M-Tour: A Smart Design Tourism Application for a Destination Competitiveness by a Design Thinking Approach

Completed Research Paper

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Abstract

The study highlights a smart tourism mobile application that generates diversified interactions among multiple stakeholders in the smart tourism industry. In the previous smart tourism studies, scholars have argued two research limitations. First, a gap exists in aspects of the tourists’ and service providers’ information environments for efficient destination management. Second, the lack of proper linkage on how ICT-enabled applications could enhance tourists’ destination experiences from a tourism comparative city to the competitive one is evident. To address these two problems, this research conducted a case study in Egypt. As a research methodology, it invited a design thinking approach with field studies and qualitative interviews focusing on six different demographics in Cairo and Alexandria. Throughout the analysis, it synthesized “M-Tour” as a smart tourism application to bridge comparative cities to competitive ones. The paper presents three contributions. First, it conceptualizes a model of smart design tourism, dealing with how a city can integrate the smart tourism comparative to the competitive advantages. Second, it methodologically applies a design thinking approach to understanding multiple stakeholders’ requirements to synthesize a smart design tourism application. Third, it will be a desirable direction for developing a user-centric smart design tourism application. Above all, the research ultimate goal is to boost the declining Egypt tourism sector by providing stakeholders’ defined solution.

Keywords: Smart tourism; design thinking; ICT; case study; tourism competitiveness & comparativeness; M-Tour

Introduction

ICT-enabled applications (e.g., Uber, Airbnb, and Google Map) have diversified smart tourism design features as well as improved the smart tourism destination management research. For instance, these smart tourism applications and innovations have drastically changed the behaviour patterns of tourists and communication protocols in destination management as alluded by (Neuhofer et al., 2012). In previous e-Tourism studies by (Koo et al., 2017), tourists’ behaviours have been revolutionized greatly. Systems applications (e.g., Booking and Expedia) have permitted tourists to make viable decisions concerning their desired destination at the comfort of their smart gadgets.

Recently, smart tourism studies encountered challenges in curbing the changing tourists’ latent behaviours as recorded by (Jovicic, 2017). The tourists’ information environments have been more complex and intangible (e.g., emotional and cognitive requirements) before, during, and after traveling.
as reported by (Sun et al., 2016). To address these, it is evident that a few scholars have persuasively argued how ICT-enabled applications could facilitate and moderate the tourists’ destination management. From these researchers’ findings, smart tourism implementation has two viable research problems. First, it has a lack of documentation dealing with information environments among tourists and the associated service providers. Second, it has a research dilemma about how the ICT-enabled applications could bridge the gap in-between the destination comparativeness and competitiveness as alluded by (Femenia-Serra et al., 2018). Based on the research paucity, this research seeks to answer the following two research questions:

**Research question 1:** What features of a smart design tourism application could offer a holistic service to the associated multiple stakeholders?

**Research question 2:** How a smart design tourism application could moderate the tourism comparative and competitive in destination management?

To address the two research questions, we invited tourism comparative and competitive destination management as a theoretical underpinning, elucidating the tourism comparative and competitive in destination management. For empirical evidence, this study conducted a case study in Egypt. In addition, the study invited a design thinking approach to fundamentally understand tourists’ and the service provider’s information environments (e.g. desire, interaction, and cognition). Based on the two field studies, we synthesized a smart design tourism application called “m-Tour” that provides an interactive platform for the multiple stakeholders (e.g. citizens, vendors, tour guides, and local agents).

This research makes three contributions. First, it suggests a smart design tourism application with a design thinking approach. The application permits interactions among multiple stakeholders, incorporating comparative and competitive advantages of a given destination. Second, it emphasizes the prospective utilization of ICT-enabled application that supports information, making decisions, and enhancing cultural facets. Third, the created “m-Tour”, and it will be a starting point for developing a comprehensive smart design tourism application by understanding multiple users’ requirements.

**Literature review**

**Smart tourism**

As a new communication and information channel, the evolution of ICT has brought up a number of tourism design applications since the mid-1990s as reported by (Guttentag, 2015). Based on this, previous researchers have documented tourists’ transactions in-between ICT-enabled applications and their usage.

