

# **Developing a Capability Maturity Model for Smart Tourism**

*Completed Research Paper*

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## **Abstract**

*There has been an increased initiative to realize smart tourism in the world. Yet, there are un-pioneered challenges for the people who lead and manage smart tourism projects and realize its value in smart tourism (we call them as 'Smart tourism initiatives'), such as coordinating of tourism complexity, planning and sharing tourism strategy, sustaining tourism projects and innovation. In light of these challenges, the overall objective of this work is to design a holistic capability maturity model for smart tourism governance enabling sustainable tourism innovations via tackling the challenges above. The Dynamic capability theory was adopted as a theoretical lens, and the Design science research methodology was introduced to develop a new capability maturity governance model as a design artifact. And We could synthesize findings from iterations of the design research cycle based on the IT Capability Maturity Model. The results of the study propose a potential capability maturity model that supports 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, Governance, Capability, Capability Maturity Model, IT-CMF, Design Science

## **Introduction**

Recently, Smart tourism has become an inevitable trend and challenge for cities toward their future developmental goals. There has been high expectation that Information Systems ('IS' in short) with suitable design and use of Information Technologies would provide better values to the tourism stakeholders and cities per se—for instance, economic values for city, businesses and citizens, and tourism experience value and post-satisfaction for tourists (Gretzel et al., 2015a; Lim et al., 2017).

Furthermore, scholars have endeavored to explore the answer how IS can create newer touristic values or boost existing touristic values by providing a new design of touristic information systems intertwining with new technology and social systems. This research paradigm is called Smart Tourism

paradigm (Gretzel et al., 2015b, 2015a). In the paradigm, the discussions are still ongoing 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., 2015b).

In the field, many cities are increasing their investment and push on smart tourism 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 examples that initiated smart tourism plans and projects from the early 2010s. Nonetheless, the success of smart tourism has not been realized fully. Most attempts have remained as potential pilot projects. On this issue, scholars have explored critical challenges in smart tourism, mainly related to a user and business aspects (Gretzel et al., 2015c)—digital access, digital exclusion, and smart destination. Admitting the importance of embracing these aspects, we believe there is also a need for studying latent challenges for smart tourism initiatives encounters and their management of smart tourism plans and projects in the city level. Based on prior work, we could discover three potential challenges as follows.

First, there is a fundamental challenge for smart tourism initiatives on managing a variety of capabilities 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 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. Particularly, the absence of evaluation processes have critically diminished logic of the smart tourism initiatives and hindered them to keep their tourism projects to be sustainable and long term (Lim et al., 2018; Mackay, 1992).

Regarding the challenges above, we introduce dynamic capabilities theory (DC) as a theoretical lens. The lens allows capability governance in complex organizations who face with drastically changing environment. As an applicable form of governance framework of DC theory, the IT Capability Maturity Framework (“IT-CMF” in short) has been developed based on the synthesis of relevant concepts and traditional capability maturity model (Curley et al., 2016). This framework has been proved as a promising framework which 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. So 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. With respect to 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 is a potential capability path for the city developing smart and sustainable tourism?
- RQ3. How can city initiatives make their tourism development process to be more sustainable? How can they systematically evaluate capability maturity to smart tourism?

The 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 detailed 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.

## **Literature Review**

### ***Smart Tourism Concept***

Over the decades, there have been many technological breakthroughs in tourism. Starting from the e-Tourism paradigm, researchers have made numerous endeavors and contributions on designing suitable tourism systems with information and communication technology (ICT) within the recent smart tourism paradigm. (Koo et al., 2015; Sun et al., 2016). In the paradigm, there are ongoing discussions among scholars on how to define the concept of smart tourism and its approach. There is a group of studies focusing on users and their experience by use of mobile and big data with ICT (Buhalis and Amaranggana, 2015; Poslad et al., 2001; Song and Liu, 2017). Their key idea 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 are 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., 2015a; Lim et al., 2017). These studies highlight the tourism systems design approach with embracing of the touristic environment, stakeholders and relevant ecosystem with a balance as a key factor of realizing successful and sustainable smart tourism. Integrating two folds of smart tourism approach, Gretzel et al. (2015) proposed three potential goals for smart tourism development 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.

