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SHIFT2
FUTURE

BEST PRACTICES FOR TOURISM 4.0



Best practices in Tourism 4.0 prioritise the integration of emerging technologies and leverage new business models with the aim of creating a better world for all and promoting sustainable tourism.



BEST PRACTICES FOR TOURISM 4.0

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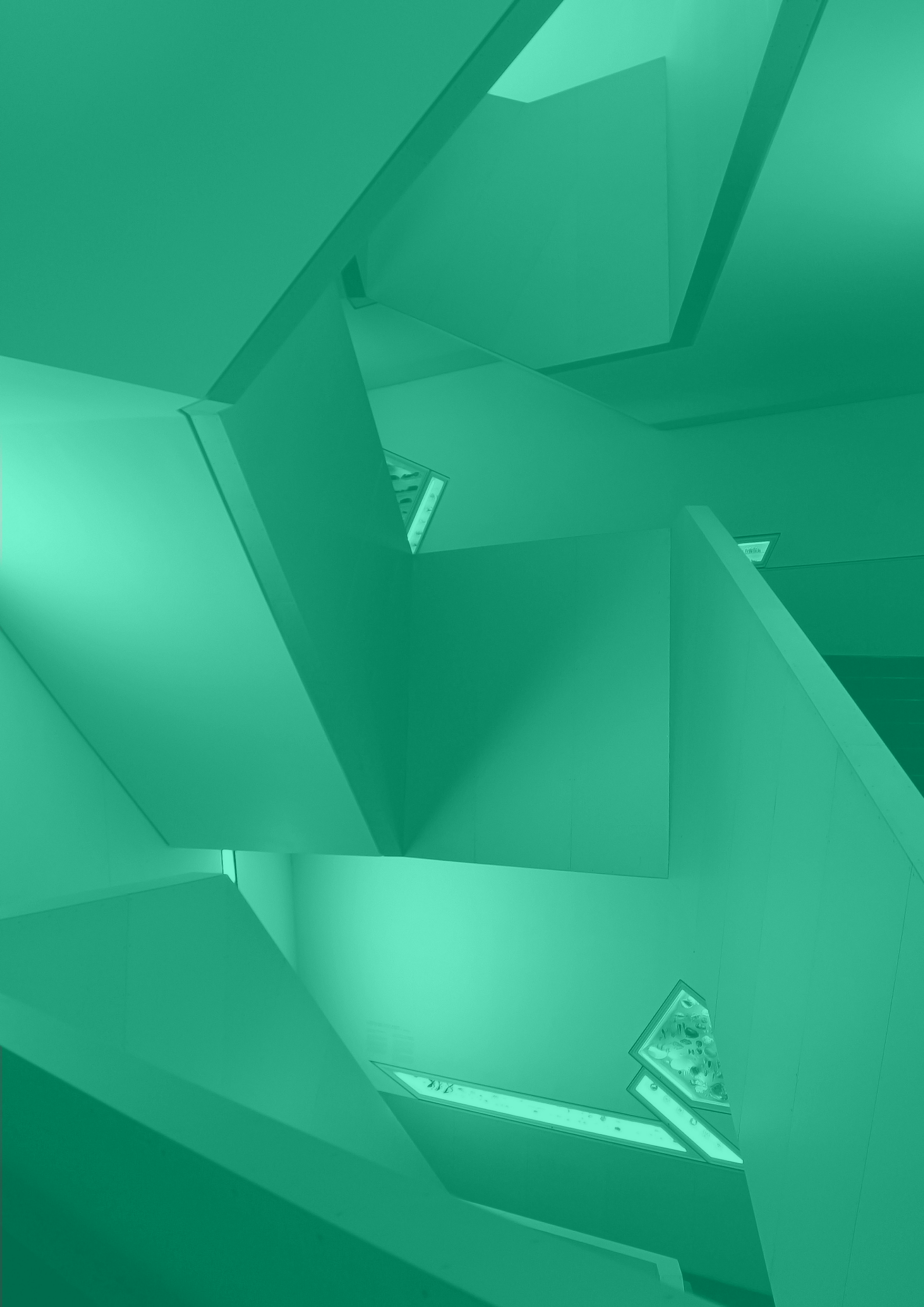
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ABOUT THE BOOK

Tourism is a pivotal economic sector where information plays a fundamental role. It has undergone significant changes with the introduction of new information and communication technologies (ICT), a phenomenon now recognised as digital transformation. On the supply side, ICT fuels the emergence of novel business models, while on the demand side, it equips consumers with a set of tools that make them better informed and, consequently, more demanding in their service expectations.

Digital transformation, therefore, serves as a solution that enhances operational efficiency and processes, while simultaneously fostering and expediting the development of fresh business models tailored to consumer needs in an era characterised by connectivity and digitalisation. The term 'Tourism 4.0' essentially signifies an evolution in the tourism industry driven by emerging technology, where connectivity and personalisation take centre stage with the presence of technologies such as virtual and augmented reality, blockchain and 5G, among others.

Tourism 4.0 represents a more modern and technologically advanced approach to the tourism sector, with the primary goal of providing travellers with richer and more personalised experiences, all while promoting sustainability and efficiency. In this book, which compiles a set of best practices for tourism 4.0, readers can therefore find the guidance to thrive in business and contribute to a smarter, more conscious, social, and sustainable future for the sector.

This guide is the result of a joint action carried out in one of the axes of the project "SHIFT2Future – Promoting economy 4.0 in SME industry and services". The project was funded by POCI and carried out by a consortium that included the Instituto de Soldadura e Qualidade (ISQ), the coordinating entity, the Agência para a Competitividade e Inovação (IAPMEI), the Associação Universidade-Empresa para o Desenvolvimento (TECMINHO), the Universidade de Aveiro (UA), and the Centro Tecnológico da Cerâmica e do Vidro (CTCV)

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Special thanks go to the entrepreneurs, industry associations, company employees, self-employed workers, researchers, teachers, and students who became involved and interested in this issue because it was only with their participation and involvement that the desired goals and results were achieved.

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The consortium and project promoters:

- ◆ ISQ – Instituto de Soldadura e Qualidade
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- ◆ TECMINHO – Associação Universidade-Empresa para o Desenvolvimento
- ◆ UA – Universidade de Aveiro
- ◆ CTCV – Centro Tecnológico da Cerâmica e do Vidro

ACRONYMS AND ABBREVIATIONS

AI Artificial intelligence	API Application programming interface	AR Augmented reality
AT Automation technology	AWS Amazon web services	B2B Business-to-business
B2C Business-to-consumer	BI Business intelligence	BoP Bank of Portugal
CRM Customer relationship management	CX Customer experience	DMAIC Define, measure, analyse, improve, control
ES Environmental sustainability	FAQ Frequently asked questions	FIT Flexible independent travel
GDP Gross domestic product	GDPR General data protection regulation	GDS Global distribution system
ICT Information and communication technologies	IoT Internet of things	IT Information technology

1. INTRODUCTION TO THE BEST PRACTICE GUIDE



The SHIFT2Future Project aims, among other things, to contribute to the implementation of digitalisation strategies to promote Economy 4.0 in various sectors, including tourism. With the development of tools and processes, the aim is to empower companies with the knowledge that will enable them to face and overcome the challenges of digitalisation.

This guide to best practices aims to bring together a set of recommendations and guidelines to guide companies in their digital transformation.

To achieve the objectives of this study, five companies – three Portuguese and two international – were assessed in order to identify best practices, strategies, methodologies and approaches used in the digital transition, as well as the needs and difficulties encountered in this process.

The aim of this assessment was to systematise the information and identify common denominators that could be used to guide other companies in the process of their digital transition. A series of actions was followed, including awareness-raising, training, capacity-building, assisted diagnoses, best practices and benchmarking, roadmaps and other support tools, as well as communication and dissemination of the project, with the aim of providing relevant and useful information for small and medium-sized enterprises (SMEs) wishing to adapt to Economy 4.0.

Tourism is a sector that is constantly evolving. However, it is still very analogue, given the challenges it faces in implementing solutions for the digital transition. For this reason, this guide to best practices not only provides companies with a set of tools to guide their digitalisation strategies, but also reinforces the importance of taking this path in the sector.

One of the main advantages of digital transition in the tourism sector is the improvement of the customer experience which, in this type of industry, is particularly important, being one of the key areas of differentiation between competing companies. Digital technologies offer new opportunities for tourism companies to personalise their offers, optimise processes and improve interaction with their customers. In addition, digital transition gives companies the ability to increase efficiency and reduce costs in areas such as managing reservations, optimising resource management and promoting a more sustainable and environmentally aware tourist experience.

On the other hand, the growing importance of online booking platforms – online travel agencies (OTAs) – has led to increased competitiveness in the sector, meaning that companies increasingly need to innovate in order to stand out from the competition and attract customers.

In the Portuguese context, the tourism sector has been one of the main drivers of the economy, representing a very significant part of the country's gross domestic product (GDP). For this reason, it is imperative to find solutions and strategies to overcome the challenges of digital transition, requiring significant investment in innovative technologies and the training of professionals in the sector in order to remain globally competitive.

As such, digital transition is a fundamental factor for the success of companies operating in the tourism sector, preparing them to adapt to the new reality, while providing them with innovation mechanisms to stand out from the national or even global competition.

