

Smart hospitality—Interconnectivity and interoperability towards an ecosystem



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ABSTRACT

The Internet and cloud computing changed the way business operate. Standardised web-based applications simplify data interchange which allow internal applications and business partners systems to become interconnected and interoperable. This study conceptualises the smart and agile hospitality enterprises of the future, and proposes a smart hospitality ecosystem that adds value to all stakeholders. Internal data from applications among all stakeholders, consolidated with external environment context form the hospitality big data on the cloud that enables members to use business intelligence analysis to generate scenarios that enhance revenue management performance. By connecting to smart tourism network, sensors and content extractors can assist to collect external information, and beacons to deliver context-based promotion messages and add value. The proposed model enables fully integrated applications, using big data to enhance hospitality decision making as well as strengthen competitiveness and improve strategies performance.

1. Introduction

The Internet brings boundary-less business environment and a strong competitive market. The oversupply of tourism suppliers, especially in the hotel industry, forces hoteliers to be innovative and creative and to find ways to differentiate and give prominence to their hotel among the large number of competitors. Smartness through interoperability and interconnectivity of all network partners increasingly enables hospitality organisations to develop their competitiveness through better understanding of customers and market conditions and develop their decision making processes. Smartness can effectively develop networks to create an ecosystem and dynamically interconnect all members. However, how to interlink the ecosystem is a challenging task as there is no standardisation among practitioners, and the stages of ICT development and implementation among members varies. Some hotels are on the technology frontier, as they adopt and upgrade to latest IT infrastructure and application systems, where some still use legacy technologies. More than one decade ago, Buhalis and O'Connor (2005) pointed out that technologies on ambiance and intelligence should be the focal point of technology developments in tourism. These included sensor technology, embedded systems, ubiquitous communications, media management and handling, natural interaction, contextual awareness and emotional computing. Advance technologies bring-in innovative and intelligence ways to control and monitor

business. The Internet of things (IoT) and the Internet of everything revolutionize and reengineer business process as effectively disrupting the tourism and hospitality industries (Porter and Heppelmann, 2014).

Data is one of the most valuable assets in the hospitality industry. Contemporary hospitality management requires tremendous amount of data, including internal big data (such as hotel reservation history, cost analysis, guest history, revenue statistics and marketing statistics), and external context information collected from the external macro-environment such as economic, political and environmental data as well as nearby event profiles to conduct comprehensive business analysis. Big data collected from both internal and external services enable hospitality practitioners to make use of historical databases to forecast and predict business trends such as occupancy, rates and yield, labour costs and investment decisions (Zhang et al., 2015). However, current big data is still spread around the Internet without a standardized format. Therefore, users have difficulties to retrieve and consolidate them in a meaningful manner. Hospitality industry consists of countless direct and indirect business partners and collaborators. Every member of the network has comprehensive and detailed data to enrich their business analysis. However, no value can be created without these data is accessible, analysed and support decision making. The main objective of this study is to explore smart hospitality and propose a comprehensive ecosystem that takes advantage of interconnectivity and interoperability. With the support of big data, cloud service, sensors and

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ambient ecosystems can collect data dynamically, and decision support systems to support business functions in order to maximise the value for all stakeholders and intelligence. This will enable all actors to develop the collective competitiveness of the entire hospitality ecosystem and cocreate value for all stakeholders. The paper demonstrates how agile management using technology can be used, to support hospitality, as a highly-interconnected and networked industry.

This conceptual study extracted an extensive body of research from two disciplines. Research related to hospitality technology development and adoption was assessed and analysed to form the preliminary smart hospitality foundation. The foundation explored the developments of information technology in the hospitality industry and the implementation of technology in operations, management and customer interaction. This study adopted desk research as the method of data collection. Due to the recency of the topic, Internet reports were used for the developments in hospitality information systems, future trends, and challenges of smart hospitality. Resources searched included journal articles, conference papers, statistics and reports. In searching for resources, the following search words were used with a range of combinations of “ICT in hospitality”, “ICT adoption”, “innovation”, “hospitality operation with ICT”, “impact of ICT” “hotel ecosystem”, “interconnect and interoperate”, “barrier and challenge”, “external macro-environment affect hotel management decisions”, “Internet of things”, “intelligent system”, “smart hospitality system”, “cloud and big data”, and “data exchange”. To ensure that the latest technologies and methodologies were extracted; only papers published after 2010 were included. Content analysis illustrated several key themes that drive smartness in hospitality and several themes were classified to explore development and critical success factors.