In the 2000s, many smart tourism researchers have considered the user-friendly smart applications (e.g. products, systems, and services) and the newly identified concept of technologies (e.g. big data, AI, and IoT). Originally, smart tourism involves an integration of information and communication technology systems with tourism experience (Li et al., 2017). The use of intelligent developments, for instance, Virtual Reality (VR) is seen to be new opportunities for advancing the tourism industry. Beck and Egger, (2018) opinionated that VR is a marketing tool which has the potential to increase positive emotions for tourist. Arguably, intelligent recommendation systems, which are based on GIS data, as well as smart guides, can be said to be one of the key elements of smart tourism systems. For instance, (Wang et al., 2016), explored smart tourists’ attractions from a tourists’ perspective by looking into the strengths and weaknesses of smart tourism systems. From the findings, it is clearly stated that smart information systems, intelligent tourism management, smart sightseeing, e-business systems, smart safety, intelligent traffic, smart forecasting, and VR destinations are key evaluation factors of smart tourist attractions.

From the literature, it is evident that substantive research has been conducted on smart technologies in-line with the tourism industry. Many scholars have highlighted destinations’ smartness. On the other hand, only a few researchers have conducted the touristlocals' interaction as well as tangible interactivity with exhibit objects. Undoubtedly, the smart tourism paradigm if well utilized, it can
transform the tourism business to be more practical by providing much needed support for the tourist in the decision-making process by providing customized and personalized suggestions.

**Comparative and Competitive Advantages as a Theoretical Foundation**

Most of the recent studies on tourism alluded that the growth in the sector has spurred significant changes such as; the way destinations are managed, local people ethics and culture, and consequently the tourists’ behaviours (Ritchie and Crouch, 2003). Some destinations are considered to be more competitive than others and in the same way, some are considered more comparative than others. Several studies have examined comparative advantages in tourism by analyzing certain destinations features such as social-cultural aspects (Mazanec et al., 2007). Buhalis and Amaranggana, (2013) for instance, found out that a good number of tourists make a decision to visit a given destination so as to have authentic experiences such as historical features, social and cultural adventures. Some do it to have a taste of the local peculiar attractions with inner desire to get contented. The study ascertains that tourists tend to set higher expectations for the comparatively speculated destinations. Therefore, the challenge is to integrate the competitive and comparative advantages of a given destination while taking the tourists’ diversities and expectations into consideration.

In the conceptual model of destination competitiveness, the core resources and attractors are the main contributors to the attractiveness of the sites thus prompting tourists to visit the place. The top core resources which attract travelers include physiography, history and culture, tourism superstructure, trade ties, a mix of attractiveness and special events (Cucculelli and Goffi, 2016). Physiography, culture and history, and tourism structure are considered to be comparative advantages while trade ties, a mix of activities, and special events are considered to be competitive advantages. The success of tourism destinations in world trends is determined by their relative competitiveness. The competitiveness factors may include the supporting factors and resources in the business perspective as discussed by (Enright and Newton, 2004).

Recently, smart tourism studies which relate the concept model of competitiveness and comparativeness suggest that technology is key to improving destinations competitiveness (Zach and Krizaj, 2017). In this regard, this paper focuses on addressing the issue of enhancing the comparative advantages of destinations with a proposed smart tourism system. In this context, Egypt, which is under focus in our case study is considered to be a highly competitive advantaged tourist destination as per the Crouch and Ritchie model (Hunter et al., 2015).

**A Proposed Model of Smart Design Tourism**

Figure 1 presents the proposed smart tourism system. The system’s conceptual design has been developed by considering ICT as an enabler of the interaction of the subsystems. It is objected that the smart tourism system will provide the needed personalized users’ experience across various tourism sections with the main aim of integrating comparative and competitive advantages.
The proposed features may include the ability to reason over the user’s requests and actions via a smart device. The system should also be able to link the tourist with desired amenities such as souvenir stores and make an order in real-time. Other proposed features may include the ability for the tourist to access information about various registered locals tour guides and their ratings. The system will also be able to provide a platform for mutual interactions among the stakeholders.

Wholesomely, the identified stakeholders which include the local people, government organizations, and tourist will be inter-linked in the proposed system. The prospects of the proposed system will not only provide efficiency in service delivery and tourist satisfaction but also provide an enabling environment for business acumen and management. For any business system to be successful, there is a need for mutual understanding among all the stakeholders involved. In this regard, the comparative and competitive advantages associated with the tourism sector have been interlinked through ICT.

