

# Evolution of information systems and technologies in the hospitality and tourism sector: A historical perspective



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**Abstract** The article examines the influence of information systems on the growth of the tourism industry. Historically, these technologies have enhanced service in the hotel and restaurant sectors. Tourism is characterised by a high volume of diverse information flows that require constant updating and rapid exchange operations. For instance, the implementation of new technologies involves automating numerous hotel processes, including electronic reservation systems, which can contribute to improving service quality. The text provides data on the use of information technologies and automated management systems in hotels and restaurants in Ukraine and worldwide, highlighting significant prospects in this direction. Additionally, it mentions programs initially developed by Ukrainian companies. When selecting a system, factors such as price and reliability are crucial as many systems share similar functional characteristics. This article outlines the history, development, and widespread adoption of computer reservation systems (CRS). CRS has expanded the range of services and reduced the cost of electronic booking and reservation services. The expansion of tourism activities has occurred in all areas of the industry, including accommodation and entertainment. The research provides information on global reservation systems such as Amadeus, Sabre, Galileo, and Worldspan (Travelport), as well as Ukrainian reservation systems in tourism. The development opportunities of the tourism industry are closely linked to the capabilities of the Internet in modern conditions. Thousands of tour operators, travel agencies, hotels, and airlines operate successfully online, along with ten reservation systems for tourism services. The network provides reliable information support and an additional electronic channel for implementing tourism services.

**Keywords:** tourism, innovations in tourism, information systems, hotel industry, history of the hotel and restaurant business

## 1. Introduction

The use of advanced technologies can have a positive impact on a company's activities, enhancing competitiveness, profitability, and customer base. It also allows for adjustments to personnel competence requirements and the review of product and service quality. In the hotel industry, providing high-quality services is a primary goal, and the degree of goal achievement depends on the efficiency of the company's work (Makarenko et al., 2023).

International hotel chains such as Hilton, Marriott, and Holiday Inn have significant competitive advantages and are essential for domestic companies that have transformed the hotel industry. In a technology-driven world, hotels and restaurants are becoming increasingly reliant on technology, at least from the consumer's perspective. Managers can promote a technology-free culture and a more intimate leisure experience by encouraging guests to disconnect from their personal technologies and smart devices during their stay. It is important to inspire guests to rely on the technologies provided by the hotel. The hotel's information technologies include:

- structured cabling system;
- hotel telephony;
- hotel television, including interactive and pay TV systems;
- hotel electronic lock management system;
- Internet access in the hotel, including Wi-Fi;
- hotel accounting software, hotel management systems (PMS), restaurant and spa management systems (POS);
- ERP systems: calculation and warehouse systems, accounting and financial systems, hotel acquiring;
- hotel website, online hotel booking systems;



- computing facilities: servers, computers, restaurant terminals;
- hotel video surveillance;
- access control and accounting systems (ACS) of the hotel (Kuščer et al., 2017).

The level of technological and economic development determines the creation of innovative infrastructures in the hotel industry. Countries with advanced industrial infrastructure are characterised by the increasing role of intangible factors in production, computerization of society, and significant development of the service sector. This presents genuine opportunities for the establishment of consulting, engineering, service, and information service networks that support innovative processes (Wang et al., 2021).

This text analyses the usage and justification of the history of information systems in enabling digital innovation in the tourism sector. It describes international experiences in implementing cutting-edge technologies and exchanging reservation information to build the development strategy of hotels and restaurants.

## 2. Literature Review

The tourism industry is considered one of the pioneers in digitalisation. A. Schulz (1996) noted that airlines started implementing booking systems in the 1960s, which can be seen as precursors to modern electronic commerce systems. Nowadays, tourism information systems are among the most significant applications of electronic commerce. G. Gardarin, F. Sha, and T.D. Ngoc (1999) reported a 1000% increase in the number of tourists using web-based tourism information systems for trip planning, from 3.1 million in 1996 to 33.8 million in 1998. In 2001, the Gartner Group reported a sixfold increase in the tourism market due to the influence of the Internet, with a \$5 billion increase in website spending compared to 1999 (Gartner Group Inc., 2000).

The use of Geographic Information Systems (GIS) in tourism has been viewed as a database and mapping technology that works with geographic data (Alan, Michael, & William, 2004). This technology combines a database with notable visualization and a world map (Gegana, Srinaga, & Dewi, 2021; Iatsyshyn, 2020). GIS is increasingly being used to provide guidance to travellers on activities and destinations (Salim, Iradzh, & Ahmed, 2022). In addition, it is possible to link layers of geographic information to other attribute tables, including databases of spatial data properties. Visualization can be provided through tabular displays, queries, and geographic analysis using maps (Wang, Mei, & Ying, 2021).