1.1 OBJECTIVES OF THE BEST PRACTICE GUIDE

In order to be an A-to-Z guide for companies in the tourism sector on the road to their digital transition, this best practice guide aims to:

- ◆ Reinforce the importance of and encouraging innovation and the development of new technological solutions for digital transition in the tourism sector – above all for its SMEs – in streamlining internal processes and improving customer service and the consumer experience.
- ◆ Present a set of technologies and practices that, when implemented within tourism companies, can increase internal productivity, boost product/service development and, consequently, make companies more competitive in this global market.
- ◆ Provide guidelines and recommendations for the selection, implementation and operation of tools and software in order to maximise their use.
- ◆ Alert companies to the identification of the resources needed for the daily use of tools and software, particularly in terms of human resources and their ongoing training, with the aim of putting together a skill set geared towards innovation and technology.
- ◆ Promote networking and the exchange of ideas and best practices between companies in the sector, in order to “fine-tune” steps and share experiences that can lead to an increase in digital maturity.





INTRODUCTION

BENCHMARKING

CASE STUDIES

BEST PRACTICES

CONCLUSIONS

1.2 METHODOLOGY

The development of this best practice guide involved the following actions:

01. Benchmarking analysis on the adoption of best practices for Tourism 4.0.

02. Carrying out case studies on the implementation of Tourism 4.0 principles with companies in the tourism sector, covering the subsectors of accommodation, tourist operations and tourist entertainment. Case studies were carried out on five companies – three Portuguese and two international – chosen on the basis of criteria such as innovation factors, organisational structure, business areas and scalability, and adaptability. Below are the companies analysed and the respective selection criteria:

Company A: A Portuguese company operating in the business-to-business (B2B) segment, a pioneer in the field of augmented reality (AR) and virtual reality (VR) for the tourism sector, implementing intelligent solutions for internal processes and structuring their offer;

Company B: A Portuguese company with an outstanding digital maturity index, showing above-average digital expertise for the tourism sector in Portugal. It already has technological solutions for strategic and operational management, business intelligence (BI), data analysis, marketing and communications;

Company C: A Portuguese company that recently rebranded itself to become a chain of hotels and local accommodation, covering almost the entire country, with a concept for all types of travellers, following trends such as 'workations'. It shows digital maturity in its ability to implement technological solutions suited to the sector, such as channel management and property system management, but also in the degree of digitalisation in operations and monitoring, with data monitoring systems;

Company D: An international (English) company that operates in tourism, focused on the B2B segment with a very specific target audience: highly regarded higher education establishments such as the University of Cambridge. They continually invest in digitalisation and innovation in their offer, given the high demands of their target audience and in order to provide a better response to their customers;

Company E: An international company focused on the B2B segment, especially for tour operators, showing a high level of digital maturity in its operations and innovation in its offer. In addition, all internal processes are properly automated using project management and collaborative work tools.

03. Evaluation of common best practice variables that can and should be applied to any company in the tourism sector, such as the definition and implementation of a customer relationship management (CRM) strategy or the implementation of collaborative working methodologies and tools.

04. Mapping of best practices appropriate to the tourism sector as a whole, taking variations between sub-sectors and the specificities of operations into account.

05. Identification of the technologies and best practices to be adopted to respond to each of the following dimensions:

- ◆ Strategy and organisation
- ◆ Intelligent infrastructure
- ◆ Smart operations
- ◆ Smart products
- ◆ Data-based services
- ◆ Human resources
- ◆ Knowledge management



2. BENCHMARKING STUDY

Before analysing the cases, it is important to understand the characteristics and specificities of the tourism sector and how the topic of digital transition has evolved over the years.

To this end, an extensive integrative literature review was carried out, selecting relevant articles for the study based on certain criteria. These range from a historical bibliographical review to a review of more recent scientific documents, allowing for a more contemporary perspective on the subject. One of them was the definition of selection terms, based on the main emerging technologies and their application, not only to the tourism sector, but also to its sub-sectors. On the other hand, priority was given – whenever possible – to scientific articles published in the last five years. Finally, higher quartile indexed journals were also prioritised.

This literature review also took the geographical diversity of the publications into account, seeking out studies that approached digital transition in tourism from various global perspectives. This not only reinforced the understanding of the global scope and relevance of the topic, but also made it possible to identify differences and similarities in the challenges and solutions presented by different countries.

Likewise, in addition to scientific articles, other relevant sources of information for this study were considered, such as reports from institutions specialising in tourism and technology, including the World Tourism Organisation (UNWTO) and the World Economic Forum. The insights gleaned from these reports have allowed us to enrich and diversify our understanding of the digital transition in the tourism sector.

Finally, based on the literature review, several relevant studies were identified that reflect the latest trends and best practices in tourism's digital transition. These cases range from small companies to large organisations, covering a variety of sub-sectors within tourism.

The analysis of these studies, which will be presented in the following sections, provides insight into the practice and application of the theories and concepts explored in the literature review.

2.1 THE SIZE AND DYNAMISM OF THE TOURISM SECTOR

The tourism sector is one of the most important in the growth of the Portuguese economy and also plays a key role in job creation. Portugal is known internationally as a quality tourist destination with a wide range of attractions, from beaches and natural landscapes to historical monuments and a gastronomic culture to match. According to Turismo de Portugal (2023) this is the country's largest exporting economic activity, contributing 8.7% to GDP in 2019. That same year, the sector was responsible for 52.3% of service exports and 19.7% of total exports.

The tourism sector encompasses a range of activities, from accommodation to entertainment. Portugal has a vast network of hotels, inns and resorts that offer options for all tastes and budgets. Portuguese gastronomy is also a major attraction for tourists, with a variety of regional dishes and a wealth of flavours, from traditional dishes to "convent sweets".

In 2021, the tourism sector in Portugal saw a significant drop in the number of visitors and revenue generated due to COVID-19. However, the sector has been gradually recovering, as restrictions have been lifted and tourist confidence in destinations and operators has increased. According to recent data, the sector is already showing signs of recovery, with an increase in the number of bookings and an improvement in hotel occupancy rates (Turismo de Portugal, 2023).

Despite the difficulties faced, the tourism industry in Portugal has a history of resilience and adaptability. With average growth of 3.8% per year between 2017 and 2019, developments have been constant and positive. The trend for the future should continue to be one of growth, with the leverage of the global economy and increased demand for differentiating and safe tourist destinations (Turismo de Portugal, 2023).

The tourism sector is one of the most dynamic in Portugal and one of the main factors responsible for the rapid recovery of the national economy, not only after COVID-19, but historically at other times of national and global economic depression.

According to the Bank of Portugal (BoP) (Banco de Portugal Eurosistema, 2022) the tourism sector in Portugal had 73 974 companies in 2021, with a total turnover of 18 524 million euros and a total of 332 426 people employed.

Statistics from the latest World Tourism Barometer from the World Tourism Organisation (UNWTO) (World Tourism Organisation, 2023) show that international tourist arrivals almost tripled from January to July 2022 (+172%), compared to the same period in 2021, meaning that the sector has recovered almost 60% of pre-pandemic levels. The steady recovery reflects the strong pent-up demand for international travel, as well as the easing or lifting of travel restrictions to date. In 2022, the national tourism sector made a full recovery, recording 69.5 million overnight stays, with a rate of change of 86.4% compared to 2021. Overnight stays in 2022 were distributed between 46.6 million – referring to the international market – and 22.9 million for the domestic market.

In terms of the size of companies in Portugal, the vast majority of the tourism sector is made up of micro-enterprises (91.45%), followed by small enterprises (7.64%), medium enterprises (0.81%) and finally large enterprises (0.1%). However, the level of turnover does not follow the previous distribution. The turnover of micro-enterprises corresponds to 26.36% of the sector as a whole, with small enterprises accounting for 25.2%, medium-sized enterprises 15.93% and the most representative of the sector, with 32.52% of total turnover, being accounted for by large enterprises, with a greater availability of resources for productivity.

In terms of human resources management and the number of jobs created, micro-enterprises are the most representative in the sector with around 40% of the human resources hired, followed by small enterprises with 30%, medium-sized enterprises with 15% and large enterprises with 15%.

With a total of 69.5 million overnight stays in 2022 (46.6 million overnight stays by foreign visitors and 22.9 million overnight stays by domestic tourists), there are five countries that constitute the source markets for Portugal in this indicator, with reference to the year 2022.

United Kingdom

8.9 million
(+191.9%)



Germany

5.4 million
(+141.9%)



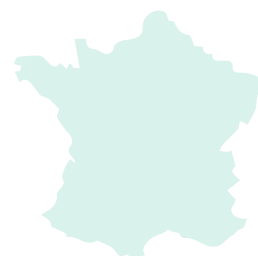
Spain

5.0 million
(+89.4%)



France

4.4 million
(+97.0%)



United Kingdom

3.4 million
(+327.4%)



As for tourist receipts, according to data from the Bank of Portugal, the accumulated figure for the 12 months of 2022 reached 21.1 billion euros, which is 109.7% higher than in 2021 and 15.4% higher than in 2019.

2.2 VIRTUAL REALITY AND METaverse IN THE TOURISM SECTOR

Several technologies have already been implemented and used in the tourism sector around the world. VR, for example, is being increasingly used. This technology aims to present a reality that is not in front of us, but which, by means of a device, can become so and be observed (Vasconcelos, 2021). This technology, although not yet massively disseminated, can be seen as one of the most revolutionary of the late 20th century (Hobson & Williams, 1995) and, when applied to the tourism sector, gives tourists the chance to visit restricted or high-risk places that no longer exist, or even fantastical and imaginary places (Beck et al., 2019).

