Romblon Islands into a Smart Tourism Destination through Point of Interest Recommender, Augmented Reality and Near Field Communication: A Proposal

Nomar B. Maestro, Menchita F. Dumlao

Abstract: The Philippine tourism industry is expected to grow with more tourists visiting and through the discovery, development, and improvement of tourist attractions. Through partnerships with the local government and media developer groups, there have been implementations of e-Tourism in the country. Though e-Tourism is an effective way of tourism promotion, smart tourism offers a more innovative way such that it enhances the tourist experience through anticipation of their needs through smart recommendations of points of interests, attractions and services while sharing their experiences to aid other tourists' decision making on which places to visit. Smart tourism is a fundamental need for such cities or municipalities which have historical value and tourist attractions. Due to this, the study aims at creating a smart tourism destination framework that would be applicable to the current information and communications infrastructure of the Romblon Islands. A smart tourism mobile application will be developed that would feature a Point of Interest Recommender based on user's location, check-in ratings, and social network ratings. Augmented reality and near field communication will be used to bridge the physical and digital world. The application's acceptance will be investigated using the Unified Theory of Acceptance and Use of Technology.

Index Terms: smart tourism, ICT, POI, recommender.

I. INTRODUCTION

Tourism has been a primary realm of ideas and innovations of the Internet or World Wide Web since the onset of web technologies in the nineteen-nineties [1]. The Internet and other related technologies such as the Internet of Things and mobile technologies have made tourism into one of its primary beneficiaries. Through the inception of concepts like smart tourism destinations, big and open data, cloud computing etc., there has been an acceleration of ideas and innovations in the field. Employing available information and communications technologies (ICT) together with web technologies embodies smart tourism. Smart tourism is a significant requirement for such destinations that possess history, tourist spots, and other related activities.

The tourism business is the tertiary development motor in the service area, after settlements from overseas Filipino workers and the BPO-IT division [2]. The tourism sector has provided 12.2% to the Philippine economy on 2017 and 8.6% on 2016 [3]. The tourism business is relied upon to develop with more tourists visiting and through the revelation, advancement, and enhancement of more tourist spots in the nation. Numerous nations around the globe received tourism ventures with the end goal to renew their national economy. Truth be told, tourism fundamentally adds to the advancement of all regions of the country's economy, for example, the rejuvenation of local economies and increment in business openings [4].

There have been numerous implementations of digital or e-Tourism in the Philippines. These were done in partnership with the local government and local media or mobile developer group. E-tourism is not the same as smart tourism to such an extent that the idea of smart tourism can be seen as a consistent advancement from the most present-day idea of e-tourism to the customary tourism in that the establishment for the developments and the innovative introduction of the tourists or travelers and additionally industry were set before with the wide acknowledgment of ICT in the tourism business, for instance, the consolidation of web-based advances that prompts the emergence of e-tourism [5]. The contrast between e-Tourism and smart tourism inferred from [6] is shown in Table I.

With the attention on the tourist as the principal client, smart tourism plans to help explorers by: envisioning client needs dependent on an assortment of components, and making proposals concerning the decision of setting particular utilization exercises, for example, points of interest like tourist spots, dining places and accommodations [7], [8]; upgrading travelers' on location encounters by offering rich data, area-based and intelligent services through augmented reality and near field communication [9], [10]; and empowering tourists to share their travel encounters to help different tourists in their decision-making process [11], [12].

	e-Tourism	Smart Tourism
Sphere	digital	bridging digital & physical
Core technology	websites	sensors & smartphones
Travel phase	pre- & post-travel	during trip
Lifeblood	information	big data, open data
Paradigm	interactivity	technology-mediated co-creation
Structure	value chain/intermediaries	ecosystem
Exchange	B2B, B2C, C2C	public-private-consumer collaboration

Table I. e-Tourism vs. Smart Tourism

Tourism in the Romblon Islands is still generally conventional with some degree of utilizing social media. To advance e-Tourism, the Romblon Islands Tourism Website

