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A Study of a Meta-governance Framework for Sustainable Cities Considering Customers' Potential Mobility Preferences

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Abstract

This study aims to reveal the meta-governance framework for managing local public transportation (LPT) in order to develop sustainable cities. Recently, the number of inbound tourists has increased remarkably in Japan and there are growing expectations of mobility and interaction with others, especially among the senior generation in an aging society. Thus, there are huge opportunities to incorporate these demands to revitalize local areas by utilizing innovative technology. Local authorities should establish policy frameworks from a broad and long-term perspective, and take the initiative to develop common policy targets that enable the private and public sectors to work closely together and demonstrate their core competencies.

This research focuses on the theoretical development of public management theories from NPM (new public management) to NPG (new public governance) and customer preference theory. It considers the two aspects required to manage LPT platforms at a regional level. Firstly, citizens' preferences for LPT were analyzed by applying Maslow's motivation theory to grasp their fundamental characteristics. Results indicated that customer preference is organized along a hierarchical structure and that there are growing demands for mobility as people age. Secondly, innovative methods utilizing big data were developed to estimate quantitative demands for LPT, which provides useful information for policy planning and implementation.

By combining these methodologies, progressive local platforms can ensure policy management meets regional targets.

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Keywords: Sustainable city; Public Transportation; Meta-governance; Customers' Preference; Potential demands

1. Background and purpose of the study

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Local cities in Japan have experienced several dramatic challenges, both externally and internally (Fig 1). Firstly, demographic trends have changed significantly and aging is steadily advancing, especially in local communities. The percentage of the population aged 65 or over was 28.2% in 2018. This percentage will increase and is forecast to reach 37.7% by 2050 (National Institute of Population and Social Security Research). Accordingly, people's values and lifestyles have diversified. Digital mobile technologies that make it easier than ever to access services and platforms hosting sharing economies are growing rapidly. Customers' preferences for LPT services have changed in accordance with the deregulation of LPT. Secondly, the numbers of overseas and domestic travelers has increased recently and the potential demand for mobility and interaction has grown among elderly people. The number of inbound tourists in 2018 was 3.74 times the number in 2008. Their destinations have spread to local areas in recent years. Thus, it has become more important to meet foreign visitors' demands by developing new sightseeing routes. These measures may contribute to regional revitalization, where both local governments and businesses can benefit from a win-win relationship. Domestic tourists have increased steadily by 0.1% in 2017 compared to the previous year (Tourism Agency 2018). The percentage of citizens in their fifties and sixties with potential travel demands accounted for 57.2% and 51.9% of their age groups respectively in 2018 (Cabinet Office 2018). These numbers are larger than the demand for pastimes and hobbies, which represents 35.2% and 31.2% of each age group. Therefore as a whole, unique opportunities exist to meet these demands by regenerating businesses. Additionally, technological innovation enables policy-planning entities to monitor changes in the behavior of passengers through creating and combining objective data. It also helps users to acquire and share information using the internet and SNS. However, the mind-set of local governments does not change much. The figures show that the percentage of local governments that utilize their local economic/social/cultural resources most productively remained at 2.7% in city/towns and 6.9% in prefectures in 2016 (Small and medium enterprise agency 2016).

In this situation, we face several institutional issues. Firstly, the ranges of stakeholders involved in policy implementation and service delivery will expand. For example, these entities include tourism and information related businesses. Local actors should work together to attract tourists by demonstrating their unique identities. Secondly, a new platform of policies should incorporate a broader and long-term viewpoint, and appropriate initiatives should be taken. Thirdly, as Osborne (2010) points out, it is important to ensure sustainable policy implementation systems where we clearly define the meaning of sustainability.

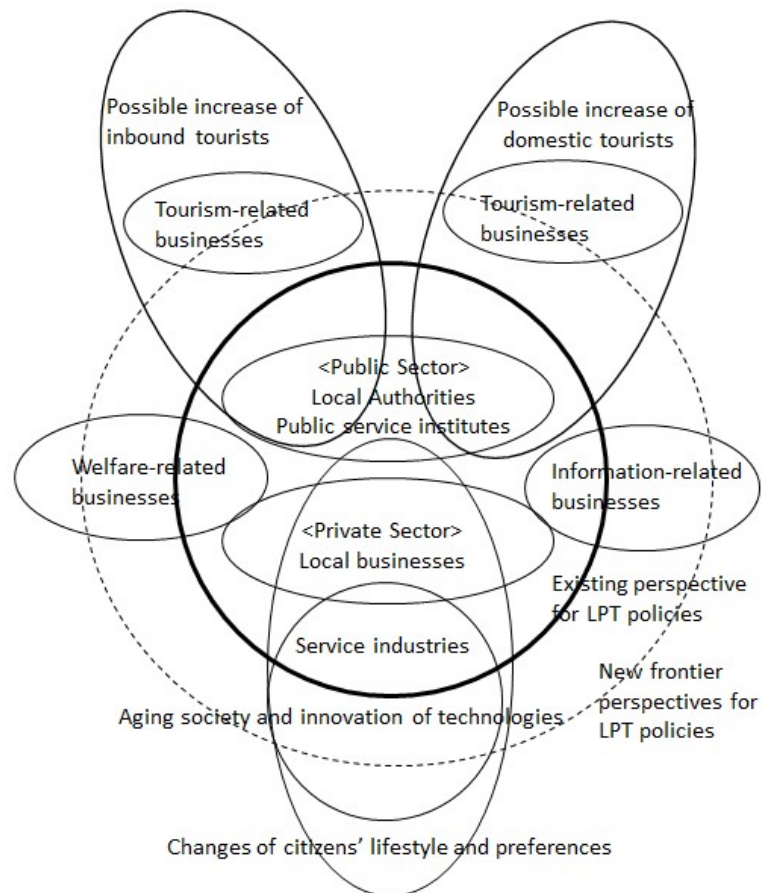


Figure 1 Changes of Policy Arena and Stakeholders in local areas

In an aging society where the population is simultaneously decreasing, creating opportunities to increase the demand for LPT is essential, especially in under populated areas. LPT services can only be improved through the well-balanced operation of both daily and non-daily demands when local economic conditions are stagnant. Therefore, it is necessary to understand customers' needs as a whole by collaborating with operators, and particular attention should be paid to potential mobility demands, including tourism activities. Appropriate policy targets and guidance for both operators and communities are required. In order to manage policy issues, it is vital that market principles as well as values-based factors, such as "interaction and community involvement," are carefully considered and prioritized appropriately. When considering technology-based communication, John U (2007) paid attention to the role of positive feedback in social networking and also stated that "face-to-face" conversations have become more important for developing trust between people.

