

# Chapter 1

## Emphasizing the Digital Shift of Hospitality Towards Hyper-Personalization: Application of Machine Learning Clustering Algorithms to Analyze Travelers

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### ABSTRACT

*This chapter aims to review the tech evolution in hospitality, from services to eServices, that will provide hyper-personalization in the hospitality field. In the past, the services were provided by hotels through diligent staff and supported by standardized and weak technology that was not allowed to provide personalized services by itself. Therefore, the study applied K-means and FCM clustering algorithms to cluster online travelers' reviews from TripAdvisor. The study shows that K-means clustering outperforms fuzzy c-means in this study in terms of accuracy and execution time while fuzzy c-means converge faster than K-means clustering in terms of the number of iterations. K-means achieved 93.4% accuracy, and fuzzy c-means recorded 91.3% accuracy.*

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## **INTRODUCTION**

In 2019, travel and tourism's direct, indirect, and induced impact accounted for US\$8.9 trillion contributions to the world's GDP (10.3%), 330 million jobs (10% of global employment), US\$1.7 trillion visitor exports (6.8% of total exports, 28.3% of global services exports) and US\$948 billion of capital investment (4.3% of total investment) (World Travel & Tourism Council (WTTC), 2020). However, in the light of the novel global coronavirus (COVID-19), as an ongoing outbreak of viral pneumonia around the world that is highly transmissible between humans, many governments imposed severe although necessary restrictions for individuals and businesses to contain the spread of the pandemic (e.g. quarantines, travel restrictions or lockdown of cities). As a result, brutal economic and social impacts were felt around the world, especially in the tourism and hospitality industry. The effects of COVID-19 were acute on international tourism demand, plunging by 74.0% in 2020 over the previous year on a global level (UNTWO, 2021). In Portugal, where tourism and hospitality account for 10.4% of the national GDP and 9.9% of the national employment (WTTC, 2018), international tourism demand decreased by 74.9% (INE, 2020).

In the light of the outbreak of such global pandemic, the described acute impacts felt in the tourism and hotel sector, particularly in small businesses, the hygiene and cleanliness of hotels have been emphasized among the main drivers of hotel guests' satisfaction, considering a virus that is highly transmissible between humans. Therefore, efforts must be made to deal with this paradigm shift. One possible solution could be based on emphasizing the digital shift of hospitality, namely in regarding the optimization of its operational standard procedures, while underlining health as the main driver of guests' satisfaction. Studying how digital solutions can ensure hygiene and cleanliness in various touchpoints in customer's experience based on operational efficiency should be critical for the next few years, contributing to the importance of rethinking and rebuilding hospitality towards a more sustainable, resilient, and innovative sector for the future.

## **RETHINKING HOSPITALITY FOR TOMORROW**

Previous research has shown that small tourism and hospitality businesses have been particularly affected by the pandemic, being pushed for mass lay-offs, temporarily closing, becoming more financially fragile with cash on hand of only one month, and/or seeking support from the government, with problematic difficulties in recovering business (Bartik et al., 2020; Sobaih et al., 2021). Considering that small and medium enterprises constitute 95.4% of the Portuguese entrepreneurial tissue (European Commission, 2019) and that 59.5% of the hospitality is composed of independent hotels (Deloitte, 2020), protecting and securing jobs in Small Hospitality Businesses (SHBs) seems to be of utmost importance for the socio-economic response to COVID-19 in Portugal.

Indeed, micro, small and medium-sized tourist companies are decapitalized financially and in human resources, with no capacity of investment to turn around their businesses on a standalone basis (Gössling et al., 2021). These companies have been facing other challenges for years, like low managerial skills, low technical and, digital skills, which will be exacerbated by the post-pandemic current and future challenges. Moreover, previous research has recognized that tourism firms' innovation efforts are often made individually and independently by various tourism stakeholders, although collaborative networks have been recognized as a competitive advantage for tourism companies' innovativeness (Martínez-Román, 2015).

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