Revised Manuscript Received on April 15, 2019.
Nomar B. Maestro, AMA University, Philippines (nomarbmaestro@gmail.com)
Menchita F. Dumlao, AMA University, Philippines

was propelled on November 20, 2017, which was a piece of the MIMAROPA Festival. The conventional methodology in the tourism industry will most likely be unable to pull in more vacationers that would help a location's economy [4]. The e-Tourism approach needs in providing voyagers, specialist organizations and different partners with more important information, better determination of choice, more prominent portability, and, at last, pleasurable and enhanced travel experience for tourists [13]. In a rundown, there is a need to set up a framework and enhance the tourism approach of Romblon Islands to amplify the islands competitiveness and traveler fulfillment.

This study intends to explore through research and studies conceptualized and actualized along these lines making a smart tourism destination framework that would be pertinent to the present information and communications infrastructure of Romblon Islands that would change it into a smart tourism destination through Point of Interest (POI) Recommendation utilizing a mobile application while integrating Near Field Communication and Augmented Reality. This framework could also be applied to other developing regions or islands in the Philippines towards the foundation of a national smart tourism destination framework.

II. RELATED LITERATURE

Smart Tourism

The word "smart" refers to an advertising term for everything that is installed or upgraded by innovations [14]. Tourism is a public, educational, and financial event which involves the juncture of individuals from nations external from their typical condition for business, individual or expert purposes [15]. Given the quality of information in tourism and the subsequent dependence on information and communication technologies [16] it is not surprising to spectate the concept of smart being honed to the wonders that centers tourism. In numerous approaches, the idea of smart tourism can be seen as an intelligent development from the most current idea of e-tourism to the conventional tourism [17] in that the establishment of the advancements and the introduction of innovations for the travelers and also industry were set before with the wide acknowledgment of information and communication technologies in the tourism business, for instance, the fuse of web-based advances that prompts the realization of e-tourism [18]. Importing smartness into tourism destinations requires progressively interconnecting partners through an innovative stage on which data identifying with tourism exercises could be traded [6], [18].

The different advances which interact to give smart tourism advantages will be the web, mobile, cloud computing, sensors, big data and open data [1], [6] which give a type of information administration to purchasers or travelers [16], [19].

Smart Tourism Destination

Bringing smartness into tourism implies that destinations need to interconnect travelers, tourism offices, government and the researcher through a progressive program intervened by ICT with the end goal to help incite information trade in regards to tourism exercises through breakthroughs which could upgrade their selection method [13], [14]. Since one of the difficulties in tourism part is the existence of various partners, which have distinctive significance between each other, the smartness proposition is then considered vital. The improvement of smart tourism destinations benefits tourism organization by giving helpful access to knowledge for both tourism associations and travelers through incorporated and concentrated information program [1], [4]. Smart tourism destinations additionally utilizes the genuine pith of innovation by building frameworks to encourage different representations in an accepted way.

It is indispensable to manage the way that in respect with ICT frameworks there is no system that would be applicable to all. An international setting would bring about diverse examples of ICT utilizations [20]. To this end, tourism destinations ought to institute bottom-up methodologies that are not simply founded on the arrangement of complex innovative frameworks, yet rather on fitting them to the regional or provincial requirements. For example, tourists have been made reference to as a source of knowledge for technology. Subsequently, smartness develops when creative and innovative individuals contribute their expertise to the framework that is all around upheld by a knowledge sharing domain.

Impact of Information in Smart Tourism

In smart tourism, business expands on a broad information network and the big and open data that manages it to a vast degree either explicit (client produced content) or implicit (through sensors on devices) given by travelers [6]. Without a doubt the indubitable idea of smart tourism is particularly founded on the presumption that information is readily shared by travelers. Smart tourism depends on a wealth of easily accessible information and access to open innovative systems (social networks) to be converted into innovations or services attractive to customers [18]. Simultaneously, the information structure of smart tourism can prompt new information inequalities that can be financially misused. Financial power in smart tourism is without uncertainty obtained from authority over data sources and streams [21]. It is likewise imperative to perceive that value rises up out of proprietorship as well as progressively from access to framework or information [22]. Consequently, past conventional ideas of significant value development, organizations looking to work inside a smart tourism destination need to think about value being used, implying or pointing to creation of value through utilization of information/innovation/framework instead of proprietorship and past individual trades [22].