The concept of VR has been talked about since the 1930s, when it was first defined as a type of technology that provides participants with sensory experiences based on reality. Essentially, these are artificial experiences that take place in the real world (Myeung-So, 2001), using devices such as virtual reality glasses and wearable technology, allowing participants to interact in three-dimensional situations (Steuer & Reeves, 1992). Along the same conceptual lines, the metaverse has more recently emerged, which is defined as an interconnected network of virtual realities that coexist and overlap with the physical world, allowing users represented by avatars to experience, consume content and interact with each other in an immersive environment (Weinberger, 2022).


VR is therefore seen as a relevant tool in various sectors of activity, tourism being one of them. For example, the Maasai Mara Villas in Kenya have already invested in VR through technology that allows visitors to explore and interact with the surrounding environment (Huang et al., 2016).

It is in this sense that the “Vis Comes True” project arose, which used VR to publicise the uninhabited island of Vis, located in the Mediterranean. This project sought to use VR as a stimulus for tourist attraction, promoting a virtual experience that could arouse interest in a physical visit (Salazar, 2022).

At the same time, there has been an increase in the use of VR in travel planning and booking situations, allowing tourists to get a “taste” of their destination before they even leave (Guttentag, 2010). In addition, VR can contribute to the promotion of more sustainable tourism by enabling the visualisation of sensitive areas without the need for a physical impact on the environment (Femenia-Serra et al., 2019).



virtual reality



In this project, maximum use was made of technology, depicting iconic points on the island and working on transitions so that the experience was as close as possible to the real environment (Ruzicka et al., 2019).

As far as the metaverse is concerned, this technology can be used to improve tourism management and marketing activities by enhancing the customer experience and creating value (Buhalis et al., 2023). Examples of its implementation are still scarce, but its adoption is gradually beginning to make its presence felt. The first tour operator to embrace this technology was the hotel company CitizenM, by creating a platform called Sandbox, where users could interact with each other, make purchases and create a collection of non-fungible tokens (NFTs). This project was extremely important, with its aim of gathering feedback from users and applying that knowledge to building real hotels by monitoring user behaviour. By collecting data on users' tastes and habits, the brand increases its knowledge of its audience and improves its positioning, promoting a co-creation approach in line with its values (Monaco & Sacchi, 2023).

Portugal is already using this technology, as in the case of the rural village of Amiais, in the Aveiro district. In order to combat the area's low population and tourist density – the village only has around 15 residents – a co-design approach was used to create a “second life metaverse” where it is possible to experience the place and its environment in detail (Martins et al., 2022). Finally, we can also find examples of this extended reality (XR) technology in tourist entertainment. Museums such as the Museum of Pure Form and the Museum of Sculpture and Architecture (MuSA) already have a digital presence through the metaverse, promoting inclusion and engagement for visitors. (Hutson & Hutson, 2023).

Technologies such as VR and the Metaverse help to eliminate physical barriers and reduce the risks associated with tourist services, adjusting expectations and promoting more accurate decision-making at the time of a physical visit (Griffin et al., 2017), which is why they are growing trends and are increasingly being adopted in the tourism sector.



2.3 INFORMATION TECHNOLOGIES FOR ENVIRONMENTAL SUSTAINABILITY IN THE TOURISM SECTOR

With growing environmental concerns, the tourism sector has been experiencing profound changes at a global level, especially considering the influence of information technologies (IT) (Gössling, 2017). The application of IT to the tourism sector can bring numerous environmental benefits, such as resource efficiency, physical integrity or the diversity of ecosystems. In order to reach these heights and for the sector to evolve, constant monitoring and training is required, which can be achieved through technology, facilitating access to information, creating environmental and cultural awareness and reducing expenditure on energy and findable resources (Adu-Gyamfi et al., 2023).

IT is defined as an organisation's infrastructure that enables it to exchange information and data, provided by computers, software, hardware, applications, networks and other devices that ultimately contribute positively to its productivity. (Fischer-Preßler et al., 2020). According to the environmental benefits mentioned above, IT can make a favourable contribution to environmental sustainability (ES), defined as a condition of balance that allows people to meet their needs without compromising the regenerative capacity of ecosystems, diminishing biological diversity and, and consequently, ensuring future generations (Han, 2021).

With products and experiences that make use of technological solutions, it is possible for companies in the sector to expand without jeopardising fundable resources. These solutions offer alternatives and profitability to the companies that adopt them, while always following the World Tourism Organisation's Sustainable Development Goals (Go & Kang, 2022).

One example is a case study on the implementation of an Internet-of-things (IoT) - based architectural solution in a smart city scenario for sustainable tourist flow management in Cagliari, Italy. The implementation of this solution met its objectives of increasing efficiency in the use of transport (cruises and buses), in visiting points of interest, in the urban environmental flow and, consequently, in increasing tourist satisfaction (Nitti et al., 2017). When it comes to accommodation, these facilities generally have a much higher environmental footprint than other similar buildings (Filimonau et al., 2021). This is why it is imperative for these operators to reduce and monitor their consumption – becoming more efficient – through the use of high-tech energy management programmes (Paramati et al., 2021).

Although the benefits of applying this type of technology to sustainable and resource management are known, there are still many obstacles to its implementation (Chan et al., 2020). However, it is already possible to find cases of implementation of technologies for sustainability, such as The Sinclair hotel in Fort Worth, Texas, which has implemented smart building and IoT technology to manage and optimise its consumption. (Meltzer, 2023) Using power-over-Ethernet (PoE) technology – a technology that allows electricity and the corresponding data to be transmitted to a device via a single cable – The Sinclair has become the world's first all-digital hotel, with automated solutions in rooms, services and common areas. On the one hand, it provides excellent service to its guests, combining innovation with luxury; on the other hand, the hotel benefits from this technology by saving resources and cutting costs.

As a result, the Sinclair has reduced its consumption bill by around 40%, making it more sustainable (Igor, 2020).

The application of technologies to the tourism sector with the aim of achieving environmental sustainability not only facilitates the monitoring, management and conservation of resources and consequent environmental protection, but is also a way of reducing operating costs, boosting profits and responding to consumer demands and expectations (Mariani, 2022).

With products and experiences that make use of technological solutions, it is possible for companies in the sector to expand without jeopardising fundable resources. These solutions offer alternatives and profitability to the companies that adopt them, while always following the World Tourism Organisation's Sustainable Development Goals (Go & Kang, 2022).

In addition to these examples, new technological solutions continue to emerge, highlighting the diversity of applications and the potential of IT to promote sustainability in the tourism sector. For example, the adoption of blockchain technologies can contribute to greater transparency and traceability in tourism operations, favouring environmental responsibility and social justice (Tyan, 2021).

A recent study also pointed to the potential of VR in promoting sustainable tourism. Through immersive experiences, VR allows tourists to explore remote or fragile sites, minimising the physical impact of these visits (Yang, 2023). This emphasises the role of IT not only in efficient resource management, but also in creating new forms of sustainable tourism.

Finally, it is important to mention the growing importance of analysing large volumes of data (big data) in tourism sustainability. Big data, when applied correctly, can help to better understand tourist behaviour patterns, optimise resource management and plan the development of tourism infrastructure more effectively, contributing to sustainable management (Li et al., 2018).

It is important to note, however, that the adoption of these technologies must be done thoughtfully, considering the possible ethical, social and environmental impacts. Technology should therefore be seen as a powerful tool, but one that requires careful implementation strategies and conscious consideration of its implications.

2.4 AUTOMATION TECHNOLOGIES IN THE TOURISM SECTOR

Process automation, driven by the advancement of technologies such as artificial intelligence (AI), has become a growing trend, leading to its implementation in various sectors, including tourism (Tussyadiah, 2020). Although it is not yet massively popular, there have already been benefits associated with its adoption, such as convenience, comfort, time savings, effectiveness and efficiency (Gurkaynak et al., 2016). However, it is necessary to know where and how to apply process automation so as not to jeopardise one of the most important things in the sector – interpersonal, human contact (Bimonte & Punzo, 2016).

Automation technologies (AT) can be applied to various processes with the aim of replacing or speeding up manual labour, and can range from robots to solutions such as AI, chatbots and IoT, among others. These technologies are defined as the implementation of a process through an autonomous agent that does not require human intervention (S. H. Ivanov et al., 2022), the main objective of which is to complete tasks that are pre-established or reprogrammable (S. Ivanov & Berezina, n.d.). This type of implementation can influence areas such as marketing, financial management, human resource management and day-to-day logistical procedures (S. Ivanov, 2019).

In the tourism sector, automation can be applied to services such as hotels, catering, events, tourist entertainment, transport and travel agencies (Ivanov et al., 2017). A good example of automation is the use of chatbot technology, which has the ability to establish a virtual dialogue with a user with natural language processing (NLP), using text or speech (Gorwa & Guilbeault, 2020). In the tourism sector, implementing this type of technology can help target customers more efficiently and effectively. For example, Nica et al. (2018) looked at creating a chatbot that would allow customers to easily receive immediate information and tourist recommendations and even book a trip.

With the use of AI, collecting and analysing data to identify consumption patterns becomes possible, which is an added value for tour operators.



This is already happening in hotels such as the Wynn Hotel in Las Vegas, which has implemented Amazon's Echo system, controlled by voice and equipped with a virtual assistant that aims to facilitate and streamline communication between guests and staff (Newsroom, 2016). In addition to automation applied to tour operators, there are also complementary infrastructures that, by means of automation, manage to improve the tourist experience and create synergies between points of interest (PoI). A good example of this is the NoWait application, which, with the use of AI and geolocation, allows users to see waiting times at restaurants or tourist attractions, queue virtually and receive suggestions for parties or events nearby (Perez, 2014).

