

Survey of local governments on their intentions to introduce new technologies (to shift to smart cities) to solve urban problems

(Research period: FY 2020–2022)

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Keywords: Smart city, urban problem, new technology, local government, intention survey

1. Introduction

Smart cities, which seek to solve urban problems through the use of new technologies, such as IoT, are expected to be the opportunity to practice Society 5.0 in the actual society. The theme of smart cities has expanded from energy conservation in the past to include transportation, lifestyle support, disaster prevention, crime prevention, tourism, and many other fields. Also, the new technologies expected to be utilized through technological innovation have also diversified.

The NILIM is systematically organizing new technologies that can be used to solve various urban problems, and is developing a prototype of a planning evaluation method to effectively use new technologies to solve major urban problems to support local governments in consideration of the direction of solutions to major urban problems through the use of new technologies, such as IoT (to shift to smart cities), in order to solve various urban problems.¹

This paper introduces some of the results of a questionnaire survey on urban problems and the use of new technologies that was conducted among local governments in order to identify the actual situation for the systematic organization of urban problems and new technologies.

2. Summary of the results of a questionnaire survey on urban issues and the introduction of new technologies

The questionnaire survey was conducted in December 2020 with a 98% response rate among 61 local governments that applied for the call for proposals on needs and seeds for the realization of smart cities (hereinafter referred to as the "Needs and Seeds Survey") conducted by the Ministry of Land, Infrastructure, Transport and Tourism in FY 2018. In the survey, the respondents selected urban problems that they sought to solve by using new technologies and answered items in Table 1. The list of urban problems was based on the major categories (12) from the Needs and Seeds Survey, which were independently subdivided by the NILIM into medium categories (42) and minor categories (172). New

Table 1: Items of the survey

Items of the survey	Response method
① Urban problem to solve by using new technologies, its	Multiple urban problems can be selected. For the importance and
② New technologies to introduce to solve urban problems	Select types of new technologies from the list (up to three types)
③ Status of the introduction of new technologies to solve urban problems	Select the status of introduction from the list (already introduced/planning to introduce/considering to introduce)
④ Challenges upon introducing new technologies	Select all types of challenges from the list (with a space to write comments)
⑤ Method to evaluate the effect of solving urban problems	Freely describe evaluation index and method (e.g. KPI, B/C).

technologies were similarly subdivided into major categories (9) and minor categories (62).

(1) Comparison of urban problems by the size of local governments

Table 2 compares the top 10% of urban problems (subcategories) with the highest selection rate by the size of local government as urban problems to be solved using new technologies. While the issues of the last one mile mobility support and mobility support for tourists are common, large cities (ordinance-designated cities, core cities, and special cities) are aiming to provide more efficient urban services by promoting the use of public transportation through such measures as the optimization of bus schedules and networks and the dissemination of information to users. In other types of cities, in addition to disaster prevention monitoring and forecasting of rivers, the use of new technologies tended to be considered mainly for supporting the lives of the elderly, such as watching over the elderly and supporting the mobility of people who have given up their driver's licenses.

Table 2: Urban problems by the size of local governments

Designated city, core city, special city (n = 33)	Other cities (except for prefectures) (n=23)
Last one mile mobility support (39.4%)	Last one mile mobility support (34.8%)
Optimization of bus schedule and network (33.3%)	River monitoring and forecasting for disaster prevention (34.8%)
Information distribution to users (30.3%)	Mobility support for tourists (34.8%)
Mobility support for tourists (27.3%)	Mobility support for those who gave up their driver's licenses (30.4%)
Shortage of workforce in public transportation (27.3%)	Mobility support in areas without public transportation (30.4%)
-	Watching over the elderly (30.4%)
-	Support for shopping by vulnerable people (30.4%)

(2) New technologies to introduce to solve urban problems

Figure 1 shows the responses to the question about new technologies that have been introduced or that should be considered for solving urban problems in major categories. For (a) transportation and mobility, 90.2% of the local governments selected it as a problem to be solved using new technologies. The most commonly selected new technology to solve this problem was (6) new applied technology using (1) to (5). The main breakdown of this by medium and minor categories was the introduction of route search, reservations, and payments using MaaS and the introduction of on-demand transportation by introducing remote sensing data and AI-based analyses through the use of communication networks to solve the problems of promoting the use of public transportation and supporting the mobility of transportation-vulnerable people. (7) Automated driving technology, robots, and new technology were also selected by many respondents. The main breakdown showed that automated driving technology, personal mobility, and sharing were considered transportation methods to solve the problems of promoting the use of public transportation and supporting the mobility of the transportation-vulnerable people.