**Methodology**

Design thinking has been invited as a research methodology. Design thinking is a process that uses a designer’s susceptibilities and approaches to match people’s needs with what is technologically feasible and practical to come up with an innovative solution. The methodology has been successfully utilized, recently. (Lim et al., 2017) successfully utilized the design science exploration methodology to design a smart tourism system and a viable design artefact. However, studies on tourists’ desires and behaviors have not been fully explored on how to enhance destination comparativeness with competitive smart tourism technologies while boosting their overall satisfaction. In this regard, this paper argues the importance of designing smart tourism system that fosters tourist-local interaction with an interest in keeping the comparative advantages of the destination. In addition, it introduces a mobile-based collaboration system called “m-Tour”.

According to (Arenas et al., 2019) design thinking approach differs from other solution finding methodologies for the following reasons: It inspires new ideas through user-centric perspective; uncovers latent needs; uses dynamic conversations; learns from extremes; and exploits empathic interpretation. Design thinking creates valuable creations out of actual facts with a strategic outlook (Liedtka, 2015). Additionally, design thinking has been highlighted to improve innovation outcomes, whether they are products, services, or strategies (Yazici Julie, 2009). The main stages of the design thinking process are presented in Figure 2. The details of the process are elaborated in the subsequent section.

![Figure 2. Design thinking process](image)

**A case study of Egypt tourism industry**

**Research site**

Tourism is one of the primary sources of revenue in the Egypt economy. It employs approximately 12% of the Egyptian workforce servicing close to 15 million tourists and generating revenues of
approximately $13 billion (Turner and Freiermuth, 2018). Since the year 2011, the industry has been
dwindling raising much concern. According to the fundamental definition of comparative and
competitive advantages in reference to tourism (de la Peña et al., 2017), Egypt is regarded to be a highly
comparative advantaged destination with respect to other countries due to its rich and ancient history. In
order to ascertain the claim that Egypt is a highly comparative advantaged destination, thorough
structured interviews were conducted among four sets of tourists’ demographics: age 55 and above, age
35 to 50; age 21 to 30; and age 6 to 18. The building block questions for the study were as follows:

- The main motivators to visit Egypt
- The primary challenges the stakeholders face
- The overall satisfaction of each party
- The limiting factors to offers improve services from the other local stakeholders (agents,
government authorities, local population).

The preliminary findings are as follows: (1) Egypt is a comparatively advantaged destination due to its
historical reputation. (2) The local population is enthusiastic about the tourists and are always willing
to interact freely. (3) A significant number of tourists in response are not comfortable with the local’s
nagging interactive nature.

The individual service providers such as the merchants, on-site tour guides and on-site transport
providers have a pushy nature that makes the tourists uncomfortable. In addition, they are unorganized
lacking an appropriate system to help them perform their daily duties effectively. The lack of knowledge
of the local transportation system and the local cuisine leaves the opportunity of immersing in the local
Egyptian culture. Therefore, the goal of the “m-Tour” project is to propose an innovative business
design by studying the users, environments and their contexts. In the next section, each stage of the
design thinking process is illustrated and elaborated for the project

**Smart Design Tourism Case study by a Design Thinking Approach**

**Hypothesis and research**

This stage was iterated in two cycles; the first cycle was a brainstorming session to understand the
nature of the problems and exploring them in details. The second cycle to evaluate, specify and validate
the problems.

The following general design inquiries were considered at this stage;

- Who are the main tourism sector stakeholders in Egypt?
- What kinds of challenges do these stakeholders encounter in their daily endeavors?

Founded on these inquiries, observations and interviews were conducted in major tourists’ destinations
in Alexandria. The destinations were the Pompay Pillars, Kayetbay, and the Alexandria library. These
destinations were selected because they covered a wider scope of both the ancient history of Egypt and
other associated modern entertaining spots. Also, the areas record the highest number of tourist in the
region. To avoid missing out any bit of information from the interviewees and the observations, Live
Trekker® a mobile application was utilized was used to record and track all our interviews.