Considering these changes in social circumstances, how should we design LPT services that meet the challenges of a complex society? What kind of platforms should be constructed beyond the existing frameworks that support day-to-day activities? Some local governments with innovative ideas have explored the new demands that have been emerging lately in Japan. From this perspective, this research focuses on the philosophical development of public management theories using NPM (new public management), NPG (new public governance) and customer preference theory. It considers the two aspects required to manage LPT platforms at a regional level. Firstly, citizens' preference for LPT was analyzed by applying Maslow's motivation theory to grasp its fundamental characteristics in section 3. Secondly, methods utilizing big data were developed to understand potential demands for LPT both quantitatively and qualitatively in section 4. During this process, this study reviewed the surveys conducted by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). It thus examined the possibility of a new framework in light of the current situation, based on these reviews.

2. The notion of public administration

The policy planning and implementation process requires the involvement of various stakeholders with different perspectives. In an increasingly complex and pluralist society, no actors have sufficient knowledge and skills to cope with current issues alone, because they can only manage issues from their own particular perspective. Therefore, it has become necessary for both the public and private sectors to cooperate to achieve their common and collective goals. However, there are many social values that citizens hold, some of which conflict with each other. Thus, there are growing demands for more comprehensive and integrated social solutions through horizontal and multifaceted networks where related entities can participate. NPM emerged during the late seventies and eighties, and "advocates for the institutionalization of market-based incentives structures and management forms that motivate unity, maximizing employees and agencies to constantly engage themselves" (Sørensen 2012). This condition is met when "goal specification and monitoring possibilities" and "relatively simple problems," but is "less successful with more complex problems where defining the problem and choosing performance indicators is harder." The definition and philosophy of NPM and governance have been discussed widely in highly cited articles. The rise of governance networks coincided with the era of shifts and "even of transformation and paradigm change" (Levi-Faur 2012). Torfing (2012) defines governance networks as the "horizontal articulation of interdependent, but operationally autonomous, actors from the public and/or private sector who interact with one another through ongoing negotiations that take place within a regulative, normative, cognitive, and imaginary framework." Klijn (2012) explains the four most important characteristics of governance. These include: "using the knowledge from societal actors in order to improve the quality of policy and public services and to make better use of information dispersed by various actors" as well as "the early involvement of societal actors, stakeholders, and citizens' groups so that the legitimacy of decisions is enhanced." These days, it is not easy to develop the right perspective from the beginning of policy planning because situations will proceed in an unforeseen way and the full range of viewpoints cannot be anticipated. Thus, various actors may participate in a policy platform to obtain new business opportunities of their own. Klijn (2012) states that the important factors are "the involvement of stakeholders and active network management," and "the willingness of the actors involved to participate in the governance process and their ability to manage that process." These governance networks have the advantage of ensuring a well-informed decision

making process that generates innovative solutions; however, the disadvantages include a directionless consensus (Torfing 2012).

Torfing concludes that social risks can be reduced through the exercise of meta-governance, defined as “the governance of governance.” Peters (2010) defines this concept as “the process of steering devolved governance processes.” In terms of competition and collaboration, Sørensen (2012) explains that “just as economic innovation theories increasingly recognize the importance of collaboration as a supplement to competition,” institutional schemes should “install continuous two-way communication and feedback loops between meta-governors and self-governing actors.” This paper applies this notion to frameworks where local entities try to build their capacity to contribute to sustainable cities beyond existing dimensions. There seems no limit to what meta-governance can mean and our goal is to solve the social problems at hand through progressive conceptualization.

3. The Investigation and Analysis of Customer Preference

It is important to understand the fundamental characteristics of customers’ preferences to establish a policy framework in a customer-centered context. This begins with the recognition of “who is the customer and what do customers think is worthwhile?” Citizens should be recognized as not only the recipients of services but also entities with specific intentions. NPM is one approach to these kinds of concepts. This notion places greater emphasis on “output controls” (Martin 2010), the “introduction of a purchaser-provider divide within organizations” and “the development of performance targets and incentives” (Stoker 2004). New Labour introduced the notion of Best Value (BV) which replaced CCT regimes. Local governments were required “to secure continuous improvement by reviewing the efficiency and effectiveness of their services in consultation with users, citizens, and other local interest groups” (Martin 2010). However, BV proved to be centrally prescriptive (Wilson 2005) and that posed the important political question of “Best Value for whom?” (Greenwood 2002). Martin says BV “has not displaced previous paradigms,” and that policy blends with traditional models of public administration, NPM, and networked community governance “have led to an increased emphasis on collaboration and “citizen-centered services.” Accordingly, most councils in the UK have a wide range of “customer first” initiatives to improve the quality of their services” (Wilson et al 2006).

Considering these trends in policy-making, this study categorized citizens in terms of attributes and analyzed “to what degree they think each value factor as important.” There have been many surveys on LPT which aimed to capture the needs of users in specific areas or modes. Studies such as Solomon and Mokhtarian (1998, 2001), Mokhtarian, Solomon, and Redmond (2001), and Mokhtarian, Solomon, and Singer (2015) covered the motivational aspects of people’s mobility by analyzing internal and external behavioral factors.

There have been relatively limited research studies on LPT that target not only direct users but also local residents. LPT customer types are classified into three categories based on the characteristics of service recipients and the spillover effects of policies. They are: (1) users as direct beneficiaries of services (daily users such as commuters, passengers for business), (2) local stakeholders (neighboring residents/users such as going out to hospitals/shopping or leisure on holidays, corporations), (3) local residents/national people (entities that benefit from the possible spillover effects such as the reactivation of local businesses, and as a result, an increase in revenue). This study categorized the degree of importance/satisfaction of each value factor according to the type of customer.

