Using Innovation Diffusion and Information Adoption to Examine the Potential of the Hard Image Attributes of a City for Urban Tourism Marketing

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Abstract

The image attributes of a city are its defining features. The literature indicates that when such attributes are in the form of quantitative or categorical data, such as cultural, economic, infrastructure-related, and social development indexes, city authorities can use them to communicate efficiently with various audiences. Although the literature suggests that the hard image attributes of a city can influence individuals' intention to visit, quantitative empirical research on this subject is lacking. Therefore, this study applies the theories regarding the influence of innovation diffusion and information to obtain a conceptual framework comprising three causal constructs: source credibility, perceived innovation characteristics, and information adoption intention. The study designs formative measurement items for these constructs and obtains data from 412 respondents. Descriptive analysis suggests that hard city image attributes can serve as a tourist reference. Partial least squares structural equation modeling reveals that innovation characteristics fully mediate the relationship between source credibility and information adoption intention. Therefore, if an individual recognizes the relative advantage, compatibility, complexity, and observability of hard attributes as tourist references, then the credibility of the sources offering the attributes does not influence information

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adoption intention. The results of the empirical study confirm that the hard image attributes of a city can be used as communication materials for the authorities to perform urban tourism marketing. This study contributes to the knowledge on urban governance, city marketing, urban tourism, and the influence of information.

Key Words: hard data, urban governance, tourism communication, city marketing, innovation diffusion, information adoption

I. Introduction

Place image refers to an individual's impression of a geographic area in terms of physical characteristics (e.g., weather), symbolic features (e.g., friendliness), and advantages (e.g., sightseeing locations) (Konecnik Ruzzier and de Chernatony, 2013). Thus, the attributes of place image refer to the specific descriptive elements of a place (Lai and Vinh, 2013; Cvitković and Kline, 2017).

Alternatively, the image-making of a city pertains to the process of applying the image-making of a place to city marketing (Lee and Anderson, 2013; Giovanardi, 2015; Joo and Heng, 2017). The literature on city marketing discusses the effects of the various image attributes of a city on the extent to which an individual can identify a specific city (Glinska et al., 2015; Melović et al., 2017). A city can feature many functions that serve numerous social activities. Thus, a diverse audience holds different interpretations of and reactions toward the city image projected by the authorities (Zavattaro, 2013; Görkemli and Solmaz, 2014; Glinska et al., 2015; Wich-Szymczak, 2015; Benedek, 2017; Pompe, 2017; Papp-Váry and Farkas, 2018). Meanwhile, studies indicate that the authorities would save on communication costs if they communicated with different audiences by transforming the features of a city into numeric and categorical descriptions, such as crime rate, gross domestic product, and the number of hospitality facilities. The reason underlying this notion is that different audiences tend to interpret these hard city image attributes similarly (Lee and Anderson, 2013; Glinska et al., 2015; Wæraas et al., 2015; Toković and Petrović, 2017).

Government and non-government sources established the hard city attributes (Anholt, 2007; Yamato et al., 2017; The Economist Intelligence Unit, 2018). In this regard, several studies employed second-hand data to discuss the

potential of hard attributes in urban governance and urban tourism marketing (Gorcheva, 2015; Kashef, 2016; Martín et al., 2017; Melović et al., 2017; Papp-Váry and Farkas, 2018).

However, quantitative empirical research that investigated the influence of hard attributes on the individual views of the potential of a city for tourism remained scarce.

Given this research gap, the current study applies innovation diffusion and information adoption to explore whether the hard image attributes of a city can act as a tourist reference. Innovation diffusion is a widely used theory to examine how individuals perceive the usefulness of a new perspective (Horn, 2020; Hovart et al., 2020; Stump and Gong, 2020; Swalleh, 2021). Meanwhile, the information adoption theory highlights that individuals' perception of the usefulness of information mediates their perception of the credibility of the information source and intention to use the information. In light of this, this study argues that individuals' perception of the innovation of using hard city image attributes as tourist references mediate their perception of the credibility of governmental and non-governmental sources and intention to adopt the information. Subsequently, this study identifies four types of hard attributes: culture, economy, infrastructure, and society. Measurement items can generate formative constructs because these four types have independent definitions. Under these circumstances, this study employs partial least squares structural equation modeling (PLS-SEM) to elucidate the causal relationships among source credibility, innovation characteristics, and information adoption intention.

These results contribute to the literature on urban governance, city marketing, urban tourism, and influence theories.

II. Literature Review

1. Hard city image attributes and urban tourism marketing

The visual attributes of a place, such as architecture, landscape, and logo, are the most straightforward means through which tourists perceive the image of a place (Hospers, 2011; Rakita and Šipragić, 2013; Novčić Korać and Šegota, 2017). Given this context, the authorities can easily present a city's image through visual attributes, such as eye-catching buildings, cutting-edge industrial parks, and fresh visual identification systems (Liu, 2013; Séraphin et al., 2016; Sihlongonyane, 2016; Cvitković and Kline, 2017; Kiroff, 2017; Novčić Korać and Šegota, 2017).