Using particular and refined data mining strategies and analytics, inside the smart tourism setting, it is conceivable to give a vastly improved tourism ordeal [19], make contextualized suggestions dependent on visitor requirements, co-produce goods and services with travelers, in this way giving better an incentive to them progressively [6]. Performed through various instruments

for data gathering, extraction, examination and perception, tourism

analytics has as of late caught the consideration of experts and researchers by showing its handiness for value creation from big and open data [21].

ICT and Tourism

The tourism sector became smarter through the tools and applications of information and communications technology. ICT has altered the way daily activities and tasks are accomplished [23]. ICT allowed these tourism businesses to raise their ability to perform and compete by means of automation, revamping organizational procedures and activities like tourism promotion services and marketing, administration of personnel and tourist service management [5]. ICT drives tourist destinations to be reachable and pleasurable for locals and travelers through interconnection of services of tourism and government associations to attain improved coordination by presenting progressive information and providing and employing information centrally. [14].

The initiation of ICT concerns all stakeholders in the tourism industry: ICT has changed the manner in which potential travelers inquire about the destinations [18]; The accessibility of information and connection with the social network through the Internet, the utilization of mobile devices and location based services have expanded the comfort and joy of traveling for travelers on tour. [24]; ICT has influenced the manner in promoting and selling products and services in addition offering chances to change manner of operation for tourism administrators [18]; ICT has implied a shift in the competence and expertise expected of employees, advancement in tourism promotion strategies, client research techniques, an adjustment in the products and services offered to incorporate ICT skills and knowledge for employees and administrators and the improvement of centralized information services for the tourism sector [6]; and ICT has raised imperative administration issues identified with tax collection and authority, among different territories for the government [16].

Recommenders in Tourism

Recommenders are basically data and information sifting systems designed for anticipating the rating or inclination that a client or customer would provide for a particular thing (e.g. books, games, movies, music or other products) or social component (e.g. person or community) that the person has not considered [25]. Recommenders prescribe those things anticipated to all the more likely match clients' inclinations, in this manner diminishing the clients' decision making process [25].

Current recommenders in tourism get the traveler preferences, either actively (by requesting) or passively (by mining travelers' social network activity), and recommend tourist spots, tour packages, services and tourism related activities [14]. The principal goal of recommenders is to make searching easy for tourists then inform and persuade the tourist about the suitability of the suggested tourist spots and tourism related services [25].

Tourism is a favored field of application for recommenders specifically mobile recommenders, which influences immense circumstances to give precise and efficient travel recommendations that regard individual inclinations and consider habits, individual and situational parameters. The following are common recommendation or suggestion tasks provided by current tourism recommenders. The tasks exhibited thus are pertinent to this research and are not planned to be comprehensive, but rather give a sensible inclusion of previous study in the field.

Recommendation of attractions (POIs). Most tourism recommenders that have been prototyped are used to suggest attractions (e.g., churches, historical sites, monuments, and so on.) [24], this suggestions are regularly envisioned either in a conventional ordered list or by overlapping POI icons on a map. Suggested attractions are calculated based on user's location, explicit and implicit preferences saved as the user data or profile.

Recommendation of services. This task is comparable to the recommendation of attractions. The client ordinarily gets information applicable to tourism services, for example, dining, lodging, transport, tourism offices, and so on [8]. Most recommenders use explicit user preferences to manage or regulate what services would be recommended. The client determines the preferences and the recommender suggests and lists which services would meet the client's preferences.

