USE OF INNOVATIVE INFORMATION TECHNOLOGIES IN THE ACTIVITIES OF PRESENT-DAY HOTELS

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ABSTRACT

The main purpose of this article is to present innovative information technologies as one of the most important elements of the functioning of present-day hotels. The article covers among others the idea of hotel industry. The notion of innovation was explained. Furthermore, the main types of information technologies used in the present-day hotel industry were defined. A short characterization of these was provided, as well. The last part of the article presents the activity of an example of a hotel (i.e. the PURO Hotel in Wrocław). Its operations are based to a significant extent on the use of present-day information technologies. In the article, a research hypothesis was accepted stating that the functioning and the market success of present-day hotels is determined to a great extent by the use of effective and innovative technological solutions in the area of information, without which the activity of these facilities would not bring the expected benefits in the form of an increased interest in the hotel's offer and an increased number of hotel guests. This translates directly into the financial result.

KEYWORDS: *innovation, information technologies, hotel, hotel industry.*

JEL CLASSIFICATION: *M15, Q55, L83.*

1. INTRODUCTION

Present-day hotel facilities come up with more and more uncommon ideas. They make attempts to gain the approval of potential guests through the creation of special offers, an introduction of new services or innovative technological solutions, whose objective is not only to draw attention but also to streamline of the facility's operations. Present-day information technologies (*IT* or *TI – Information Technology*) are more and more frequently helpful in this respect. This is a relatively new field of knowledge, one that integrates various technologies (including computer hardware and software, telecommunications, teleinformatics) whose purpose is to obtain information, select, analyze, process, store, manage and transmit it to other people. It is the Internet that is the most popular technology that is used in the communication process between the hotel and the customer. Websites (e.g. social media portals) can be an excellent instrument of promotion for present-day hotel companies. Nevertheless, it needs to be emphasized that the Internet permits the use of more advanced information technologies (e.g. booking systems, self-service hotel check-in systems) that those who manage hotels are seeking these days. It is an analysis of innovative technological solutions of this type in the area of information that is the subject of this study.

In the article, a research hypothesis was accepted, i.e. the functioning and a market success of present-day hotels is to a great extent determined by the use of effective and innovative technological solutions in the area of information, without which the activities of these facilities

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would not bring expected benefits in the form of an increased interest in the hotel's offer or an increased number of hotel guests. This translates directly into the company's financial result.

2. IDEA OF PRESENT-DAY HOTEL INDUSTRY

Hotel industry is a socially organized service business activity that is aimed at the fulfilment of the elementary existential needs of those people who are temporarily staying outside of their homes. These needs include the need of rest, food, accommodation, personal hygiene, care provided to one's health and property, recreation, cultural entertainments, contact with environment etc. (Kowalczyk, 2001).

The nature of hotel industry is emphasized by the following features:
− hotel industry is an organized business activity,
− the primary function of hotel industry is the provision of accommodation for money (ensuring comfort, standards, a specific level of services, the safety of stay, a good atmosphere during the stay in the hotel, high professional qualifications as well as an ethical and moral level of the hotel personnel,
− hotel activity consists of various services, especially services connected with living, i.e. accommodation and food,
− the scope of services offered by hotel facilities is developing very dynamically,
− the stay of guests in hotels is as a rule of a temporary nature (Witkowski, 1998).

M. Turkowski (1997) emphasizes that the fact of the provision of this service by a hotel company and not the type of service itself is accepted as the criterion that distinguishes the hotel service from other kinds of services. This author defines hotel services as temporary renting out to travellers rooms or places in these rooms and other services connected with this. In other words, it is the complex of the activities performed by the hotel personnel that uses technical devices which are specially adapted to suit this purpose.

A combination of tangible products (including food, drinks, accommodations) and intangible services such as customer service in as nice as possible atmosphere is the effect of the operations of hotel companies. These companies provide to customers a package of products and services of both tangible and intangible qualities.

A hotel service consists of many services connected with the fulfilment of the elementary existential needs of the human, such as:
− accommodation,
− food,
− entertainment,
− health care.