Based on the smart tourism goals, scholars and practitioners have exerted to actualize values of smart tourism, particularly within the areas of smart experience and smart tourism business ecosystem. For instance, Buhalis and Amaranggana (2015) suggested a tailored design of tourism products and services that can satisfy the unique needs and preferences of each visitor. Chung et al. (2017) displayed the potential of the recommendation services that influence tourists' unplanned behaviors during the trip. Lim and Park (2016) and Lim et al. (2017) proposed a design of mobile tourism system focusing on tourists' experience as well as staffs in local business by providing support of communication and cultural instructions. In the area of smart destinations, however, only a few studies discussed potential approach in conceptual level. Koo et al. (2016) and Boes et al. (2015) clarified potential elements and dimension for smart tourism destination within various technical component and social components. Cacho et al. (2016) addressed use of social big data as useful analysis tool for managing smart destinations. Vecchio et al. (2018) figured out that use of social big data can support generating social values, such as trust and transparency, between tourist and tourism stakeholders.

### ***Smart Tourism Challenges***

Smart tourism has recently received 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 increasing their investment and policy supports on smart tourism projects (Gretzel et al., 2015c; Lim et al., 2018). They mainly expect that the successful tourism development would ultimately entail various values to the city—economic, business and citizens, and tourism experience and post-satisfaction for tourists (Gretzel et al., 2015c; Lim et al., 2017).

Nonetheless, most smart tourism attempts indeed have remained as potential pilot projects. On this issue, scholars have tried to explore primary 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 by scholars (Gretzel et al., 2015b) 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 sustainably monetize smart tourism.

Admitting importance of embracing these aspects, 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..

Looking into smart tourism challenges for city level, three potential challenges were found in previous works of literatures. **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 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 lack 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 for tourism development. Also, a lack of studies and empirical cases on smart tourism makes cities difficult to establish their future tourism strategy and projects. **Lastly**, to the best of our knowledge, there are no holistic governance frameworks enabling systematic and sustainable smart tourism approaches. Particularly, practitioners argue that it is difficult to initiate or sustain the project, 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. This absence of evaluation processes and methods diminishes the logic of smart tourism initiatives in the city and hinders them to keep the projects sustainable and long term (Lim et al., 2018; Mackay, 1992).

From the reviews above, we found a critical need for developing a systematic governance framework, which can support practitioners in the city level to overcome the aforementioned challenges.

### ***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 recent 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. Particularly, 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 DC theory view, they clarified four interrelated Macro Capabilities ('MC' in short), 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 ('CC' in short) for minutely managing each maturity levels

of those procedures, such as strategic planning, budget management, project management, benefits assessment and realization, etc. And they also developed an evaluation tool for these MC and CC with mapping evaluation criteria of capability maturity into a traditional capability maturity model in five different qualitative levels (See figure 1 below). 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 deeper comprehensions, which ultimately enabled the entire organization to gain sustainability, controllability and predictability of the IT Capability toward its business goal (Curley, 2007).

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

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

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 dynamically changing technology and business needs in the market. IT-CMF has been also 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 MCs) and discovered potential six capabilities (corresponding to CCs) toward Smart Tourism. Yet, 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.

