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Smart Tourism Capability Maturity Framework : A Design Science Research Approach

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ABSTRACT

Many cities in the world have increased initiative to realize smart tourism. There are unexplored challenges for the people which lead and manage smart tourism projects and realize its value in tourism (we call them as 'Smart tourism initiatives'), such as orchestrating of tourism complexity, developing and sharing tourism strategy, sustaining tourism projects and innovation. Concerning these challenges, we aim to design a holistic capability maturity model for sustainable and smart tourism governance enabling sustainable tourism innovations via tackling the challenges above. We adopted Dynamic capability theory as a theoretical lens and introduced Design science research methodology in order to develop a new capability maturity governance model as a design artifact. As a result of the study, we could synthesize findings from iterations of the design research cycle based on the IT Capability Maturity Model. Our result proposes a potential capability maturity model supporting effective communication and strategic alignment for the initiatives with illuminating future paths with evaluation methods on tourism capabilities for the initiatives. Throughout this study, we contribute to the body of knowledge as well as practice by proposing a new tourism capability governance model.

Keywords: Smart Tourism, e-Tourism, IT Governance, Capability Maturity Model, Design Science

I . Introduction

Smart tourism recently has become an inevitable trend for cities toward their future developmental goals. Traditional e-tourism has focused on figuring out technical impact and technological progress of

information communication technologies ('ICT in short') of single users, mostly tourists, for efficiency and convenience, such as various tourism service reservation platforms, or mobile applications providing a summary of tourism information. The Smart tourism highlights an importance of improving expe-

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rience, facilitating co-creation and co-values among stakeholders in ecosystem, and designing suitable data and technology to destination context, such as Chung et al. (2017)'s tourism recommendations system for tourists' unplanned behaviors during the trip by big data approach, or Lim et al. (2017)'s mobile tourism system improving experience for both tourists and staffs in local business. Therefore, a High expectation has been made that touristic information systems with a suitable design, and use of ICTs would provide better values to the tourism stakeholders and cities per se. For example, the success of smart tourism could generate sustainable economic values for city, businesses and citizens, and tourism experience value and post-satisfaction for tourists (Gretzel et al., 2015b; Lim et al., 2017).

Furthermore, researchers have endeavored to explore the answer how Information Systems ('IS' in short) can support the creation of new touristic values or improvement of existing touristic values by providing a new design of touristic information systems intertwining with new technology and various systems in a society. This research paradigm is called Smart Tourism paradigm (Gretzel et al., 2015b, 2015c; Koo et al., 2016). In the paradigm, the discussions are still in progress on how to define the concept of smart tourism. Among many opinions in the IS discipline, there is a commonly shared idea on the future direction of smart tourism; the smart tourism approach should embrace the value of tourism experience, tourism business ecosystem and tourism destination (Gretzel et al., 2015c).

On the ground, many cities are expanding their investment and initiating smart tourism projects as a future strategy for transforming themselves into a smart city. For instance, major cities in Europe, Australia China, South Korea, and Japan (Gretzel et al., 2015b; Lim et al., 2017) are one of those exam-

ples that initiated smart tourism plans and projects from the early 2010s. Nonetheless, smart tourism success has not been realized fully. Most attempts have remained as potential pilot projects. On this issue, researchers have explored significant challenges in smart tourism, primarily related to a user and business aspects (Gretzel et al., 2015a)—digital access, digital exclusion, and smart destination. Admitting the importance of embracing these findings, we believe there is also a need for studying inherent challenges for smart tourism initiatives encounters and their management of smart tourism plans and projects in the city level. Through reviewing prior works, we could find three potential challenges as follows.

First, there are fundamental challenges for smart tourism initiatives on managing a variety of capabilities and resources related to advanced technology, their data, new and legacy infrastructure, multiple stakeholders and ecosystems of the city (Lim et al., 2018; Maccani and Donellan, 2017). Second, smart tourism initiatives struggle with organizing suitable smart tourism plans for their cities. Each city has to deal with different resources and circumstances related to the tourism strategy. To the best of our knowledge, no prior studies have discussed strategic guidelines and supportive framework for suitable tourism development for the city level. Third, there are some challenges on smart tourism initiatives to sustain their initiative power and investment on projects in a city organization. There has been no holistic governance framework discussed in smart tourism, that enables systematic management of IT from planning level to value delivery level. Notably, the absence of evaluation processes have critically diminished logic of the smart tourism initiatives and hindered them from keeping their tourism projects to be sustainable and long term (Lim et al., 2018; Mackay,

1992).

Regarding the challenges above, we introduce a Dynamic capability theory as a theoretical lens. The lens allows Dynamic capability governance in complex organizations which encounter a drastically changing environment. As an applicable form of the governance framework of Dynamic capability theory in practice, the IT Capability Maturity Framework (“IT-CMF” in short) was developed based on the synthesis of relevant concepts and traditional capability maturity model (Curley, 2007; Curley et al., 2016). And this framework has been proved as a promising framework that supports holistic management of IT capability in organizations, potential paths, and guidelines of capability development, a method and process of evaluation on each capability for enabling strategic alliance between management and IT. We decided to set the IT-CMF as conceptual base of our framework design, since the framework is the unique and empirically proved framework which provides potential guideline, supports development of comparative advantage in specific system, and enables measurement of capacity in ecosystem at once, among various governance frameworks (Kenneally et al., 2013; Maccani and Donellan, 2017).

Thus, it could potentially tackle the three challenges above. Therefore, in this paper, we aim to develop a new capability governance framework focused on smart tourism initiatives in a city, as design artifact, based on the capability maturity concept of IT-CMF. In terms of our study, we put forward three research questions as follows:

RQ1. *What are critical capabilities on smart and sustainable tourism governance for city initiatives in the city level?*

RQ2. *What could be a potential capability path for the city developing smart and sustainable tourism?*

RQ3. *How could city initiatives make their tourism development process to be more sustainable? How could they systematically evaluate capability maturity to smart tourism?*

Our paper is organized as follows. In section 2, we conduct a literature review about smart tourism concept, Smart Tourism challenges and IT capability governance. In section 3, we explain the design science methodology. In section 4, we articulate our design research project, its specific phases and our proposing design artifact for smart tourism capability maturity framework with its evaluation. In section 5, we conclude our study with a discussion on the implications and limitations of this study.