Hotel services consist in temporary and generally available renting out of houses, flats, rooms, accommodation facilities and also sites for tents or car trailers and the provision of services connected with this within the facility. Such an approach to the issue analyzed points out to the fact that it is not only services aimed at the provision of accommodation but also other services which are provided within the framework of hotel facilities (including gastronomic services, cultural and entertainment services, parking services, biological regeneration services etc.) that constitute hotel services.

In combination with those services that accompany the hotel service, there occurs a comprehensive form the tourists' service, its most attractive element being the possibility to spend time in a lodging facility of a specific type, including:
− a holiday village, e.g. of a *ClubMed* type,
− high class hotels that represent the space of formal tourism, i.e. official tourism connected with the use of a tourist infrastructure of a very high quality and international standards,

- in hotels that possess specific qualities, e.g.:
  - the highest hotel (*Burj Al Arab*: 321 m of height situated on an artificial island in Dubai in the United Arab Emirates),
  - the highest situated hotel (*Grand Hyatt* in Shanghai that occupies 53-87 floors of the *Jin Mao Tower* skyscraper),
  - an ice hotel (*Jukkasjarvi* in Sweden).

Hotel services can be provided in those hotel facilities which meet the following criteria among others:

- requirements concerning the size of the facility, its fittings and the scope of services provided, which are adequate to a given class and category to which the facility is classified,
- building, sanitary, fire and other requirements provided for in separate regulations.

Hotel services can also be provided in other facilities if they meet the minimum requirements under the Ordinance issued by the Minister of Economy and Labour of Poland related to hotel facilities and other facilities where hotel services are provided.

The basic qualities of hotel services include the following:

- unity of the production place and of the service consumption places (simultaneous production and provision),
- complementarity and substitutability,
- complexity: the product consists of a smaller and larger number of services provided by a hotel company,
- flexibility: possibility to adapt the service to the guests' tastes, preferences and needs,
- diversity: elements can occur in various combinations (Turkowski, 1997).

The hotel sector is a typical representative of services market. The widely understood customer service policy is one of the pillars of the marketing activities pursued by hotel companies. This is made up of the following among others:

- recognition of the existing market segments,
- identification of customers' needs inside the distinguished segments,
- permanent contact with customers with the use of available instruments of marketing communication,
- supervision of the performance and assessment of services realized.

3. NOTION OF INNOVATION

The noun "innovation" originates from the Latin Language: *innovare*, that is "the creation of something new". A dictionary of foreign words defines it as a new solution, reform and novelty (Marcinów, 1999). Innovation is understood ambiguously, which is the result of too short a period of research and the resul oft diversified theoretical approaches.

According to E. Okoń-Horodyńska (2013), innovation is a process which consists in the transformation of those possibilities that already exist into new conceptions and an introduction of these to practical use (Okoń-Horodyńska, 2013). The notion of innovation was introduced to economic sciences by J.A. Schumpeter, who claimed that it is connected with launching the following into the market:

- new products,
- production methods,
- searching new markets,
- finding new sources of raw materials,
- development of a new organization (Niedzielski, 2008).

J.A. Schumpeter interpreted innovations as lasting changes that involve a transformation of a new

idea or an invention into a market product or process (Schumpeter, 1995). P. Kotler (1994) proposes a different way to perceive the innovation; according to him, everything perceived as novelty is an innovation. P.F. Drucker (1992) supports this view by claiming that it is an intentional and profitable change that follows from needs or systematic observations of environment. However, D. Begg (1997) understood innovations as new knowledge in the production process.

In statistical research, it is accepted that innovation is a new or improved product, process, a new organizational method or method in the area of marketing. These novelties do not have to directly concern the market where the company functions that is introducing them, yet they must constitute a reform for at least a given company. There is no need for given products, processes or methods to be the product of the entity that is making them available.

Innovation determines the development and transformations of every state. Therefore, innovations have been perceived for many years now as the most essential source of competition, employment and economic growth. Those companies which implement innovations are much more profitable than those companies which do not incur any costs related to investments (Frankowski & Subiak, 2010).