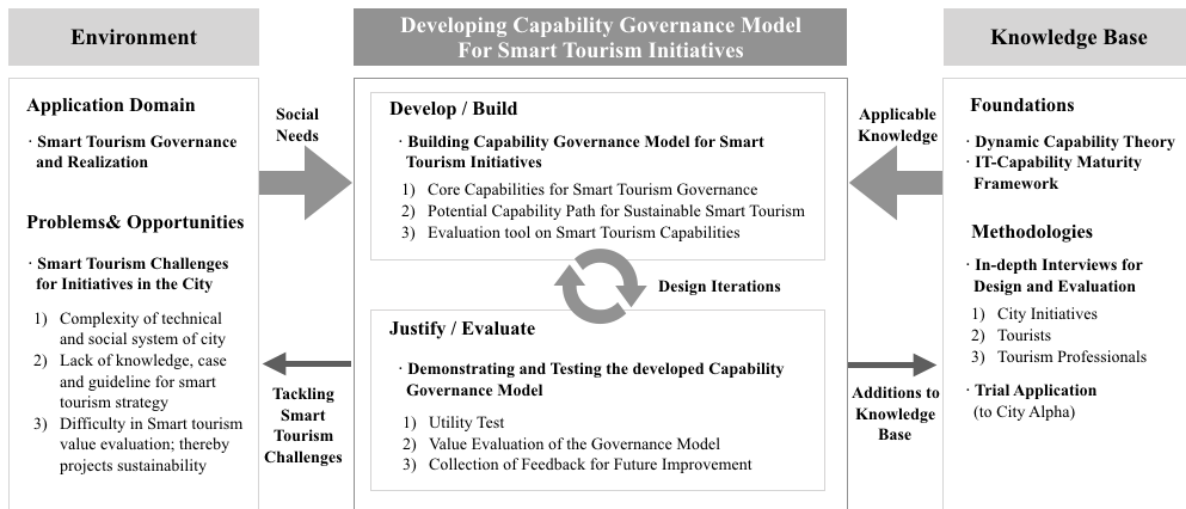


Figure 2. Research Overview based on DSR framework (Hevner et al. 2008)

## Methodology

### Design Science Research

In this study, we considered Design Science Research (‘DSR’ in short) as a primary research approach (Gregor and Hevner, 2013; Hevner and Chatterjee, 2010; Peffers et al., 2007). DSR is one of the two important main research paradigms accepted in the IS discipline, which highlights the artificial/synthetic approach of science. In DSR, researchers iterate 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 structure suggested by Hevner et al. (2010).

We followed the guidelines for design science research proposed by Peffers et al. (2007). The remainder of this chapter describes the key 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-structured in-depth interviews with 6 smart tourism initiatives from city government, 10 random tourists, and 3 tourism professionals from industry. 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).

**Table 1. Discovered problems and Objectives of Solutions**

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

## Designing Capability Governance Model

### *Problem Identification, Motivation and Definition of Objective of Solution*

There is an increasing push of 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 a 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 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 good 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 adding 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 five critical tourism capabilities and potential resources required to be holistically considered for effective tourism governance for the holistic values of the tourism ecosystem.

In the second round, based on design objectives, we conducted recursive discussions and grounded theory approach based on reviews from priory conducted interview data and relevant literature in smart tourism. As an output of the second phase, the project team could add one more critical tourism capabilities, fostering public tourism awareness and determine six tourism critical capabilities. Also, the team could specify evaluation criteria on each capability in five different levels following maturity levels of IT-CMF (Curley et al., 2016)—Ad hoc(1), Basic(2), Intermediate(3), Advanced(4) and Optimizing(5).

**Table 2. Design and Development Process**

	<b>First Round</b>	<b>Second Round</b>
<b>Method</b>	<ul style="list-style-type: none"> <li>· Recursive Discussions</li> <li>· Brainstorming</li> </ul>	<ul style="list-style-type: none"> <li>· Grounded Theory approach; three stages of coding by multiple coders suggested by Strauss and Corbin (1990)</li> <li>· Recursive Discussions</li> </ul>
<b>Design Output</b>	<ul style="list-style-type: none"> <li>· Initial conceptual governance model with five smart tourism capabilities</li> </ul>	<ul style="list-style-type: none"> <li>· 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</li> </ul>

### *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 before actual application to the city Alpha; 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.