Meanwhile, according to Echtner and Ritchie (2003), a place's physical characteristics and political, economic, and social conditions can form holistic imagery, such as a mental picture and atmosphere, of a tourist destination for an individual to identify. Moreover, the literature indicates that a city's political, economic, and social conditions can be considered image attributes, such as monumental government buildings, crowded business districts, and historic street patterns, that influence the intention to visit tourists (Jansen-Verbeke, 1988; Law, 2002; Görkemli and Solmaz, 2014). These attributes also serve as efficient marketing messages because they are suitable for various audiences (Graan, 2013; Bunio and Wyly, 2014; Bagdonienė and Langvinienė, 2015; Giovanardi, 2015).

However, the understanding of emotional–appeal and visual–dimensional marketing messages, such as the history, local celebrities, and iconic architecture of a city, is dependent on individual experience. For instance, a government building may relate to exaggerated state power; a business district with glass skyscrapers may be questioned for its absence of local characteristics; the historic sites of a city may relate to colonialism and prompt

criticism among tourists. Conversely, a city's political, economic, and social conditions can be presented as numeric and categorical data with the revolution of urban governance techniques. Under these circumstances, the literature suggests that numeric and categorical attributes, such as the number of infrastructure, the level of public security, and the degree of citizen satisfaction, can efficiently convey a unified city image to tourists, residents, and investors. In other words, these various audiences tend to interpret marketing messages based on numeric and categorical attributes similarly (Lee and Anderson, 2013; Liu, 2013; 2014; Glinska et al., 2015; Wæraas et al., 2015; Toković and Petrović, 2017).

In urban and regional planning research, numeric and categorical attributes denote hard data and indicators (Toković and Petrović, 2017). Therefore, the study defines hard city image as an individual's impression of a city in its numeric and categorical attributes.

Scholars and institutions have established operational index systems for urban governance. The systems also serve as hard image attributes of a city. For instance, Anholt (2007) offers a set of city brand indexes consisting of six dimensions: presence, place, potential, pulse, people, and prerequisites. Moreover, *The Economist*, an international weekly newspaper, calculates the Global Liveability Index based on five dimensions: stability, healthcare, culture and environment, education, and infrastructure (The Economist Intelligence Unit, 2018). In Japan, the Institute for Urban Strategies, which the Mori Memorial Foundation launched, reports the Global City Power Index, which includes 70 economic indicators, research and development, cultural interaction, livability, environment, and accessibility (Yamato et al., 2017).

Comparison is crucial to lend usefulness to the hard image attributes of a city. For instance, comparing the infrastructure quality across years, the number of public security incidents between two cities, and the economic outputs of several cities (Li and Heap, 2008; Olivié et al., 2015; Van Dorp, 2018). The index systems mentioned above use numeric and categorical data

to enable people with limited knowledge of urban planning to easily understand, compare, and differentiate cities based on their images. As such, these indexes have become easy-to-report data for the mass media. Ultimately, city authorities may regard the results of an index system survey as an alternative form of public opinion (Kashef, 2016).

In summary, in light of the limitation of conventional image representations of city marketing and the growing trend of hard data for urban governance, the existing literature indicates that the hard image attributes of a city may enable the authorities to communicate with tourists, residents, and investors efficiently. Nevertheless, the literature tends to take different cities as case studies and applies quantitative approaches to demonstrate that hard attributes can be a tourist reference as long as marketing materials (Graan, 2013; Lee and Anderson, 2013; Bunio and Wyly, 2014; Bagdonienė and Langvinienė, 2015; Giovanardi, 2015; Glinska et al., 2015; Wæraas et al., 2015; Toković and Petrović, 2017). In terms of Taiwan, its capital city Taipei is an example of setting an index system for urban governance and city marketing. However, the current literature taking Taipei as the case for study focuses on examining how bureaucracy may make the system ossified (Chu, 2008; Chiu and Lin, 2014). Overall, empirical studies that utilize the quantitative approach to confirm the potential of the hard image attributes of a city for urban tourism marketing are scarce.

Many types of urban tourists exist. The general type comprises leisure tourists who visit a city purely for relaxation instead of business or personal reasons (Law, 2002). Given the research gap mentioned above, this study applies the concepts of innovation diffusion and information adoption to investigate whether the hard image attributes of a city can serve as a tourist reference in the context of urban leisure tourism.

2. Innovation diffusion and information adoption

Rogers (2003) presents the innovation diffusion theory in 1962 to explain the adoption of ideas, products, and services within a society. The theory proposes five perceived characteristics of an innovation that can optimize the intention of an individual to use it. The first characteristic is relative advantage, which refers to the perception that the innovation can benefit more than its existing counterpart. The second is compatibility, which refers to how an individual perceives the innovation as compatible with their beliefs, experience, or needs. The third is complexity, which emphasizes an individual's perception regarding the ease of understanding and using the innovation. The fourth is observability, which refers to the ease of observing and communicating the results of using the innovation. The final characteristic is trialability, which refers to whether an individual can use the idea, product, or service on a trial basis.