Automation represents an opportunity to facilitate systematic processes; it can accomplish what it is programmed and designed to do, but it does not have the capacity to acquire human and moral, ethical or affective values, as well as creative or problem-solving capacity (Gurkaynak et al., 2016). Thus, automation, properly understood and applied, not only does not replace people, but allows them to allocate their time more effectively to really important tasks, such as customer relations and customer care.

When it comes to hospitality, automation has made it possible to simplify processes in hotels, from check-in to check-out. Marriott, an international hotel chain, for example, has started using the chatbot 'ChatGPT' to answer frequently asked questions from guests, provide local recommendations and even make restaurant reservations, thus providing a personalised experience for guests (Marriott International, 2023).

The applications of automation in the catering sector are also notable. Several restaurant chains have started to implement self-service kiosks, allowing customers to place orders and make payments without human interaction, thus reducing waiting times and increasing service efficiency (Johnson, 2022).

In addition, automation is playing an important role in the tourist transport sector. Companies like Uber are using automation and AI to improve the efficiency of their transport services. For example, Uber uses machine learning algorithms to predict demand for journeys and adjust prices accordingly, thus providing better service to customers and improving the efficiency of its platform (Uber Technologies Inc., 2022).

AT can also be implemented in the tourism sector to optimise the visitor experience at points of interest. For example, the implementation of augmented reality in museums and tourist attractions allows visitors to obtain additional information about the exhibits in an interactive and engaging way (Rauschnabel et al., 2023).

Last but not least, it should be noted that automation in the tourism sector must be applied with consideration. The adoption of AT should be strategic and considered based on the individual needs of each business, ensuring that the customer experience is maintained and enhanced, rather than jeopardised (Smith & Brynjolfsson, 2023).

In short, automation, when applied correctly, has the potential to increase efficiency and improve the customer experience in the tourism sector. However, it is essential for companies to adopt these technologies strategically, with a focus on improving the customer experience and preserving human interaction where appropriate.



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3. CASE STUDIES

The aim of this best practice guide is to contribute to the implementation of digitalisation strategies, based on the development of a benchmarking study with a group of companies representing the accommodation, tourist entertainment and tourist operation sub-sectors that make up the tourism sector in Portugal and around the world.

To this end, five companies were assessed – three Portuguese and two international – with the aim of observing and systematising strategies, methodologies and approaches in order to identify best practices.

3.1. GUIDE FOR BENCHMARKING



Figure 1 // Guide for benchmarking.

GUIDE FOR BENCHMARKING

STEP BY STEP

01

Visits to the company that is the subject of the case study, meeting with senior management and/or people from the innovation & development area. A questionnaire is answered on the ShiftTo4.0 platform, and diagnosis is assisted with open-ended development questions, based on the following topics:



Strategy and Organisation:

- ◆ Strategies already implemented and in use, considering their limitations and gaps to be filled;
- ◆ Involvement of the company's leaders and managers;
- ◆ Organisational chart of the company structure and respective flows of responsibilities;
- ◆ Investments already made for the digital transition;
- ◆ Indicators for evaluating company performance: key performance indicators (KPIs).



Human Resources:

- ◆ Analysing the level of digital literacy of human resources;
- ◆ Training for digitalisation;
- ◆ Structuring training plans for digitalisation.



Intelligent Infrastructure:

- ◆ Technological infrastructure implemented to support daily logistics and management operations;
- ◆ Constant updating and adaptation of the technological infrastructure;
- ◆ Methods for collecting, processing and analysing data.



Intelligent Operations:

- ◆ Diagrams representing operations and their requirements;
- ◆ Responsiveness of the technological solutions already/yet to be implemented;
- ◆ Level of digitalisation and automation of daily operations;
- ◆ Information systems that, alone or integrated, meet the requirements of day-to-day operations;
- ◆ Possibilities for accessing, monitoring and tracking information.



Smart Products:

- ◆ Development of new products/services based on the possibilities of the digital transition;
- ◆ Tracking and reading the data collected and/or generated by new products/services;
- ◆ Improving the customer experience.



Data-based services:

- ◆ Using the analysed data and its results to structure the company's offer;
- ◆ Training in data collection and analysis, as well as its applicability to structuring the offer;
- ◆ Implementation of technological solutions to support data analysis.

02

Interview and diagnosis, highlighting best practices that can be replicated in other companies and other sectors of activity, safeguarding confidentiality requirements.

03

Validation of the results, cross-checking the results of the SHIFT2Future platform questionnaire with the assisted diagnosis with open development questions.

- ◆ **This step is relevant for companies that carried out the initial diagnosis in the first phase of the SHIFT2Future project**, in order to gauge the evolution between the two diagnoses.

04

Presentation of the results to the companies, accompanied by suggestions for future action in the areas assessed.

- ◆ This part is particularly important so that the companies that collaborated in the study also have a guiding document for their journey to date and for the future so that they can achieve their digital transformation goals.

Subsequently, all the knowledge from this phase was taken into account when drawing up the roadmap for digital transformation. It is important to emphasise that the companies that chose to participate are pioneers and are part of this digital transition movement in the tourism sector in Portugal.

05

Dissemination: Once the benchmarking has been completed and the roadmap has been drawn up, the SHIFT2Future Project is applied to the tourism sector in Portugal, and knowledge is disseminated to the stakeholders and the general public:

- ◆ Start-ups and SMEs that want to start or continue on the road to Industry 4.0.
- ◆ Large companies that want to start or continue on the road to Industry 4.0.
- ◆ Researchers and academics interested in this subject.
- ◆ The general public, who are enthusiastic about new technologies and innovation, mainly applied to the practice of travelling.

With this guiding structure for preparing the case studies in mind, all the dimensions were taken into account when choosing each of the companies studied, in order to ensure that they would provide exemplary implementations of the digital transition in their activity – both internally in terms of streamlining and authorising processes, and in terms of customer service and improving the experience.

Table 1 summarises the analyses carried out on each of the case study companies, reflecting the reasons for choosing them and the main insights gained.



INTRODUCTION

BENCHMARKING

CASE STUDIES

BEST PRACTICES

CONCLUSIONS



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3.2. THE CASE STUDIES ANALYSED

Company	Sub-sector	Characterisation
Company A	Tourist entertainment	Origin: Portugal; Year founded: 2020; No. of workers: 10; Turnover 2022: 180 K; Main markets: Portugal.

Summary

- ◆ A Portuguese company that focuses its activity on offering interactive and immersive experiences to tourists, through solutions that exploit technologies such as VR, AR and AI;
- ◆ It mainly works in the B2B segment, but plans to launch and test the B2C segment;
- ◆ They stand out for being pioneers in the field of AR and VR in the sector in Portugal, implementing intelligent solutions for processes and structuring the offer.

Company	Sub-sector	Characterisation
Company B	Accommodation	Origin: Portugal; Year founded: 2009; No. of workers: 23; Turnover 2022: 3.1 M; Main markets: Netherlands, United Kingdom, Spain, America.

Summary

- ◆ Portuguese local accommodation management company in the Porto area;
- ◆ It has continually explored other business areas, such as co-working spaces: they created the VERTICAL concept, a space located in the centre of Porto that offers all the conditions for 24-hour remote workers within a single building;
- ◆ They have above-average digital expertise in the tourism sector in Portugal, having already implemented technological solutions for strategic and operational management, BI, data analysis, marketing and communication.

Company	Sub-sector	Characterisation
Company C	Accommodation	Origin: Portugal; Year founded: 2015; No. of workers: approx. 150; Turnover 2022: 8 M; Main markets: Netherlands, United Kingdom, Spain, America.

Summary

- ◆ A Portuguese company that operates in the management of local accommodation, with 12 accommodation units and an innovative hostel concept, managing to provide an offer in various market segments;
- ◆ They also operate in other sectors of tourism, such as catering and tourist entertainment;
- ◆ They show digital maturity through their ability to implement technological solutions suited to the sector, such as channel management and property system management, but also in the degree of digitalisation in operations and monitoring, with data monitoring systems.

Company	Sub-sector	Characterisation
Company D	Tourist operation	Origin: United Kingdom; Year founded: 1967 (NST Travel Group Limited); No. of workers: approx. 50; Turnover 2022: 10 M; Main markets: United Kingdom.

Summary

- ◆ An international (English) company that operates in the tourism sector, focused on the B2B segment with a very specific target audience: prestigious higher education establishments;
- ◆ They create the entire customer journey, tailor-made to their needs and encompassing all services, from transport to accommodation, as well as tourist entertainment;
- ◆ They have a relatively low level of digital maturity, but are keen to evolve and invest more in the digital transition. Some actions are already being implemented, such as the use of a CRM that integrates an automatic invoicing system, feedback reporting and a programme developed in-house to build tours for each client.

Company	Sub-sector	Characterisation
Company F	Tourist operation	Origin: France; Year founded: 2019; No. of workers: 12; Turnover 2022: +700% compared to 2021; Export tax: 50%

Summary

- ◆ An international (French) company that focuses its activity on the production and B2B distribution of software for travel agencies, with a view to tailor-made tourism operations: foreign independent travel (FIT), meetings, incentives, conferences and exhibitions (MICE) and groups;
- ◆ It was founded in 2019 and is made up of a team of 12, all developers, producing their software from end to end. They continuously work on implementing new features and updating their product/service;
- ◆ They show a high level of digital maturity in their operations. Although they do not collect data from clients (they have a web services system), all internal processes are properly automated using project management tools and collaborative work.

Table 1 // Summary of the digital maturity of the national and international companies analysed in the benchmarking (own elaboration).