Four different stakeholders with distinctive interests were identified from the field study. They included
the foreign tourists, the service providers, the local people around the tour sites, and the government
organizations. The project team could identify a lack of proper organs to provide information to the
tourists upon arrival at a given destination. Also, because of the cultural differences and language
barriers, communication between foreign tourists and the service providers was restrained.

It was interesting to find out that the local people living around the tour sites were eager and enthusiastic
to interact with the tourist. On the other hand, the tourists were bothered by the informal and
unorganized manner in which different service providers and locals rushed to them trying to market
their services.
Few service providers utilized a temporal solution such as pictures to explain their services. The subsequent round of study started with more specific design inquiries as follows:

- What kinds of conceptual problems that can be defined by the interaction among foreign tourists, service providers, and locals?
- What is the negative consequence occasioning from the existing problems?
- What are the possible solutions to the identified problems?

Based on these set of inquiries, more interviews and observations were conducted in Cairo at the Pyramids of Giza, Salah el-Din Citadel, and the Egyptian National Museum. According to the interviews and the project team’s observations, various problems were identified and verified. The locals were very helpful and eager to interact with the tourists. However, they met rejection from the tourists. The main reason for rejection was the informal approach of the locals and the service providers. Some local vendors reiterated that they would like to do anything possible to render their customers better services but they lacked a platform so the only choice was to push and rush for the tourist to have them heard.

Another issue, which came up, was that sometimes tourists get lost while trying to navigate through different sites. This was attributed to the lack of clear labels and name tags. Along with other problems identified and recorded, they were analyzed to get more insight and interrelations of the problems.

**Findings analysis**

This phase aimed at objectively analyzing and categorizing the recorded problems to get an insight into the possible design solution. The problems identified were logically nested using the KJ method as shown in Figure 3. KJ analysis involves developing insight into themes and relationships among the issues. To identify design issues for a smart tourism application, the Insight matrix tool was introduced to weigh the interrelations between the 31 sub-problems. As William Pollard states, information is a source of invention, but unless is organized, processed, and available to the right people in a format for decision-making, it is a burden, not a benefit.

The major design issue clustered are highlighted in Table 1. They include (1) Lack of ICT-oriented support system. (2) Social and cultural differences creating dysfunctional communication. (3) Available resources management. (4) Business management gaps. These problems were then justified for the development of a design to be utilized in the proposed smart tourism system in Figure 1.

**Design synthesis**

The synthesizing process involves exploring solution design concepts and making preliminary plans. This process is simply meant to assign meaning to data. The problems analyzed by the users are evaluated as design opportunities. The user’s voice is retrieved by using user maps or personas. The concept of personas has been adopted to synthesize the design. The extremes of the possible users are taken into consideration. For instance, for this study, the safe chooser vs. the adventurous tourist, the Conservative vs. the open-minded personality for the locals and poor negotiators vs. good negotiators for the service providers are considered as follows:

**The story of Sarah Rodriguez:** Sarah is a 23 years old Master ancient history researcher from Spain. She has just arrived in Egypt as part of her first-hand experience trip in Egypt. She has plans to tour many historical destinations; however, she has limited time for her trip. One of the main objectives of her tour is to have authentic stories about the historical implications of the diversified destinations in Egypt. In this regard, she wants to have somebody who is specifically experienced by the historical destinations she is visiting. She is disappointed with one of the tour guides she was hooked up with. The online tour agent guide doesn’t have firsthand information at specific destinations. Arriving at the various destinations, she meets many people very eager to interact with her but she is hesitant and unsure if these people are genuinely destination guides or even have the experience of the destination. Many times, she feels like she has been missing getting the information she wants because she feels insecure about the informal approach of the local guides who may be having the information she needs.
The story of Mohamed Salama: Salama is a 52-year-old local staff who has been working as a tour operator at the pyramids since he was young as he inherited the business from his father. He has all the history of the pyramids readily available. He is not good at pestering the tourists and would like to have a good rapport with his client. Things have not been usual; sometimes he misses customers because of the unorganized manner fellow mates approach the tourists. Salama is fluent in six languages. He wants to interact with the tourists effectively.