Innovation diffusion is widely used to examine how individuals adopt new products, services, skills, and perspectives (e.g., Mahajan and Muller, 1979; De Marez and Verleye, 2004; Cook et al., 2008; Alkhateeb and Doucette, 2009; Phillips and Vinten, 2010; Chung, 2014; Raynard, 2016; Horn, 2020; Hovart et al., 2020; Stump and Gong, 2020; Swalleh, 2021). Scholars argue that the stronger the aforementioned five perceived innovation characteristics, the more likely the innovation will be adopted (Moore and Benbasat, 1991; Parisot, 1997; Anderson et al., 1998; Bennett and Bennett, 2003).

There is literature applying the theory to examine the issues concerned with the public sectors' social marketing tactics (e.g., Fernandez et al., 2016; Klingemanna and Klingemann, 2017; Munkácsy and Monzón, 2018). Meanwhile, studies on tourism marketing apply the concept of innovation diffusion to investigate the adoption of novel products, services, and tourism-related knowledge among consumers (e.g., Susanne et al., 2003; Leder

et al., 2004; Stierand and Lynch, 2008; Yap, 2012; Scaglione et al., 2015; Ganglmair-Wooliscroft and Wooliscroft, 2016). Nevertheless, such studies tend to use the theory to explore the adopters' profiles and their adoption processes, rather than using the aforementioned perceived innovation characteristic to develop conceptual frameworks for causal research. Therefore, the current study uses innovation diffusion theory to examine an individual's positive perception and consider using the hard image attributes of a city as a tourist reference in a causal research context.

Meanwhile, two concerns emerge when using only innovation diffusion theory as the research framework of the current study. The first is whether the five perceived innovation characteristics are suitable to the context of the study. In this study, trialability is not suited to the context because an individual cannot evaluate a tourism product until after completing the tourism experience (Horner and Swarbrooke, 2016). In other words, an individual can use the hard image attributes of a city as a tourist reference on a limited basis to determine whether to adopt information only after completing the related tourist experience. Hence, the research framework of this study does not include trialability.

The second concern is that few studies point out that perceived innovation characteristics are not the sole independent variables within an individual's information adoption process (De Marez and Verleye, 2004; Cook et al., 2008). The innovation adoption process is similar to the information adoption process. For example, Sussman and Siegal (2003) conduct a study on information adoption and apply the elaboration likelihood model (ELM) based on informational influence theory to explore the potential variables within an information adoption process. They suggest that the quality of argument represents high-level information, whereas the credibility of a source represents low-level information. Thus, argument quality is the central route of informational influence, whereas source credibility is peripheral. High- and low-level elaborations can influence individuals' assessment of the usefulness

of the information. In other words, the stronger the perception of the usefulness of information, the more likely the information is adopted. Furthermore, Sussman and Siegal suggest that if people cannot process personal opinions in a message, such as exchanging views with the information source, they follow the peripheral route to process information. Accordingly, the primary cues that influence individuals are peripheral given hard attributes as a tourist reference because individuals cannot input personal opinions when perceiving the hard image attributes of a city.

Within the model of Sussman and Siegal (2003), source credibility is the peripheral cue and the antecedent variable of the peripheral route. Moreover, source credibility refers to an individual's perception of the ability and willingness of an information source to continually deliver trustworthy information (Bucy et al., 2014; Hajli et al., 2015; Blach-Ørsten et al., 2018; Loureiro and Sarmento, 2019). From the perspective of information seeking, source credibility is indicative of whether information merits further processing (Idid et al., 2017; Chininga et al., 2019; Loureiro and Sarmento, 2019). Regarding the sources of hard city image attributes, the previously reviewed literature suggests they are either proposed by the municipal authorities or independent research institutes ((Lee and Anderson, 2013; Chiu and Lin, 2014; Kashef, 2016; Schwak, 2016). Therefore, the current study proposes that information sources include government institutes and non-government sources.

Comparing the innovation diffusion process with the information adoption process mentioned above, arguably, the former suggests that the perceived characteristics of innovation influence the intention to adopt the innovation; the latter indicates that the usefulness of the information mediates the credibility of the information source and information adoption intention. By investigating the theoretical definition of perceived innovation characteristics, thus, this study argues that these characteristics function as an individual's in-depth assessment of the usefulness of the innovation. As a

result, this study suggests that the four perceived innovation characteristics play mediating roles in the relationship between individuals' assessment of the source credibility of the hard image attributes of a city and their intention to adopt the attributes as a tourist reference. The arrangement responds to the previously mentioned concerns regarding the use of innovation diffusion theory as the research framework for empirical investigation: whether the innovation characteristics suit the context of the study and the integration of the innovation adoption process into the information adoption process.

III. Methods

Based on the literature review, this study proposes a theoretical model that consists of three major constructs. The first is innovation diffusion (ID). It refers to the perceived characteristics of the innovation regarding the use of the hard image attributes of a city as a tourist reference for leisure. The construct reflects four lower-order components of innovation characteristics, namely, relative advantage (RA), compatibility (CP), complexity (CX), and observability (OB). According to ID theory, they are related to a certain extent.