The phenomenon of innovation is inseparably connected with a new conception which has not been patented so far. They are also frequently defined as an economically successful use of a new idea. Innovation is a part of a four-stage process. It is preceded by an invention which has not been patented so far; then, owing to the design, its utility model is formed, and later it is distributed. Every idea is transformed into an invention which is put to circulation as a new product, and then it becomes disseminated.

When analyzing the definitions mentioned above, one may conclude that an innovation is something which has not been there so far, and its objective is to improve something which already exists. To conclude, the notion of "innovation" can be broadly defined as a set of the company's competences to continuously find sources of innovation, to absorb innovations from outside and to create its own innovations. It is also their implementation and dissemination.

4. DEFINITION AND TYPES OF PRESENT-DAY INFORMATION TECHNOLOGIES

The information technology (*TI or IT*, *Information Technology*) includes in its meaning a combination of computer science and similar technologies related to information, computers, informatics and telecommunications. In other words, IT constitutes a complex of modern devices that are used during communication (Siemińska-Losko, 2007).

J. Ratajewski (1994) says that this term is referred to as an arranged set of methods and resources of the newest intentional activities aimed at a realization of all information processes in the society. S. Juszczyk (2002) defines information technology as the entirety of methods and tools that serve the purpose of information processing, one which involves ways to seek and select information, to cumulate, record, store and process it, and also to transmit or remove it.

  UNESCO documents define the triple meaning of information technology, i.e.:

− computer science is included in scientific activity whose domain consists in planning, implementation, assessment, use and maintaining of information processing systems taking into consideration hardware and software,
− information technology is the technological purpose of computer science in society,
− information technology (IT) is a combination of computer science with other technologies that are connected with it, chiefly with communication technology.

Information technologies play an essential role in present-day companies, and they permeate almost every aspect of their operations. This is proven among others by expenses allocated to investments in IT.

R.S. Kaplan and D.P. Norton (2004) distinguish four main types of elements in the structure of

information technologies. These are the following:
- technological infrastructure,
- transactional applications,
- analytical applications,
- transformation applications (cf. Table 1).

Table 1. Main elements of present-day information technologies

No.	Element of information technologies	Description
1	Technological infrastructure	Physical infrastructure: - hardware - access channels - safety and risk - sets of data - infrastructure of application Management infrastructure: - *IT* management - architecture and standards - education in *IT* - research and development in *IT*
2	Transactional applications	Integrated management systems of ERP/MRP type, supplies chain management (SCM), customer relations management (CRM), other field related systems
3	Analytical applications	*Business Intelligence* (*BI*): - decision support systems (*DSS*) - query and reporting systems (*Q&R*) - online analysis and data processing systems (*OLAP*) - statistical analysis systems, - data forecasting and exploration (*Data Mining*) - knowledge management support applications (KMS)
4	Transformation applications	These can be both transaction systems (e.g. an interactive system that allows clothes tailoring) and analytical systems (e.g. a profit measurement system)

Source: Author's own study based on: (Orzechowski, 2008), pp. 18-25.

The technological infrastructure consists of the physical and managerial infrastructure. It consumes a substantial part of the company's expenses. However, benefits are not directly connected with the infrastructure but with the applications that use it. It is important that the company understands in what way the IT infrastructure supports business processes as well as permits and reduces the activity of individual applications (Orzechowski, 2008).

Transaction applications consist of software that is integrated with the specificity of the activity of a given company. Owing to an introduction of transaction applications, the company obtains benefits connected with automation, faster and easier access to information, the possibility to observe the course of processes and to go over geographical barriers, etc.

Further applications are analytical applications. Their operation consists in an analysis and interpretation of results, sharing information and knowledge. These include *Business Intelligence* (*BI*) and *KMS* (knowledge management support applications). The *BI* application allows one to take more accurate decisions in relation to the business.

Modern information technologies also have an influence on service markets. They can be divided into three groups, i.e.:

− definitely developed, e.g. e-tourism, e-banking, e-trade,
− moderately developed, e.g. e-education, e-culture,
− hardly developed, e.g. e-insurances, e-health, e-education (Dąbrowska, 2009).