II. Literature Review

2.1. Smart Tourism Concept

Till recent times, Tourism has encountered many technological breakthroughs. Beginning from the e-Tourism paradigm, Researchers have made various endeavors and contributions on designing suitable tourism systems with ICT within new smart tourism paradigm. (Koo et al., 2015; Sun et al., 2016). There are discussions in progress on how to define the concept of smart tourism and its approach in the paradigm. Some studies focus on users and their experience by the use of mobile and big data with ICT (Boes et al., 2015; Poslad et al., 2001; Song and Liu, 2017). Their central idea was to make suitable design between data, infrastructure, and tourism information systems for innovation; one of those examples could be a recommendation system more relevant, personalized, predictive in real-time for tourists’ experiences, enabled by the utilization of big data.

On the other hand, there is a group of studies focusing on “suitable integration of technical and social components of the city for enriching tourist experiences as one approach toward smart city” (Buhalis and Amaranggana, 2013; Gretzel et al., 2015c; Lim et al., 2017). These studies stress on the tourism systems design approach with embracing of the touristic environment, stakeholders, and relevant ecosystem with a balance as a critical factor of realizing successful and sustainable smart tourism. And Gretzel et al. (2015a) proposed three potential goals for smart tourism development by integrating two folds of smart tourism approach as follows:

Smart Experience: technology-mediated tourism experiences and their enhancement through personalization, context-awareness, and real-time monitoring

Smart Business Ecosystems: a complex business ecosystem that creates and supports the exchange of touristic resources and the co-creation of the tourism experience.

Smart Destinations: application of smart city principles to urban or rural areas and not only consider residents but also tourists in their efforts to support mobility, resource availability and allocation, sustainability and quality of life/visits.

Reflecting the recent works of researchers and practitioners through the concept above, they have endeavored to realize values of smart tourism, mainly within the areas of smart experience and smart tourism business ecosystem. For instance, there is a work of Buhalis and Amaranggana (2015) suggesting a tailored design of tourism products and services that can satisfy the unique needs and preferences of each visitor. Also, Chung et al. (2017) showed the potential of the recommendation services which influence tou-

rists’ unplanned behaviors during the trip. And Lim and Park (2016) and Lim et al. (2017) proposed a potential design of mobile tourism system focusing on tourists’ experience as well as staffs in local business by offering support of communication and cultural instructions.

In the area of smart destinations, however, only a few studies discussed the potential approach in the conceptual level. There are some studies of tourism destination competitiveness discussing possible actions on tourism resources (Crouch and Ritchie, 1999; Koo et al., 2016). Also, Koo et al. (2016) and Boes et al. (2015) classified potential elements and dimension for smart tourism destination within a various technical component and social components. Cacho et al. (2016) explained the utilization of big data from social media as a useful analysis tool for managing smart destinations. Vecchio et al. (2018) found that the use of big data from social media can support generating social values, such as trust and transparency, between tourist and tourism stakeholders.

2.2. Smart Tourism Challenges

Smart tourism is recently receiving much attention from practitioners from the field. With high expectations on its positive values, major cities in China, Japan, South Korea, and Spain have been initiating various smart tourism project with increasing their investment and policy supports (Gretzel et al., 2015a; Lim et al., 2018). Those cities mainly expect that the successful tourism development would eventually entail variety of values to the city—economic growth, business opportunities for business, job creation and social cohesion for citizens, tourism experience and post-satisfaction for tourists, and protection of natural and cultural heritage (Gretzel et al., 2015a;

Husting, 2013; Lim et al., 2017).

Nevertheless, most smart tourism attempts indeed have remained as potential pilot projects. Regarding this issue, researchers have exerted to explore critical challenges in its design and realization processes in smart tourism. And three tourism challenges, related to Smart Experience and Smart Business Ecosystems, received attention as prerequisites toward smart tourism success by researchers (Gretzel et al., 2015a) as follows:

Digital Access: smart tourism highly dependent on smart devices and access to power.

Digital Exclusion: lack of discussion was made on what experience to give to the Users without necessary devices in smart tourism.

Smart Tourism Business Model: smart tourism is mostly driven as a government agenda. There is a lack of articulation of how tourism businesses would be able to monetize smart tourism sustainably.

Acknowledging the importance of embracing these challenges, however, we believe there is also a need of study to fill the gap between scholars and voices from the field. As aforementioned above, cities are actual initiators and drivers of most smart tourism projects; they are also powerful balancers among various resources, values, and stakeholders. Like as Smart City (Kenneally et al., 2013; Maccani and Donellan, 2017), there are areas of tourism, that have to be fostered, coordinated and governed by the city, not by business or any profit-driven entities in order to progress toward the holistic value of the touristic ecosystem in a sustainable form.

Supposing that we look into smart tourism challenges in the city level, three potential challenges were found in previous works. First, there is a fundamental complexity in technical and social systems

in the city. Cities suffer from a lack of technical knowledge (i.e., urban infrastructure, data, and advanced technology) (Lim et al., 2018; Maccani and Donellan, 2017). They struggle with coordinating values between multiple stakeholders in an ecosystem (Timur and Getz, 2009; Waligo et al., 2013) and overcoming their legacy structures and regulations toward smart tourism (Morozov and Bria, 2018; Zhu et al., 2014). Second, there is a scarce of accumulated knowledge on the future path of smart tourism as well as a guideline for practitioners. Cities face with different tourism needs and resources (Lim et al., 2018; Rudan, 2010). They struggle with comprehending their available ingredients and strategic focus for tourism development toward destination competitiveness (Crouch and Ritchie, 1999; Koo et al., 2016). Also, a lack of studies and empirical cases on smart tourism makes cities challenging to establish their future tourism strategy and projects. Lastly, to the best of our knowledge, no holistic governance frameworks are enabling systematic and sustainable smart tourism approaches. Mainly, practitioners argue that it is difficult to initiate or sustain the project and investment (Bird, 2019), as there is lack of measuring methods on smart tourism values in micro and project-specific level (Lim et al., 2018; Wen, 1998). There have been trials of tourism projects by cities (i.e., informative kiosk or WIFI for inbound tourists); however, measuring the value delivery of each project has been limited. Intertwining with Incorporating with instantaneous demand of investment output toward election cycle (Bird, 2019), this absence of evaluation processes and methods diminishes the logic of smart tourism initiatives in the city and hinders them from keeping the projects sustainable and long term (Lim et al., 2018; Mackay, 1992).