The second construct is source credibility (SC). It refers to the perceived source credibility of the hard image attributes of a city. Two lower-order components form SC, namely, governmental institutes (GO) and non-governmental institutes (NG), regarding the perceived credibility of the information they release. GO and NG are formative lower-order components because they represent two independent sources.

The final construct is information adoption intention (IA). It refers to an individual's intention to adopt the hard image attributes of a city as a tourist reference.

Thus, ID, RA, CP, CX, and OB form a formative–reflective hierarchical component model, whereas SC, GO, and NG are formative–formative models (Ringle et al., 2012). The designation of the hierarchy can reduce the number of paths of a variable and render the theoretical model lean and clear (Hair et al., 2014).

In terms of the causal relationships among the three constructs, as previously mentioned, this study adopts the model of Sussman and Siegal (2003) and replaces their information usefulness construct with ID. Thus, the current study hypothesizes that SC will affect ID, and ID will influence IA, whereas ID will mediate the relationship between SC and IA. Sussman and Siegal (2003) confirm the mediation of the usefulness construct by examining the significance of two causal paths, namely, SC → information usefulness and information usefulness → information adoption. Consequently, the approach cannot demonstrate whether usefulness fully or partially mediates the relationship between the other constructs. Hence, this study proposes an additional causal path between SC and IA. Through this path, the study will investigate the mediating effect of ID.

In terms of survey items, as previously mentioned, scholars and institutes defined various hard image attributes of a city (e.g., Anholt, 2007; Yamato et al., 2017; The Economist Intelligence Unit, 2018). However, including all possible hard attributes in the research constructs of the survey may have influenced the respondents' willingness to complete the questionnaire, which can lead to questionable data reliability. Therefore, the current study consults the literature and selects four types of hard attributes as survey items: culture, economy, infrastructure, and society, which are defined as follows. The first type of attribute is culture (CU). It includes sports consumption, sports stadiums, fields and relevant infrastructure, number and scale of sporting events, the extent of culture and art consumption, cultural and arts-related places and relevant infrastructure, and number and scale of cultural and arts events.

The second is the economy (EC). It includes consumption capacity, the total value of production in the national economy, benefits from economic policies and laws, types and number of industry clusters, and quality of human resources.

The third is infrastructure (IN). It includes climate, green area ratio, environmental pollution, resource recycling, disaster prevention, relevant infrastructure, ecological sanitation and maintenance, food sanitation and maintenance, web accessibility, transportation infrastructure, power supply infrastructure, and water supply infrastructure.

The fourth is society (SO). It includes crime rate, the likelihood of terrorist attacks and military conflicts, frequency of conflagration, frequency of transportation accidents, frequency of natural disasters, political and religious restrictions, the financial status of municipal bodies, social welfare and subsidies, population structure and composition, multicultural society, medical resources, health conditions of residents, resources of education, living costs, and satisfaction of residents.

This study uses these four hard city image attributes to develop the survey items to measure GO, NG, RA, CP, CX, OB, and IA. For example, the GO construct is formed from the perceived credibility of the reports of government organizations on CU, EC, IN, and SO. In addition to items about demographics, the formal survey includes 28 items regarding hard attributes. Table 1 takes CU as an example and presents the format of the main survey questions.

Table 1　Format of the main survey questions

Context
The image of a city can be perceived through numeric and categorical information about its cultural development, such as frequency of sports consumption; the number of sports stadiums and fields and relevant infrastructure; number and scale of sporting events; the amount of culture and art consumption; cultural and arts-related places and relevant infrastructure; and number and scale of cultural and arts events. Please indicate your level of agreement with the following statements using a seven-point scale (1 = "completely disagree"; 7 = "completely agree"; and 4 = "neutral").

Code	Statement
GO_CU	I trust the information released by government institutes.
NG_CU	I trust the information released by non-government institutes.
RA_CU	The information makes it easier to evaluate whether a city is suitable for leisure tourism.
CP_CU	The information is compatible when I need it for evaluating whether a city is suitable for leisure tourism.
CX_CU	It is easy to access information when I need it to evaluate whether a city is suitable for leisure tourism.
OB_CU	I think that other people would use the information for evaluating whether a city is suitable for leisure tourism.
IA_CU	I would use the information to evaluate whether a city is suitable for leisure tourism.

Note: GO = governmental institutes; NG = non-governmental institutes; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; IA = information adoption intention; CU = culture.

Source: This study.

Items were rated using a seven-point Likert-type scale. Instead of using covariance-based structural equation modeling (CB-SEM), the study employed PLS-SEM for statistical analysis to prevent model misspecification since the theoretical framework includes the measurement of formative constructs (Hu and Bentler, 1998; Jarvis et al., 2003; Hair et al., 2014). Moreover, this study used SmartPLS 3.3.3 to conduct the primary statistical analyses.

