stage of the smart city development project in 2011, the implementer selected the following six services as basic smart city services and began operating them: real-time traffic control system; information services on traffic control; incident management system; parking enforcement system; information services on public transportation; and safety monitoring system in public places. And since June of 2019, a total of 58 smart city services have been developed and operated.

As the six basic services are offered in more and more smart city districts, the LH should make sure that the services are put to use by regularly inspecting their status and setting technological standards for each service to maintain quality of service. It also should not repetitively install the service systems that are used the least without making improvements or solving their issues.

However, BAI's audit revealed that the LH has built the systems only customarily without having conducted any regular inspections regarding their usage.

A. Repeated Installation of Unused Traffic Control System

The LH has equipped 29 districts out of 74 smart city districts with a real-time traffic control system, "TRC" (Traffic Response Control). This system controls traffic signals in real time based on traffic conditions such as travel speed, road area occupancy rate, traffic light waiting time, and the level of traffic congestion reprocessed from the data collected by a vehicle detector.

Unfortunately, the full implementation and operation of this TRC system is not possible due to its current technical limitations. Despite this issue, however, the LH has continued to blindly install the system and transferred its ownership and operation to relevant local governments without updating it to the latest version or checking how often it has been used.

As a result, 3,353 loop detectors and 139 video detectors, where construction costed KRW 6.8 billion and KRW 2.1 billion respectively, are barely used to serve their initial purpose of controlling real-time traffic in 29 smart city districts.

B. Removal of Neglected Facilities

From 2010 to 2012, the LH constructed a pipeline leak detection system throughout Byeollae district in the city of Nanmyangju and transferred its ownership and operation to the city on

⁴ In a smart city, information on administration, transportation, welfare, environment, and disaster prevention is collected through smart city facilities. Smart city services refer to the services that provide such collected information directly or link the information with each other and offer the reprocessed version to users.

November 21, 2014. In the process of this construction, the LH realized that the system might not be applicable to pipes smaller than 400 millimeters, which was the size of the pipes mainly installed in the district. However, the project implementer overlooked the matter and kept on building the system, spending KRW 98 million on it.

Such dismissal resulted in the new system to be left unused and neglected by the city due to its detection range being shorter than the existing system and the maintenance costs being double for upkeep of the two systems. Eventually, the city requested the LH to remove the new system in August, 2020, and it was got rid of in January, 2021, costing another KRW 1.5 million.

Audit Recommendation

(Notification) BAI notified the Korea Land & Housing Corporation to make sure that smart city service systems are built with consideration for their usage before proceeding with their establishments, and that no services are installed only to be left unused and later be removed. BAI also requested that the LH check the current level of technology and operating status of the services installed as yet and identify the issues in need of fixing. And through these actions, the LH should set technological standards for each service so as to utilize them when building a new smart city.

2) Inappropriate Management of Smart City Integrated Platform Projects

From 2009 to 2013, MOLIT invested KRW 10.6 billion to develop an integrated platform of smart cities⁵. In 2015, as the platform development project became a government subsidy program, the ministry selected 108 local governments as subsidy program operators and paid them national subsidies totaling KRW 63.9 billion from 2015 to 2020.

When MOLIT promoted the subsidy program through a public competition, it set out a condition that selected operators must build an integrated platform along with the following five major services linked to one another: emergency video call report service; emergency police response service; emergency ambulance service; emergency disaster service; and support service for the vulnerable. While the ministry allowed the selected local governments to subcontract the establishment of the integrated platform to private businesses, the task of linking the five services was only given to the Smart City Association⁶.

A. Underuse of the Five Services

BAI performed an inspection on 49 local governments that completed the platform development project to check whether the five services are serving their purpose. The inspection found that the emergency video call report service, emergency police response

⁵ The integrated platform offers information on crisis situations like crime and natural disasters in real time by connecting separate information systems of local governments and relevant agencies with the smart city integrated operating center.

⁶ The Smart City Association is a nonprofit organization established according to Article 24 (2) of the Smart City Promotion Act.

service, and emergency ambulance service were being actively utilized, whereas the emergency disaster service and support service for the vulnerable were never used in 33 and 29 of the local governments respectively. This underuse of the services was either caused by the absence of basic systems required to use the services or extra phone charges that occur for using the services.

B. Smart City Association Single-Handedly Tasked with Linking the Integrated Platforms

Article 24 (2) of the Smart City Promotion Act defines the tasks of the Smart City Association as collecting and analyzing data and information on smart cities, consulting on smart city technologies, and handling matters entrusted by the Ministry of Land, Infrastructure and Transport. Adding to this definition, Article 60 of the Enforcement Decree of the Smart City Promotion Act further stipulates that the association is entrusted with the responsibilities by MOLIT to provide financial support for linking and integrating information systems related to smart city services.