Types of what people value		A. Maslow	C. Alderfer
Values that are in common	-	Physiological needs	Existence
	Safety and Security (Safety, Reliability, Environmental effect)	Safety needs	
Values achieved through interactons	Interactions and Community involvement (Economic effect, Regional effect (regional redevelopment, etc), Interactional effects (Social participation, etc))	Love/belonging needs Esteem needs	Relatedness
Values in individuals	Convienience and Confortability (Speedity, Convienience, Amenity, Confortability)	Self-acrualization needs	Growth

Works based on Nakano (2005)

3.1. Theory of people's motivation

LPT is expected to deliver value realized by policy implementation and service delivery. Its degree of importance will become the driving force for behavior. Human expectations of LPT are thus conceptualized with reference to motivational theory in the field of behavioral psychology. It has been argued that human motivational factors are divided into two types: physiological needs (primary needs) and social needs (secondary needs). One of the leading arguments discussing the hierarchical structure of motivation and human nature was Maslow's hierarchy of needs theory (Maslow 1987).

Maslow explained how the diverse needs of human beings are expressed in personality development and argued that people have five types of needs and that these are activated in a hierarchical manner. This process means that these needs are aroused in a specific order from lowest to highest, such that the next order need is triggered by the current need satisfaction and this course continues. This process is irreversible and the structure is culturally widespread. These needs are divided into two categories; deficiency needs (psychological, safety, social needs) and growth needs (esteem, self-actualization needs). The five types of needs are: (1) physiological needs; (2) safety needs, which seek a secure environment free from any threats and risks; (3) social needs refer to the need to be affiliated (the need to be loved and accepted by other people), which is activated after safety needs; (4) the need for esteem, including self-respect and the approval of others, and (5) the need for self-actualization refers to the need to develop to one's full potential.

Alderfer redefined Maslow's hierarchy of needs into three broader classes as the ERG theory of motivation. It states that human needs are composed of three dimensions: (1) existence needs that seek basic material necessities, (2) relatedness needs that include an individual's aspirations to maintain significant interpersonal relationships, and (3) growth needs that include need for self-development and personal growth/advancement. Maslow's self-actualization needs and the intrinsic components of esteem needs belong to this latter category of need (Alderfer 1972). This theory states that needs are continuous and reversible. Thus, needs can coexist and ascend/descend along a continuum of multiple needs, and people's behavior is motivated by multiple needs simultaneously.

Regarding service delivery, the increasing awareness of service qualities initiated its research as well as the influential components of services. Parasuraman et al developed SERVQUAL model to measure service quality and the gaps between customer expectations and perceptions of the service offered (Parasuraman et al 1988). This model indicates that five crucial factors influence service quality, and this methodology has been discussed from both theoretical and operational concerns. LPT policy has to include a wide range of issues from fundamental values such as "safety and security" to values regarding human interaction and community that change and diversify. Thus, this research constructs the methodology by interviewing The expectations of LPT were organized and classified into three categories by applying these motivational theories to LPT policies as shown in Table 1: 1) "safety and security" values that people seek in common, 2) "interaction and community involvement" values recognized as a social values and expectations of interaction with other people through community activities, and 3) "convenience and comfort" values. This framework was developed to analyze customers' desires.

3.2. Methodology

The citizen survey consisted of group interviews and a questionnaire. This was implemented in 2003 when MLIT was established due to the merger of four ministries and agencies, and thus new policy evaluation frameworks were introduced. The survey was conducted with residents of the Tokyo and Osaka metropolitan areas where the density of LPT is high and needs are well established. It paid attention to the overall value of transportation services.

3.2.1. Implementation of Group Interview

A group interview was designed using market research methods. Different types of people were recruited from a range of situations (unmarried, parents with children, LPT user/non-user), age groups (from twenties to seventies), and occupations (office worker, student, self-employed, unemployed); altogether, a total of 21 people were interviewed in three segmented groups. The interview items consisted of: 1) customers' attributes, 2) actual state of LPT usage or other modes, and 3) the image of LPT and the value of LPT. A trained chairperson provided a

stimulus to ensure participants' understood the structure of specific themes. Participants' were encouraged to express their various opinions.

Value Factors / Customer Type		1) Daily users	2) General users/Stakeholders	3) Local residents/Citizens
A. Safety and security	Safety	a) There is little risk of accidents even when it's crowded	a) It is very safe against natural disasters and external threats	a) There will be less traffic, so it will be safer (There will be less traffic accidents)
		d) We don't get involved in accidents or troubles in terminals or trains/buses		
		e) Stations and vehicles are very clean and can be used safely including toilets	d) Stations and vehicles are very clean and can be used safely including toilets	
	Reliability	b) Even in typhoons and heavy snow, there are few delay or discontinuation and we can use at ease	b) Even in typhoons and heavy snow, there are few delay or discontinuation and we can use at ease	b) It is carefully considered not to be noisy, for example, this is no buses and train service at midnight
		c) Even when it's crowded, trains or buses operate almost on time without delay	c) Trains or buses arrive at the scheduled time	c) It will be quieter and this will be noticeable
		f) In case of accidents or delays, information of situations are conveyed clearly and appropriately	f) In case of accidents or delays, information of situations are conveyed clearly and appropriately	
Environmental effect			d) There are little influence to global environment by traffic	
B. Interactions and community involvement	Economic effect	g) Ticket prices are appropriate when using public transportation. For example, when we transfer trains or buses, it isn't expensive.	f) Trains and bus ticket prices are generally appropriate whenever you go	e) Traffic congestion decreases, therefore transportation of goods as well as people can move around easier
	Regional effect			f) Business and commercial activities become more active
	Interactional effect		g) There are few stairs and steps and elevators are installed in the stations, so we can go out easily and comfortably	g) Elderly people can travel and move around more easily and comfortably, therefore there are more interactions in the community
C. Convenience and comfortability	Duration of travel	h) We can travel in a shorter time as much as possible	h) It is operated at an appropriate speed	
		i) There is less waiting time and connection time when we transfer trains or buses	i) There is less waiting time and connection time when we transfer trains or buses	
	Convenience	j) From early morning to midnight, railways and buses are in operation, and connecting between transportation are smooth	j) We can transfer trains or buses easily in the stations	h) We can choose various means of transportation including private cars
		k) There are enough trains and buses running, and they are on time	k) We can carry luggage easily even if it is very heavy	
		l) There are many options to travel to our destination regarding travel routes, fares and transportation methods	l) There are many options to travel to our destination regarding travel routes, fares and transportation methods	
Comfortability	m) There will be less traffic on the street	m) We can enjoy our time and relax at the station in terms of facilities and atmosphere	i) There will be less traffic on the street, and it will be easier for people to move around on foot or bicycle	

