

BUSINESS INTELLIGENCE IMPLEMENTATION ROADMAP FOR HOSPITALITY AND TOURISM INDUSTRY: EXPLORATORY WORK

ROTEIRO DE IMPLEMENTAÇÃO DE BUSINESS INTELLIGENCE NO SECTOR DA HOTELARIA E TURISMO: TRABALHO DE EXPLORAÇÃO

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ABSTRACT

Hospitality and tourism are sectors that generate a large amount of data, from hotel bookings, flights and customer information to data on tourist destinations and tourist preferences. The use of business intelligence in the hospitality and tourism industry enables companies to intelligently analyse this data and make informed decisions to improve their services, optimise operational efficiency, and enhance the customer experience. This research addresses the adoption of business intelligence in hospitality and tourism companies and, in the first phase, aims to identify and characterise the strategic objectives underlying decision-making in hospitality and tourism companies. After reviewing the literature, it was found that there are some studies on the use of business intelligence in companies in the hospitality and tourism sectors, although there is no roadmap to serve as a reference for the implementation of a business intelligence system in companies in these sectors. The objective of this research is to present the methodology of a roadmap proposal for the implementation of business intelligence systems in companies in the hospitality and tourism sectors, which will allow them to improve their ability to analyse and evaluate the data and information available in the different systems and platforms.

Keywords: Business Intelligence, Decision-making, Tourism.

RESUMO

A hotelaria e o turismo são sectores que geram uma grande quantidade de dados, desde reservas de hotéis, voos e informações de clientes a dados sobre destinos turísticos e preferências dos turistas. A utilização de business intelligence no sector da hotelaria e do turismo permite às empresas analisar estes dados de forma inteligente e tomar decisões informadas para melhorar os seus serviços, otimizar a eficiência operacional e melhorar a experiência do cliente. Esta investigação aborda a adoção do business intelligence nas empresas de hotelaria e turismo e, numa primeira fase, pretende identificar e caracterizar os objetivos estratégicos subjacentes à tomada de decisão nas empresas de hotelaria e turismo. Após a revisão da literatura, verificou-se que existem alguns estudos sobre a utilização de business intelligence em empresas dos sectores da hotelaria e turismo, embora não exista um roteiro que sirva de referência para a implementação de um sistema de business intelligence em empresas destes sectores. O objetivo desta investigação é apresentar a metodologia de uma proposta de roteiro para a implementação de sistemas de business intelligence em empresas do sector da hotelaria e turismo, que lhes permita melhorar a sua capacidade de análise e avaliação dos dados e informações disponíveis nos diferentes sistemas e plataformas.

Palavras-chave: Business Intelligence, Tomada de decisões, Turismo.

INTRODUCTION

In today's digital age, technological developments are becoming faster and more advanced, having an incredibly positive impact on all aspects of different sectors. Traditionally, the industry has found it increasingly difficult to obtain relevant and timely data and has been unable to perform decision-relevant analysis due to a lack of time to use the data effectively (Madyatmadja et al., 2021). Decision-relevant data from various business processes in tourism destinations (e.g., bookings or customer feedback) are usually widely available in electronic form. However, these data are usually not used by tourism managers for product optimization and decision support (Höpken et al., 2015).

Businesses and destinations are confronted with growing levels of uncertainty and complexity in a rapidly evolving environment, which has resulted in a greater demand for enhanced decision-making by the hospitality and tourism industries (Mariani et al., 2021). The decision-making process is a multifaceted cognitive function that involves different stages and factors (Hanks & Summerfield, 2017). Furthermore, decision-making involves a thorough exploration of options and ends with the final selection of an ideal option (Nibbelink & Reed, 2019). In addition, decision-making can be analysed by evaluating the problem's complexity and the decision-maker's preferences towards criteria. These criteria can be impacted by changes in external conditions and the decision-maker's emotions (Yu et al., 2017).