The story of Asmaa Khaled: Asmaa is a 20-year-old native Egyptian, she is an excellent student at the University (Faculty of Engineering), her life has been affected by the lack of proficiency in English language and she missed many great opportunities due to this problem. She wants to enhance her English language and she tried many different methods, but she didn’t get the progress that she desired. Many people have advised her to interact with English native speakers to improve herself and she thought to create that prospect by visiting the touristic sites and interacting with tourists but to her amazement, most tourists were hesitant to talk to her and she wished she could communicate only with tourists that have similar preferences.

Figure 3. Qualitative analysis of data using the KJ method

Exploring different stakeholders’ perceptions and experiences through the empirical study of participation, motivating factors, and the authenticity of comparative advantage factors in Egypt, the findings reveal that local culture, service quality, and participatory experience are essential factors in coming up with a suitable solution. The tourists’ perception reveals positive experiences based on cultural fortification, people-friendliness, and destination facilities management. Based on these a solution in terms of a mobile application is realized.

Prototype development

The present research has identified lack of proper integration among the listed industry stakeholders as a major challenge. In regard, an interactive mobile application in the name of “m-Tour” was realized to boost the destination comparativeness. Referring to the personas, for the tourists like Sarah, they will easily access services from reviewed experts and plan their tour within their area of interest. On another hand, the service providers like Salama will capitalize on getting more customers. The application aims to bridge the communication gap, which exists between the tourists and the local service providers, and eventually boost the business value of tourism in Egypt. The conceptual prototype was established for further tests and assessment. With the analysis findings and the before proposed smart tourism system in mind, the following design objectives were reached:

Firstly, the application should offer interaction capability among the stakeholders. Secondly, it should provide pertinent information to identified stakeholders. Thus, the design should have an interface where the tourist will access reviews of the place and a video tour of the place. Thirdly, the application should be a tool for assisting in decision-making.
<table>
<thead>
<tr>
<th>Design Issue</th>
<th>Typical example</th>
<th>Explanation</th>
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| Lack of ICT-oriented support system | Lack of digital technology integration, coordination between tourism stakeholders | • The local service providers and tourists depended on face-to-face negotiations  
• Tourists could not search for activities available at a given destination. |
| Social and cultural differences | Most service providers employed informal methods to pursue tourists but on the other hand, the tourists were not comfortable creating a dysfunctional communication | • Lack of mutual understanding  
• Language barriers  
• Resulting in constrained interactions |
| Available resources management | The tourist attracting features not well protected e.g. the pyramids not well maintained. | • Limited activities at the destinations to engage the tourists  
• Digital engagement of the tourists |
| Business management gaps      | Key industry players like souvenir vendors not well integrated into the systems. | • Lost business opportunity  
• Lost possible mutual interaction and developing a rapport |

The prototype was implemented by Axure RP© Team Edition 8.0 (Axure Software Solutions, CA-USA). The software offers the capability of designing interactive prototypes for mobile applications with functionality features verifiable and testable via any smart devices. The information architecture for “m-Tour” is presented in Figure. 4. The main features are explained as follows

**Searching:** With “m-Tour”, a person can search for different destinations and discover different services available nearby in real time. For instance, a tourist is able to search for a local vendor or local tour guide in the area by choosing the categories of attractions sites, services, and other locational preferences. The tourist can reach out to the service provider via instant messaging.

**Informing:** The application provides expedient information about the interesting activities, which one can engage in a given tourist destination. With the feature of interactive video and audio explanation of the chosen destination, a tourist can then make a decision depending on a series of suggestions which pop out while watching.

**Live Interaction:** One of the problems, which the project endeavoured to solve, was the informal hassle for the tourist from the local vendors and guides. From the findings, the local vendors/people/guides were found to naturally interactive but most tourists were hesitant to interact with them because of the informal approach. With “m-Tour”, upon arriving at the destination, the tourist is able to see those vendors/guides who are available via an online pop alert. From there the tourist will be able to see which guide is more appealing according to his or her ratings. You will have a look at the world around you through the lens of its past.

**Narration:** The application also has a feature where the tourist can get different cultural tips about the people living in a given destination. The user will easily navigate with this feature since it offers cool bits of trivia about areas around you. With the application, you will not be bothered with large volumes of guidebooks and maps.