This study applied the repeated-indicator approach to establish higher-order models (i.e., ID and SC) without concern of significant bias caused by the inequality in the number of items per lower-order component (Becker et al., 2012). The reason for this notion is that each lower-order

component (i.e., GO, NG, RA, CP, CX, and OB) has four measurement items. Figure 1 presents the proposed research framework.
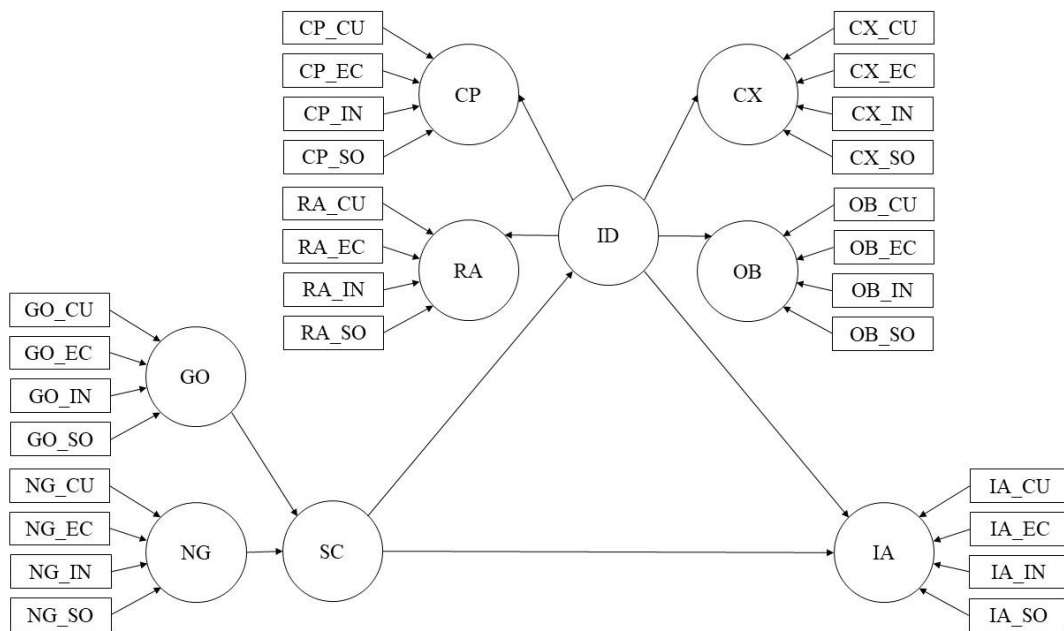

Figure 1   Proposed theoretical framework

Note: ID = innovation diffusion; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; SC = source credibility; GO = governmental institutes; NG = non-governmental institutes; IA = information adoption intention; CU = culture; EC = economy; IN = infrastructure; SO = society.

Source: Compiled by author.

In terms of the data sources, because a city may typically offer various entertainment activities that cater to the interest of young people, city authorities tend to view the more youthful, skilled, and educated generation as the primary tourist market (MacDonald, 2000; Mbaiwa et al., 2007; Scott and Cooper, 2010; Candrea et al., 2012; Carlino and Saiz, 2019; Kurt Konakoğlu and Kurdoglu, 2019). Furthermore, the literature suggests that college/university students can be useful sources of empirical data for compiling a realistic project design concerned with the development of urban tourism (Krajnović et al., 2013; Chernega, 2017). Given these preconceptions,

the study collected data from students from a university in Taipei, Taiwan. Although there might be concern regarding result generalization, using student samples is common in psychological and marketing-related research. It helps researchers with limited resources explore a relatively new theoretical concept (Hanel and Vione, 2016; Peterson, 2001; Peterson and Merunka, 2014).

The data collection took place in May 2020. The trained survey distributors are stationed at the main seating areas at the campus from 11 am to 5 pm during the weekdays. They asked every tenth of students entering the areas to fill the electronic questionnaires. The responding rate was 74.2%. Finally, the study collected 412 useable samples. The sample size exceeded 350, which satisfies the rule of thumb for quantitative research in social science (Ipsen et al., 2005).

IV. Analysis and Discussion

1. Descriptive analysis

Out of the 412 respondents who provided usable data, 34.0% are men, 65.3% are women, and 0.7% preferred not to reveal their sex. 61.4% stated that tourism activities are one of their interests. The majority of the respondents (99.5%) are undergraduate students, whereas the rest are postgraduates.

The mean scores of many items are higher than or close to 5.00 (Table 2). Therefore, given the seven-point scale used, the respondents are generally positive about SC, innovation characteristics, and the possibility of adopting the four types of the hard image attributes of a city.

<div align="center">Table 2   Mean scores of the measurement items (N = 412)</div>

Item	Mean	Standard Deviation
GO_CU	4.98	1.070
GO_EC	4.99	1.129
GO_IN	5.17	1.116
GO_SO	4.79	1.028
NG_CU	5.03	1.126
NG_EC	5.04	1.155
NG_IN	5.14	1.141
NG_SO	4.92	1.081
RA_CU	5.37	0.951
RA_EC	5.00	1.076
RA_IN	5.39	1.037
RA_SO	5.35	0.979
CP_CU	5.36	0.950
CP_EC	5.01	1.085
CP_IN	5.42	1.056
CP_SO	5.38	0.962
CX_CU	5.55	0.987
CX_EC	4.93	1.183
CX_IN	5.35	1.080
CX_SO	5.46	0.972
OB_CU	5.41	0.978
OB_EC	4.97	1.128
OB_IN	5.31	1.102
OB_SO	5.43	0.975
IA_CU	5.45	1.049
IA_EC	5.03	1.199
IA_IN	5.45	1.103
IA_SO	5.41	1.013

Note: GO = governmental institutes; NG = non-governmental institutes; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; IA = information adoption intention; CU = culture; EC = economy; IN = infrastructure; SO = society.