To increase the competitiveness of a company in the hospitality and tourism sector, maximise its revenues, improve its online reputation and intensify its relations with its customers, its information must be managed by appropriate Information Systems (IS). These IS must be able to extract insights from a large amount of data and information and anticipate and influence consumer behaviour (Ramos et al., 2017). To develop IS that meets the needs of

hospitality and tourism companies, it is essential to consider various technological advances and their impact on the industry. The employment of Business Intelligence (BI) and big data has been recognised as a crucial element in tackling the difficulties related to handling and examining substantial quantities of information within the hospitality and tourism industry (Madyatmadja et al., 2021). In addition, the integration of technology for service innovation and the strategic management of Information Technology (IT) practices can enhance the operational and service capabilities of tourism and hospitality companies (Juan Luis et al., 2022; Lee et al., 2021).

In the field of IS, Decision Support Systems (DSS) play a crucial role in supporting decision-making processes in the hospitality and tourism sector and can be fundamental for the analysis of specific tourism segments, for competitive intelligence practices and for the organisation of destination marketing IS (Mariani et al., 2018). Furthermore, the adoption of BI and big data is critical to the competitiveness and resilience of tourism sector players, highlighting the importance of data-driven strategies (Samara et al., 2020). BI is a set of processes or techniques, policies, culture, and technology to collect, manipulate, extract, shop, visualise, and analyse data. BI uses historical data to make decisions for the future (Madyatmadja et al., 2021). The authors Nyanga et al. (2019) state that the tourism industry benefits from the implementation of a BI system that offers advantages such as flexible and user-friendly collection, storage, retrieval, processing, and analysis of tourism data.

This paper is organised into five sections: The first section presents the problem and also highlights the contribution and motivation for this research. The second section describes the relevant related work. In the third section, a preliminary overview of the roadmap is presented. The last section mentions the current and future work,

followed by the list of all the bibliographical references used for this research.

1.1 CONTRIBUTION

This article presents the methodology of a roadmap that could serve as a reference for the implementation of a BI system in hospitality and tourism companies to support their various decision-making processes. The future roadmap should include a set of decision support dashboards and a reference architecture of a BI system, scientifically validated by a review of the state of the art and a panel of experts.

The chosen research methodology is Design Science Research (DSR), which has numerous benefits for creating an artefact, especially in the context of tackling complex issues and devising innovative solutions (Confetto & Covucci, 2021; Mikkelsen et al., 2020; Schou et al., 2021; Shrestha et al., 2018). DSR offers various advantages for outlining a plan to implement a BI system. These advantages comprise the capacity to convey design theory autonomously, discuss the diverse benefits of BI systems, recognize crucial elements for efficient execution, and grasp the strategic impact of implementing BI (Alnoukari & Hanano, 2017; Lim & Teoh, 2020; Peffers et al., 2018; Rezaie et al., 2017).

In conclusion, the results of this research will be reported to determine whether the proposed methodology makes it possible to create a roadmap for improving the quality of decision-making by companies in the hospitality and tourism sector.

1.2 MOTIVATION

Decision-making in the hospitality and tourism sector is influenced by a variety of factors, including technology, governance, consumer behaviour, and IS. The authors Infante-Moro et al. (2021) identify factors that influence hotels' decisions to implement the Internet of Things, including perceived reliability, top management support, and customer pressure. On the other hand, the researchers Leopizzi et al. (2021) examine the relationship between family business, corporate governance, and firm

performance in the tourism sector. The authors Dixit et al. (2019) discuss consumer behaviour in hospitality and tourism, including individual decision-making and its impact on customer satisfaction and loyalty. Our starting point, then, begins with a systematic account of how hospitality and tourism companies use data generated by their various IS for decision-making, and an analysis of the extent to which IS can be critical to good institutional performance.

Although we found during the literature review that there are some studies on the use of BI in companies in the hospitality and tourism sectors, we could not find any evidence of the implementation of a roadmap for the adoption of BI systems in companies in these sectors. However, several authors indicate that companies in this sector can benefit from the implementation of a BI system. The authors Mariani et al. (2018) highlight the need for a conceptual framework that links BI and big data to tourism and hospitality management and development. The researchers Nyanga et al. (2019), indicate that the tourism industry was among the pioneers to adopt BI and reap its benefits, such as versatile and user-friendly methods of capturing, storing, retrieving, processing and analysing data. The authors Salguero et al. (2017) reinforce this concept by proposing a competitive intelligence model that can be applied in the tourism sector, specifically in hotels.