From the reviews above, we found a critical need

IT Capability Maturity			4 Macro Capabilities			
Level	Details	Managing IT like a Business	Managing the IT Budget	Managing the IT Capability	Managing IT for Business Value	
High	Level 5 Optimizing	<ul style="list-style-type: none"> Value-centric IT management State-of-the-art practices and outcomes 	Value Centre	Sustainable Economic Model	Corporate Core Capability	Optimized Value
	Level 4 Advanced	<ul style="list-style-type: none"> Benefits from IT investment quantified and communicated Practices and outcomes well above industry average 	Investment Centre	Expanded Funding Options	Strategic Business Partner	Options and Portfolio Management
	Level 3 Intermediate	<ul style="list-style-type: none"> IT/business interaction formalized for all for all critical processes Transparent investment decisions 	Service Centre	Systematic Cost Reduction	Technology Expert	ROI and Business Case
	Level 2 Basic	<ul style="list-style-type: none"> Delivering basic IT services Some IT/business interactions formalized 	Cost Centre	Predictable Performance	Technology Supplier	Total Cost of Ownership
Low	Level 1 Ad Hoc	<ul style="list-style-type: none"> No formal processes Ad-hoc management of IT 				

<Figure 1> IT Capability Maturity Framework (Curley et al., 2016)

for developing a systematic governance framework, which can support practitioners in the city level to overcome the challenges mentioned above.

2.3. Capability Governance for Sustainable Smart Tourism

In business practice, managing a sustainable innovation process has been an important issue since the process critically affects business opportunities, cost issues, reputation, and revenue generation issues (Curley, 2006). In the new smart tourism paradigm, many cities have struggled with sustaining such processes, since the organization faces with the complexity of technology, dynamicity of market environment, lack of knowledge on sustainable innovations and holistic governance framework answering needs of both IT and business management. Notably, the absence of assessment processes and tools associated with future improvement roadmaps have hindered sound discussion between senior IT and business management from IT strategy issue to its business value delivery issues (Carcary and Zlydareva, 2014;

Curley, 2007).

To fill this gap, Martin Curley and his research group developed a governance framework and evaluation tool called IT-CMF (Curley, 2006; Curley et al., 2016; Donnellan and Helfert, 2010). Based on the Dynamic capability theory view, they clarified four interrelated macro capabilities, such as managing the IT budget, managing the IT capability, managing IT strategy and managing IT like a business, toward supporting the organizational innovation processes and structures. Also, they clarified thirty-six procedures required to be managed related to organization’s agility, innovation and value issues and defined it as critical capabilities for minutely managing each maturity levels of those procedures, such as strategic planning, budget management, project management, benefits assessment, and realization, etc. Moreover, they also developed an evaluation tool for these macro capabilities and critical capabilities with mapping evaluation criteria of capability maturity into a traditional capability maturity model in five different qualitative levels (See <Figure 1> above). When using this framework, senior IT and

business management are enabled to discuss IT values in business logic and language. Senior IT could attain the opportunity to strengthen their investment logic and value of IT. Management is enabled to hold a long-term, systematic and holistic view on IT investment and its value delivery with more in-depth comprehensions, which ultimately enabled the entire organization to gain sustainability, controllability, and predictability of the IT Capability toward its business goal (Curley, 2007).

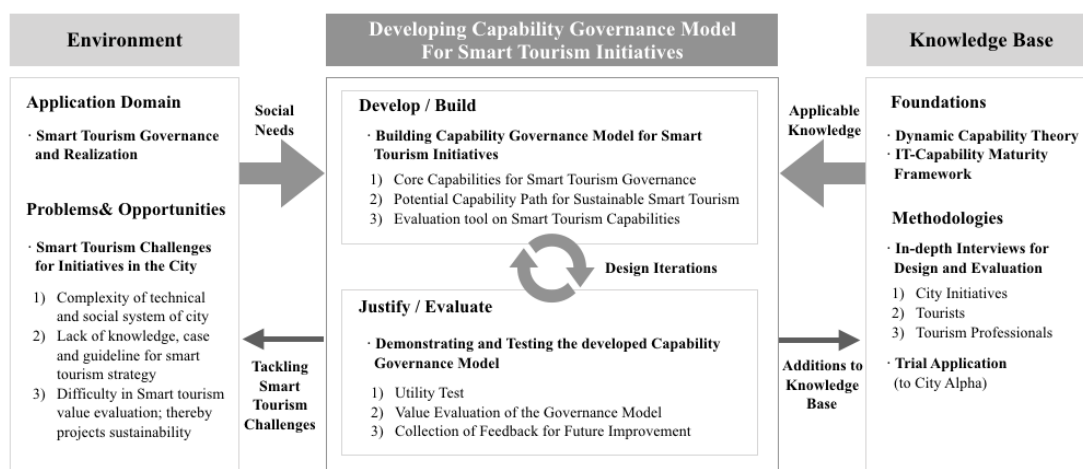
With application to many enterprises globally (Curley and Kenneally, 2011; Doherty et al., 2013; Inozume and Iijima, 2015), IT-CMF has been validated and evolved to the potential framework embracing a dynamically changing technology and business needs in the market. IT-CMF has also been applied to the public city context (Nunes et al., 2013) and recently extended and applied into the context of Smart City (Kenneally et al., 2013; Maccani et al., 2014). In the discipline of Smart Tourism, there is a prior study of Lim et al. (2018), which proposed a governance model with four dynamic capabilities (corresponding to macro Capabilities) and discovered potential six capabilities (corresponding to

critical capabilities) toward Smart Tourism. This conceptual model is required to be extended with a minute description of capability roadmap and maturity path within capability maturity model form in order to make more practical contributions to smart tourism initiatives suffering from the defined challenges.

III. Research Methodology

3.1. Design Science Research

In this study, we considered design science as a primary research approach (Gregor and Hevner, 2013; Hevner and Chatterjee, 2010; Peffers et al., 2007). Design science is one of the two crucial main research paradigms accepted in the IS discipline, which highlights the artificial/synthetic approach of science. In design science, researchers iterate the process of creation, evaluation, and improvement design artifact based on prior knowledge against potential problems. <Figure 2> above displays an overview of our study mapped in design science research



<Figure 2> Research Overview based on design Science framework (Hevner et al., 2008)

structure suggested by Hevner et al. (2010).