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	<b>Level 5 Optimizing</b>	<ul style="list-style-type: none"> <li>Leading value-centric and sustainable tourism innovations</li> <li>Open innovation values shared in tourism ecosystem</li> <li>Dynamic collaborations in extra-organizational level</li> <li>Pervasive co-creation and co-innovation activities with tourism stakeholders</li> <li>Dynamic management on IT and tourism capabilities</li> <li>State-of-the-art smart tourism practices and outcomes; maximized synergistic value</li> </ul>	Shared governance across municipalities & citizens toward Smart Tourism linking with various fields	Industry, Academia, Municipalities/Gov & Citizens sharing trusted data in the all parts of country level. Sustainable innovations and integrations of tourism resource and data.	Ubiquitous high-speed, secure & intelligent networks and data exchange structure among tourists and tourism stakeholders, closely linked to administration and industry other than tourism	Well-shared tourism vision, creative tourism development environment supported by sustainable and voluntary participations and collaborations by all tourism stakeholders.	Bottom-up entrepreneurship & open-innovation, Sustainable voluntary co-creations in tourism	Intelligent automation of city operations, sustainable co-developmental practices via systematic examination and improvement cycle covering economic, environmental, social and other various values
	<b>Level 4 Advanced</b>	<ul style="list-style-type: none"> <li>Systematic tourism innovation routine with value quantifications</li> <li>Open innovation platform and management</li> <li>Active collaborations in inter-organization level</li> <li>Voluntary participations from tourism stakeholders</li> <li>Systematic and dynamic management on IT and tourism capabilities</li> <li>Practices and outcomes well above industry average; managed synergistic value</li> </ul>	Pervasive citizen participation, cross-department Smart Tourism management positions	Dynamic integrations, Mega data-pattern processing of tourism resource and data, crowd-sourcing initiatives	Real time network sense & respond & service quality management intertwining with voluntary provision of touristic data from Industry, Academia, Municipalities/Gov & Citizens	Sharing of unified tourism vision in whole tourism ecosystem. Large scale voluntary endeavors on improving tourism by all tourism stakeholders	Tourism stakeholders' prosumers driving smart tourism innovation	Systematic examination and improvement cycles on all aspects of tourism values, Predictive city operations and development for tourism
	<b>Level 3 Intermediate</b>	<ul style="list-style-type: none"> <li>Formalized tourism innovations process</li> <li>Limited open innovation structure</li> <li>Well-built intra-organizational collaboration</li> <li>Some participations from tourism stakeholders</li> <li>Integrated/transparent management on IT and tourism capabilities</li> <li>Systematically managed value creation; unmanaged synergistic value</li> </ul>	Centralized Smart Tourism vision, policies & resourcing in systematic management	Intra and inter integration of data and tourism resource in City tourism data platform, tourism data mashups from diverse sources	Near real-time network sense, tourist data collection & respond management supporting touristic service in tourism destination	Unified of tourism vision, some voluntary endeavors on improving tourism by tourism initiatives and stakeholders	Well-implemented collaboration structure in entire tourism region. Tourism stakeholder feedback loops present	Managed examination and improvement cycles in economic and other various values of tourism including factors related to tourists and tourism bureau
	<b>Level 2 Basic</b>	<ul style="list-style-type: none"> <li>Some formalized tourism innovation process</li> <li>No proper connections or interactions</li> <li>Ad-hoc management on IT and tourism capabilities</li> <li>Unmanaged value creation; Limited synergistic value</li> </ul>	Decentralized city involvement, some cross-department collaboration with utilizing technology on tourism operation and development	Data Policies for regulatory, privacy, security & sharing. Small scale data and tourism resource integration	Some variations on levels of instrumentation, connectivity of environment, technology with urban infrastructure to improve touristic experience and service quality	erratic tourism visions, Discrete tourism value awareness initiatives	Some collaborations between tourism initiatives, Limited tourism stakeholder engagement	Limited examination and improvement cycles in tourism operation and development
	<b>Level 1 Ad Hoc</b>	<ul style="list-style-type: none"> <li>No formal tourism innovation process</li> <li>No proper connections or interactions</li> <li>Ad-hoc management on IT and tourism capabilities</li> <li>Limited value creation; No synergistic value</li> </ul>	Little engagement, no interest of city administration on utilizing technology for tourism operation and development	Proprietary, No integration on data and access to tourism resources among departments	Manual detection, response & recovery across urban infrastructure and service provision	No tourism vision, limited tourism value awareness initiatives	No collaborations, no co-creation strategy and opportunity on tourism stakeholders. Voluntary co-creations in tourism	No evaluation process on values from tourism operation and development
Low								

Figure 3. Smart Tourism Capability Maturity Model; Final Design Output

To apply the model to the city alpha, we conducted an analysis of the secondary data, previous six interviews and additional feedbacks from 10 tourism stakeholders related to city Alpha. We compared features of 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 obvious gaps on tourism vision and management issues among the initiatives from relevant departments, which means the maturity level of city Alpha on Governing Smart Tourism (CC1) could be placed at level 2 (Basic). Figure 4 displays the results of applying the model on all CCs in city Alpha, achieved level 2 in Governing Smart Tourism, Managing Data and Tourism Resources (CC2), Managing Infrastructure and Services (CC3), Realizing Tourism Values (CC6) and level 3 (Intermediate) in Fostering Public Tourism Awareness (CC4), Realizing Tourism Values (CC5).