Adapted from Nakano (2005, 2018)

3.2.2. Framework of Questionnaire

LPT value factors were categorized based on the results of the group interview. There were three value items, and each category contained three further items (Table 2). This survey asked respondents "to what degree do customers think that values were important/satisfied" where these items were measured in four stages (degree of importance: important, relatively important, relatively not important, not important and degree of satisfaction: satisfied, relatively satisfied, relatively not satisfied, not satisfied). Customers were categorized into three types as mentioned in 3.1. The questionnaire was designed so that any person could understand it easily. The sample number in each area was 3,500 respectively and participants were randomly selected using an equal interval sampling method from

the voter list. The survey was conducted by post from February to March 2003 and 3,469 copies (effective response rate: 49.6%) of the questionnaire were collected.

3.3. Analysis of LPT Value Structure

Fig 2 shows the degree of importance of each value factor. These figures correspond to the question of “to what degree were value factors regarded as most (secondly/thirdly) important?”. “A: safety and security” values accounted for approximately 70% of “most important,” which included the value factor of “safety” (43.7%), “environmental effect” (14.7%), and “reliability” (11.5%) . “C: convenience and comfortability” values accounted

Table 3 Structure of Value factors and their evaluation

Service issues	Contents	Degree of Importance (Satisfaction) (%)		
Common Value	A. Safety	It is safe against natural disasters and external threats	79.9 (68.8)	
		There is less danger of accidents even when crowded	66.1 (72.0)	
		We don't get involved in accidents or troubles in terminals or trains/buses	64.0 (67.6)	
	A. Reliability	In case of accidents or delays, information of situations are conveyed clearly and appropriately	65.5 (44.1)	
		Trains or buses arrive at the scheduled time	61.6 (74.6)	
	A.Environmental effect	Less influence on the global environment	60.8 (33.2)	
B. Economic effect	Trains and bus ticket prices are generally appropriate whenever you go	62.9 (41.5)		
	Traffic congestion decreases, therefore transportation of goods as well as people can move around easier	57.8 (25.7)		
Individual Value	A. Reliability	Even with typhoons and heavy snow, we can use at ease without delay or discontinuation	52.0 (61.3)	1) Age group (Twenties, Thirties, Sixties), 2) Occupation (Part timer, Student, No Occupation), 3) Sex (Woman)
	A. Safety	Stations and vehicles are very clean and can be used safely including toilets	49.2 (52.4)	1) Age group (Twenties, Thirties, Seventies), 2) Occupation (Self employed, Part timer, Student), 3) Sex (Woman), 4) Families with children
	B. Economic effect	Ticket prices are appropriate when using public transportation. For example, when we transfer trains or buses, it isn't expensive	43.7 (51.5)	1) Age group (Twenties), 2) Occupation (Student), 3) Residents in Keihanshin area
	B. Interactional effect	Elderly people can travel and move around more easily and comfortably, therefore there are more interactions in the community	47.6 (35.9)	1) Age group (Twenties, Sixties, Seventies), 2) Occupation (Student, No Occupation), 3) Families with children
		There are few stairs and steps and elevators are installed in the stations, so we can go out easily and comfortably	48.2 (50.5)	1) Age group (Sixties, Seventies), 2) Occupation (No Occupation), 3) Sex (Woman), 4) Families with children, 5) Residents in Keihanshin area
	B. Regional effect	Business and commercial activities become more active	44.2 (38.4)	1) Occupation (Self employed)
	C. Convenience	We can transfer trains or buses easily in the stations	51.0 (55.9)	1) Age group (Twenties, Thirties, Sixties), 2) Occupation (Self employed, Part timer, Student), 3) Sex (Woman)
C. Comfortability	There will be less traffic on the street	44.0 (38.1)	1) Age group (Twenties), 2) Occupation (Student), 3) Residents in Metropolitan area (Shutoken)	
Additional Value	Improvement of all LPT services as a whole	Stations of LPT and daily activity facilities (day-care center for children, libraries, car parks, shopping centers) are near to each other and transferring buses and trains can be done smoothly. LPT facilities and public areas are always safe and accessible.		
	Universal design of service areas and facilities	There are continuous efforts of facility improvement, and all passengers always have access to giving feedbacks on the current situations. As a result, elderly people or handicapped people can enjoy their time, and they can stay in touch with the communities.		
	Providing customer-oriented and personalised services	It is convenient when commuters use station facilities. User-friendly information is available such as route selections and station facilities when we transfer trains in a visually understandable manner. The status of trains as well as buses are delivered in a timely manner and is up-date including the event of emergency.		
	Raising awareness about the advantages of LPT to residents	People are aware that we should not depend on cars. People learn the advantage and significance of LPT, bicycle or walking in terms of such as health or environment. Children have the opportunity to learn about morals and how to behave in the public areas. The importance of showing empathy to others will be taught to children.		

Note: Degree of Importance means the percentage of "Important", degree of satisfaction means the percentage of the total of "relatively satisfied" and "satisfied". The right column of Individual value shows attribute which feel with high sensitivity regarding degree of importance. Works based on Nakano (2005)

for 17.5%; however, this was deemed the “second most important” and “third most important,” factor at 43.1% and 45.2% respectively. As a result, the “need for existence” was strong, but it showed that the value of “growth” was also great. “B: interactions and community involvement” accounted for 11.7%, 17.1%, 13.7% of each item, and there were no big differences in people’s awareness.