Our design work attempts to develop a capability governance model throughout accommodating social needs from the environment and applicable knowledge from the knowledge base. For instance, we defined targeting challenges for smart tourism governance for city initiatives as social needs, such as complexity of the city, lack of knowledge and strategic guideline, and difficulty in the evaluation and sustaining projects. And we introduced dynamic capability theory, and IT-CMF provides useful conceptual ground for tackling the challenges. Based on this, we set functional goals of our design artifact, which also became an evaluation criterion of our design, such as allowing systematic capability governance, guidance on potential capability path, and a function as a measurement tool. By iteration of design and evaluation processes, we endeavored to tackle the Smart tourism challenges in the field and to contribute to the knowledge base with our design process and a developed concept.

While Hevner et al. (2010)'s framework helps us to figure out overview and position of design research, design research procedure Peffers et al. (2007) provides actual guideline and process how we can initiate and operate design research. And the procedure helps systematically articulating the specific actions and outputs from each design stages. Thus, it strengthens explanation ability of design research. Therefore, we followed the guidelines for design science research proposed by Peffers et al. (2007). The remainder of this chapter describes the critical steps of our design research project. The steps are (1) Problem Identification and Motivation, (2) Definition of Objective of Solution, (3) Design and Development, (4) Demonstration and Evaluation, and (5) Communication.

In order to design and evaluate our governance model, we conducted a literature review, semi-struc-

tured in-depth interviews (Myers and Newman, 2007) with six smart tourism initiatives from city government, ten random tourists, and three tourism professionals from the industry. The six smart tourism initiatives were head of departments from the local government of city Alpha which are closely related to tourism development (i.e., Department of Tourism, Department of Urban Planning, Department of Urban Infrastructure, Department of Economy, Department of International Relation, Future Creation Laboratory), selected by the city government. And ten tourists were inbound foreign tourists in the international airport after their travel, randomly selected by project members. And three tourism professionals were managers who belong to tourism research, planning, and development activities from the one of the biggest travel agency in Japan and tourism-related review platform. All these interview contents were recorded and transcribed in its original language, Japanese. And we admit that our design steps were not as linear as written, like as priory studies addressing the design process could be highly iterative (Beck et al., 2013; Peffers et al., 2007).

3.2. Designing Capability Governance Model

Problem Identification, Motivation and Definition of Objective of Solution

There is an increasing push in transforming the entire tourism sector in Japan. As Japan is going to host the 2020 Olympic Games in Tokyo (Osada et al., 2016), the many cities are encountering a critical situation that requires more an effective tourism strategy and governance structure for their tourism innovations.

We initiated a design project with cooperation by Alpha City (the name is concealed by request from the city), which is one of the 23 sub-cities

<Table 1> Discovered problems and Objectives of Solutions

	First Round	Second Round
Goal	<ul style="list-style-type: none"> Understanding the nature and challenges of smart tourism governance in Japan Exploration of potential capability for smart tourism governance 	<ul style="list-style-type: none"> Validating potential challenges of smart tourism governance discovered in Smart tourism literature Validating initially defined capabilities and definitions Exploring potential capability path and evaluation criteria in the initially developed capability governance framework
Method	<ul style="list-style-type: none"> Second Data Analysis (reports, publications related to tourism from Japanese cities) Unstructured Interview with 1 City Planner in Alpha City 	<ul style="list-style-type: none"> Literature Review (literature with relevant keywords, such as tourism development, e-Tourisms, Smart Tourism, Smart City, IT-Governance, Smart City Governance) Semi-structured Interview with 5 Smart Tourism Initiatives in Alpha City
Design Inquiry	<ul style="list-style-type: none"> What is the nature of tourism governance at the city level? What are the existing or potential challenges for tourism development and its governance at the city level? What can be an essential capability for successful tourism governance? 	<ul style="list-style-type: none"> What government perspective and process does alpha city, and its tourism initiatives have? Are there any challenges or obstacles to realizing future tourism plan of the city? What could be an important and valid capability for successful tourism governance in the city level? What could be an ideal process of tourism governance? What can be the ideal future and impact of smart tourism?
Discovered Problems	<ul style="list-style-type: none"> Many cities are desiring to promote their tourism industry; however, they suffer from the lack of ideas on smart tourism strategy and approaches. Many cities deal with tourism plan by targeting on single subject or problem relatively in short-term Project Proposal with long-term projects targeting the whole tourism ecosystem is pushed back due to uncertainty and lack of budget and period. Balanced capability in both city governance aspects (in social administration and technology) and tourism aspects are required. 	<ul style="list-style-type: none"> There is a noticeable gap in the future vision of tourism development, knowledge on available tourism resources and development process between smart tourism initiatives. There was a lack of communications and silo problems observed among initiatives from different departments in terms of tourism development collaborations. The initiatives were struggling with evaluating value from tourism projects, and there was no useful tool for evaluating the holistic value of tourism development. The evaluation problem makes them the initiatives tend to be conservative in innovative but high-risk projects and large and long-term projects that are difficult to evaluate. There was an initial framework that needs to embrace capability from tourism stakeholder aspect, for instance, public tourism awareness.
Objective of Solutions	<ul style="list-style-type: none"> Design a governance model guiding effective strategy and approach for the smart tourism initiative Design a governance model supporting smart tourism initiatives to grasp available tourism resources and capabilities related to both technical aspects and social aspects of a city. Design a governance model supporting sustainable and long-term smart tourism practices toward the holistic value of the tourism ecosystem. 	<ul style="list-style-type: none"> Design an informative governance model allowing tourism initiative to discuss together and make consensus on future smart tourism vision. Design a communication supportive governance model providing a unified term and integrated roadmap in order to support communication and collaboration among tourism initiatives. Design a systematic governance model that provides a systematic evaluation process of capability and holistic value of the tourism ecosystem. Design valid evaluation criteria into the capability maturity model from reflecting future capability path and roadmap toward sustainable innovation cycle of smart tourism projects; the SCC-CMF can be modified and specified into the tourism development context. Adding public tourism awareness as capability into the initial model and develop its definition and evaluation criteria.

of Tokyo Metropolitan city in Japan. The city has shown high aspirations on tourism development by setting its future plan as an “international city”, and it has displayed significant achievement on tourism development in Japan as a tourism resource-scarce city (Lim et al., 2018).