2. Hospitality ecosystem and smartness

Hospitality business involve a large number of direct and indirect stakeholders. Direct stakeholders play the key role in the hospitality ecosystem. They have direct business relationships with the hotel. Indirect stakeholders are those who are working closely with the stakeholders but do not have direct contact with the hotel. Direct and indirect stakeholders form an ecosystem that serves customers and creates value for all stakeholders. Fig. 1 illustrates the key members in the hospitality ecosystem and some of their sub-systems.

Hotel guests increasing real time service cocreation and unpredicted level of interactivity and engagement. Technology provide a range of tools to enhance, personalize and co-create their stay experience

(Buhalis and Foerste, 2015; Neuhofer et al., 2015). Guests expect hotels to provide effective ICT applications for daily itinerary planning, information search, and for locating nearby activities. Communicating access voice, data and face-to-face hotel guest expect instant gratification as well as understanding of their personal desire and circumstances against the range of contextual factors, towards maximising value. Furthermore, business travellers require ICT to maintain effective and efficient business activities such as communications, remote office, document preparations etc. (Šerić and Gil-Saura, 2012). Free access and flow of data can access and allow key players in the ecosystem to enhance tourists’ experience and empower the co-creation process. Operating and interacting with recent technologies such as augmented reality, virtual human, robots, and virtual reality can enrich their stay experience (Buhalis and Law, 2008; Insights, 2016).

The impact of ICTs in hotel management is mainly reflected in four major areas: strategic planning and revenue management; operations; marketing distribution and communication; and customer service and relationship management (DiPietro and Wang, 2010). Global competition among hotels is vigorous. Hotel managers and salespersons are required to implement competitive marketing and pricing strategies in order to maintain a reasonable profit level that satisfy the owner and investors requirements. Yield management relies on historical and contextual data to predict the future incoming business trends and recommend rate strategies (Smith et al., 1992). Contextual information macro environment changes and upcoming events are critical in this process (Buhalis and Foerste, 2015). Under globalisation, anything that happens around the world may affect the business environment directly or indirectly. Proactive and reactive strategies improve decision making and value cocreation and therefore influence the competitiveness and profitability of organisations.

Business partnerships also change due to the interconnectivity and interoperability capabilities of systems. Distribution as an element of marketing is the most influenced function that smartness revolutionised. Hotels need multiple distribution channels to expand their market share and to address different markets by using a comprehensive distribution mix. Major hotel business partners include airlines, travel agencies and tour operators, event organizers, and wedding planners conference organisers etc. Not only they bring customers to hotels, but also utilize hotel venues to carry their business activities and organise functions. In order to provide comprehensive service to hotel guests, each one of them work with a range of hotels independently. They also are involved with a large number of contractors according to the event activity nature and requirements. Hotels need to work closely

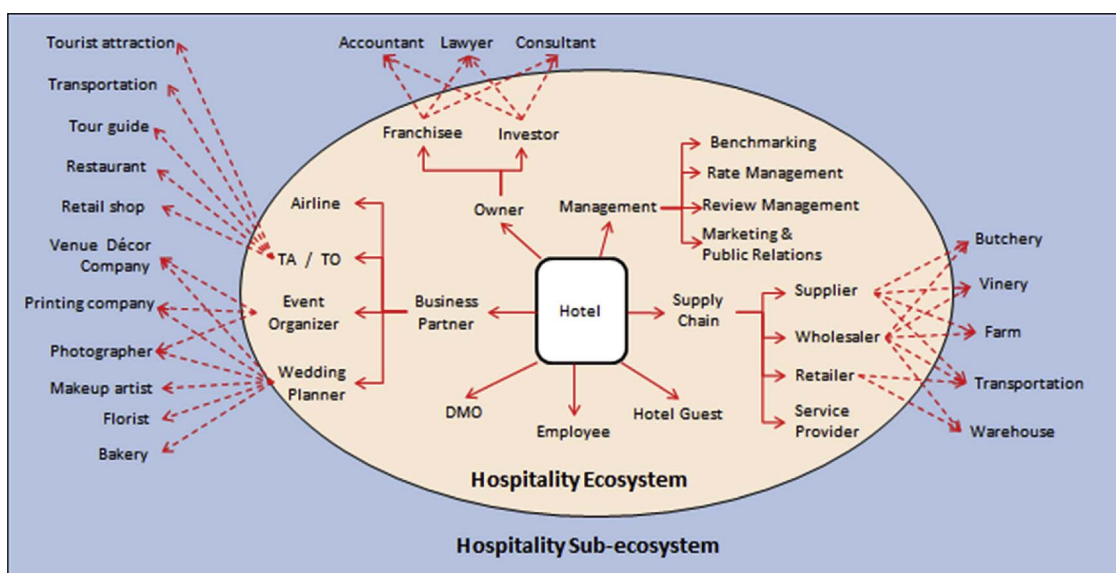


Fig. 1. Key Members in Hospitality Ecosystem and Sub-system.

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