The survey showed that LPT values can be classified into three types of value factors. The statistical significance of the difference in the degree of importance and satisfaction was obtained using a χ^2 test with a null hypothesis rejection rate of less than 1%.

3.4. Value categories

The categories that more than 50% of respondents recognized as “most important” in all attributes were regarded as a “common value factor.” There were 8 items, which included “safety and security” and “interactions and community involvement” (Table 3).

Regarding “individual value factors,” the degree of importance of the overall average exceeded 50%, but was less than 50%, depending on the certain attributes. In addition, the degree of importance of the overall average was less than 50%, but more than 50%, depending on which attributes were recognized as this factor. The former included “operation without delay when crowded” and “easy transfer,” while the latter fell into six items, among which “clean and safe toilets,” “installation of elevator with few steps,” and “elderly can go out easily” were highly valued by respondents who were in their sixties/seventies, and users with children.

Other than common/individual value factors, additional feedback was also analyzed as an “additional value factor” for some highly sensitive customers. People who value this factor will increase continuously in the future according to the feedback/comments made by the group interview and on the questionnaire.

3.5. Relative evaluation of factors

The weighted averages for each value factor were calculated where 4 points were added for “most important,” 3 points for “relatively important,” 2 points for “relatively unimportant,” and 1 point for “not important” respectively (Table 4). Daily users of LPT considered “safety” and “reliability” to be very important. General users/stakeholders believed “reliability” and “interactions” were important, which were included as common needs. On the other hand, local residents/citizens thought “interaction and community involvement” were essential. The rating of value factors of f), g), and i) among local residents/citizens became higher with increasing age (Fig 3).

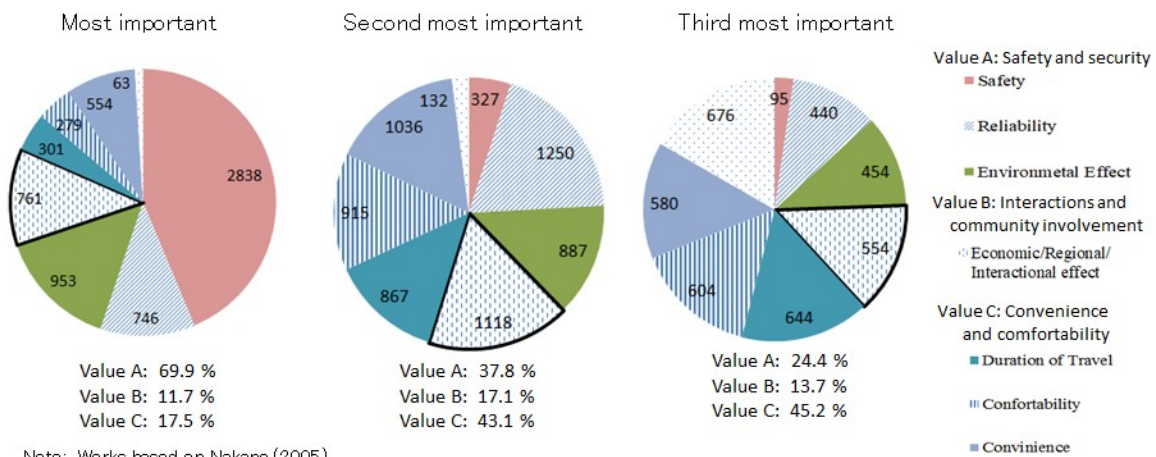


Figure 2 Degree of Importance by need issue of LPT

3.6. Summary of this section

Based on the above analysis, the following points can be argued. Firstly, as for customer preference, growth/individual values were more important than survival /existence needs, and it was inferred that customers' expectations were currently between two categories. Customers were observed seeking service improvement, which was the transition stage continuously moving toward individual needs. Although the need for "interaction and community involvement" was deemed relatively less important, it turned out that most customers tended to require it. According to these results, it seems that LPT customers' preference structure was close to Alderfer's theory, which proposed that multiple needs coexist.

Secondly, customers' LPT needs differed depending on the category of each value and could be organized as a hierarchical structure that consisted of "common needs," "individual needs," and "additional needs." By observing each individual's attributes, we were able to discover highly concerning issues, such as "community-based exchange effect," "barrier-free measures including soft policies," "public space friendly for women and the elderly," and "timely and appropriate information." In addition, we discovered the needs of some sensitive customers.

Thirdly, local residents/citizens rated the value factors of "B: interactions and community involvement" as more important than other categories and these figures rose with age. This infers that the total demand for this category has the potential to expand in the future of an aging society.

Table 4 Evaluations of LPT by Customer type and Value factors

Value factor/Customer Type		1 Daily users		2 General users/Stakeholders		3 Local residents/Citizens		
A. Safety and security	Safety	a)	3.7 (3.4)	a)	3.8 (2.8)	a)	3.3 (2.3)	
		d)	3.7 (2.9)					
		e)	3.3 (2.5)	d)	3.5 (2.7)			
	Reliability	b)	3.4 (2.7)	b)	3.7 (3.1)	b)	2.7 (2.8)	
		e)	3.5 (2.8)	e)	3.5 (2.5)	e)	3.1 (2.6)	
		f)	3.7 (2.4)	e)	3.7 (2.4)			
Environmental effect					d)	3.6 (2.2)		
B. Interaction and community involvement	Economic effect		g)	3.4 (2.6)	f)	3.6 (2.4)	e)	3.6 (2.1)
	Regional effect						f)	3.3 (2.3)
	Interactional effect				g)	3.4 (2.5)	g)	3.4 (2.3)
C. Convenience and comfortability	Duration of travel		h)	3.2 (2.8)	h)	3.2 (3.1)		
			i)	3.4 (2.6)	i)	3.4 (2.7)		
	Convenience	j)	3.1 (2.6)	j)	3.5 (2.6)	h)	3.2 (2.6)	
		k)	3.2 (2.6)	k)	3.1 (2.6)			
	Confortability		l)	2.6 (2.8)	l)	2.9 (2.7)		
	Confortability		m)	3.4 (2.3)	m)	3.9 (2.6)	i)	3.2 (2.2)
Average			3.4 (2.6)		3.4 (2.7)		3.2 (2.4)	