The next most common urban problem to be solved by new technology was (e) tourism (54.1%). Many local governments selected (1) communication networks and sensing technology and (6) new applied technology using (1) to (5) as new technologies to solve this problem. As a major breakdown, the use of human flow data and the introduction of MaaS and automated driving technology for tourism promotion and the introduction of digital signage for tourism information distribution were considered.

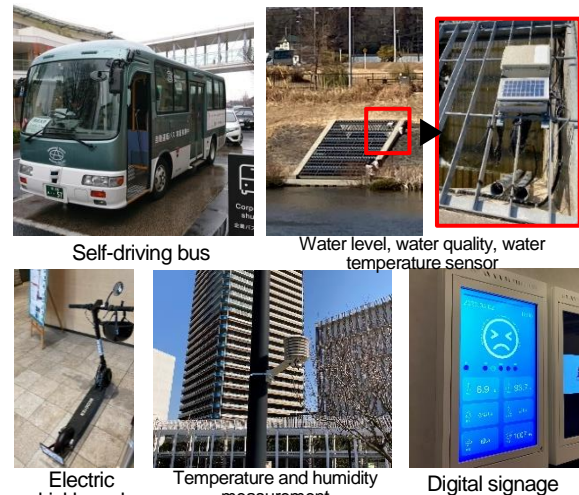


Photo 1: Example of the introduction of new technologies

(3) Issues upon introducing new technologies

In terms of the status of the introduction of new technologies to solve urban problems, new technologies have already been introduced to address only 14.9% of the 714 urban problems, are now in consideration for introduction in 73.2% of the cases, and are in the plan to be introduced in 11.8% of the cases (Photo 1).

Figure 2 summarizes challenges in introducing new technologies. Out of a total of 1,084 patterns of the combination of urban problems and new technologies, the most common challenges were operation cost (256 cases, 23.6%) and cost of introduction (249 cases, 23.0%), which were seen in a wide range of new technologies. The next most common challenge was social acceptability (62 cases, 5.7%). The breakdown of new technologies with this challenge include those related to

	(1) Communication network and sensing technology	(2) Analysis and forecasting technology	(3) Data storage	(4) Data platform	(5) Data utilization (e.g. visualization technology)	(6) Applied technologies using (1) to (5)	(7) Automated driving technology, robot, and new technology (transportation)	(8) Robot and new technology (other than transport)	(9) Other	Unknown
(a) Transportation and mobility	55	18	24	14	2	7	92	60	0	4
(b) Energy	20	0	2	1	3	1	62	10	1	6
(c) Disaster prevention	28	52	11	5	13	10	15	1	1	42
(d) Infrastructure maintenance and management	26	0	0	0	0	0	0	0	0	0
(e) Tourism	33	17	1	9	3	10	17	8	1	5
(f) Health and medicine	27	9	11	17	5	1	28	2	0	2
(g) Productivity improvement	28	5	1	4	3	2	7	13	6	2
(h) Environment	5	1	0	1	0	1	1	0	0	1
(i) Security	15	9	1	4	1	0	11	0	1	0
(j) Logistics	17	0	0	2	1	0	3	8	9	1
(k) Compact city development	25	6	1	12	4	3	16	8	0	3
(l) Other	19	4	6	0	2	5	0	0	0	4

■ Numbers among 61 local governments, ■ Number of local governments that selected (some are counted multiple times)

Figure 1: New technologies to introduce to solve urban problems

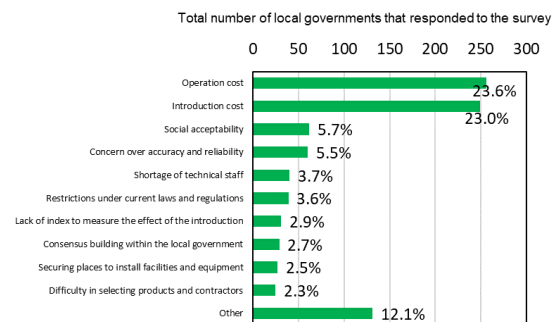


Figure 2: Issues upon introducing new technologies

personal information such as human vital data and information banking, and those related to safety, such as automated driving technology and personal mobility.

3. Conclusion

In the future, based on the results of the above analysis, detailed case studies will be conducted to prepare technical references (draft) on the use of new technologies according to the characteristics of urban

problems and to develop an evaluation method for the introduction plan of new technologies.

☞ For more information:

1) Website of Urban Planning Department

<http://www.nilim.go.jp/lab/jbg/smart/smart.html>