Data management techniques can be performed by inputting coordinates of tourist sites into QGIS 3.26 software, followed by creating databases equipped with non-spatial data. Tarmiji et al. (2016) collected tourism-related data in the Perak Tengah region, focusing on 5 types of tourism products: attractions, food and beverages, accommodation, educational institutions, trade, and services. They created a tourism database that included data on roads, rivers, and land. The coordinates of each site were obtained and the data was used for visualization purposes.

According to J. Mapjabil (2020), the main factors behind the growth of the tourism industry currently are the development of the media, public relations in the telecommunications space.

Muhammad Soffian and colleagues (Muhammad Soffian, Mohd Rosli, Azman & Muhamad, 2021) note that the reservation system differs from each other in the following ways:

1. completeness and efficiency of the information provided;
2. a set of services with a specific GDS;
3. an information system that is used and installed on a travel agency's personal computer;
4. reliability of the equipment and data processing centre of the GDS.

In their work, K. Kuščer, T. Mihalič, and H. Pechlaner describe the three-dimensional model of innovation Mountain Destination (MDIM) in the context of mountain tourism development in Austria, Slovenia, and Switzerland. The authors argue that tourism development depends on the innovative level of socio-cultural, natural, political, legal, and technological factors.

C.A. Roslizawati, N. A. A. N. Hashim, and Z. Awang (2018) identified several drawbacks of tourism portals. These include copying information from other websites, unstructured data updates, a limited number of offers, high levels of portal congestion with advertising content, banners, and spam, and inadequate development of specific sections in Internet portals lacking information (Table 1).

**Table 1** Document Management Automation System for a Travel Company.

Software product	Features
Parus-enterprise	The system is aimed at automating accounting and management tasks performed by small and medium-sized tourism enterprises. The basic modules of the system are: Wind Restaurant; Wind Hotel; Wind Travel Agency.
TITVIT	An automated system for travel companies that performs accounting and analytical functions and calculations. The basic modules of the system are as follows: Titbit "Price calculation"; Titbit "Prices+flights"; Titbit back-office.
SAMOTUR	An automated system for tour operators, travel agencies and companies. The basic modules of the system are SAMOTourAgent; SAMO; Online for PC SAMO-tour; SAMO-Incoming; Online for PC SAMO-Incoming
SAMSEBETUR	An information system designed to automate the work of travel agencies.

Source: Naidoo & Ramseook-munhurrin (2011).



### 3. Materials and methods

This research examines the use of information systems in tourism, both in Ukraine and internationally. It includes a retrospective analysis of various technologies, as well as an evaluation of the technical characteristics, effectiveness of use, and prospects for the development of booking, data storage, and analysis methods.

The study employs methods of historical and logical analysis and comparison, expert assessments, system analysis, and forecasting. The study materials comprised advanced technologies used in contemporary hotels and restaurants, including the implementation of digital innovative systems for information organization.

The following reservation systems were used for the study: Galileo, Worldspan, Amadeus, Sabre, their analysis was carried out on the basis of a study conducted by Fried&Partners. The study of reservation systems Accor, Amadeus, Tourico, GTA, MGHotels in Ukraine was carried out by a systematic analysis of the authors.

### 4. Results

The emergence of modern aviation transport and computer reservation systems has significantly influenced the development of mass tourism. In 1987, the largest European airlines Air France, Iberia, Lufthansa, and SAS created the first reservation system, Amadeus, which is now one of the largest and most widely used reservation systems. The company is headquartered in Madrid, Spain, with a product development centre in Nice, France, and a data processing centre in Erding, Germany. The main office determines the corporate, marketing, and financial development strategies of the company. The product development centre develops the company's innovation policy and provides consulting support to clients.

The data processing centre is one of the largest in Europe and processes over 3 million bookings daily. Amadeus is a prominent computer reservation system in Europe. Following the acquisition of the System One reservation system in 1995, it expanded into the American market. Currently, the Amadeus reservation system has over 400,000 terminals in 215 countries worldwide. It provides flight bookings for over 420 airlines, and flight schedules can be viewed for 710 airlines worldwide. The Galileo system was founded in 1987 by British Airways, Swissair, and Covia. In December 2002, Galileo opened its office in Ukraine. Currently, Galileo GDS is part of Travelport. The Galileo system is used by 67,000 travel agencies in 160 countries worldwide. The system includes 420 airlines, 90,000 hotels, and 30,000 car rental locations.