Note Works based on Nakano (2005), NRI (2003), the figures in column show the degree of "importance", the figures in parentheses show the degree of "satisfaction"

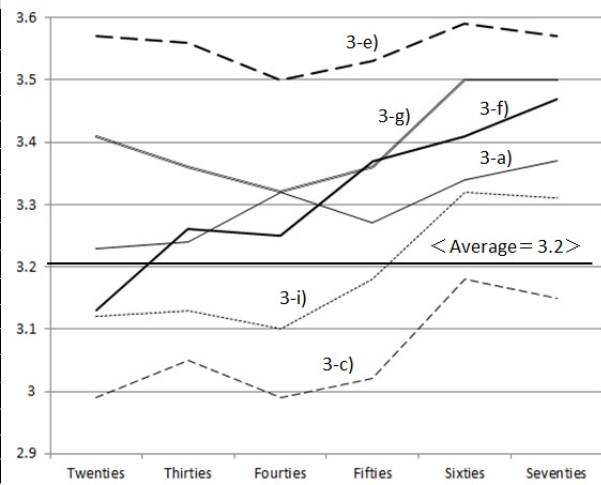


Figure 3 Value factors of local citizens by the age group

4. Investigation and Analysis of Potential Demands by Utilizing Big Data

Technological innovation contributes to the creation, accumulation, and distribution of enormous amounts of unstructured data as well as structured data. The usage of this data supports the creation of new social and economic value. Evidence for policy planning based on quantitative data is now required, such as specific and in depth traffic movement data to solve local transportation issues. This has the potential to monitor the performance of LPT services and collect customers' feedback continuously.

When an LPT survey of the specific area is conducted to follow up the performance of policy measures and predict future demand, we should examine the methodologies of analysis, taking into account the possibility of increasing daily and non-daily demands. We are likely to generate innovative ideas by clarifying our core competencies and strategic position when discussing findings with related entities. The behavior of inbound tourists led to Tourism Agency guidelines being published in 2017 and these use ICT data (mobile station data, SNS and GPS data) effectively, based on the analysis of the strength of ICT data (Tourism Agency 2016, 2017).

When we analyzed LPT services, traffic flow information, such as OD, operational status, and service information, and the actual flows of competitive modes, such as the private car, were measured. The questionnaire and actual LPT usage survey were conducted during the planning stage. It is possible that data could be collected more efficiently and accurately by utilizing big data solutions. The MLIT survey (2014, 2015) examined the possibility of setting up a framework to provide a low-cost, convenient method for grasping population movements, and potential needs for LPT. Case studies were conducted in the Tsukuba city area (Ibaragi Prefecture) and Fukushima area (Fukushima Prefecture) from Sep 2014 -March 2015. A three stage survey was conducted to analyze customers' expectations and their potential demands as follows: 1) analysis through population estimate statistics using mobile station information, 2) visualization through a combination of both static and dynamic data, and 3) an ICT questionnaire to estimate potential needs and demands.

4.1. Methodologies to estimate potential needs and demands

4.1.1. Analysis using population estimate statistics

In population estimate statistics utilizing mobile phone location information, it is possible to grasp seasonal/monthly/day/week fluctuations and analyze the concentration of the population and the number of bus passengers in fine-grained detail. This makes it possible to design an efficient operation based on population changes from both a short and long-term perspective.

Population movement estimates using mobile phone station information enable us to calculate the inflow and outflow of the population during certain time periods within a 1 km² mesh. Both the population of the bus stop area, within the radius of 300m from bus stop calculated by GIS, and bus passengers over a specific time period can be calculated. The areas where the number of bus passengers was relatively low were identified and compared to the population movement around the bus stop area during commuting hours. The areas where population movements were relatively low were compared to the number of residents. This comparative analysis then estimated substantial population movements over a specific time period.

At this stage, potential demands were defined as local people who do not use a bus at present. This was estimated by checking the differences between actual population movement near the bus stop area and the number of bus passengers over a certain time period. Considering the volume of substantial population movement in relation to the number of bus passengers at each bus stop can contribute to an analysis of LPT service strategies. These data are useful for formulating an effective schedule, taking into account changes in the number of passengers based on the time /day /week /season, and also the possibilities of strategic demand development. Through using static data and population estimate statistics, the potential demands according to certain time periods were estimated by calculating the differences between the actual population movements in the bus stop area and the number of bus passengers (Table 5).

	1) 3 am to 9 am	2) 9 am to 12 am	3) 12 am to 3 pm
Actual Bus Passengers (a)	363	124	83
Actual population movements of bus stop sphere (area within the radius of 300m from bus stop which were calculated by GIS) (b)	2676	2001	1120
Ratio of usage (a/b)	13.60%	6.20%	7.40%
Potential demands (b-a)	2313	1877	1037

Note Quoted from MLIT (2015), Nakano (2018)

4.1.2. Analysis of population movement through visualization of data combination

Data, such as the spatial distribution of the population, public facilities and retail/workplaces, and LPT service status, including bus routes and the location of bus stops, were combined and visualized. Population movements could be monitored on an area-to-area basis rather than on a specific point-to-point basis. Through this analysis, close relationships between regions where the population movement is large were identified on a quantitative basis, which could not be perceived sensuously previously. These regional connections were first discovered using the dynamic data of population estimate statistics and demonstrated the potential to develop new LPT routes. Through the comparative analysis of studies between areas, the locations where the number of bus passengers was relatively low were discovered and a detailed analysis of passenger behavior was conducted.