COMPANY A

This company emerged on the Portuguese market as a spin-off from a group dedicated to computer programming and the creation of solutions based on augmented reality, but aimed at the experience's tourism market. Created in 2020, it is an innovative tourism company that offers immersive and interactive tourism experiences through its own platform. This app offers contextualized information (video, images and audio) based on users' location and interests, as well as georeferencing features, augmented and virtual reality, 3D sound, gamification and inclusive tours. The company has generated a turnover of 180 000 euros and an export rate of around 10% in 2022, with a dedicated team of six people and plans to expand its operations to the domestic and international B2C market. Distinguished by the innovation and quality of its product, it has received several national and international prizes and awards in recent years.

The use of the ShiftTo4.0 digital maturity diagnosis made it possible to identify the following points prior to carrying out the digital transformation project:

- ◆ Dynamic pricing system: the company did not have a dynamic pricing system. The company still operated with a fixed price list on its website, which might not be fully adapted to the varied needs of its customers.
- ◆ Upgrading management platforms: the company used various management and CRM solutions to support management of orders and customer interactions, but there was still no incorporation of other more advanced systems that could improve the customer experience and operational efficiency.

- ◆ Information sharing with business partners: the company had not yet implemented an integrated and transparent system for sharing information with its business partners, a gap that could be affecting coordination and operational efficiency.
- ◆ Exploring new digital marketing channels: the company had a strong online presence, but had yet to fully exploit other digital marketing channels in addition to social networks and its website.
- ◆ In-depth analysis of customer data in after-sales: there was no systematic practice in the company of in-depth analysis of customer data in after-sales. This gap could be improved to provide more personalised support and further increase customer satisfaction.
- ◆ Digital maturity level: the company had the vision and will to move forward on the path of digital transformation, but had not yet reached digital maturity level 5. However, the company's commitment to digitalisation is evident and it is a priority.

A

COMPANY A - BEST PRACTICES

01

Innovation and market leadership: the company is a pioneer in the application of advanced technology and has placed itself at the forefront of digitalisation in the tourist entertainment sector in Portugal. Its robust investment in technological development is characterised by the development of its own proprietary software specifically for the tourism experiences sector, positioning it as a market leader and enabling it to offer truly innovative, disruptive and unparalleled solutions. The diversified communication strategy, aligning digital and direct marketing, as well as the intensive monitoring of customer data for product optimisation, underline its orientation towards Industry 4.0. The company maintains a proactive and aggressive approach, focusing on diversifying its portfolio of digital products and expanding its range of clients through strategic partnerships to commercialise digital solutions.

02

Effective management of platforms and communications: the company uses a number of efficient digital platforms, such as integrated management systems and client resource management, in support of managing and communicating with clients and structuring marketing campaigns. The company also uses productivity and collaboration platforms to streamline communication with the internal team, demonstrating a well-implemented platform management strategy that gives it competitive advantages.

03

Customer-centred and data-driven strategy: the organisation stands out for its customer-centric approach, valuing the retention of existing customers and the attraction of new ones through the provision of innovative, high-quality services. The company monitors and analyses customer data intensively, which allows it to constantly improve its products and offer personalised solutions based on the real preferences and needs of its customers.

04

Diversified marketing and communication strategy: the company has a marketing strategy that integrates a variety of channels, from digital marketing to direct marketing. The use of different communication platforms, email marketing campaigns and presence on social networks demonstrate an effort to diversify its marketing actions, ensuring greater visibility and reach in the market.

COMPANY B

Founded in 2013, this company operates in the furnished accommodation, local accommodation and tourist services sector and is based in a city in the north of Portugal. Since its creation, it has evolved from a single entity to a group of five companies, diversifying its operations beyond tourism into areas such as property investment and transfer services. Recently, it expanded its portfolio of business areas by launching a vertical co-working concept, targeting emerging trends such as “Workcations” for digital nomads. With a team of 23 employees, the company generated a turnover of 3.1 million euros in 2022. Valuing rigour, continuous innovation and the development of digital transformation strategies, this company is constantly changing and increasing its operational efficiency.

The use of the ShiftTo4.0 digital maturity diagnosis made it possible to identify the following points prior to carrying out the digital transformation project:

- ◆ Lack of a CRM: the company did not yet have an integrated customer relationship management system (CRM), which could have improved operational efficiency and customer relations.
- ◆ Multichannel reservation management: reservation management was not carried out in an automated multichannel way. This implementation could increase efficiency and accuracy in the management of reservations.

- ◆ Lack of IoT technologies: The implementation of IoT technologies in flats was lacking, which could contribute to a better understanding of consumer behaviour and optimisation of operations.
- ◆ Affiliate marketing strategy with influencers: The company had a strategy for affiliate marketing with influencers, but it was not robust enough, which could have maximised the effectiveness of this channel.
- ◆ Insufficient use of digital communication tools: the company was not maximising the use of tools such as Google My Business and WhatsApp Business to improve communication with customers.
- ◆ Integrated customer data analysis: The company did not carry out an integrated analysis of customer data, which could have helped to personalise the service offering based on customer preferences and behaviour.

COMPANY B - BEST PRACTICES

01

Specialised subcontracting and technological management: the company demonstrates best practice in outsourcing specialised services to manage technical aspects of the business, such as the maintenance of technological infrastructures and cybersecurity. This approach allows it to focus more on its core area, managing tourist accommodation, while entrusting external specialists with technical and security issues.

02

Efficient use of tools for reservation management: the company adopts effective tools such as a channel manager and a property management system (PMS), among others, for the efficient management of reservations and the creation of personalised experiences for customers. These technological tools help make operations more efficient and offer guests a quality service.

03

Operations and accommodation management software: the company uses various management support software packages to manage the preparation and availability of accommodation, ensuring that all customer needs are met. This software is the essential pillar of operational management and strategy, allowing more human resources to be allocated to providing a service of excellence.

04

Robust communication and after-sales marketing: the organisation implements robust communication and marketing strategies, such as email marketing, social media, influencer marketing and affiliate marketing, enabling it to connect effectively with clients and promote the company's services. This practice increases the company's visibility and interaction with its guests, fostering a stronger relationship with them.

COMPANY C

Founded in 2015, this hotel group is a leader in the tourist accommodation sector in Portugal. Initially known as one of the largest Portuguese hostel chains, the group currently manages 13 accommodation units from the north to the south of the country. The offer includes guesthouses, hostels, hotels, family rooms, studios, villas and flats, aimed at different traveller profiles. The unique and differentiated concept of this hotel chain is mainly focused on a younger and more irreverent public. In addition, the company plays an important role in Portuguese tourism as a member of several recognised organisations in the sector and recording a turnover of over 8 million euros in 2022, consolidating its status as a leading SME. With around 150 people in its human resources structure, this hotel chain is highly committed to innovating in the tourism sector in Portugal.

The use of the ShiftTo4.0 digital maturity diagnosis made it possible to identify the following points prior to carrying out the digital transformation project:

- ◆ Booking integration: there was no effective coordination and full integration of bookings from different sources. The use of more sophisticated channel management solutions or upgrades to existing tools could improve this situation.
- ◆ Automation of operations: there was not yet full automation in the company's operations. The implementation of a real-time inventory management system and the updating of the property management system (POS) to allow automatic replenishment based on sales were identified needs.

- ◆ Use of data management and product lifetime management: data management and product lifecycle tools were not used in a comprehensive way. The use of these tools could provide valuable insights for optimising operations.
- ◆ Personalisation of communication and offers: there was still no personalisation of communication and offers for customers. Implementing CRM software could enable greater personalisation and improve customer relations.
- ◆ Collecting and using customer feedback: there were no systematic practices for collecting customer feedback and using this data to improve services and the offer. Implementing such practices could bring significant benefits.
- ◆ Real-time interaction with guests: the use of technology to enable real-time interaction with guests was not yet in practice. The implementation of such technology could significantly improve customer satisfaction and the efficiency of operations.

C

COMPANY C - BEST PRACTICES

01

Digitalisation and automation of services: the company has invested in the digitalisation and automation of its services, using M2M and AI technologies. The focus on sustainable consumption management through the Managing the Intelligence (MTI) tool is also a notable practice, as is the investment in training and capacity building for its human resources team in these areas.

02

Integrated reservation management: the company uses robust, integrated systems for reservation management, using a channel manager, POS, POS and others. It is improving the solution for integrating reservations from different sources and investigating more sophisticated channel management solutions.

03

Efficient operations and customer support: the company has automated systems for invoicing, price management and inventory. The intention to change the POS system to allow direct and automatic liaison with suppliers is commendable. The use of data management and product lifetime management tools to improve the efficiency of operations is a further step in the right direction.

04

Diversified communication and marketing strategy: the hotel chain adopts a digital approach to its marketing strategy, with intensive use of social networks, remarketing techniques, retargeting, search engine marketing and search engine advertising. The company also collects customer feedback through reviews and questionnaires. A strategy is being implemented to improve customer relationship management and personalise offers and communications, as well as implementing technology to enable real-time interaction with guests.

COMPANY D

This UK-based company stands out in the travel and tourism agency sector, specialising in group travel for students. As part of an international group, the company has a strong presence in the European market, with a turnover of 10 million euros in 2022 and a team of 50 highly qualified professionals. The company enjoys the trust of more than 450 loyal customers who use its services every year. Although it does not yet have a clear strategy for implementing Industry 4.0, it does have a robust IT and digital transformation department that develops customised software solutions. The company's overall assessment is in line with the sector average in Portugal, highlighting the company's potential and the need for more automation and systematisation in the tourism services sector.