Recommendation of new POIs and services via Social network sites (SNS) and collaborative traveler-created content. Some recommenders offer recommendations of little-known or newly discovered POIs and services which is currently provided by well-known SNS [12], These recommenders give access to archives of client produced content; in that capacity, they are intended to help guests to tour a city or island and additionally share their travel adventures and experiences. Traveler actions or activities such as POIs visited, travel patterns, websites visited, products purchased and so on, are recorded, while traveler-significant substance such as photos and videos posted, comments and reactions, POI ratings and so on, might be centrally overseen and shared.

Recommendation of routes. Geography's First law by Tobler stated that "All items are closer with all other items, however, the closer items offer more association or connectivity than farther items" [26]. Geography's First law infers that tourists like to visit closer attractions as opposed to farther ones and tourists may give more attention with attractions closer to other attractions that tourists lean toward. Most attraction recommenders give importance to nearby attractions which immensely influences a tourist's traveling routine or tendency. Previous recommenders suggest attractions via the closest route or shortest path from the tourist's present location to the nearest suggested attractions.

III. SMART TOURISM FOR ROMBLON ISLANDS

This section describes the objectives of the study, the function of the POI recommender, and the scenario and framework of

smart tourism relevant to the islands of Romblon.

Proposal Objective

The principal goal of this study is the design and development of a smart tourism destination framework and the facilitation of its implementation in Romblon Islands by utilizing a Point of Interest (POI) recommender through a mobile app while integrating Near Field Communication (NFC) and Augmented Reality (AR). POI suggestions will be achieved via a context-aware recommender that would use current user location, check-in, and attraction ratings from the app as well as social network ratings as basis or criteria for establishing recommendations. NFC will bridge the physical
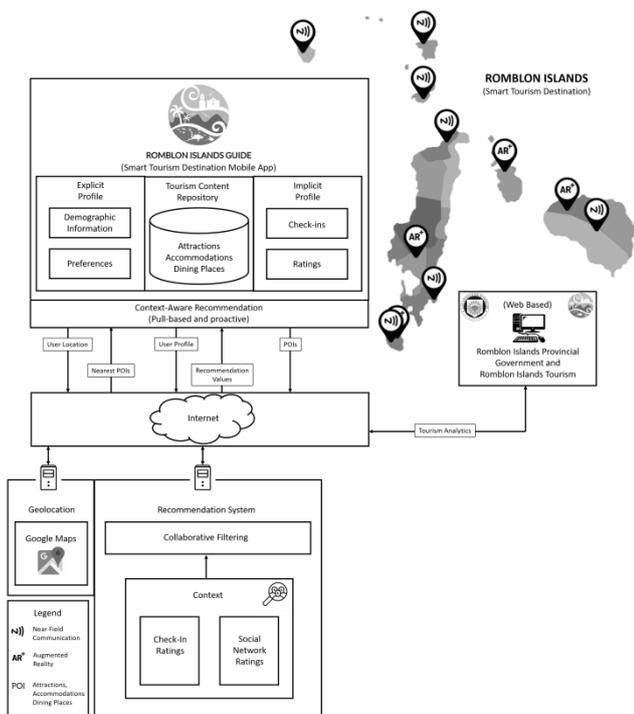

Figure 1. Smart Tourism Destination Framework

world to the digital realm by allowing communication of the mobile app to the tagged destination. AR will emphasize historical value on locations where significant events took place.

POI Recommender

This study would belong to three tasks of current recommenders. Initially, the mobile app would perform as a conventional recommender by suggesting POIs where ranking of POIs are calculated by a recommendation algorithm. Next, the mobile app would suggest POIs through ranking obtained from a SNS. Lastly, the tourism app will suggest POIs, dining places, and accommodations using geographical attributes and listing the nearest items.