Due to the diverse amount of data generated by hospitality and tourism companies, from hotel bookings, flights, and customer information to data on destinations and tourist preferences, this data should be used to play a decision-support role in these types of organisations to be prepared and used it properly. In this sense, the storage and organisation of data and information are relevant processes supported by computerised tools that can enable a more efficient process, including retrieval and access to information itself (Boghossian et al., 2019).

In conclusion, we can state that there is room for the development of research in this

area, as it is necessary to define a roadmap for the implementation of BI systems that can serve as a reference for companies in the hospitality and tourism sector.

2 RELATED RESEARCH WORK

In this section, we present a series of analyses that emerged from the examination of several studies that focus on the use of BI solutions in hospitality and tourism businesses. Although several studies were found, we selected those that best support the current research.

The authors Ramos et al. (2017) observed that the hospitality industry utilises the web as a worldwide showcase for specialised sites. Big data warehouses are regarded as excellent systems for conducting marketing research. The data is extracted from a variety of websites and stored in four collections, namely, AboutHotel, Rooms, Comments and Scores. This study introduces a framework for a Hospitality Big Data Warehouse (HBDW). The framework comprises a web crawler that accesses targeted websites at regular intervals for automated information extraction. It also includes a data model for organizing and consolidating the collected data into an HBDW. An HBDW is crucial in this process as the conventional Data Warehouse no longer suffices to meet the demands of hoteliers and marketers.

The researchers Vajirakachorn and Chongwatpol (2017) have created and tested a BI framework that enables the management and transformation of visitor data into festival tourism insights. This framework integrates database management, business analytics, business performance management, and data visualization to guide for analysing visitor data, with a focus on gaining knowledge. To showcase the practicality and validity of the proposed BI framework, a case study is conducted at a local festival in Thailand. The findings aid the organisers in prioritising marketing strategies to attract and retain festival attendees.

The authors Mariani et al. (2021) present a comprehensive framework for improving tourism destination competitiveness by combining established frameworks for destination competitiveness, the competitive productivity framework, as well as research on big data and Big Data Analytics (BDA) in destination management IS and smart tourism destinations. The role of BDA in BI is illustrated and examined in various industries, sectors, and business operations. In the present investigation, the researchers utilise a conceptual approach and develop a model that draws upon multiple research endeavours and pursuits carried out during the past decade.

The Data Analytics Framework (DAF) is a project initiated by the Italian government to streamline and enhance data exchange and interoperability between public administrations. This objective is achieved through the application of semantic technologies and data visualization tools. Within this context, researchers Michele et al. (2019) present a study that aims to improve the DAF through the introduction of a tourism case study based in Sardinia. The DAF aims to facilitate data analysis, enhance Open Data management, and promote the dissemination of linked open data.

The authors Bustamante et al. (2020) introduce BITOUR, a BI platform that integrates data from four collaborative sources: Twitter, OpenStreetMap, TripAdvisor, and Airbnb. BITOUR includes functionality for transforming, processing, analysing, and visualising data. It is designed specifically for examining tourist destinations, with a particular focus on user-generated data from Web 2.0. Given the importance of user experience in the tourism industry, making decisions based on tourist behaviour and preferences is crucial for achieving growth and success.

3 BUSINESS INTELLIGENCE SOLUTION

The use of a roadmap is essential when designing a BI solution, and the inclusion of an architecture in the roadmap can increase

its effectiveness by providing a systematic approach, ensuring effective data processing, guaranteeing independent functions and supporting the successful implementation of BI solutions (Mariani et al., 2018; Pessoa & Gowda, 2022; Villegas-Ch et al., 2020). The architecture of a BI system for hospitality and tourism companies involves a comprehensive design that integrates data sources, processing and analysis capabilities, reporting and visualisation tools, metadata management, security measures, scalability and integration with business processes to support effective decision-making and organisational performance (Mariani et al., 2018).