Table 6 Designs of Questionnaire survey of potential demands for buses

Case Study Area	Tsukuba City Area	Fukushima Area
Purpose of study	Possible shift to bus from other transportation methods through the improvements of bus service	Possible increase in bus passengers for sightseeing through promotion of tourism activities
Items in Questionnaire	1) Respondents personal description	Place of residence, sex, age, having a driver's licence or not. These items were used to understand the trends and features of respondents through cross tabulation analysis.
	2) Actual situation of journey	Purposes of going out, destinations, frequency, period of time, transportation mode
	3) Actual situations of the use of LPT	Actual situations of bus usage and bus routes, accessibility to bus service, requirements of customers to change transportation methods
	4) Actual situations of the use of specific transportation methods	Conditions of customers for the use of demand taxis, service items of demand taxi customers wants to improve
	5) Requirements to increase the use of PT	Extra space for customers to give additional feedback and comments
	6) ICT questionnaire feedback	Opinions about ICT questionnaire methods, frequency of ICT device usage
	7) Sources of finding about services	Convenience of obtaining information source was evaluated from comparative viewpoints of ICT device usage

Note: Summerrized from MLIT (2015), Quoted from Nakano (2018)

4.1.3. Forecasting potential needs using an ICT questionnaire

In order to forecast the potential demand for a local bus service, an ICT questionnaire was conducted and requests for the improvement of bus services were collected through the effective use of ICT devices. Three types of ICT questionnaire were conducted: 1) survey utilizing SNS (Facebook), 2) survey utilizing a web site, and 3) an interview survey utilizing a tablet, which was conducted at bus terminals and local community meetings. The

Table 7 Results of estimates of possible potential demands in case study areas

Case Study Area	Tsukuba City Area	Fukushima Area
Purpose of study	Possible shift to bus from other transportation methods through the improvement of bus services	Possible increase in bus service for sightseeing through promotion of tourism activities
Respondents of questionnaire	293 people	411 people
Actual bus users	Bus users 41 people (14%) Non bus users 252 people (86%)	Bus users who know specific package tour 38 people (9%) Non bus users 373 people (91%)
Percentage of pottential users	60.90%	91.70%
Conditions of shifts to bus usage	<ul style="list-style-type: none"> •Easier access to bus stop •Usage in earlier or later hours •Shorter time to destinations •Punctuality in accordance with bus time table •Convenience in transferring to trains 	<ul style="list-style-type: none"> •Easier booking for package tours •Discount scheme for families/relatives and friends •More convenient bus time schdule for tourists •Benefits when transportation and hotel accomodation is included together •Benefits when we use with elderly people or children
Estimates of possible potential users per day	1400 people (2313 people (Non bus users in bus stop sphere) * 60.9%)	Weekdays 736 people/day (803 people * 91.7%) Weekends 399 people/day (435 people * 91.7%) (The number of tourists for weekdays (803 people)/weekends (435 people) are estimated from tourism statistics)

Note: Summerrized from MLIT (2015), Quoted from Nakano (2018)

questionnaire consisted of multiple-choice questions to enable customers to answer easily (Table 6). As a result, the major factors motivating users to travel on buses were discovered as shown in Fig 2. To increase the tourist demand through the more effective use of conventional buses, major factors were identified as follows. Firstly, a more flexible use of packages was suggested, such as 1) easier booking of package tours, 2) discount schemes for families/relatives and friends, and 3) more convenient bus time schedule for tourists. Secondly, more detailed information on bus services was requested, such as clear information about the operational status of recommended tourist routes. The ICT questionnaire analysis estimated substantial potential demand on condition that certain service factors were improved (Table 7).

4.2. The evaluation of the case studies

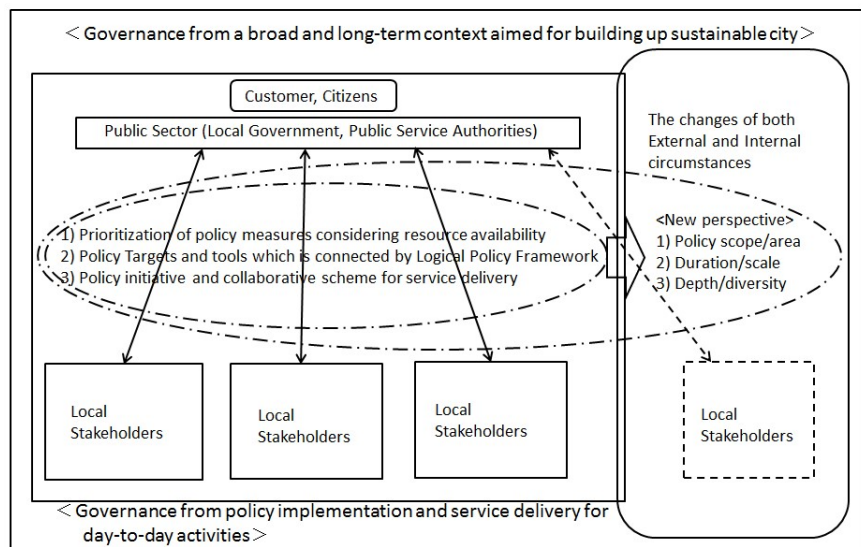
The results of the case studies were evaluated from both strategic and policy realization perspectives. There were two points that indicated that big data were very useful. Firstly, through the review of local government results and bus operators in case study areas, local government mentioned that objective data may be useful to track traffic movements in the scoping area as a whole. This could help to identify solutions through constructive communication with local communities. In several cases, multiple measures of service improvement, such as identifying optimum bus routes and schedules, could be analyzed in collaboration with bus operators. A unique business model, such as the hub & spoke bus network system and a P & R scheme, could be created. A local bus company provided and expanded services for tourists where they used both a highway express bus and local regular-route bus services, based on the results of this survey. Each region had its own characteristics and preferences. Thus, results should be examined from different viewpoints that reflect actual local people's opinions by using the appropriate methods, including traditional, modern, and innovative ones. Also local communities should track visitors' behavior, and try to propose original ideas to enhance the convenience of LPT and the attractiveness of places.

Secondly, the questionnaire utilizing ICT was efficient in terms of time and cost. Therefore, higher response rates could be expected. Overall, 52% of respondents from Tsukuba city area and 75% from the Fukushima area had no major issues answering the ICT survey. The positive feedback was mainly due to clear guidance and customization. However, 39% of respondents from Tsukuba city area and 27% from the Fukushima area in the over 65 age group experienced difficulties answering the questionnaire. Answers can be acquired more easily when surveys are conducted in local community meetings using tablets and surveyors can offer clear instructions for the survey.