The use of the ShiftTo4.0 digital maturity diagnosis made it possible to identify the following points prior to carrying out the digital transformation project:

- ◆ **Dynamic price management:** there was no established dynamic pricing system in the company. The company's pricing structure, publicised on its website, was fixed and did not adapt to the different needs and preferences of customers.
- ◆ **Reservation management platform:** there was still no use of an integrated reservation management system or an upgrade of current systems to improve the customer experience and operational efficiency.

- ◆ **Information sharing with partners:** there were no systematic and integrated information sharing practices with business partners. The absence of a transparent system for sharing information could limit coordination and operational efficiency.
- ◆ **Exploitation of digital marketing channels:** there was no exploitation of other digital marketing channels by the company, apart from social networks and the website. This limited the scope of its marketing strategy.
- ◆ **After-sales customer data analysis:** although the company collected customer data, it had not yet invested deeply in analysing this data to offer more personalised support and improve customer satisfaction in the after-sales area.

D

COMPANY D - BEST PRACTICES

01

Diversification and technology in business and services: the company stands out for its ability to adapt and innovate in the dynamic tourism sector, with an eye towards digitalisation and the integration of the i4.0 strategy. The company has adopted an aggressive market strategy, continually seeking to expand its presence through new partnerships and online distribution channels, both its own and in partnership. This approach leverages the use of data and automation to create more personalised solutions for its customers. The company's proactivity is also evident in the diversification of the products and services it offers, with an investment in technological solutions, including reservation management systems, marketing platforms and others. This diversified and technologically advanced approach allows it to meet a variety of customer needs, further strengthening its position in the market and positioning the company at the forefront of industry trends. In addition, its strong investment in technology has boosted the company's growth and efficiency, allowing it to remain at the forefront of industry trends and demonstrate proactive leadership in the use of technology and digitalisation in the context of tourism.

02

Efficiency in reservation management and platforms: the company adopts varied platforms to facilitate customer interactions and internal communication, such as client resource management, cloud-based sales interaction systems and a marketing platform, allowing it to generate communication and sales campaigns integrated with other reservation management systems, further improving the customer experience.

03

Robust operational support: the company has implemented automated systems to ensure efficient operations and uses SCRUM methodology and JIRA software for project management. These strategies make it possible to improve information sharing with business partners using a more integrated and transparent system.

04

Omnichannel marketing and focus on after-sales: the company has a robust marketing strategy, using digital and direct channels, and a strong focus on after-sales service, interacting with customers through social networks and using customer data to improve products and experiences. A strategy to diversify digital channels is underway, as well as an increase in customer data analysis for personalised support.

COMPANY E

Based in Paris, France, this is an emerging company that stands out in the tourism sector and software development for travel agencies and tour operators. Founded in 2018, the company has developed an innovative tool that has revolutionised the way travel is organised and sold. Its software helps travel organisers sell their services more effectively by enabling the rapid creation of personalised trips. In just five years, the company has seen an impressive turnover growth of around 700% and has more than 300 clients. With a team of 12 specialised professionals and a strong digital presence, the company is committed to constantly evolving, investing in automating its processes and improving the customer experience, with plans to integrate ChatGPT with its software. This is an excellent example of a young company with ambitions to become technologically advanced and mature.

The use of the ShiftTo4.0 digital maturity diagnosis made it possible to identify the following points prior to carrying out the digital transformation project:

- ◆ Reservation management: there was still no efficient reservation management system that could integrate all the platforms the company used.
- ◆ Internal communication and collaboration: there was no efficient communication and collaboration between teams, largely due to the lack of a suitable team collaboration platform.
- ◆ Security: there was no secure and effective method for managing passwords, which potentially jeopardised the security of the company's data and that of its customers.

- ◆ Task automation: the company was not yet using any kind of automation tool to optimise its workflows, making processes slower and less efficient than they could have been.
- ◆ Data analysis: comprehensive and rigorous data analyses were not yet carried out to support decision-making, due to the lack of a suitable data analysis platform.
- ◆ Understanding the data: even when the data was analysed, there was no thorough understanding of it. There was still no advanced data analysis system that could help the company extract valuable insights from its data.

COMPANY E - BEST PRACTICES

01

Technological innovation and personalisation of services: the company demonstrates a strong commitment to innovation, and is in the process of implementing cutting-edge technology solutions using machine learning and AI, both from an internal operational point of view and in terms of customer solutions. The company is a leader in implementing technology for travel agencies and tour operators, and is in constant contact with the competition and with technological development units in the tourism sector.

02

Reservation management and platform integration: the company has adopted an effective reservation management strategy, ensuring integration between the various technological platforms it uses. To this end, it has adopted voice over IP systems for calls, password managers for security, team collaboration platforms for internal communication, automation tools to optimise workflows, data analysis platforms to support decision-making and advanced analysis software to better understand the data. These solutions increase operational efficiency and facilitate collaboration and communication between teams, enabling more effective and personalised booking management.

03

Security and transparency of customer data: the company demonstrates responsibility and commitment to the security of its customers' data by following all GDPR guidelines and using Amazon Web Services (AWS) for data management. This reinforces customer confidence and guarantees that the company complies with European data protection regulations.

04

Communication, marketing and after-sales strategy: the company has a robust communication and marketing strategy, with an active presence on various social networks and an institutional website with institutional information and content marketing production through blog articles, as well as an integrated conversation system, which makes it possible to increase the effectiveness of response and lead nurturing. The company also implements effective internal communication practices and has a proactive approach to after-sales, guaranteeing customer satisfaction and ongoing support.

4. BEST PRACTICES FOR TOURISM 4.0

4.1. GENERAL BEST PRACTICES

At this stage of the project, following a literature review and a benchmarking study of five companies, a set of best practices was developed for the digital transition of companies in the tourism sector. Based on the literature and considering the insights drawn from each of the cases analysed, a range of actions that can be considered was identified so that companies can take the necessary steps towards digitalisation. It was thus possible to understand the most frequent practices in each of the sub-sectors analysed, providing a comprehensive overview of the state of the art in the tourism sector, both in Portugal and in Europe. In addition, the main shortcomings and common needs of companies were identified, which made it possible to design a guideline to overcome these shortcomings.

The analysis begins with an assessment of the **strategy and organisation** dimension, which is one of the fundamental pillars in the digital transition process. Companies must invest in defining a solid strategic plan for digitalisation, which includes well-defined objectives, goals to achieve and an organisational structure that supports this new paradigm. Leadership must be strong and committed to the digital transformation process, promoting an organisational culture geared towards innovation.

Intelligent infrastructure is equally crucial. It must be robust, secure and flexible, capable of supporting the company's operational needs and adapting to changes and technological advances. Companies should consider adopting technologies such as IoT, AI and cloud computing, which boost the efficiency and effectiveness of operations.

Intelligence must also be applied to **smart operations**, with the automation of routine tasks and the use of algorithms to make data-based decisions. Intelligent products should be implemented that provide personalised and unique experiences for customers, through technologies such as AR and VR. The addition of data-based services is also a relevant practice which makes it possible to gain valuable insights into customers, improve commercial offers and obtain management metrics.

Finally, **human resource management** and knowledge are fundamental parts of this equation. Employees must be trained and properly qualified to deal with the new technologies, and a process of continuous learning must be introduced and encouraged. **Knowledge management** is key to capturing and disseminating the lessons learned throughout the digitalisation process.

This best practice guide has been developed with the aim of being a guiding document for the tourism sector's digital transition. However, it should be noted that each company must consider its own constraints and adapt these actions according to its needs, objectives and resources.

4.2. BEST PRACTICES BY DIMENSION



Strategy and Organisation

- ◆ Outline a schematic vision of the digitalisation strategy covering the entire value chain of the tourism operation, clearly indicating what is and is not part of the digital transition. It is also crucial to identify and address the greatest needs that are foreseen or planned to be met.
- ◆ Develop a detailed description of the digitalisation project, using a signalling board and production flow control (Kanban, Monday, Asana) to determine deadlines, responsibilities and resources required. The use of solutions such as AI, metaverse, gamification, NFTs and blockchain should also be included in this strategic document.
- ◆ Organise a formal kick-off session for the digital transformation project to ensure that everyone involved understands and commits to the process.
- ◆ Definition of a timetable, making it possible to establish times for periodic evaluations as well as to assess the effectiveness of the implementations and the possibility of carrying out pilot tests, analysing costs and applications for incentives.
- ◆ After implementation, carry out regular evaluations of the effectiveness of the implemented solutions, using pre-established KPIs and, if necessary, using formal or informal focus groups within the company and/or the team responsible. This process should consider the performance of all the technologies implemented.