Considering the multitude and diversification of information applications which are available on the market, their multi-dimensional nature of use can be observed. Those applications are constantly being improved, and they are used not only in companies but in almost every field. Their purpose is to make life easier and to bring benefits. When implemented with competence, they help to save time and money.

5. INNOVATIVE INFORMATION TECHNOLOGIES THAT ARE USED IN HOTEL INDUSTRY

The dynamically progressing information technologies are one of the most important directions in the development of the modern market. As mentioned before, tourism and, consequently, also hotel industry, use in to a great extent innovative information technology. The causes of the implementation of IT in hotel branch are complex, and they can be divided into two groups, i.e. *pull* and *push. Pull* include the following among others:

− tourist demand,
− growing number of Internet users,
− growing significance of the Internet,
− savings in the area of marketing,
− possibility of cooperation with other companies.
   The following are included in *push* elements:
− cooperation with strategic partners (suppliers, customers, agents etc.),
− franchise holders,
− the European Union (Pawlicz, 2008).

E-tourism is understood as those connections that occur between the tourist market and information technologies. In e-tourism, information technologies are implemented by the following groups of companies:

− hotel managers,
− tour operators,
− air lines,
− tourist agents (Panasiuk, 2014).

The primary technologies which have contributed to the formation of the present-day e-tourism are as follows:

− the Internet: this is a very important channel that allows one to reach the customer. Those systems which are available to customers are divided into universal ones, which include information on offers, and autonomous ones, which are used as a rule by market giants, hotel chains etc.,
− Central Reservation Systems (*CRS*) are closed systems which are available to tourist companies only. The purpose of CRS is the sale of reservations with all available sources and an increase of the conversion rate with a simultaneous reduction of the costs of operation,

– Global Distribution Systems (*GDS*) that are a stage in the development of *CRS*; these are also closed systems that are used mainly by air lines. They are usually used in large hotels that are part of international chains.

At the beginning of 21st century, *IT* tools were used in three sectors of hotel industry, i.e.:

– communication,
– purchase and sale of services over the Internet,
– hotel management.

Each of these elements is operated by an application which is created to meet the needs of a given hotel. These applications are more and more frequently integrated to ease the flow of information to a maximum. Internal systems that support management of hotels play a very important role in hotels. Their purpose is to lower costs and to automate part of routine activities connected with customer service. The literature points to those systems that support the functioning of a single hotel. They are referred to as *PMS* (*Property Management Systems*). These are large databases that group all the information from guests to services. They are equipped with accounting functions to allow them to generate sales reports as well as profit and loss accounts. As a rule, *IT* systems in the hotel are divided into two types: *front office* and *back office*. The former ones are found in the reception (they may also appear in the system on websites). B*ack office* supports the internal part of the hotel, e.g. the accounting department, cost management, reports for chambermaids etc. (Pawlicz, 2012).

The present-day *PMS* offer the following possibilities among others:

– saving databases,
– verification of the extent to which rooms are used,
– provision of information on the availability,
– finance management in the hotel,
– conducting loyalty programmes,
– supporting marketing,
– aid with settlements.

PMS systems consist of modules that control the work of the individual segments of the hotel. If the hotel possesses more than one *PMS* system, attention should be paid to their compatibility. From the point of view of the hotel, *PMS* should be characterized by:

– reliability and round-the-clock service,
– ease of operation,
– ensuring data security,
– practicality,
– invariability (Pawlicz, 2008).

The Internet, which was mentioned previously, is another instrument that is used in hotel industry. With the aid of websites and electronic mail used as a fast and cheap method of communication with customers and suppliers, the Internet has become very useful in this branch. Websites are also used as means of advertising and promotion. Doing shopping and reservations and, what follows from this, also the sale of hotel services is yet another important function of the Internet in the hotel sector. The hotel service was one of the first additional services provided by *GDS* which, owing to this, gained among others the possibility to reach a wider circle of customers and to sell air tickets as well as lodging services with the use of one system. Due to the different nature of transport and hotel services, a decision was taken to implement separate booking systems, which were later combined with *GDS* (Jędrzejczak, 2000).