Smart Tourism Scenario

Romblon Islands, a member of MIMAROPA or Region IV-B in the Philippines, is affluent in historical value and breath-taking natural attractions. It has seven islands namely, Romblon, Tablas, Sibuyan, San Jose, Corcuera, Concepcion, and Banton. Tourism promotion in Romblon Islands currently utilizes brochures, web and social networking sites. Smart tourism is a principal need for islands like Romblon in order to advance tourism operations, upgrade traveler experiences and enhance the lives of the locals. The aim of Romblon Islands being a smart tourism destination will be attained through the utilization of the framework and the smart tourism app. The smart tourism destination framework proposed for Romblon Islands is shown on Fig. 1.

As per the abovementioned, the specified user situations are proposed for the smart tourism app:

Ramon is a Filipino citizen who loves to explore different tourist spots in the Philippines. He decided to visit the town Romblon for its history and beautiful beaches. He prefers to travel to the nearest attractions from where he is currently located but he prefers attractions that are recommended by other tourists than least recommended ones. He is advised by the tourism officer to download the smart tourism app. The app suggests the nearest and highest rated attractions to him. Ramon was able to visit the attractions that are near the town which are also highly rated by other tourists. Ramon was able to see history digitally through Augmented Reality.

IV. METHODOLOGY

This research will be established on the association of three fields: Information Technology, Computer Science and Social Sciences. From the field of Information Technology and Computer Science is the investigation, design, development, and integration of the mobile tourism app together with the POI recommender, AR and NFC. At the same time from the field of Social Science is the survey, examination, and interpretation of tourist behavior. The following tasks which are defined below have been modified to suit the current study are derived from [24].

1. Investigate the relationship between recommenders together with the field and scope of study. This task examines current recommenders and algorithms used by recommenders in a tourism setting. An examination of related researches and implementations of recommenders in the scope of tourism and attractions is going to be carried out. After this, the recommender tasks and the algorithm proposal is going to be determined.

2. Analyze the tourism setting in Romblon Islands. A sequence of actions should be completed before a profile of possible tourists and attraction can be created. A few of these crucial tasks have been previously accomplished as stated in Sect. V.

a. Decide which recommendation items to include. Establishing the attractions, accommodations and dining places in Romblon Islands that will be included in the smart tourism app is the intention of this subtask.

b. Describe the intended users. This subtask chooses the potential audience of the smart tourism app which is done once attractions have been decided. This subtask has two functions: to obtain generic profile of travelers, and to assist the POI recommender's

information training of the profiles.

c. Identify the intended users. The aim of this subtask is to construct a survey in order to produce a database of the target users' explicit and implicit profiles. This task will test the database with the prospected POI recommendation algorithm before integrating the said algorithm to the smart tourism application.

d. Validate the survey through tourism experts. This activity aims to assess the survey questions and items for the purpose of receiving feedback from the experts.

e. Revamp the survey. In order to gain attention from respondents outside Romblon Islands, the following subtask communicates the survey through different avenues, such as e-mail and posting or sharing on social networking sites.

f. Publish the revamped survey. It is intended to publish the digital survey on different social networks to obtain the participation of people external to Romblon Islands.

g. Determine the outcome of the survey. The data obtained from the survey will be assimilated into a data examining framework in order to obtain a single document with all the survey records after each survey is acquired.

3. Identify the classification of recommendation items. This task determines the different classes of POIs or attractions, accommodations, and dining places in Romblon Islands that would be included in the smart tourism app with regards to the intended users and the recommendation algorithm to be used.

4. Design and develop the initial mobile application. Design a database and encode the determined POIs. Design a mobile application that would show to the users available POIs together with its information and categories. The initial mobile application will serve as content with geographical influence that could later be upgraded into a smart tourism application. Identify the augmented reality model that will be used and which POIs will be included.

5. Analyze the data obtained perspective of the recommendation algorithm. On this activity, data obtained from the surveys will be preprocessed for normalizing the input values for the recommender. This task is expected to be a major detail in developing the smart tourism application.

6. Present the algorithm of the POI recommender. This task looks at an algorithm's characteristic that satisfies the three tasks for recommendation such as POI ratings, location based influence and social network site ratings.