Source: This study.

2. Measurement model assessment

Conventionally, when performing PLS-SEM, internal consistency reliability (i.e., Cronbach's alpha), convergent validity (i.e., average variance extracted), and discriminant validity (i.e., Fornell–Larcker criterion) of reflective measurement models should be assessed before examining the entire structural model (Hair et al., 2014). Nevertheless, the measurement models within the research framework of this study are formative, such that no consensus exists regarding the method for assessing the validity of formative measurement models (Wang et al., 2015). Under these circumstances, the collinearity and relevance of the measurement items are commonly used as empirical indicators of construct validity (Freeze and Raschke, 2011; Hair et al., 2014). Moreover, path algorithm and bootstrapping are the main techniques for performing related analyses.

In terms of collinearity, all items' variance inflation factors (VIFs) are less than 5.00 (Table 2). Thus, no critical levels of collinearity exist between the items (Hair et al., 2014).

Table 3 provides the t-values, which indicate that the majority of items have a significant weight. Exceptions are nine items with t-values less than 2.00. Additionally, the outer loading of these nine items is greater than 5.00. Thus, although the items lack relative importance, they hold absolute significance to their respective measurement models (Hair et al., 2014). Hence, this study retains all items.

Table 3   Measurement model assessment (N = 412)

Construct	Item	VIF	Weight	Loading	t	p
GO	GO_CU	2.20	0.44	0.90	3.93	0.00
	GO_EC	2.44	0.29	0.86	2.62	0.01
	GO_IN	2.11	0.27	0.81	2.20	0.03
	GO_SO*	1.81	0.18	0.75	1.59	0.11
NG	NG_CU	3.13	0.50	0.94	3.48	0.00
	NG_EC	2.80	0.39	0.91	3.13	0.00
	NG_IN*	2.64	0.14	0.83	1.00	0.32
	NG_SO*	2.13	0.08	0.75	0.64	0.52
SC	GO_CU	2.88	0.20	0.80	2.40	0.02
	GO_EC*	3.06	0.09	0.77	1.29	0.20
	GO_IN*	2.78	0.11	0.73	1.32	0.19
	GO_SO*	2.37	0.10	0.67	1.31	0.19
	NG_CU	4.13	0.31	0.90	2.51	0.01
	NG_EC	3.56	0.27	0.87	2.46	0.01
	NG_IN*	3.43	0.10	0.80	0.88	0.38
	NG_SO*	2.74	0.05	0.72	0.52	0.60
RA	RA_CU	1.51	0.22	0.71	2.50	0.01
	RA_EC	1.44	0.33	0.75	4.85	0.00
	RA_IN	1.43	0.37	0.75	5.11	0.00
	RA_SO	1.41	0.42	0.77	3.47	0.00
CP	CP_CU	1.43	0.29	0.73	5.59	0.00
	CP_EC	1.35	0.34	0.73	6.14	0.00
	CP_IN	1.46	0.37	0.79	5.56	0.00
	CP_SO	1.41	0.33	0.74	5.98	0.00
CX	CX_CU	1.35	0.32	0.71	4.32	0.00
	CX_EC	1.41	0.32	0.74	5.09	0.00
	CX_IN	1.64	0.42	0.84	5.08	0.00
	CX_SO	1.47	0.26	0.72	4.15	0.00
OB	OB_CU	1.51	0.40	0.81	7.07	0.00
	OB_EC	1.52	0.33	0.77	5.01	0.00
	OB_IN	1.60	0.33	0.79	4.28	0.00
	OB_SO	1.50	0.23	0.72	4.09	0.00
ID	RA_CU*	2.19	0.04	0.63	1.48	0.14
	RA_EC	2.51	0.09	0.67	3.70	0.00
	RA_IN	2.75	0.11	0.67	4.65	0.00
	RA_SO	2.52	0.12	0.68	3.69	0.00
	CP_CU	2.77	0.10	0.69	4.53	0.00
	CP_EC	2.73	0.09	0.69	4.34	0.00

	CP_IN	3.06	0.09	0.74	3.84	0.00
	CP_SO	2.88	0.09	0.69	4.20	0.00
	CX_CU	2.40	0.08	0.62	3.60	0.00
	CX_EC	2.31	0.08	0.64	3.80	0.00
	CX_IN	2.28	0.10	0.73	4.56	0.00
	CX_SO	1.96	0.08	0.63	4.00	0.00
	OB_CU	2.04	0.13	0.72	6.40	0.00
	OB_EC	2.41	0.10	0.68	4.31	0.00
	OB_IN	2.54	0.10	0.70	3.58	0.00
	OB_SO	1.71	0.08	0.63	4.04	0.00
IA	IA_CU	1.49	0.37	0.79	5.68	0.00
	IA_EC	1.50	0.23	0.72	3.76	0.00
	IA_IN	1.44	0.37	0.78	4.54	0.00
	IA_SO	1.53	0.33	0.78	5.78	0.00

Note1: GO = governmental institutes; NG = non-governmental institutes; SC = source credibility; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; ID = innovation diffusion; IA = information adoption intention; CU = culture; EC = economy; IN = infrastructure; SO = society.