Intelligent Infrastructure:

- ◆ Evaluate and analyse the company's current technological structure that supports operations and guarantees information security, observing the degree of innovation in the equipment and solutions currently in use. This process should include an assessment of the digital communication models used, as well as the methods for collecting, storing and analysing information. Likewise, it is essential to learn about the new technological solutions available on the market, trying to understand how they can be integrated to boost the efficiency of operations and the customer experience. The choice of technological solutions must take into account not only the ability to improve operations management, but also the security of the data collected and customer privacy.
- ◆ Define the technological resources that will be applied to support the implementation of the company's digitalisation strategy, including:
 - Digital platforms for streamlining internal processes, project management and internal communication, essential for effective coordination of activities and information sharing;
 - Operational management software to deal with aspects such as reservations, accommodation and other key elements in the tourism industry, including a channel manager and a property management system;
 - Invoicing and payment processing systems;

- Data collection tools, essential for understanding the profile and needs of customers, as well as for monitoring and improving the efficiency of operations;
- Data analysis software to interpret the information collected and turn it into actionable insights to optimise supply and management;
- Community management and CRM platforms that promote a closer and more personalised relationship with customers, improving their experience and loyalty.
- ◆ Selecting suitable suppliers and partners to help set up the technological infrastructure needed to implement the digitalisation strategy in the tourism sector.
- ◆ Map the physical infrastructure data network and identify points for improvement.
- ◆ Create favourable conditions for the installation of new technological infrastructures, according to identified needs.
- ◆ Establishing integrations and automations between the new and pre-existing infrastructures, guaranteeing the correct storage and processing of data.
- ◆ Implement the technological infrastructure based on what has been previously defined and specified.
- ◆ Implement IoT solutions and other systems to ensure data collection, streamline processes and improve the customer experience.
- ◆ Collect technical documentation and a list of best practices from technology suppliers to ensure the correct use and maintenance of the systems implemented.
- ◆ Promote training for the company's internal team on all the technological solutions to be implemented in the company.
- ◆ Call on technical support whenever necessary.
- ◆ Regularly analysing key performance indicators (KPIs) related to the resilience, response capacity and security of the infrastructures in place.
- ◆ Adjusting subscription plans as necessary to ensure that the technological solutions implemented continue to meet the company's needs and objectives.



Smart Operations:

◆ Evaluate:

- The operations that make up the value chain of the tourism sector, such as customer acquisition, lead generation and qualification, budgeting, conversion and invoicing, tourism project management, accommodation booking management, partnerships with suppliers (hotels, rent-a-car, restaurants, tourist entertainment companies), customer service and after-sales;
- The use of technology, such as AI in structuring tourist programmes and customer service (in person and remotely) using automated technological solutions;
- Automation in analysing and processing supplier and customer data in real time, using more advanced CRM and invoicing tools;
- For accommodation units, the use of tools to automate logistical processes, such as: remote opening of locks, temperature control of accommodation units, real-time monitoring of guest spending, etc;
- Automation of processes to streamline administrative and operational tasks in tourism, and the integration of systems to access real-time information on tourists, bookings, prices and availability of rooms and accommodation;
- The introduction of gamification and VR or AR solutions in operations, allowing the impact of these solutions on user experience and brand and destination awareness to be realised;

- Integrating and investing in blockchain solutions, enabling the creation of transparent and immutable records, increasing consumer confidence when making bookings, reducing fraud and guaranteeing the integrity of transactions. Blockchain solutions can offer new opportunities for innovation and differentiation in the tourism sector. For example, the tokenisation of assets via blockchain can enable new forms of financing and investment in tourism;
- Companies are looking to the metaverse as a solution for creating immersive and attractive experiences for customers, while offering a new medium for promoting tourist destinations and branding the company;
- Integration of systems to access real-time information on users/customers, reservations, prices, room and accommodation availability and different sales platforms and channels, such as OTAs, global distribution systems (GDSs) and social networks;
- The use of virtual assistants or chatbots that can provide immediate and personalised customer service, answering frequently asked questions and guiding customers through various processes, such as making reservations or looking for information on tourist destinations.

◆ Define:

- Digital processes needed, identifying the operations and processes that can be improved through digitalisation. This could include market prospecting, lead qualification, booking management, customer service and partnership management. The inclusion of AI solutions, such as chatbots and virtual assistants, to improve efficiency and the customer experience should be considered;

- Information systems, choosing the most appropriate ones to support each operation. This support can range from a CRM system for sales and marketing, a reservation management system for accommodation (channel manager) to a PMS. It is also important to include systems that support the use of emerging technologies such as blockchain, the metaverse and NFTs. Hardware, software for developing technological solutions (e.g. apps);
- An integration matrix of how the different information systems and technologies will integrate with each other. This includes the integration of different sales platforms, such as GDS, OTAs, channel managers, property managers, invoicing systems and POS, among others;
- The appropriate hardware and software for developing the digital solutions to be implemented, which can range from mobile applications to AR and VR experiences;
- A strategy for the continuous updating of hardware and software, ensuring that the company remains at the forefront of technology;
- A monitoring and control plan, establishing clear plans for controlling, monitoring and analysing operations. This can include the use of IoT for data collection, and the use of data analysis to assess the operational efficiency.
- ◆ Identify the ideal suppliers for each technological solution, ensuring that all those chosen are capable of integrating efficiently. It is crucial to guarantee interoperability between blockchain solutions, AI, chatbots, virtual assistants and metaverse experiences.
- ◆ Drawing up and defining a clear strategy for the day-to-day use of the technological solutions implemented, ensuring that they are fully integrated into the tourism operation and the customer experience.
- ◆ Establish the KPIs that will be monitored to evaluate the success of the solutions implemented. This can include metrics such as customer satisfaction, operational efficiency, and ROI.
- ◆ Continuously monitor operations and KPIs to assess the return on technological implementations. Use these analyses to make adjustments and continuously improve operations.
- ◆ Analyse KPIs to obtain insights and results that can be used to improve the company's performance and offer in the tourism sector.
- ◆ Implement the information systems selected in accordance with the work plans agreed with each technology supplier. These systems must support the management of operations, the improvement of the offer and the structuring of new products or events.
- ◆ Ensure efficient data integration between different platforms and software, allowing for a consistent flow of information.
- ◆ Regularly monitor KPIs to assess the performance of operations and make adjustments as necessary.



Smart Products:

◆ Evaluate:

- Technological resources for developing products, services and streamlining internal and external processes: IoT, AR, VR, marketing automation, AI, etc;
- Level of customer care & support via digital media;
- Intelligent and automatic sales funnel management models (e.g. automation of remarketing newsletters, CRM, etc.);
- Use of information and communication technologies (ICTs), such as internal management and communication tools, project management, digital platforms and immersive environments.

◆ Define:

- Communication systems that are fundamental to product development and the structuring of differentiating offers;
 - Applications that make it possible to personalise, adapt and adjust the offer, based on the data collected and automation processes;
 - A data storage system that makes it possible to record operational information, user/customer behaviour and emerging trends;
 - Remote management, monitoring and analysis systems that can be integrated into products and even give rise to new business models related to roadside assistance, remote customer service and product digitalisation;
 - Online platforms, OTAs, digital tourist offer aggregators, company website and/or digital marketplaces where the product can be commercialised and/or promoted.
- ◆ Validating updates to applications/technologies/devices and their ability to integrate with other systems in the company.
 - ◆ Evaluate the changes needed in the production process to include these technologies in tourism services/products.
 - ◆ Carry out a study of the market, both quantitative and qualitative, using the data stored, to assess the potential of new business models linked to maintenance, customer support or remote customer service in the tourism market.
 - ◆ Ensure the communication and distribution of new technological products from these implementations through the appropriate channels for the tourism sector.
 - ◆ Structure new products based on digital transformation and data analysis results:
 - Analyse the competition and carrying out qualitative and quantitative market research in line with the product/service phase in its life cycle;
 - Define the strategic marketing objectives, the buyer and user persona, image and analyse the company's own portfolio;
 - Develop and structure the product/service, with prototypes and tests for gradual improvement, right through to the final product;
 - Launch of the product/service, considering the strategic communication and marketing actions required for this purpose.



Data-based services:

◆ Evaluate:

- ◆ Design questionnaires to collect data from B2B and/or B2C customers as part of quantitative market research to obtain perceptions of the consumer experience with new products and/or technological implementations that are applied to the customer experience.
 - ◆ Develop a qualitative market study (e.g. in a focus group) for B2B and/or B2C customers to obtain feedback on the consumer experience of new products and/or technological implementations that are applied to customer experience (CX).
 - ◆ Regularly making a qualitative and quantitative analysis of the impact of monitoring and collecting operational data and consumer experience and its impact on new offers and/or business areas.
- Strategies for collecting, transforming and analysing data to support the optimisation and/or development of products, services and processes with the use of data analysis software;
 - The level of maths/statistics literacy for data analysis;
 - The role of data analysts in the organisational chart;
 - The types of data and requirements of the GDPR;
 - Business models that can emerge from monitoring and analysing data;
 - Technical requirements for tracking/monitoring services/products;
 - Strategies for processing and analysing data and applying the results;
 - Personalisation and segmentation of the offer and communication;

◆ Define:

- The integration, storage, loading and automation of databases/big data;
- The design of the statistical analysis strategy for the organisation's KPIs;
- Mapping, integrating and automating data collection sources wherever possible;
- The implementation of the selected BI platform and its integration it with the data collection sources;

- The development of a system of personalised analysis reports that make it possible to evaluate the performance of operations and the company;
- ◆ Evaluate the adaptation and responsiveness of data analysis platforms and software to the company's needs every three months.



Human Resources:

◆ Evaluate:

- The level of digital literacy of team members (both internal and temporary hires);
- The training provided by partners/suppliers in digital transformation;
- Actions underway to develop new competences;
- Training needs (foreseen and/or planned).

◆ Define:

- Internal competences to be developed in response to the digital transition. Focus on training in BI, big data, digital & tech and digitalisation for tourism;
 - Training for new hires when necessary;
 - Key members of the team who can coordinate processes or be responsible for implementing specific solutions;
 - Strategic technological partners.
-
- ◆ Define and train the team(s)/department(s) responsible for nurturing, automating and analysing data and its subsequent application and processes.
 - ◆ Select technology partners.
 - ◆ If necessary, readjust and reorganise the organisational structure, involving the teams and ensuring a smooth transition.
 - ◆ Train the team to manage new systems and platforms and their use.
 - ◆ Train the data analysis team to use the software and tools implemented.
 - ◆ Keep abreast of new developments, innovations and trends in the field of data analysis through training courses and subscriptions to scientific journals.
 - ◆ Develop feedback and evaluation questionnaires on the tools and software implemented for teams to respond to in order to diagnose training needs and outline training actions.