Computer Reservation Systems (CRS), which emerged in the mid-1960s, accelerated the process of booking airline tickets and enabled real-time booking. The quality of service improved due to reduced customer service time, increased volume and variety of services offered, optimization of airline load factors, implementation of flexible pricing strategies, and application of new management methods. These reservation systems were rapidly and widely adopted due to their high reliability and convenience.

The Sabre system was created in 1964 by American Airlines and launched in Oklahoma (USA) in 1976. It provides reservations for air and rail tickets, hotel accommodations, and more. Currently, the Sabre system enables booking of airline tickets for over 400 airlines, with representation from more than 93,000 hotels and 25 car rental companies. It is used by over 350,000 travel agents. The Sabre system processes around 1 million transactions per minute, making it the most efficient organization in the world.

The Sabre GDS can find the lowest fares, with four times greater capabilities than Amadeus or Travelport, resulting in an average saving of 20% on each ticket. According to a study conducted by Fried&Partners, the Sabre system provides minimum fares 9% more frequently than Amadeus and 33% more frequently than Travelport. On average, fares found through Sabre are \$13 USD cheaper than those found through Amadeus and \$72 USD cheaper than those found through Travelport. Tables 2-3 provide a comparison of computer reservation systems in the tourism industry.

**Table 2** Comparative Characteristics of Computerised Reservation Systems.

Indicator	Booking system			
	Galileo	Worldspan	Amadeus	Sabre
Number of terminals connected to the system	>160 000	>28 000 tour company	>400 000	>350 00
Number of supplier airlines	420	500	490	400
Number of supplier hotels	90 000	45 000	110 000	86 000
Number of car rental companies supplying the system	30 000 offices	45	30 (35 380 offices)	25
Number of user agencies in the world	67 000	40 000	64 300	55 000

The success of the implementation of automation systems in Galileo, Worldspan, Amadeus, Sabre (table 2) is largely determined by the following factors: readiness for a possible reorganization of the existing management system with real changes functional responsibilities and job descriptions; understanding by the hotel management of the need to implement of



the automated management system and interest in the final results; organizational preparation of the team the hotel staff for the implementation of the automation system; readiness of the staff for training and changes in work technology; control by the management over the implementation of the system.

The integration of project management processes into the company's daily operations creates new interaction schemes with customers in the tourism and hospitality industry. Project managers' functions are integrated and complemented by the functions of department managers within the company. Implementing project management requires the company's management to address a range of new organizational, technological, personnel, legal, educational, and other issues.

The Fidelio automated hotel management system was first installed in Ukraine during the early 1990s at the "Rus" hotel, which was part of the Intourist system. The first software package for automating the activities of tour operators in independent Ukraine was "Master-Tour", developed and supported since 1995. As of 2013, "Master-Tour" had been installed in 50% of tourist companies in Ukraine.

**Table 3** Characteristics of Booking Systems.

Booking system	Advantages	Disadvantages
Accor	<ul style="list-style-type: none"> <li>- work in multiple languages;</li> <li>- search for hotels around the world;</li> <li>- personal account in the system, the ability to independently modify reservations;</li> <li>- easy to compare prices for other hotels in the city;</li> <li>- all price data is taken directly from the hotel database;</li> <li>- you can search for a hotel by a large list of additional services;</li> <li>- the possibility of getting advice on booking by phone;</li> <li>- free loyalty programme with a system of discounts and savings</li> </ul>	<ul style="list-style-type: none"> <li>- search for accommodation, only among those hotels belonging to the Accor Group;</li> <li>- authorisation is required for booking;</li> <li>- you need a credit card to make a reservation</li> </ul>
Amadeus	<ul style="list-style-type: none"> <li>- when requesting hotels in the city, you get a full list of hotels in the city where you can book rooms;</li> <li>- the largest selection of hotels;</li> <li>- for each presented hotel there are several different rates and room categories;</li> <li>- you can search for a hotel by a large list of additional services;</li> <li>- payment directly to the hotel;</li> <li>- it is possible to get visa support from the hotel</li> </ul>	<ul style="list-style-type: none"> <li>- knowledge of English is required;</li> <li>- there is no possibility to make a reservation "on request";</li> <li>- no possibility to view hotels on the city map;</li> <li>- prices do not include local taxes and fees, prices are not discounted;</li> <li>- a credit card is required for booking;</li> <li>- description of additional services and cancellation policy is given in short form</li> </ul>
Tourico, GTA, MGHotels	<ul style="list-style-type: none"> <li>- when requesting hotels in the city, you will be given a complete list of hotels in the city where you can book rooms and hotels with places "on request";</li> <li>- you can see on the city map where all the presented hotels are located and choose the most convenient hotel by location;</li> <li>- it is easy to compare prices for other hotels in the city;</li> <li>- you can sort hotels alphabetically, by price, by stars, by location in the city;</li> <li>- it is possible to book several hotels in the city at once;</li> <li>- you do not have to pay for the hotel at the time of booking</li> </ul>	<ul style="list-style-type: none"> <li>- 100% prepayment before arrival;</li> <li>- visa support is not available everywhere;</li> <li>- prices displayed online do not include taxes and may change significantly upon check-in</li> </ul>

MICROS-FIDELIO is a popular comprehensive hotel automation solution in Ukraine and abroad. The company's software products have been distributed in Ukraine and the post-Soviet countries by HRS-systems for hotels and restaurants since 1991. Currently, over 15,000 hotels in more than 140 countries use this computer management system.