7. Develop the recommender. This task implements the algorithm of the POI recommender. This task also develops the information that would be seen by the user, whether it would be a list of attractions or attraction icons or routes on a map.

8. Design and develop the smart tourism app. In this task, the design and features of the mobile application are suited to the users' needs on the basis on the study about smart tourism, information impact, ICT, and recommender tasks. The developed mobile app should improve the tourism experience of the traveler thereby transforming Romblon Islands into a smart tourism destination.

9. Deploy the smart tourism app to the probable users. Select individuals who could be probable users of the mobile app will be testing the app with the aim of supplying evaluations based on user interface, efficiency, etc. The goal of these evaluations is to further improve the features of the smart tourism mobile app specifically, the POI recommender.

10. Investigate the user acceptance of the smart tourism app. For the researcher to make conclusions or to test the hypothesis, the UTAUT model will be used through the statistical research by collecting data from the select individuals who could be probable users.

V. RESULTS AND DISCUSSION

This section describes the learning experiences as well as a discussion of the tasks already done in designing and developing a smart tourism mobile app.

Based on the investigation of the relationship between recommenders from previous and current studies, collaborative filtering was the recommendation algorithm selected since it is most frequently used by researchers to focus on suggestions built on user ratings [12], [24], [28].

After investigating the relationship between recommenders and field of scope of study, the recommendation items that would be included in the smart tourism app were identified. It was done with the help of the Provincial Government of Romblon and Romblon Islands Tourism Office. During this step, it was determined that the Points of Interests or attractions, accommodations and dining places would be the recommendation items. There are a total of 178 tourist attractions divided between the islands, however, only 64 tourist attractions were defined as points of interest due to the accessibility and availability of other attractions. During the selection of points of interest for accommodations and dining places, a problem was encountered since there were only 8 accommodations and 1 dining place accredited by the Department of Tourism. For this reason, the selection of points of interests to be included in the survey was delimited to tourist attractions. The remaining accommodations and dining places were to be identified by the researcher with the help of Romblon Islands Tourism as validator.

Once the recommendation items have been identified, the next phase is to identify the probable users. For that reason, a study has been carried out to define the probable users, who will aid in constructing the database by using a survey where the 55 POIs were identified (25 from Tablas, 6 from Sibuyan, 3 from San Jose, 13 from Romblon and 8 from Tres Islas) which will be ranked by the users. Nine (9) points of interest were removed due to similarities from other tourist attractions. For this state, the probable users are comprised of potential tourists of Romblon Islands. According to the report provided by Romblon Islands Tourism, there were 60,196 guests that visited the islands of Romblon from January to December 2017 in which

50,437 or 83.79% were residents of the Philippines, 6,979 or 11.59% are non-residents of the Philippines and 2,780 or 4.62% are overseas Filipinos. The report does not state the gender, age group or religion of guests.

Subsequently, it was built up that the survey would be non-probabilistic utilizing quota sampling to separate the target populace dependent on known subgroups and Snowball sampling which includes asking individuals who have already taken the survey to choose other individuals

they believe would participate [28]. The populace was then separated into five groups according to age which was <18, 18-30, 31-40, 41-50, and >50, which also have been separated into women and men. Consequently, the margin of error for the data should ensures the construction of a database representative of the probable clients of the smart tourism application. Accordingly, the margin of error was settled at 3%, therefore setting the representative sample at 1,049 respondents, of which: 879 people to be surveyed must be residents of the Philippines (83.79%), 122 people to be surveyed must be non-residents of the Philippines (11.59%) and 48 people to be surveyed must be overseas Filipinos (13.6%).

With respect to the survey design, it is comprised by seven sections. The first section obtains some personal data of the respondents, such as gender, age range, occupation, religion, hometown, and country of residence, in order to be aware of the user's profile. Next, a sequence of survey questions that are technological essence are shown to see if the probable visitor employs these technologies in tourism related activities. Consequently, further survey questions are added to obtain the tourism relationship the probable visitor has with the Philippines and Romblon Islands. Additionally, preferences about accommodations, cuisines and travel arrangements are asked. For sections 2 to 6, the 55 points of interest in Romblon Islands are shown and defined for the user to rate according to the possible interest the user might have towards the POIs. The last section shows the acknowledgements and submission of the survey response.

