# Smart Glasses Adoption in Smart Tourism Destination: A Conceptual Model

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## Abstract

Tourism industry is composed of numerous sectors which make it a complex system. As such, ICTs are contributing to smart tourism destinations competitiveness with new wearable devices. The system dynamics (SD) has been used to understand the human behaviour towards use of wearable smart glasses by breaking down the system into pieces and scrutinize each element of the system holistically. Causal loop diagrams were used as a tool to propose a conceptual model to illustrate the complexities of smart tourism system in using smart glasses in case of Langkawi Geopark, Malaysia. The study result showed that the concept of 'Social Influences' is one of the significant predictors for individual's intention behaviour to accept smart glasses.

**Keywords:** Smart Tourism, Smart Glasses, System Dynamics, Causal Loop Diagrams

## 1 Introduction

Tourism industry with its rapid growth has become one of the biggest industries in the world which has a direct impact on economic, environmental and social aspects. Tourism industry is recognized as one the major economic driving forces which contributes to job creation and generating income. Up until now, several studies have considered determinants of technology acceptance in tourism destinations. Gretzel, Werthner, Koo, and Lamsfus (2015) give a holistic look to smart tourism by considering it as a complex and dynamic ecosystem and emphasises on the interconnectivity of the whole system. In this vein, with the emergent context of travel, the focal concern for smart destinations is to determine tourism experience throughout mobile surroundings (Lamsfus, Martín, Alzua-Sorzabal, & Torres-Manzanera, 2015). Given this background, this paper uses a systems dynamics approach to build a conceptual model in order to illustrate the adoption of smart glasses in smart tourism destinations in case of Langkawi Geopark. The dynamic model has two goals in the context of the modelling literature: first, it illustrates the complex interactions between smart tourism and technology which can be modelled in detail and social systems which have often proved difficult to quantify.

The proposed methodology in order to build the conceptual model is System Dynamics (SD). System Dynamics is a computer-based approach that tries to analyse a system's behaviour over time. The SD approach has the ability to break down a system into pieces and scrutinize each element of the system to find the impacts and outcome of changes on these components at a macro-level. Maani and Cavana (2000) explain, in their book, that SD can be applied to a variety of fields and purposes such

as designing a new system or improving an existing system. The SD approach is founded on the concepts of interrelationships, feedback structures, and cause and effect. Causal loop (CLD) and stock and flow diagrams playing a crucial role in SD modelling. Finding the relations of feedback processes, stock and flow diagrams, time delays and nonlinearities in the system can be considered as an art in SD modelling (Sterman, 2000). The relations among elements of the system and all the causes and effects are shown in causal loop diagrams. Causal loop diagrams are very strong in structuring a mental model of the system and forming the relations among elements. Coyle (2000) emphasizes on the ability of causal loop diagrams in showing the interactions of a system in order to gain a better understanding of its dynamics. CLDs help the modeller to easily convert qualitative dynamic models into quantitative ones. Furthermore, causal loop diagrams are frequently used to study dynamic problems and are aimed at gaining a new perspective towards the problem rather than at its quantification.

## 2 Theoretical Determinants

### 2.1 Wearable Augmented Reality Smart Glass and its Applications in Tourism

AR wearable technologies like smart glasses with various sensors comprising GPS, microphone, and built-in camera provide immersive information in front of user's eyes and various features in it can be controlled with various techniques such as gesture, speech, or other methods depending on the smart glass model (Hein & Rauschnabel, 2016). These potentials according to Tussyadiah (2013) in tourism context enable tourists to capture and share travel experience with peer groups with smart glass built-in camera in addition to navigating with immersive functions in front of your eyes contrary to other mobile devices that user has to look down and link virtual map in a device with the perceived reality.

### 2.2 Smart Tourism Destination

Lamsfus et al. (2015) asserted that ICT Infrastructure in smart destinations has been developed in two fold, a) Allocating modern mobile technology in the intelligent mobile surroundings, b) Fortifying the cooperation between technology enterprises and tourism stakeholders to foster the foundation of the innovation ecosystem. Dynamicity of Smart Businesses in the smart tourism ecosystems could enhance tourism stakeholders to manage the resources in the automated methods (Gretzel et al., 2015). In Smart Tourism Destination, the portion of real-time information trend produces a notable amount of data sets that is called Big Data (Buhalis & Amaranggana, 2015). It is essential for ICT infrastructure in smart tourism destinations to be concentrated on both technological and touristic aspect simultaneously.

### 2.3 ICT Adoption in Tourism

Assessing technology acceptance behaviour has been deployed in previous research in tourism (tom Dieck & Jung, 2015; Young Im & Hancer, 2014). The initial TAM suggests that 'perceived ease of use' which demonstrate the level of user friendliness

in specific technology in addition to 'perceived usefulness' as the user's perception of specific functionality in such technology are the predictors of end-users' attitude towards technology which finally lead to adoption or rejection of technological innovation (Davis, 1989). For instance, Mathieson (1991) argues that availability of a device is one of the materials for performing the behaviour. Furthermore, in the study on smart glasses, Hein and Rauschnabel (2016) argue that competitiveness of smart glasses refers to the potential of these devices to retain in the industry competitions. Although accessibility and affordability do not guarantee for the user's intention to accept a new technology (Gretzel, Sigala, Xiang, & Koo, 2015), development of the relevant information via application (apps) in the particular context (Hein & Rauschnabel, 2016) could fortify the user's perception of the functionality for technological innovation.