The decision-making process is an integral part of the successful implementation of a BI system, and defining this process is essential to developing a roadmap that aligns with the organisation's objectives and requirements (Muntean, 2018; Rouhani et al., 2018). The establishment of a BI system that aids the decision-making process of hospitality and tourism firms encompasses several crucial stages. This includes developing a framework: according to the authors Thomas et al. (2017), a social media content mining framework can be designed to serve as a decision support system mechanism for tourism management, promotion, development and planning carried out by destination management organisations. This section emphasises the importance of creating a framework aimed at addressing the distinct requirements of the tourism industry. Additionally, the integration of collaborative data is discussed by the experts (Bustamante et al., 2020), highlighting its potential in a data-driven BI system to enhance decision-making processes and ultimately, the competitiveness of tourism. This phase includes combining various data sources to aid decision-making in the tourism industry. Additionally, the authors Ibrahim and Handayani (2022) emphasise the necessity of constructing multiple BI architectures tailored to each sector of the tourism industry, including destination management,

hospitality, and transportation. This phase concerns creating custom BI frameworks to meet the distinct needs of the hospitality and tourism industry. Additionally, the authors in Pappas and Brown (2021) explore various pathways for making business decisions in times of crisis within the Greek tourism and hospitality sector. This stage involves identifying and understanding the decision-making pathways specific to the industry, taking into account factors such as creativity and crisis management.

A BI system in a hotel or tourism business works by integrating different data sources, analysing information and providing actionable insights to support strategic and operational activities. Here's how a BI system works in the context of a hotel or tourism business: (1) data collection and integration: the authors Mariani et al. (2018) discuss the use of mobile customer relationship management applications in the hospitality and tourism industry, which involves the automatic detection of customer opportunities communicated to customers' smartphones. This stage involves the collection and integration of customer data to support the decision-making process; (2) evaluation and adoption: the researchers Puklavec et al. (2018) emphasize the evaluation, adoption, and use stages of BI system diffusion in the context of small and medium enterprises. This stage involves the evaluation and adoption of BI solutions tailored to the specific needs of the hospitality and tourism industry; (3) data management and control: the authors Menon et al. (2019) discuss the ability of Industrial Internet platforms to access, manage, and control product-related data across all lifecycle phases. In the context of the hospitality and tourism industry, this phase involves the management and control of data to support operational and strategic activities; (4) implementation and strategic consensus: the researchers Köseoglu et al. (2020) highlight the importance of internal considerations such as employee involvement and strategic consensus in the implementation phase. This stage involves the implementation of BI solutions and the

alignment of strategic objectives within the hospitality and tourism industry.

4 CONCLUSIONS AND FUTURE WORK

Our research aims to see if, using the proposed methodology, it will be possible to define a roadmap that will enable better data processing, the detection of trends and patterns, and an adequate visual representation that will enable hospitality and tourism companies to make decisions based on relevant data. Our research will therefore consist of the following stages: reviewing BI systems in hospitality and tourism companies; identifying and characterising the strategic objectives that underpin decision-making, as well as the IT systems in hospitality and tourism companies; proposing a set of dashboards to support decision-making in hospitality and tourism companies; proposing a reference architecture for a BI system; and finally proposing the implementation roadmap.

Following the completion of the literature review, a series of semi-structured individual interviews will be conducted with several managers from companies in the hospitality and tourism sector to find out how these companies use the data generated by the various IS for decision-making to identify the appropriate strategic objectives.

A set of decision support dashboards will then be defined based on the strategic objectives previously identified and characterised. In the next phase, a reference architecture of the BI system will be proposed, showing the different elements of the system, the relationships between them and the flow and processing of information from the sources to the dashboards, and then the final design of the roadmap will be conceived.

In the final phase, our proposed roadmap will be scientifically validated through interviews with a panel of experts from companies in the hospitality and tourism sectors to verify whether the roadmap can serve as a reference for the implementation of BI systems in companies in these sectors.

The results of this research will be presented to determine if the proposed dashboards and architecture improve the decision quality of hospitality and tourism businesses.

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PROCEDIMENTOS ÉTICOS

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