**5. Discussion**

The importance of information systems for travel agencies has increased due to the modern level of development and intense competition in the tourism industry. The systems' functional capabilities must enable the input, editing, and storage of information regarding tours, hotels, clients, order status, and provide output of information in various document forms, such as questionnaires, vouchers, tourist lists, tour and hotel descriptions. Additionally, the system should calculate the cost of tours, considering exchange rates and discounts, monitor tour payments, generate financial reports, and transfer data to other software products (such as Word, Excel, and accounting programs). Project management information systems can accelerate calculations and document formation, as well as reduce the cost of services such as transportation and accommodation for clients.

These systems have a wide range of applications in the tourism and hospitality industry. The level of complexity involved in implementing tasks is contingent upon various factors, such as the size of the enterprise, the existing management structure,



the degree of automation, the scale and types of projects implemented, and the extent of involvement of external companies in project management. However, even in relatively straightforward situations, the system's implementation plan can play a pivotal role in its successful introduction into the tourism sector (Gegana, 2021; Salim et al., 2022). As of 2019, in most hotels in Ukraine (75%) the introduction of automated information technology (AIT) management is necessary and has already become a real fact that is crucial for successful business development. Both globally and in Ukraine, the use of modern IT is becoming a means of competitive struggle for hotels.

State-of-the-art information technologies are being rapidly introduced into the hotel business and allow us to maximize the ability to meet the most diverse needs of guests and improve quality. For example, there is a program called Skype Translator that simplifies communication between people who speak different languages. Using Skype Translator in the hotel business can open up unlimited opportunities for communication, interaction with guests and work together around the world, regardless of geographic region and language. This technology can expand a hotel's customer base without additional costs for native speakers of other languages and increase the level of guest loyalty to the hotel. In large global booking systems, the commission is 25% of the booking amount, and Booking.com's standard commission rate is 15%. Service. BookingSuit will help small and independent hotels to get their own website and build their online presence without a number of additional costs, develop and implement an online marketing plan, promote and increase the importance of the hotel in the rankings of Google and other search engines.

The study of booking and reservation systems (Galileo, Worldspan, Amadeus, Saber) showed the necessity and urgency of implementing the latest reservation systems. Thus, Amadeus, which owns the largest number of hotels and offices, is inferior to Galileo in terms of the number of travel agencies, and Worldspan in terms of the number of air carriers due to its policy less oriented towards third world countries. If we analyze Ukrainian realities, we should note such information systems as "Parus-podrymstvo", TITVIT, SAMOTUR, SAMSEBETUR, etc., which have shown their competitiveness in the tourist market, and the presence of reservation systems from Accor and Amadeus indicates the high priority of foreign companies in the tourism industry of Ukraine (Iatsyshyn, 2020).

## 6. Conclusion

If you use modern information systems for interacting with customers, you can increase the efficiency of solving problems: from sales booking, reception and accommodation of guests, organization of conferences and banquets and customer relationship management to providing complete data for financial control and management accounting of the company's activities. The management of hotel companies understands that the introduction of a marketing information system in the hotel business will provide competitive advantages in the market business will provide competitive advantages in the market, increase market share, reduce overall costs, improve the service process, increase the efficiency of individual departments and the hotel as a whole of individual departments and the hotel as a whole.

Modern computer information technologies can significantly improve the methodological, informational, and technological components of management processes, resulting in a more efficient level of execution. It can be concluded that the use of automated information technologies is essential for customer service in today's tourism enterprises. The main types of information technologies used in the tourism industry are reservation and booking systems such as AMADEUS, Galileo, and Worldspan, as well as management automation information systems like Parus-enterprise, TITVIT, SAMOTUR, and SAMSEBETUR. Additionally, CRM resources, mobile communication means, and tourism information resources on the internet, including tourist portals, websites of tourist organizations, websites of tourism enterprises, tourist internet portals, and virtual internet tours, are also commonly used.

## Ethical considerations

Not applicable.

## Conflict of Interest

The authors declare no conflicts of interest.

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