Note2: * t < 2.00.

Source: This study.

3. Structural model assessment

According to Hair et al. (2014), structural models should be assessed by investigating collinearity, the significance of causal paths, effect sizes, coefficients of determination, and predictive relevance. In terms of collinearity (Table 4), the inner VIFs between the measurement models are less than 5.00. Thus, collinearity is not an issue for the structural model. All causal paths are significant (t > 2.00) except for SC → IA. Moreover, all significant paths have effect sizes (f^2) greater than 0.35. Thus, all exogenous constructs strongly affect their respective endogenous constructs (Hair et al., 2014).

Table 4   Causal path assessment (N = 412)

Path	VIF	Path coefficient	t	p	f^2
GO → SC	2.06	0.43	3.57	0.00	109.38
NG → SC	2.06	0.65	5.85	0.00	254.48
ID → RA	1.00	0.89	36.88	0.00	3.72
ID → CP	1.00	0.94	122.05	0.00	7.20
ID → CX	1.00	0.87	46.95	0.00	3.22
ID → OB	1.00	0.88	58.78	0.00	3.53
SC → ID	1.00	0.51	11.16	0.00	0.36
ID → IA	1.36	0.88	33.73	0.00	2.08
SC → IA	1.36	-0.06	1.67	0.10	0.01

Note: GO = governmental institutes; NG = non-governmental institutes; ID = innovation diffusion; SC = source credibility; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; IA = information adoption intention.

Source: This study.

Table 5 illustrates that the coefficients of determination (R2) of all constructs are greater than 0.75 except for ID (0.26) and IA (0.72). Thus, the majority of the exogenous constructs have high predictive accuracy. However, the exogenous ID constructs have predictive accuracy that is relatively low (0.25), whereas the exogenous IA constructs have a relatively high level of accuracy (0.75) (Hair et al., 2014). Thus, Stone–Geisser's Q^2 value of ID should be determined (Q^2 =0.12) because RA, CP, CX, and OB are lower-order components in the ID construct. The value is larger than 0.00, which indicates predictive relevance (Hair et al., 2014).

Table 5   Predictive accuracy and relevance assessment (N = 412)

Construct	R^2	Q^2
SC	1.00	Higher-order component of a formative–formative hierarchical component model
RA	0.79	Lower-order component of a formative–reflective hierarchical component model
CP	0.88	Lower-order component of a formative–reflective hierarchical component model
CX	0.76	Lower-order component of a formative–reflective hierarchical component model
OB	0.78	Lower-order component of a formative–reflective hierarchical component model
ID	0.26	0.12
IA	0.72	Dependent formative construct

Note: SC = source credibility; RA = relative advantage; CP = compatibility; CX = complexity; OB = observability; ID = innovation diffusion; IA = information adoption intention.
Source: This study.

Incidentally, Hair et al. (2014) reiterate that researchers should avoid investigating model fit (e.g., goodness-of-fit) when performing PLS-SEM. In contrast to CB-SEM, it cannot fully transfer the concept of model fit to the PLS-SEM techniques, which focus on examining prediction among constructs. Meanwhile, Henseler et al. (2014) suggest that researchers may investigate the structural model's standardized root mean square (SRMR) when using PLS-SEM. Based on this suggestion, the study obtained an SRMR of 0.10 for the structural model, which indicates that the model fit remains acceptable.

4. Mediation assessment

Although the causal path SC → IA is non-significant, the SC → ID and ID → IA paths are significant. The indirect effect from SC to IA through ID is $0.51 \times 0.88 = 0.45$. Thus, the total effect is 0.45 - 0.06 = 0.39, which is less than the total effect. Furthermore, the study examines the causal relationship between SC and IA with the exclusion of ID. As presented in Table 6, that model's SC → IA path is significant (t = 8.40; p =0.00).

Based on these results, this study suggests that ID plays a mediating role that fully absorbs the direct relationship between SC and IA. Specifically, the sign of the SC → IA path coefficient changes from positive (0.41) to negative (-0.06) due to the existence of ID. Thus, ID exerts a suppression effect on the causal path. This situation is expected in the case of complete mediation (Hair et al., 2014).

Table 6   Assessment of the structural model without ID (N = 412)

Path	VIF	Path coefficient	t	p	f^2
GO → SC	2.07	0.28	1.70	0.09	84.79
NG → SC	2.07	0.78	5.46	0.00	675.10
SC → IA	1.00	0.41	8.40	0.00	0.20

Note: GO = governmental institutes; NG = non-governmental institutes; SC = source credibility; IA = information adoption intention.

Source: This study.