We iterated these steps for two rounds—first-round for validating potential problems in tourism governance and exploring potential capability for smart tourism governance, and second-round for specifying and validating our detailed capability governance framework and evaluation criteria. Our detailed approach, including process, inquiry, and findings are minutely described in <Table 1> above.

Design and Development

This phase was conducted in two rounds—the first round is to explore and synthesize the initial governance model, and the second round is to improve and to extend the initial governance model with validity and to add specified criteria of each capability maturity levels based on our discoveries and analysis result from priory conducted in-depth interviews. Our detailed approaches in the design and development process are minutely described in <Table 2> above.

In the first round, based on design objectives, we conducted recursive discussions and brainstorming based on reviews from the unstructured interview

and secondary data. As the output of the first phase, the project team figured out potential resources for tourism development as well as five critical tourism capabilities required to be holistically considered for effective tourism governance for the holistic values of the tourism ecosystem—Governing sustainable tourism, Managing data and tourism resources, Managing infrastructure and services, Facilitating co-creation, and Realizing tourism values.

In the second round, based on design objectives, we conducted recursive discussions and grounded theory approach, suggested by Strauss and Corbin (1990), based on reviews from priory conducted interview data and relevant literature in smart tourism. Our process comprises of three stages of coding — open coding, axial coding, and selective coding (as theoretical coding); two coders advanced the coding process with literature reviews and recursive discussions for theoretical matching. As a partial output of the second phase, the project team could confirm the conceptual framework with six critical tourism capabilities, by adding one more critical tourism capability—Fostering public tourism analysis. Our ground of the conceptual framework is represented in Appendix 1, consisting of twenty open codes and six axial codes, built initially from 235 initial codes. Based on the codebook, we also defined the meanings of each critical capability in our framework, as described in <Table 3>.

<Table 2> Design and Development Process

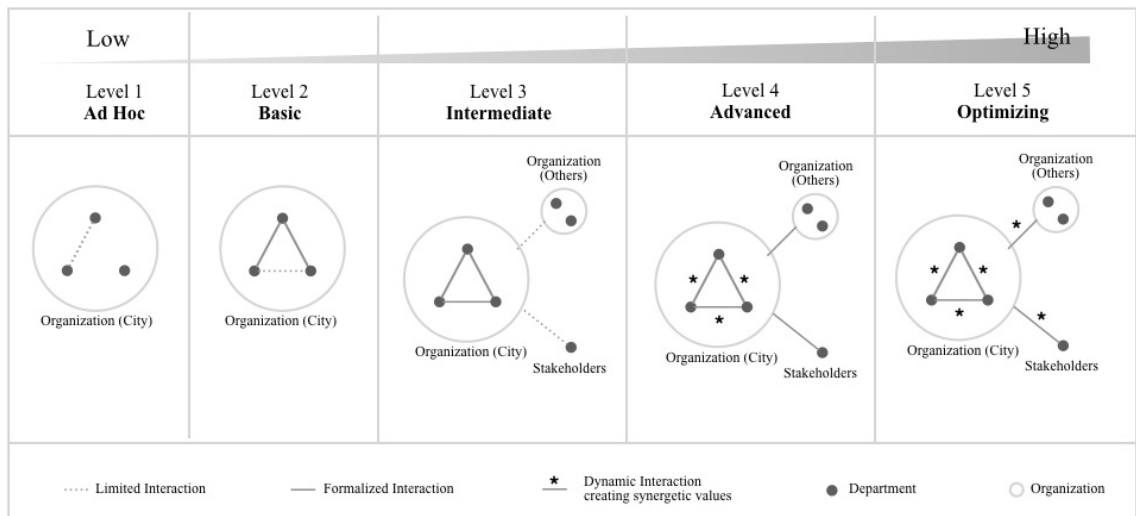
	First Round	Second Round
Method	<ul style="list-style-type: none"> • Recursive Discussions • Brainstorming 	<ul style="list-style-type: none"> • Grounded Theory approach; three stages of coding by multiple coders suggested by Strauss and Corbin (1990) • Recursive Discussions
Design Output	<ul style="list-style-type: none"> • Initial conceptual governance model with five smart tourism capabilities 	<ul style="list-style-type: none"> • Improved capability governance model with six tourism capabilities ('Public tourism awareness' is added to the model) in five different maturity levels with detailed evaluation criteria

<Table 3> Six Capabilities for Smart Tourism Governance

Capability	Meanings
Governing smart tourism	The ability of the city on its strategic planning and coordinating city stakeholders and their ecosystem for sustainable tourism development
Managing data and tourism resources	The ability of the city on its data and resource discovery, collection, process, integration, and management for enhancing tourism value
Managing infrastructure and services	The ability of the city on its urban infrastructure and service development, maintenance, and provision for enriching tourism experience
Fostering public tourism awareness	The ability of the city on its educating multi-culture harmonization and tourism awareness of the city stakeholders for improving public hospitality for tourists.
Facilitating co-creation	The ability of the city on its supporting co-creation activities of the city stakeholders for tourism innovation
Realizing tourism values	The ability of the city on its enriching, sharing and measuring the economic and sustainable values from tourism to all the tourism stakeholders

The other output of the second phase is evaluation criteria on each critical capability. In IT-CMF, there are common evaluation criteria which define five different maturity levels for each of dynamic capability of organization in specific fields related to ICTs from Ad hoc(1), Basic(2), Intermediate(3), Advanced(4) and Optimizing(5). And the use of this common criteria for designing governance framework for city and its usefulness has been proved by the design

and application cases of Sustainable Connected City Capability Maturity Framework (“SCC-CMF” in short), such as functions of being potential guideline, communication tool among city officers, and measurement tool on ICT capacity of the city. As we similarly aim to develop a governance model which provides the future path of the city, collaboration and measurement tool for the comparative advantage of the city, we decided to introduce the proven com-



<Figure 3> Common Evaluation Criteria on Each Maturity Level

mon evaluation criteria on its conceptual design base.

Based on recursive discussions and reviews, we specified common evaluation criteria on each level, which can be applied to each critical capability, as represented in <Figure 3>. For instance, In the level of Ad hoc(1), collaboration processes between departments are not existing or very limited in city organization. In the level of Basic(2), some inter-departmental collaboration processes are established and formalized. In the level of Intermediate(3), there are well-built intra-organizational collaboration processes, and the city initiates collaboration with stakeholders in the tourism ecosystem; however, the process is still not well-formalized. In the level of Advanced(4), the intra-organizational collaboration process is dynamically managed and generating some synergetic values, and the city established formalized collaboration processes with the stakeholders. Lastly, in the level of Optimising(5), the city is dynamically managing all collaboration processes within and out of the organization with stakeholders and sustainably generating synergetic values for the whole tourism ecosystems.