The sale of hotel services over the Internet is a compound process which may be based on applications with diversified levels of sophistication. The three main levels of sophistication include the following:

− provision of information by the system concerning services on a website; payment for the service is made by transfer or on site,
− the system allows individual customers to make payments with credit cards,
− the system allows both individual customers and business customers to realize all activities.

The majority of hotels use basic booking functions, ones that allow only to send an inquiry concerning booking. The inquiry is then received by the reception in the form of an e-mail message or a fax. In this situation, there is a risk of additional costs and a delayed reply from the hotel. As a consequence of the desire to increase availability and to streamline the booking process without any direct contact with the personnel, hybrid systems came into being.

The hybrid system is a combination of an external system (a website) and the hotels' internal system. The reservation form is placed on the website. Once the customer has filled it in, it is directed to the reception which receives a signal that a reservation has been received. Then, the personnel may transfer the reservation to the appropriate internal system module, and the reservation is entered, while the customer receives confirmation to their e-mail address. When no rooms are available, the person who made the booking is automatically notified of this act (Mańkowski, 2008).

The most technically advanced systems allow the following:

− credit card payments: the customer provides their card number, which is authorized,
− virtual card payments: this is an electronic notation of the account number; the payment process is analogical to that related to the credit card,
− transfer payments: directly from the customer's account into the hotel's account (Nalazek & Moskała, 2003).

Those systems that allow one to purchase and reserve hotel services are the Internet systems of reservation and sale. They are created in cooperation with hotel chains, and they are used in categorized facilities: covered by the hotel chain and in those which function separately.

With the development of modern information technologies, the hotel sector has gained tools that streamline activities in the field of facility management and promotion. However, in order to fully use the potential of *IT*, these instruments that allow one to obtain the maximum benefits should be selected in a rational way, one that is adequate to expectations.

Those hotels that are part of the *PURO* chain are an example of hotels that use innovative information technologies. This is a chain of three-star, multimedia and smart hotels which go beyond the present-day standards. In accordance with the rules that apply in this chain, these hotels use the same name and logo, they possess defined functional qualities such as uniform location conditions (they are situated in town centres in the vicinity of the best restaurants, cafés, shops etc.), they possess the same organizational structure (the minimum number of personnel, *Concierge* services), the same operational documentation, the same standard of fittings, standardized computer systems in all the facilities and a central service booking system (the *VISION TIME* software).

The *PURO Hotel* in Wrocław is one of the facilities that are part of the abovementioned chain. In some way, this hotel denies the rule that it is people who create and manage the hotel. The policy of this place is based chiefly on innovative technologies which are aimed at an automation of services and an adaptation of these to the self-service of guests. The self-service *PURO Hotel* in Wrocław has 102 fanciful rooms at the guests' disposal. It addressed to the middle class: accommodation in beautiful interiors at a reasonable price.

Elements from glass, exotic wood and some works of the "Kulczyk" brand project build the atmosphere in the *PURO Hotel* in Wrocław. Each room constitutes an artistic idea implemented in a panel that controls the temperature, lightning or television. Additionally, there is a free coffee and a large outdoor screen on the ground floor. The wealth and knowledge of trends in interior decor were combined there with an innovative business approach. Instead of the traditional reception, there are computers in the hotel lobby. With the use of these, guests can log into the hotel system on their

own. They pay by a credit card for accommodation in a climatic space. The *PURO Hotel Wrocław* cooperates with the *VISION TIME* company in Wrocław, which ensures comprehensive services starting from the *PMS* system to the system of hotel locks and the catering programme.

PROTEL is the *PMS* system that is used in the *PURO Hotel. PROTEL MPE* is a centralized hotel chain management system. It is operated by the main computer: the centre, and it possesses the main database of all the hotels that are controlled by it. Access to the databases is always realized in real time. The functions of the *PROTEL MPE* system include above all the following:

– central reporting: with the aid of the built-in analytical *Business Intelligence* application, generation of reports for individual facilities and the whole chain is made possible. Owing to the groups of user rights, it is easy to define which data concerns individual hotels,

– central booking: the hotels possess access to their own data and to that of the remaining facilities in the chain. Booking is immediately realized in the central database. All the system functions are available both to the centre and individual facilities;

– central marketing: each guest or company possesses only one profile in the central database. All the sale data can be viewed in the centre, owing to which transactions can be planned and supervised from its level;

– central rate management: the built in *Revenue Management* module allows one to generate individual rates for each facility depending on the adjustments introduced, e.g. as a result of increased occupancy etc.