The prototype interface is presented in Figure. 5. The prospect of “m-Tour” is that it brings closer the complex relations of socio-technical systems in an optimal mixture in a comparatively advantaged with competitive features. “m-Tour” is a great way to learn about a given comparatively advantaged destination in an expansive way. Furthermore, the guided tours which are often expensive and require to stick with a group and your guide, with limited to no time to do your own interesting activities will
be eliminated with “m-Tour”. “m-Tour” will give you the ability to take a tour at your own pace at a minimum cost.

![m-Tour Information Architecture](image1)

**Figure 4. Information architecture**

![m-Tour Prototype Interface](image2)

**Figure 5. Prototype interface**

**Prototype Testing and Evaluation**

The functionalities and effectiveness of the design artefact were tested at this stage. Users were selected randomly from each identified stakeholders. By demonstrating the demo application, the project team ascertained that the application qualitatively meets the aimed at objectives. For instance, the application provides information about the available tour guides and their ratings. In addition, the artefact provides historical and cultural information related to particular destinations. The digitization of the information about various historical sites gave more excitement to the users (tourists) and they demonstrated more urge to know better about the place resulting in seeking advice from the local people. **Figure 6** presents the actual user interface of the “m-Tour” application. A swipe on the dashboard, the user is able to access multiple functions such as live interactions with different, destination recommended activities, available offers, and other online users on the platform.
Promoting tourism: Smart tourism application

**Predictive analytics**

The “M-Tour” application has been developed by articulating the needs of the targeted users. Projecting the tourism industry, the stakeholders are shifting towards using smart technologies for efficient services. Therefore, the applicability and opportunities of this artefact cover the much-needed efficiency in the tourism industry and business development. “M-Tour” will boost the Egyptian tourism industry, which has been filled with several uncertainties. The artefact is in line with the worldwide millennium goals of economic empowerment. The future of the artefact looks brighter for it can accommodate the much-needed customized advertisements hence bringing together different industries on-board.

**Contributions and Implications**

The study provides empirical support for designing smart tourism systems that offer personalized interactions among multiple stakeholders. Understanding their latent needs and developing a technologically feasible solution determines a desirable approach for establishing the competitive destination direction while upholding the comparative advantages. This argument has been proven by the present smart design tourism application “M-Tour”, in which the local citizens and tourists can formally interact while easing the hassling giving the following theoretical and practical implications:

**Theoretical Implications**

The significance of “M-Tour” is to enhance interactions and to offer effective decision-making for tourists. Few researchers addressed the issue of interaction between tourists and other industry stakeholders. A design thinking approach with the Egyptian tourism sector case study has been utilized realizing the followings: (1) A smart tourism system that enhances interactivity between different stakeholders. (2) A tourist-experience centered innovative solution boosting the business (3) Integrating ICT into the tourism industry by providing more diversified roles such as bringing together the comparative and competitive advantages to a given destination, in this case, Egypt.

**Practical Implications**

The expediency of this project can be unfolded in the essence of economic value and bettering service systems in the tourism industry. For the economic value, the study provides a solution, which can steer professionalism in service delivery in the Egyptian tourism industry. The local service providers can
maximize the visiting customers by engaging them. “m-Tour” is an effective solution for real problems experienced in the tourism sector in Egypt. The study has implications for the various stakeholders such as shop owners, tour planners, and marketers, as well as the clients who are the tourists. For example, the tourist respondents in the current investigation have relatively highly motivated to explore comparatively high destinations with enhanced competitive advantages

**Conclusion**

The project has proposed a smart tourism system and a supporting design artefact “m-Tour” synthesized while utilizing the design thinking process. Nevertheless, the study presents one of the interesting findings that the Egyptian local people are highly motivated to interact with the tourists, but the tourists do not like their informal approaches. This study has tried to bridge this gap by providing an ICT-based solution. Most importantly, it is evident that comparatively advantaged destinations cannot be simply transformed into competitive ones without considering authentic contents and service quality as the most tourist are becoming more informed due to the availability of smart applications. Therefore, the study gives leeway for future research on how actual nature and ICT can be integrated to positively influence the livelihood of the local service providers and other stakeholders. In addition, how tourists can reap more authentic experiences through smart technologies. Thus, proposing a further improvement of the design artefact to capture more suitable and realistic scenarios.

**References**