Based on these common criteria, we specified evaluation criteria on each level for each critical capability. The entire output of the second phase is represented in <Figure 4>.

Demonstration and Evaluation

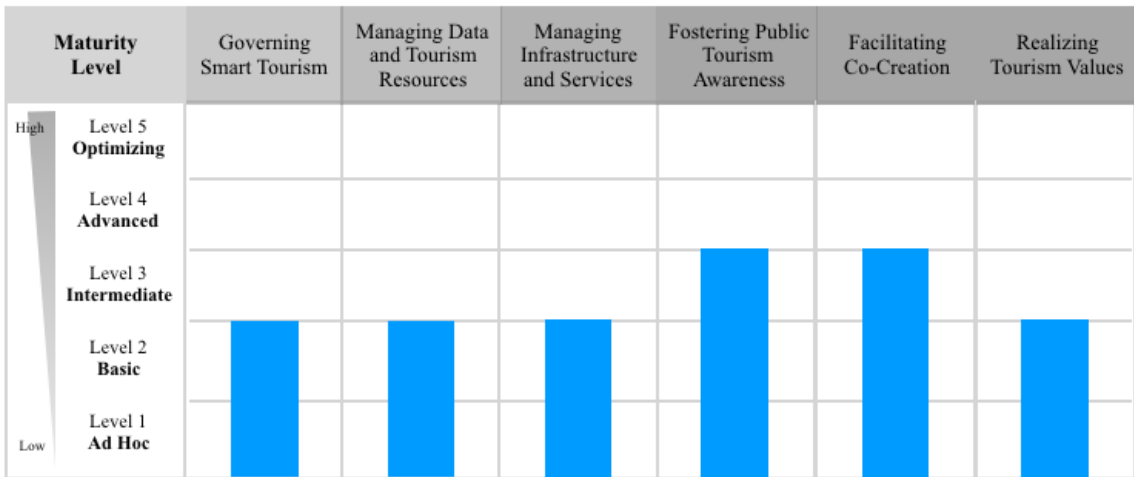
This demonstration phase was iterated in two rounds – the first round is for checking usability of the model by two project members in the lab environment; the second round was for actual demonstration of the developed capability maturity model by applying it into city Alpha to test how exactly the artifact functions and supports and contribute to resolving to a present challenge on tourism governances for smart tourism initiatives.

To apply the model to the city alpha, we analyzed the secondary data, previous six interviews, and additional feedbacks from 10 tourism stakeholders related to city Alpha. We compared features of the city alpha and each of our evaluation criteria and granted level if the feature satisfies the criteria. For instance, City Alpha had some processes, structures, and initiatives relevant to promoting and innovating tourism and globalization. We found cases developed from cross-departmental collaborations, such as transportation planning for inbound tourists (between departments of tourism, urban development, and urban infrastructure management) and free WiFi for the tourists (between the office of future planning research and departments of tourism, urban planning) (Lim et al., 2018). However, we found those processes are not fully formalized, and there are apparent gaps on tourism vision and management issues among the initiatives from relevant departments, which means the maturity level of the city Alpha on Governing Smart Tourism (critical capability 1) could be placed at level 2 (Basic). <Figure 5> displays the results of applying the model on all critical capabilities in city Alpha, achieved level 2 in Governing Smart Tourism, Managing Data and Tourism Resources (critical capability 2), Managing Infrastructure and Services (critical capability 3), Realizing Tourism Values (critical capability 6) and level 3 (Intermediate) in Fostering Public Tourism Awareness (critical capability 4), Realizing Tourism Values (critical capability 5).

Concerning evaluation, the phase was iterated in two rounds. First, we checked the validity and inclusiveness of the conceptual model by feedback from smart tourism initiatives. As a result of evaluation, we figured out that the model is valid and generally inclusive as a smart tourism governance model; we could tune our definitions and added capability about