The *PROTEL* system also possesses a wide range of communication interfaces that ensure compatibility with the remaining systems used in the hotel. Owing to the *Web Booking Engine* module, there is a possibility of online booking through the website of the facility. This module, as opposed to other ones of this type, automatically enters the reservation to the *PROTEL* system without the personnel's participation. Apart from this, *PURO* cooperates with numerous booking portals such as *Booking.com* or *HRS*. One may also book a room through *Facebook.com.*

Self-service *check-in kiosks* is yet another innovation that functions in the *PURO* hotel. After making a reservation, the guest receives confirmation via SMS and e-mail. While checking into the hotel, he/she enters the booking number in the system (he/she makes payment by a credit card or possesses a prepaid reservation), and the system automatically generates the key card.

There is also a touch panel, which enables the following:

– lightning and temperature adjustments,
– wake-up calls,
– making telephone conversations,
– change of the language version,
– setting the ECO mode,
– conversion of time to time zones,
– view of messages from the *PMS* hotel system and from hotel personnel via *RSS*,
– setting checking out of the hotel room,
– calling the hotel service (via telephone).

The integrated *BMS* system based on the server and the *Asix.Evo* specialized software controls all the systems in the hotel. The tasks of *BMS* system include the following among others:

– monitoring and control of lightning in the building and of the hotel sound equipment,
– control of heating, air-conditioning and ventilation
– visualisation of emergency conditions,
– permission for remote control over the Internet,
– possibility to manage integrated installations in the building.

6. CONCLUSIONS

Nowadays, hotel owners seek additional values which they can offer to their guests. Such elements of the hotel infrastructure as a swimming pool or a sauna are not sufficient now to attract the crowds of weekend tourists. The idea of hotel self-service is extravagant and reasonable considering economic aspects. Cooperation with hotel portals is helpful in advertising and obtaining renown, and at the same time it is a convenient way to make bookings. The *PURO Hotel* in Wrocław analyzed in this article is an example of the use of innovative technological solutions, which on the one hand streamline its functioning (help to verify occupancy, control finances or store databases) and, on the other hand, they constitute an unquestionable attraction to hotel guests.

Present-day information technologies currently perform two main functions, i.e. service and innovation. Owing to the service function, the company can realize its strategy more effectively, e.g. through automation, acceleration of processes or cost reduction. The innovative function creates conditions for the company's development, which would not be possible without the use of *IT*. Owing to this the company has an opportunity to reach new segments of customers, to launch innovative products on the market or to create new competition models.

The most important advantages that result from a wider application of innovative information technologies by hotels may include the following:

− the possibility to calculate costs per one hotel guest (including maintenance, laundry or even breakfast), which allows one to determine the price in such a manner that it covers the calculated expenses and yields profit,
− supervision of the amounts of costs incurred (among other by using key-cards, which at the same time perform the function of power transmitters,
− reduction of labour costs connected with the functioning of the self-service hotel reception (use of touch panels that allow one perform activities connected with the stay on their own as well as self-service check-in kiosks),
− free of charge means of communication with the customer (e.g. via e-mail, SMS notifications),
− free of charge advertising social networking sites (including *Facebook)*.

Concerning the research hypothesis accepted in the article, it appears that it has been proved. When examining the model of the functioning of present-day hotels, one may conclude that the demand for novelties in the hotel sector is constantly growing and innovations have already become obligatory. The implementation and use of *IT* in present-day hotels should take into consideration the requirements of internal processes in the context of their environmental impact, and it should be oriented towards the provision of the expected value, one highly estimated by the customer, with a simultaneous reduction of the production costs related to this value. As a result, there will be an increase of incomes and a reduction of operating costs, and this will be taken notice of and properly diagnosed in the financial perspective with the use of adequate financial indices. Therefore, the analysis above seems to confirm the research thesis accepted in the article.

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