5. Conclusion

We should continuously review the bigger picture involving people's changing external situations and values that create potential demand. We should put customers at the center of policy frameworks by developing meta-governance schemes beyond existing governance platforms, and consider a range of related policies that should be in public view. A remarkable increase in travelers should be utilized as a trigger to revitalize local

Figure 4 Meta Governance Structure of LPT in a Regional level



businesses. Thus, the importance of formulating a strategy that harmonizes LPT with city needs is greater than ever.

The role of local governments is becoming vital. They are able to review the policy agenda and the cause and effect relationship as a whole. Thus, they can prioritize possible policy measures accordingly. Fig 4 shows the structure of governance, and how it should be constructed, considering the following items.

- Understanding customer preference as a whole is a vital step to improving LPT services. By grasping the fundamental structure of customers' preferences, we can track changing value trends and apply them to specific policy measures. For example, by utilizing data from the public opinion survey carried out by the Cabinet Office in 2003, 2009, and 2016, we can understand the key travel trends and issues in terms of attributes such as sex/occupation. These results can be used to enhance citizens' awareness according to their attributes.
- To achieve the outcomes citizens' desire, we should establish a common image of future cities. These should be so persuasive that they motivate related entities to implement changes timely and appropriately. Customers' preferences change over time and differ across cultures. Thus, we need to study the differences in peoples' values from both long-term and cross-cultural perspectives. It would be also useful to learn to predict a further increase in demand for LPT. As Salomon argues, there is certain desire for mobility beyond the utilities and activities at the destination itself, such as adventure-seeking and exposure to a new environment (Salomon, I. and Mokhtarian, P. L.,1998). These desires for mobility are likely to be met by LPT.
- By collaborating with other parties, such as academics, businesses, and educational organizations, new frameworks can be drafted indicating how targets and tools should interact with each other. Consequently, a logical framework can be formed to convince citizens and related entities. Therefore, developing a customer-friendly policy platform can identify suitable social solutions. There are a lot of policies that must be applied to different assignments. However, they should be selected in accordance with resource availability.
- The role of political will is crucial for deciding future directions. Moore (2010) says, the political challenge is “to create a vision and mobilize for the proposed changes, with long-term commitment to the innovation,” taking traffic congestion charging in London as an example.

Big data has the potential to contribute to meeting citizens' expectations and create new business models. Database platforms enable us to analyze peoples' behavior more effectively in both planning and operational contexts. Elderly people can easily answer questions by utilizing tablets as survey devices. These methods seem effective for collecting answers from the increasing numbers of elderly people. Local government and operators' awareness of the strengths of unstructured data is expected to increase. The following conditions are important for demonstrating the strength of big data.

- Potential demands for LPT can be forecast using dynamic data in response to a broader range of customers' expectations of local social benefits.
- A methodical data platform should be developed, taking into account both daily and non-daily demands, including activities motivated by personal desire, such as driving and walking around for health. However, these demands differ. Therefore action needs to be taken to enhance awareness of recent regional issues and to formulate new business models. Creating opportunities to increase demand, through the strategic exploitation of potential of business/commercial/cultural assets, is vital.
- Big data could become a useful tool for both operators/residents and administrative bodies to discuss issues logically and reach a consensus on local policy issues. It could help to construct a local cooperative platform to ensure the optimum use of LPT services and local resources from a managerial viewpoint. Effective data use will ensure efficient outcomes in both demand and supply contexts. This means data will improve operational efficiency by constructing an environment where relating entities (operators/citizens/administrative bodies) can communicate smoothly.

6. Discussion

Governance schemes should be reconsidered and modernized according to changes in external situations and the increasing complexity of conflicting factors. Social issues arise continuously. For example, a shortage of human

resources is currently a crucial issue. Thus, solutions should be reasonably prioritized through the debates between local entities and citizens. These are related to actors' participation in networks and the democratic process, the role of storylines and soft rules in unifying policy networks and creating innovative means of policies, the methods used for evaluating and assessing network performance, and finally, the role of politicians.

The role of the local government needs to be fully examined through an in-depth analysis and new policy dimension should be considered. These possible aspects are: 1) broader policy scope we should take into account to achieve the best possible solution, 2) effective communication and dialogue networks between meta-governor and related actors, 3) positive loops of service delivery and feedback to potentially create innovative services. Sørensen (2012) indicates that barriers in governance strategy lies in the trends of taking solutions that are close to the status quo. However, as he argues, collaboration has the potential to fertilize “the grounds for the development of new perspectives, ideas, and practices”. Torfing (2010) also discusses the role of discourse in unifying policy networks and shaping interaction between the participants. Taking into account the good practices in Japan, the policy platform of Nara prefecture includes two conceptual dimensions: the status of a community's growth through the cross-sectoral measures of local entities, and the desired directions communities aim for. Through local government initiatives, possible paths for future development are demonstrated. These paths create a cooperative relationship with new entities by raising the awareness of local stakeholders. Another case is the local platform established by Tohoku Tourism Promotion Organization. This creates policy concepts beyond the area of single communities. As such collaborative scheme is established where related municipalities and local government offices join. It mainly implements tourism measures in wider and cooperative perspectives.

When using big data, we must pay attention to the limits of survey design and methodology. The first point relates to the possibility that the potential demand estimated will be larger than actual demand. This is because respondents tend to answer questions on the basis of hopes. Thus, answer sheets should be carefully designed. For example, choices should infer actual changes in services such as bus routes, bus frequency, and people's changing responsibilities. Secondly, the accuracy of processed data and its applicability to specific areas should be recognized. Technological and personal data protection issues must be considered. Tracking detailed passenger movements must be reviewed with reference to personal data protection rules. This includes the risk of identifying individuals. For example, data that tracks the behavior of specific age groups remains unavailable due to personal data protection principles. In order to use objective data more effectively, guidelines should be prepared for local government and transportation operators that balance the usefulness of objective data with respect for personal data protection.

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