When BAI surveyed the above mentioned 49 local governments to inquire them whether they are unable to connect their integrated platforms with the five services without going through the association, all of the 24 respondents answered that they would be able to do so, if the government standards set for the data linkage are made available to the public. For this reason, some respondents called for the disclosure of the standards, remarking that MOLIT's designation of the smart city association as the sole operator in charge of the linkage is inappropriate.

This leads to the conclusion that it would be a more sensible approach to disclose the necessary data standards and enable local governments' subcontractors to link the platforms and services rather than granting the authority only to the association.

Nevertheless, MOLIT's conditions set for the public competition and government subsidies mandate subsidy program operators to use the software provided by the association, and entitle the association with the responsibility for linking the platforms with the services. And as the information on the data standards are kept within the association, local governments have no choice but to follow the rules and pay the license fee to the association. As such, the total amount of the fee paid by 81 local governments amounted to KRW 4.16 billion by December, 2020.

Audit Recommendation

(Notification) BAI notified MOLIT to come up with measures to encourage the usage of the emergency disaster service and support service for the vulnerable and to make public the data standards currently provided only to the Smart City Association.

3) Mismanagement of the Smart City Association

In accordance with Article 24 (3) of the Smart City Promotion Act, MOLIT is responsible for supervising the Smart City Association. Until 2017, only the Smart City Association was

entitled to construct an integrated platform called “Eco-integrated platform” and to provide the five services, receiving KRW 4.794 billion from the LH and local governments that developed five and 13 smart city districts respectively. Then, since 2018, with private firms taking over the job of constructing the integrated platform, the responsibility of the association was decreased to only providing the five services. As a result, a total of 95 local governments and four districts under the oversight of the LH and the Seoul Housing & Communities Corporation had to pay a total of KRW 5.064 billion as license fee to the association for building the systems needed to provide the five services.

In an audit conducted to check whether the association has been properly carrying out its job, BAI found a number of following mishandled issues: a) offering duplicate module functions or continuously providing the problematic, initial version of the platform to the LH, in particular to Gimpo-Hangang smart city district, even after having updated the platform to an advanced version; b) charging higher prices from the LH than from the local governments for constructing the same platform; c) charging the license fee twice for building the systems for the five services; d) charging the full amount of the license fee without ever having installed all the functions or when there were no services to link; and e) not fulfilling a contract of establishing the emergency police response service system.

Audit Recommendation

(Warning) BAI requested that MOLIT order the Smart City Association to fix the issues, for example reinstalling the platform in the Gimpo-Hangang district and returning the unfairly acquired license fees, and also demanded that the ministry exercises strict supervision over the association and its tasks.

3. Operation and Management: Delay in the Transfer of Ownership

BAI conducted an inspection on the information and communication facilities of 46 districts and automatic waste collection facilities of ten districts, for which the LH had completed⁷ the ownership transfer, to find out the average number of days and expenses spent on the transfer process.

The result of the examination showed that as for the information and communication facilities, it took an average of 413 days with each facility having around 56 of its parts in need of improvement, which required expenses amounting to KRW 24 billion or KRW 828 million per district. Furthermore, the delay in the transfer incurred additional management expenses of KRW 2.5 billion. Cases in point were the district of Yeongjong in Incheon and the city of Naepo. Ever since the establishment of the facilities in the both places in August, 2014 and in April, 2018 respectively, the transfer had still not been carried out as of the date of the inspection, February, 2021.

The average number of days taken for the ownership transfer of automatic collection

⁷ For the cases where the transfer of a facility has not taken place, BAI counted the number of days from the end of February 2021.

facilities for domestic waste was 922 with each facility having an average of 51 areas to improve, which required expenses totaling KRW 1.2 billion. Moreover, additional maintenance costs of KRW 14.9 billion were incurred due to the postponement of the transfer. This was particularly notable in Yeongjong district in Incheon city and Baebang district in Asan city, where the transfer was still put on hold since the installment of the facilities in December, 2014 and June, 2013 respectively.

In light of this, BAI examined ten districts where the transfer of information communication facilities took 300 days or more to identify the causes of the delay.

Delayed or Withheld Cases of Ownership Transfer

		Total Number of Cases
Delay in Transfer	Local governments' previously undiscussed, additional requests (unreasonable requests)	10
	Local governments' requests for improvements or changes in installed facilities for being defective or being hard to use	3
	Local governments' requests for upgrades of installed facilities	2
	Local governments' requests for improvements out of need from other government agencies (ex. the police agency)	1
	Local government's requests for improvements for having unexpected situations occurred after installation (reasonable requests)	10
Transfer Withheld	Local governments' refusal of the transfer due to noncompletion of facilities and concerns over management costs	2
	Local governments' refusal of the transfer of defective facilities	1
		29

The above cases occurred largely due to the lack of discussion and planning in advance and poor construction of the facilities.

Audit Recommendation

(Notification) In order to prevent delays in the ownership transfer and to make clear which requests are acceptable, BAI notified MOLIT to set a standard guideline for local governments to follow when they make requests to the LH during the transfer.