V. Conclusion

The existing literature argues that the hard image attributes of a city, such as physical attributes and political, economic, and social conditions, can influence the intention to visit of tourists (e.g., Jansen-Verbeke, 1988; Law, 2002; Görkemli and Solmaz, 2014; Novčić Korać and Šegota, 2017). Meanwhile, several qualitative case studies indicate that the numeric and categorical image attributes serve as modern urban governance technique that provides various audiences with a more unified city image (e.g., Graan, 2013; Lee and Anderson, 2013; Bunio and Wyly, 2014; Bagdonienė and Langvinienė, 2015; Giovanardi, 2015; Glinska et al., 2015; Wæraas et al., 2015; Toković and Petrović, 2017). However, the literature lacks quantitative evidence to justify the potential of the hard image attributes of a city for urban tourism marketing. Therefore, the study applies the concepts of innovation

diffusion and information adoption to investigate whether tourists adopt the hard image attributes of a city as a tourist reference. This study reiterates the importance of selecting perceived innovation characteristics, as suggested by Rogers (2003), suitable to empirical research through the literature review.

Moreover, this study emphasizes the difference between the innovation and information adoption processes. In so doing, it amends the ELM model of Sussman and Siegal (2003) by replacing information usefulness, which was the original mediating variable in the relationship between source credibility and information adoption, with innovation characteristics. Notably, the study further examines the mediation effect of innovation characteristics instead of the significance of the path between the constructs being confirmed, as done in the statistical analysis approach of Sussman and Siegal (2003).

The model designation of the study merits further discussion. The source credibility (SC) is a formative–formative hierarchical component model formed by two constructs, namely, government and non-government sources. Furthermore, innovation characteristics are a type of a formative–reflective model that reflects four constructs, namely, relatively advantage (RA), compatibility (CP), complexity (CX), and observability (OB). The measurement models comprise formative constructs based on the survey items, which were developed from four types of hard image attributes, namely, culture (CU), economy (EC), infrastructure (IN), and society (SC). This study applies PLS-SEM to test a relatively complicated research framework that includes formative models. The findings reveal the following. Firstly, the respondents positively recognized the credibility of the hard image attributes of a city according to information released by the government and non-government institutes. Secondly, the respondents positively perceived that using the hard image attributes of a city as a reference for urban leisure tourism is innovative. Thirdly, the respondents displayed strong intentions to adopt the hard image attributes of a city as a tourist reference. Fourthly, when the respondents did not perceive using the hard image attributes of a city as a tourist reference as

innovative, their assessment of source credibility influenced their intention to adopt the hard image attributes of a city as a tourist reference. Fifthly, when the respondents perceived using the hard image attributes of a city as a tourist reference as innovative, source credibility is the independent variable that positively influenced innovation characteristics instead of information adoption. Finally, the respondents' perception of using the hard image attributes of a city as a tourist reference as innovative fully mediates their assessment of source credibility and information adoption.

In terms of theoretical implications, the descriptive statistical analysis of the study confirms the potential of the hard image attributes of a city as materials for urban tourism marketing. In general, the respondents provide high ratings for the survey items. In addition, PLS-SEM analysis highlights the possibility of replacing information usefulness with innovation characteristics to develop the peripheral route of the influence of information.

Moreover, the study finds that innovation characteristics fully mediate the relationship between source credibility and information adoption. This finding leads to the managerial implications of the study. Altering the assessment of source credibility, which influences personal intention to adopt hard attributes as a tourist reference, appears challenging. However, city authorities can ensure that the audience can perceive the relative advantage, compatibility, complexity, and observability of using hard attributes as a tourist reference. In this manner, they can change the audience's attitude toward source credibility from an independent variable that influences information adoption to an enhancement variable that mediates the influence of innovation characteristics on information adoption.

This study selected four types of hard attributes for the practical research design to develop the measurement items. By confirming the potential of the hard image attributes of a city as communication materials for urban tourism marketing through the alternative ELM model, this study contributes to the literature on urban tourism, urban governance, and the influence of

information. Additionally, this study collected data from university students as previous studies consider the younger generation more interested in urban tourism (MacDonald, 2000; Scott and Cooper, 2010; Kurt Konakoğlu and Kurdoglu, 2019). Therefore, scholars should consider using different types of hard attributes and data sources in future studies or adding moderators to the theoretical framework to explore broad academic subjects.

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城市硬意象屬性觀光行銷之潛力：
創新擴散與資訊採用之觀點

劉松達[*]

摘　要

　　本研究探討城市的文化、經濟、基礎建設、社會發展現況在量化後所呈現之硬意象屬性，能否作為都市觀光的行銷素材。研究架構基於兩個重要傳播理論：創新擴散與資訊採用。透過問卷調查 412 份樣本，搭配偏最小平方結構方程式模型進行數據分析。結果發現，樣本對兩種硬意象屬性的資訊來源－政府與非政府－之信任度，會強化其採用這些資訊做為都市觀光參考資料的意圖；與此同時，若城市治理者能彰顯城市的硬意象做為觀光參考資料之創新特性－相對優勢、互容性、簡易性、可觀察性－樣本對資訊來源的信任度即無法影響其資訊採用意圖。

關鍵詞：硬性資料、城市治理、觀光傳播、城市行銷、創新擴散、資訊採用