### 2.4 Impression of Society in Human Behaviour

Hein and Rauschnabel (2016) assert that social influences play significant roles in the circumstances in which individuals employ an innovation visibly in front of the others. For instance, using ICT advancement vary according to the cultural value for masculine societies with the main focus on self-confident, and value for work in person' life compare to feminine societies that are mainly considered modesty and spending more time on leisure activities (Hofstede, Hofstede, & Minkov, 2010). The other source of the influential attribute in hospitality and tourism industry is word-of-mouth (WOM) (Litvin, Goldsmith, & Pan, 2008).

## 3 Conceptual Model for Adoption of Smart Glasses

By using casual loops diagrams as a tool and considering the above mentioned factors we tried to focus on understanding the cause and effect relationships of each indicator. The presented casual loops diagram (figure 1) is mainly divided into three main sub-systems: subjective norms, smart glasses' technological factors and smart tourism destinations.

As shown in the diagram, the masculine and feminine societies have delayed impacts on social influences. As indicated in CLD, loop B2 is the result of changes in technology related factors such as increase in awareness regarding the functionality of smart glasses that will contribute to increasing the concerns about the people's privacy. The technology mediated experience of using smart glasses in a destination motivates users to use word of mouth to spread what they have experienced (loop R1). In a smart destination, a strong infostructure facilitate the big data process which contributes to the dynamics of smart businesses and can provide a better experience for users. The delays in lead time of smart glasses manufacturer and developing the related and suitable applications will cause a thread of delay**s** in our model. As mentioned, User friendliness of the smart glasses affect the level of functionality perceived by users (loop R2). Meanwhile, availability of smart glasses creates a competitive market that affect the use of smart glasses within a smart destination (loop R4). Simultaneously, by increasing the dynamicity of smart businesses gradually the use of smart glasses increases (loop R3).

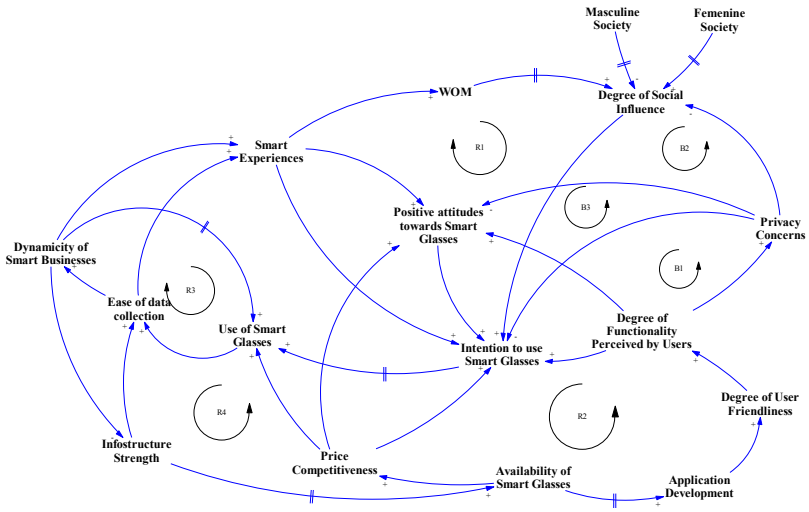


**Fig. 1**. The proposed CLD for adoption of smart glasses in smart tourism destination

## 4 Discussion and Conclusion

Recently, geological heritage and geodiversity attracted large number of tourists and visitors who are curious about natural and cultural heritages (Mc Keever & Zouros, 2005). Geotourism is the contemporary concept in which visitors' perception of geological heritages will improve with various means and methods such as mobile technology (Dowling & Newsome, 2010). The preliminary research on the influential parameters of tourists' intention to accept smart glass in Langkawi Geopark denoted that social factors were the significant predictors for the behavioural intention to accept smart glass. In addition, the moderating role of culture such as masculinity/ femininity indicated a substantial influence on the tourists' behavioural intention in the proposed study in Langkawi Geopark. However, due to the sort of limitation which is also the essence of all research, it is essential to evaluate visitors' post-behaviour with the set of detailed determinants in smart tourism, societal characteristics, and technology adoption behaviour in a comprehensive study.

From the theory and case study, we built our proposed framework which can be used as a foundation for further discussion in order to create a holistic approach for smart tourism destinations. The interaction with the visitors of Langkawi Geopark helped us to identify key players of the system and define essential feedbacks structure of the systems' components and explore interrelations of the intention to use smart glasses in a holistic approach. Generally, the casual knowledge gained from the interviews and using CLD enabled us to see how systems are interconnected and focus on critical feedback structures. Although this study tried to qualitatively illustrate the related factors affecting the intention to use smart glasses, yet the main challenge which is quantifying these elements still remains ahead. The complexity of the smart tourism, limited case studies or lack of proper data should not prevent us from building a

comprehensive and holistic model in this regard. Our future work would be developing a system dynamics model according to the conceptual framework proposed in this study to further scrutinize the interrelations and impacts of each element of the system. The dynamic model can provide policy planners and decision makers with a useful tool to achieve a sustainable smart tourism ecosystem.

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