Capability Maturity		6 Critical Capabilities for Sustainable and Smart Tourism					
Level	Details	Governing smart tourism	Managing data and tourism resources	Managing infrastructure and services	Fostering public tourism awareness	Facilitating co-creation	Realizing tourism values
High	<ul style="list-style-type: none"> Leading value-centric and sustainable tourism innovations Open innovation values shared in the tourism ecosystem Dynamic collaborations in extra-organizational level Pervasive co-creation and co-innovation activities with tourism stakeholders Dynamic management on IT and tourism capabilities State-of-the-art smart tourism practices and outcomes; the maximized synergetic value 	<p>Shared governance across municipalities & citizens toward Smart Tourism linking with various fields</p>	<p>Industry, Academia, Municipalities Gov & Citizens sharing trusted data in all parts of the country level.</p> <p>Sustainable innovations and integrations of tourism resource and data</p>	<p>Ubiquitous high-speed, secure & intelligent networks and data exchange structure among tourists and tourism stakeholders, closely linked to administration and industry other than tourism</p>	<p>Well-shared tourism vision, creative tourism development supported by sustainable and voluntary participation and collaborations by all tourism stakeholders.</p>	<p>Bottom-up entrepreneurship & open-innovation, Sustainable voluntary co-creations in tourism</p>	<p>Intelligent automation of city operations, sustainable co-developmental practices via systematic examination and improvement cycle covering economic, environmental, social and other various values</p>
Level 4 Advanced	<ul style="list-style-type: none"> Systematic tourism innovation routine with value quantifications Open innovation platform and management; Active collaborations in inter-organization level Voluntary participations from tourism stakeholders Systematic and dynamic management of IT and tourism capabilities Practices and outcomes well above industry average; managed synergetic value 	<p>Pervasive citizen participation, cross-department Smart Tourism management positions</p>	<p>Dynamic integrations, Mega data-pattern processing of tourism resource and data, crowd-sourcing initiatives</p>	<p>Real-time network sense & respond & service quality management intertwining with voluntary provision of touristic data from Industry, Academia, Municipalities Gov & Citizens</p>	<p>Sharing of unified tourism vision in the whole tourism ecosystem, Large scale voluntary endeavors on improving tourism by all tourism stakeholders</p>	<p>Tourism stakeholders' promoters driving smart tourism innovation</p>	<p>A Systematic examination and improvement cycles on all aspects of tourism values, Predictive city operations and development for tourism</p>
Level 3 Intermediate	<ul style="list-style-type: none"> Formalized tourism innovations process Limited open innovation structure Well-built intra-organizational collaboration Some participations from tourism stakeholders Integrated/transparent management of IT and tourism capabilities Systematically managed value creation; unmanaged synergetic value 	<p>Centralized Smart Tourism vision, policies & resourcing in systematic management</p>	<p>Intra and inter integration of data and tourism resource in City tourism data platform, tourism data mashups from diverse sources</p>	<p>Near real-time network sense, tourist data collection & respond management supporting touristic service in tourism destination</p>	<p>Unified of tourism vision, some voluntary endeavors on improving tourism by tourism initiatives and stakeholders</p>	<p>Well-implemented collaboration structure in the entire tourism region, Tourism stakeholder feedback loops present</p>	<p>Managed examination and improvement cycles in economic and other various values of tourism including factors related to tourists and tourism bureau</p>
Level 2 Basic	<ul style="list-style-type: none"> Some formalized tourism innovation process Some formalized interactions between departments Uncoupled management on IT and tourism capabilities Unmanaged value creation; Limited synergetic value 	<p>Decentralized city involvement, some cross-department collaboration with utilizing technology on tourism operation and development</p>	<p>Data Policies for regulatory, privacy, security & sharing, Small scale data, and tourism resource integration</p>	<p>Some variations on levels of instrumentation, connectivity of environment, technology with urban infrastructure to improve touristic experience and service quality</p>	<p>erratic tourism visions, Discrete tourism value awareness initiatives</p>	<p>Some collaborations between tourism initiatives, Limited tourism stakeholder engagement</p>	<p>Limited examination and improvement cycles in tourism operation and development</p>
Level 1 Ad Hoc	<ul style="list-style-type: none"> No formal tourism innovation process No formalized connections or interactions between departments Ad-hoc management on IT and tourism capabilities Limited value creation; No synergetic value 	<p>Little engagement, no interest in city administration on utilizing technology for tourism operation and development</p>	<p>Proprietary, No integration on data and access to tourism resources among departments</p>	<p>Manual detection, response & recovery across urban infrastructure and service provision</p>	<p>No tourism vision, limited tourism value awareness initiatives</p>	<p>No collaborations, no co-creation strategy and opportunity on tourism stakeholders, Voluntary co-creations in tourism</p>	<p>No evaluation process on values from tourism operation and development</p>
Low							

<Figure 4> Smart Tourism Capability Maturity Model; Final Design Output



<Figure 5> Application of the developed model to City Alpha; Demonstration

fostering public tourism awareness in the second development phase, following their feedbacks that the model may need to embrace the impact of tourism awareness by relevant stakeholders in city.

Second, we conducted a further semi-structured interview (Myers and Newman, 2007) with the head of smart tourism initiative and six tourism professionals in the tourism industry for evaluation purpose. In the interview, we presented the research context, process and application result of the artifact and asked prepared questions related to the soundness and utility of the model, potential value and effect of the model, and issues that need to be improved for future steps, improvisational questions (i.e., From industry perspective, which part of model is particularly useful? how could the model be improved? etc.).

In the previous chapter, we discussed three potential challenges that smart tourism initiatives encounter in the city government – (1) Coordinating Tourism Complexity, (2) Planning and Sharing Tourism Strategy and (3) Sustaining Tourism Project and Innovations. We evaluated our governance model based on these challenges, particularly we tested

how our model, designed artifact, contributed to resolving the defined challenges and discussed the potential direction for future improvement. <Table 4> summarizes the evaluation result and suggestions from the interviews.

To summary the evaluation, our model displayed significant potentials on resolving the target problems. In terms of the first challenge (coordinating tourism complexity), the model showed the inclusiveness on the whole of tourism and easiness for practitioners as a value of tourism capability governance framework. It provided a holistic and easy roadmap for smart tourism initiatives to effectively grasp what to do in each technical and social domain as well as in the current level to the next level. Feedback such as a predictable challenge on acceptance of the model to every stakeholder or lack of guidance or benchmarkable contents can be overcome by further improving the design of the model with adding more feedbacks and significant cases from various tourism stakeholders and different cities.

Concerning the second challenge (planning and sharing tourism strategy), the model displayed significant value for tourism initiatives in the sense

<Table 4> Summary of Feedbacks from Six Tourism Professionals; Evaluation

Coordinating Tourism Complexity	Planning and Sharing Tourism Strategy
<ul style="list-style-type: none"> • Agreeing to the point that capability is the key issue to manage; although technology is complicated, ultimately the result varies based on who organized and designed the technology. • Seeming that the model is helpful for city planners giving common roadmap on many domains for tourism development. For example, the future path is easy to understand. • There may be some resistance from some initiatives of local government or each of tourism stakeholders, if they do not agree to any descriptions in the model or evaluation results. • It would be nice if there are more cases in various contexts which the city can benchmark when they want to improve the capability level. 	<ul style="list-style-type: none"> • It is an interesting approach in the sense that the model allows the city stakeholders to effectively respond to tourism issues together in a shared vision and language. • Easy to understand from the strategy planner's perspective. • Description on each level can be varied based on what type of tourism strategy does that city or region have. • Perhaps the described future path in the model may limit creative idea or proposal of each tourism initiatives. • Yet, there may be more potential capabilities that the model can embrace more, in other words, inclusiveness of model could be improved.
Sustaining Tourism Projects and Innovations	Possible Future Direction
<ul style="list-style-type: none"> • The model allows a systematic evaluation process on tourism, which has been a critical bottleneck for the sustainability of tourism projects. • The model allows systematically consider what to continue from current actions to the next action. • The model provides a new way of evaluating the value of tourism development for the city, which may enable more various actions of city based on these aspects of results. • The model still does not sufficiently answer the economic value of tourism projects, which is the core logic for the city on its investments on tourism development. 	<ul style="list-style-type: none"> • The model could specify and codify the evaluation process in detail to attain stronger objectivity of result (i.e., participants, questionnaire, managing structure, etc.) • The model and value could be demonstrated in the longer term and in other cities with various strategies as a future study. • The model and description in each level can be improved by keeping feedbacking with industry people. Fundamentally, needs and expectation and way of thinking between city officers and business people are very different.

of sharing tourism vision, strategy, and available resources in unified language. We expect that enabling organization to have a well-shared and unified vision, strategy and knowledge on the available resources can promote more communication and collaborations in intra, inter and extra form in tourism ecosystem, against current silo problems. Feedbacks such as limiting creative ideas or proposals of each tourism initiatives can be overcome by keeping the model structure flexible and customizing approach for each city.