Knowledge management:

◆ Evaluate:

- The company's organisational culture, analysing the processes of continuous learning, knowledge sharing and innovation. A culture that values knowledge contributes to better knowledge management;
- Structure and processes, looking at the organisational structure of the company and the work processes that facilitate or impede the circulation and use of knowledge. This can involve assessing hierarchies, work-flows and collaboration practices;
- Knowledge management systems, analysing the company's policies and practices for the training and continuous development of its employees. This can include training programmes, workshops and webinars, among others;
- Strategies for recording projects, innovative actions and activities for constant improvement, effectively archiving best practices and valuable experiences gained;
- The existence of a best practice guide for the organisation and its activity, in digital format;
- The capacity to adapt to technological innovation, observing how the company adapts to new technologies and how it uses them to improve knowledge management.

◆ **Define:**

- A culture of knowledge sharing, encouraging the sharing of experiences. It must be ensured that all team members understand the value of sharing knowledge for the collective growth of the company;
 - Ongoing training programmes to ensure that staff are up to date with the latest technologies and trends in the tourism sector. This could include webinars, workshops, online training courses, etc;
 - Tools and processes for collecting, storing and analysing the data your company generates. This could include customer data, operational data, financial data, etc. Analysing this data can provide valuable insights that help you make informed decisions;
 - Collaboration tools or technological solutions for project management and information sharing;
 - Templates for describing projects and recording actions, best practices and lessons learnt;
 - Appropriate knowledge management systems (KMS) to collect, store and distribute knowledge within the organisation. This system must be easy to use and accessible to all team members;
 - Prioritisation using Agile methodologies (e.g. SCRUM).
- ◆ Regularly structuring the storage of documents on the network, respecting everyone's responsibilities and thus facilitating the exchange of and access to information.
 - ◆ Organising an initial presentation of the digital transformation project for internal circulation, ensuring that everyone is aware of the planned changes.
 - ◆ Establishing work cycles (sprints) and monitoring their completion.
 - ◆ Registering ongoing processes using the project management platform adopted.
 - ◆ The marketing & communications team, including brand managers, marketing strategists and communications managers, must integrate the valorisation of the company's digital transformation initiatives into their plans, using a digital strategy and public relations (PR).
 - ◆ Encouraging the adoption of the Lean Six Sigma methodology, a set of process improvement techniques and tools for solving problems and optimising operations. This methodology is based on the DMAIC cycle, which consists of:
 - **Define:** identify the problem, customer requirements and project objectives;
 - **Measure:** collect data to understand the current process and how it is performing;
 - **Analyse:** examine the data collected to identify the root causes of the problem;

o **Improve:** develop, test and implement solutions that address root causes, always based on data;

o **Control:** monitor the improved process to ensure that the solutions implemented are effective and sustainable.

◆ The adoption of this methodology must be adapted to the context of the tourism sector, with a view to continuously improving the company's processes and products/services as a whole. This can involve improving booking operations, optimising accommodation management or improving the customer experience, among other aspects.

5.

CONCLUSIONS

Based on the information presented above and the drafting of this guide to best practices, it can be concluded that the digitalisation of the tourism sector in Portugal is an **emerging and strategic need**. The transition to Tourism 4.0 requires a comprehensive approach that encompasses several fundamental vectors.

Firstly, understanding the **strategy and organisation** within each company is crucial in defining the remaining stages of the digitalisation process. According to the resources and organisational chart, each company must define its vision and objectives and chart a path for their digital transition. Establishing these points before starting a project is essential for good management of the available resources and for guaranteeing the adequate and continuous involvement of all those involved.

Implementing an **intelligent infrastructure** should be the starting point for the digital transition. Each company must assess the tools at its disposal and whether they fulfil its current and future needs. Subsequently, and in line with the reality and needs of each company, it is essential to assess which tools to implement, the suppliers/partners and the training of human resources to use them. This strategy in the decision-making process is essential to guarantee the success of the following stages. In addition, it is the results of these choices that will allow companies to carry out their activities more effectively and efficiently, focussing their efforts on improving customer relations, a factor that strongly influences customer loyalty and, consequently, turnover.

When it comes to **intelligent operations**, here too, companies' decisions will influence practical results. There are already several technological solutions that can be adopted by companies to help with daily operations, in order to streamline more programmable tasks and allow for better allocation and management of team time. Solutions such as the implementation of chatbots, for example, make it easier to answer FAQs, requiring human intervention only when dealing with more specific questions. Also in customer and sales management, the implementation of a CRM allows for greater personalisation of the service and constant monitoring of current and potential customers, which boosts the return rate and consequent loyalty.

The importance of structuring **smart products** is indisputable. This vector involves the use of advanced technologies such as IoT, AR, VR or AI, among others, according to observations made in companies representing the tourism sector in Portugal. These technologies have the potential to facilitate the creation of smarter, more personalised products and services, while providing a better customer experience. Constantly evaluating and updating these technologies is key to ensuring that tourism companies lead and remain competitive in the digital age.

The use of **data-based services** is an equally crucial pillar in the optimisation of products and services in the sector. Data collection and analysis, combined with the implementation of big data and BI practices, can provide valuable information on customer behaviour, helping companies to make informed decisions and develop more effective and sustainable business models.



Human resources management is also an unavoidable factor in digital transformation. Employees' digital literacy and ongoing training are key to ensuring that the organisation is prepared to deal with the changes and innovations of the digital world. During fieldwork, it was found that companies need to hire specialists in specific areas, such as data analysis and IT, to effectively support their digital transformation.

Finally, **knowledge management** plays a crucial role in the efficiency and effectiveness of digital transformation strategies. It was evident during fieldwork that companies should consider using collaborative platforms to facilitate the sharing of information and knowledge. In addition, the adoption of Agile methodologies and the implementation of documentation strategies can contribute to effective monitoring and management of digital transformation progress.

To summarise, the development of this guide to best practices leads to the conclusion that the transition to Tourism 4.0 requires a joint effort and well-defined strategies in various areas, from the implementation of an intelligent infrastructure to knowledge management. The aim of this guide is for each company to understand and adopt best practices according to their specific needs and circumstances in order to maximise results. This path, although challenging, is essential in guaranteeing the competitiveness and sustainability of the tourism sector in Portugal.

What is more, the customer's perspective cannot be neglected in this process. The customer experience is becoming increasingly digitalised, from the initial search to the final feedback after the tourist experience.

It is therefore essential that companies understand their customers' needs and expectations in the digital sphere, providing solutions that go beyond their expectations and contributing to customer satisfaction and loyalty.

It is also important to emphasise the importance of collaboration and cooperation between different players in the sector. The digital transition should not just be the individual responsibility of each company, but a coordinated strategy involving public and private players, universities and research centres, among others. In this way, a robust digital ecosystem can be created that will boost the development and competitiveness of the tourism sector in Portugal.

Finally, it is crucial for companies in the tourism sector to be aware that the digital transition is a continuous process of learning, adapting and innovating. Emerging technologies such as AI, AR and IoT will continue to evolve and present new opportunities and challenges. Companies must therefore be prepared to keep up to date, explore new possibilities and implement innovative solutions.

In conclusion, the transition to Tourism 4.0 is a complex, often non-linear journey that may, at first glance, be considered too challenging by companies in the tourism sector. In reality, this process is transformative and potentially rewarding, allowing for profound changes in companies, their teams and therefore the products they implement in the increasingly informed and demanding market. Companies that successfully adapt to this new paradigm will not only survive, but also thrive in the new digital age, contributing to the sustainable development and competitiveness of the tourism sector in Portugal.

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GLOSSARY

Big data

This refers to the analysis and extraction of value from large volumes of data that cannot be processed or analysed by traditional methods. In tourism, big data can be used to understand patterns of tourist behaviour, predict trends and improve service personalisation.

Destination management company

It is a professional company specialising in organising travel and event logistics in a specific destination.

Metaverse

The metaverse refers to an interconnected collection of digital worlds. These can be used to simulate and experience virtual journeys, allowing users to explore tourist sites without leaving home.

Tour operator

It is a company that organises and sells tourist packages, which may include transport, accommodation, meals and tourist activities.

Channel manager:

Software used by hotels and other properties to manage the distribution of their inventory and rates across various booking channels. It also helps to manage reservations.

Global Distribution System

This is a network that allows travel agents and their clients to access tourist information, make bookings, issue tickets and other tourism-related transactions. The software was originally created by airlines to allow travel agents to book flights, hotels and hire cars.

Natural language processing

This is the technology used to help computers understand and respond to human language. In tourism, it can be used in chatbots, virtual assistants and sentiment analysis in customer evaluations.

Property management system

This is a software used by hotels and other types of accommodation to manage day-to-day operations such as reservations, check-in and check-out, rates, room availability and channel management.

Chatbots

These are computer programmes that simulate human conversations. In tourism, chatbots can be used to answer frequently asked questions, make reservations or provide personalised recommendations.

Internet of things

This refers to the network of physical objects (“things”) connected to the internet and capable of collecting and sharing data. In tourism, IoT can be used to improve the customer experience, for example through smart luggage or automated check-in solutions.

Non-fungible tokens

These are cryptographic tokens that represent a unique digital asset. In tourism, they can be used to represent ownership of exclusive experiences or digital souvenir items.



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