Maturity Level	Governing Smart Tourism	Managing Data and Tourism Resources	Managing Infrastructure and Services	Fostering Public Tourism Awareness	Facilitating Co-Creation	Realizing Tourism Values
High						
Level 5 Optimizing						
Level 4 Advanced						
Level 3 Intermediate				█	█	
Level 2 Basic	█	█	█		█	█
Level 1 Ad Hoc						
Low						

Figure 4. Application of the developed model to City Alpha; Demonstration

With respect to 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 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 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 open 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.

**Table 3. Summary of Feedbacks from Six Tourism Professionals; Evaluation**

<b>Coordinating Tourism Complexity</b>	<b>Planning and Sharing Tourism Strategy</b>
<ul style="list-style-type: none"> <li>· 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.</li> <li>· 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.</li> <li>· There may be some resistance from some initiatives of local government or each of tourism stakeholders, if they don't agree to any descriptions in the model or evaluation results.</li> <li>· 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.</li> </ul>	<ul style="list-style-type: none"> <li>· It's 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.</li> <li>· Easy to understand from the strategy planner's perspective.</li> <li>· Description on each level can be varied based on what type of tourism strategy does that city or region have.</li> <li>· Perhaps the described future path in the model may limit creative idea or proposal of each tourism initiatives.</li> <li>· Yet, there may be more potential capabilities that the model can embrace more, in other words, inclusiveness of model could be improved.</li> </ul>
<b>Sustaining Tourism Projects and Innovations</b>	<b>Possible Future Direction</b>
<ul style="list-style-type: none"> <li>· The model allows a systematic evaluation process on tourism, which has been a critical bottleneck for the sustainability of tourism projects.</li> <li>· The model allows systematically consider what to continue from current actions to the next action.</li> <li>· 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.</li> <li>· 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.</li> </ul>	<ul style="list-style-type: none"> <li>· The model could specify and codify the evaluation process in detail to attain stronger objectivity of result (i.e. participants, questionnaire, managing structure, etc.)</li> <li>· The model and value could be demonstrated in longer term and in other cities with various strategies as a future study.</li> <li>· The model and description in each level can be improved by keep feedbacking with industry people. Fundamentally, needs and expectation and way of thinking between city officers and business people are very different.</li> </ul>

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 potential direction for future improvement. Table 3 above 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.

With regard to the second challenge (planning and sharing tourism strategy), the model displayed significant value for tourism initiatives in a sense 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 a wider 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 alternative measurement method which can reflect holistic for 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 DSR paradigm, we shared some part of design phases and six capability in conceptual level was presented in a well-known academic conference (Lim et al., 2018). 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.

### **Conclusion**

Our research reinforces the views on smart tourism governance in dynamic capability theory, the essence of this design 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. This view has been operationalized in the context of designing a Capability Governance model for smart tourism Initiatives in the city level. In a section below, we discuss generic and specific theoretical and practical implications from our reflections, as well as some proposed future research directions.

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 smart destination, and discovered three possible 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 DC view as a theoretical lens, the study developed the capability maturity governance model by synthesis of findings from iterations of the design cycle and concept of IT-CMF. The evaluation showed a significant impact of framework against discovered challenges with future direction for improvement.

Third, the study proposed a new evaluation method in smart tourism governance. The study specified evaluation criteria of six critical capacities in five different levels tailored for city organization toward its sustainable tourism governance 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.

Like other studies, this study also has several limitations.

First, our study conducted a design approach with a single city with participants in unitary cultural background. Despite the sample was suitable for the object of our study and we included other type tourism stakeholders, there is a limitation on the generalization of our built framework to all cities in the world. As a future study, we can consider improving and extending our built model with interviews and case with other cities.

Second, our study conducted multiple interviews as a qualitative evaluation. We admit this evaluation approach could be relatively a subjective way, despite the DSR paradigm approves the usage of qualitative evaluation, especially when the outcome factors are difficult to quantify. As a future study, a more rigorous systematic approach may be considered as an evaluation method.

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