In terms of the third challenge (sustaining tourism projects and innovations), the model could attain strong agreement of value by professionals as a new

alternative way of measuring values from the smart tourism approach. We expect the model can support tourism initiatives to manage their tourism development projects in the broader domain (not necessarily economic-related) and longer-term. Regarding the feedback for economic factor, we argue our main design aim on the model is to develop an alternative measurement method which can reflect holistic for the entire ecosystem. Developing the economic value of tourism development is out of our focus in this design project.

Communication

As part of the "Communication" phase of design

Science paradigm, we shared some part of design phases, and six capability in conceptual level was presented in a well-known academic conference. We received some feedback from the academic audiences, and the team enhanced the description of the process and design artifact in detail as a response. Also, we extended the boundary of evaluating subject to other tourism stakeholders, such as professionals from businesses and tourists.

IV. Conclusion

Our research reinforces the practical views on smart tourism governance in dynamic capability theory. The essence of our design work is (1) guidance of holistic capability governance and roadmap, (2) Promotion of effective communication and tourism strategic alignment by unifying governance view, (3) enablement of evaluation by capability maturity management. And this view has been operationalized in the context of designing a Capability Governance model for Smart tourism Initiatives in the city level.

Answering to the first research question, we clarified six capability and which the city could manage toward sustainable and smart tourism with defining its meaning, such as Governing smart tourism, Managing data and tourism resources, Managing infrastructure, and services, Fostering public tourism awareness, Facilitating co-creation, and Realizing tourism values. Answering to the second research question, we specified each evaluation criteria of each maturity level in each defined capability; the output provides a general guideline for practitioners what could be potential capability path for their cities, for instance, the upper level of maturity evaluation criteria than their level of maturity. Answering to the third research question, we found that city is

required to operate performance check and feedback process with tourism stakeholders and flexibly transform itself with its capability management structure in order to sustain their tourism competitiveness. And our development and demonstration of ST-CMF provided one suitable example for this question.

In a section below, we discuss general and specific theoretical and practical implications from our reflections, as well as some discussions on limitations with potential future research directions.

4.1. Implications

The contribution of this study to the Smart Tourism in IS can be condensed into three main directions.

First, this study explores and tackles new challenges in smart tourism. Thus far, most of the literature in IS was focusing on tourism challenges in smart experience and smart business ecosystem from an individual perspective. There was a lack of works that consider challenges that Smart tourism initiatives encounter during their tourism governance in the city level. In the study, we focused on the aspect of the smart destination, and discovered three potential challenges for smart tourism initiatives in the city level on their tourism management and development as follows: (1) Coordinating Tourism Complexity, (2) Planning and Sharing Tourism Strategy and (3) Sustaining Tourism Projects and Innovations.

Second, the study proposed a potential approach to govern the capability for sustainable tourism management and development. Based on the Dynamic capability view as a theoretical lens, the study developed the capability maturity governance model by the synthesis of findings from iterations of the design cycle based on field interview data and concept of IT-CMF. The evaluation showed a significant

impact of the framework against discovered challenges with future direction for improvement. In addition, our framework development included a case of Alpha city in Japan, which exerted achievement in Smart Tourism with its strategic approach to comparative advantage. We expect our framework would provide a future strategic path for cities similar to the Alpha city, which encounters a scarce of tourism resource.

Third, the study proposed a new evaluation method in smart tourism governance. The study clarified six critical capacities on Smart Tourism as follows: (1) Governing smart tourism, (2) Managing data and tourism resources, (3) Managing infrastructure and services, (4) Fostering public tourism awareness, (5) Facilitating co-creation, (6) Realizing tourism values. Then, based on discovered six critical capacities, the study specified evaluation criteria of the six critical capacities in five different levels tailored for city organization toward its sustainable tourism governance. The result of evaluation shows that Smart tourism initiatives can use the model for evaluating and the degree of advancement of smart tourism capability in their city and representing the result to their decision-makers for sustainable and long-term investment toward smart tourism development.

4.2. Limitations and Future Direction

Like other studies, this study also has several limitations.

First, our study conducted a design approach with a single city with participants in a unitary cultural background. There is a limitation on the generalization of our built framework to all cities in the world, although our sample was suitable for the object of our study and we tried to blend external view by embracing other type tourism stakeholders.

Second, our study conducted multiple interviews as a qualitative evaluation. We admit this evaluation approach could be relatively a subjective way, despite the design Science paradigm approves the usage of qualitative evaluation, especially when the outcome factors are difficult to quantify.

Therefore, as a future direction, we can consider improving and extending our built model with more interviews and case with other cities. However, we highlight that each city has a different resource and distinctive tourism strategies for its tourism competitiveness. Thus, the extending model should take into account the possibility of distinctive strategic patterns of cities, not just generalizing the unitary strategic model. Also, a more rigorous systematic approach may be considered as an evaluation method.

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<Appendix> Codebook (from second round of design and development phase)

Axial Codes	Open Codes
Governing smart tourism	Practical use of tourism policy
	Creation of integrated tourism strategy
	Effective propagation of tourism policy information
	Tourism environment improvement
	Extended comprehension toward city stakeholders
Managing data and tourism resources	Collection · Process · Management of data and information
	A Connection of downtown and tourism spots for a more attractive excursion
	Utilization of tourism resource for creating higher tourism value
Managing infrastructure and services	Maintenance of urban infrastructure for digital innovation
	Personalized information delivery about tourism site
	Service improvement for better tourism experience
Fostering public tourism awareness	Fosterage of local hospitality culture for tourists
	Raise of public awareness and participation for tourism
Facilitating co-creation	Support for co-creational activities for tourism
	Effective usage of regional resources
	Inter and Intra solidarity of the city organization and the community
	Reflection of various stakeholders' opinions
Realizing tourism values	Sharing various tourism values
	Systematic measurement and evaluation of tourism values
	Follow-up improvement after evaluation

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