The survey has been designed and organized through the use of Google Forms to better ease the distribution process. The survey has been validated by tourism experts which include the Romblon Islands Provincial Tourism Officer and tourism experts from the academe.

CONCLUSION

This study proposes to design and develop a smart tourism destination framework and its implementation in Romblon Islands through utilization of a Point of Interest (POI) recommender through a mobile app while integrating Near Field Communication (NFC) and Augmented Reality (AR). The mobile app would perform recommendations by suggesting POIs, dining places, and accommodations based on location, in-app ratings or SNS ratings.

Initially, data to be used by the recommendation algorithm will be obtained from a survey conducted to collect the preferences of possible tourists of Romblon Islands. As more in-app user ratings will be recorded, it is

set to replace the ratings that came from the survey. The utilization of NFC and AR will the tourist to digitally interact with the attraction.

The advancements set forth through ICT and the development of the smart tourism app and the implementation of the framework shall transform Romblon Islands into a smart tourism destination.

REFERENCES

1. K. Kaur and R. Kaur, R. "Internet of Things to Promote Tourism: An Insight into Smart Tourism," International Journal of Recent Trends in Engineering Research, vol. 2, issue 4, pp. 357-362, Apr. 2016.
2. B. Villegas, "The future of Philippine tourism," 2017. [Online]. Available: https://opinion.inquirer.net/104143/future-philippine- tourism. [Accessed: 27- Oct- 2018].
3. L. G. Bersales, "Contribution of Tourism to the Economy is 12.2 Percent in 2017," 2018. [Online]. Available: https://psa.gov.ph/content/contribution-tourism-economy-122-percent-2017. [Accessed: 27- Oct- 2018].
4. B. P. Gautam, H. Asami, A. Batajoo, and T. Fujisaki, "Regional Revival through IoT Enabled Smart Tourism Process Framework (STPF): A Proposal." Soft Computing and Intelligent Systems (SCIS) and 17th International Symposium on Advanced Intelligent Systems, 2016 Joint 8th International Conference, pp. 743-748, Aug. 2016.
5. M. Vasavada and Y. J.Padhiyar, (2016). "Smart Tourism: Growth for Tomorrow," Journal for Research, vol. 1, no. 12, Feb. 2016.
6. U. Gretzel, M. Sigala, Z. Xiang, and C. Koo, "Smart Tourism: Foundations and Developments," Electronic Markets, vol. 25, no. 3, pp.179-188, Sep. 2015.
7. K. Meehan, T. Lunney, K. Curran, and A. McCaughey, "Context-aware intelligent recommendation system for tourism," Pervasive Computing and Communications Workshops, pp. 328-331, Mar. 2013.
8. H. Gao, J. Tang, X. Hu, and H. Liu. "Content-Aware Point of Interest Recommendation on Location-Based Social Networks," AAAI, pp. 1721-1727, Jan. 2015.
9. M. Nitti, V. Pilloni, D. Giusto, and V. Popescu, " IoT Architecture for a Sustainable Tourism Application in a Smart City Environment," Mobile Information Systems, 2017.
10. N. Dlodlo, O. Gcaba, and A.Smith, " Internet of Things Technologies in Smart Cities," IST-Africa Week Conference, pp. 1-7, May 2016
11. D. Buhalis, and A. Amaranggana, "Smart Tourism Destinations Enhancing Tourism Experience through Personalisation of Services," ICT in Tourism, pp. 377-389, 2015.
12. K. Meehan, T. Lunney, K. Curran, and A. McCaughey, "Aggregating Social Media Data with Temporal and Environmental Context for Recommendation in a Mobile Tour Guide System," Journal of Hospitality and Tourism Technology, vol. 7, no. 3, pp. 281-299, Aug. 2016.
13. K. Boes, D. Buhalis, and A. Inversini, "Conceptualizing Smart Tourism Destination Dimensions," ICT in Tourism, pp. 391-403, 2015.
14. Buhalis, D., &Amaranggana, A. (2013). Smart Tourism Destinations. In *Information and Communication Technologies in Tourism*

2014 (pp. 553-564). Springer, Cham.

15. UNWTO, "Understanding Tourism: Basic Glossary," 2018. [Online]. Available: http://media.unwto.org/en/content/understanding-tourism-basic-glossary, [Accessed: 27- Oct- 2018].

16. Y. Li, C. Hu, C. Huang, and L. Duan, "The Concept of Smart Tourism in the Context of Tourism Information Services," Tourism Management, vol. 58, pp. 293-300, Feb. 2017.

17. D. Buhalis, and R. Law, "Progress in Information Technology and Tourism Management: 20 Years on and 10 Years after the Internet—The State of eTourism Research," Tourism Management, vol. 29, no. 4, pp. 609-623, Aug. 2008.

18. J. H. Park, C. Lee, C. Yoo, and Y. Nam, "An Analysis of the Utilization of Facebook by Local Korean Governments for Tourism Development and the Network of Smart Tourism Ecosystem," International Journal of Information Management, vol. 36, no. 6, pp. 1320-1327, Dec. 2016.

19. D. Wang, X. R. Li, and Y. Li, "China's Smart Tourism Destination Initiative: A Taste of the Service-Dominant Logic," Journal of Destination Marketing & Management, vol. 2, no. 2, pp. 59-61, 2013.

20. E. L. Gomes, J. M.Gândara, and J. A. Ivars-Baidal, "Is it important to be a smart tourism destination? Public managers' understanding of destinations in the state of Paraná," RevistaBrasileira de PesquisaemTurismo, vol. 11, no. 3, pp. 503-536, Dec. 2017.

21. M. Fuchs, W. Höpken, and M. Lexhagen, M. "Big Data Analytics for Knowledge Generation in Tourism Destinations–A Case from Sweden," Journal of Destination Marketing & Management, vol. 3, no. 4, pp. 198-209, Dec. 2014.

22. P. Del Vecchio, G. Mele, V. Ndou, and G. Secundo, "Creating Value from Social Big Data: Implications for Smart Tourism Destinations," Information Processing & Management, vol. 54, no. 5, pp. 847-860, Sep. 2018.

23. N. Maestro and A. A. Balute, "ICND2 MAESTRO -An Android App Companion and Cisco IOS Command Guide for Interconnecting Networking Devices 2," American Journal of Engineering Research, vol. 5, issue 12, pp. 70-80, Dec. 2016.

24. J. Alvarado-Uribe, A. Gómez-Oliva, G. Molina, M. Gonzalez-Mendoza, M. C. Parra-Meroño, and A. J. Jara, "Towards the Development of a Smart Tourism Application Based on Smart POI and Recommendation Algorithms: Ceutí as a Study Case," International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing, pp. 904-916. July 2017.

25. A.Bozanta, and B. Kutlu, B., "Current State and Future Trends in Location Recommender Systems," I.J. Information Technology and Computer Science, vol. 6, pp. 1-8, June 2017.

26. W. R. Tobler, "A Computer Movie Simulating Urban Growth in the Detroit Region," Economic Geography, vol. 45, pp. 234–240, 1970.

27. B. Kitchenham, S. L. Pfleeger, "Principles of survey research: part 5: populations and samples," ACM SIGSOFT Software Engineering Notes, vol. 27, no. 5, pp.7–20, 2002

28. Q. Yuan, G. Cong, and A. Sun, "Graph-based point-of-interest recommendation with geographical and temporal influences," 23rd ACM International Conference on Conference on Information and Knowledge Management, pp. 659–668, Nov. 2014.