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Research note

Employment in tourism: The jaws of the snake in the hotel industry

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ABSTRACT

For many years, the capacity of technologies to automate jobs was more visible in industrial settings. However, the latest advances have generated systems (through self-service technologies, online and mobile applications, and robots) that are capable of replacing human tasks in service environments. The question is whether these trends are already taking place in the tourism industry. Using data from hotels in Spain, France, Germany, and Europe as a whole, this research demonstrates that in the past 10 years, there has been a decrease in the intensity of the human labor required. This trend is occurring especially in high-end hotels, and it points to a reduction in human labor in the hotel industry.

1. Introduction

One of the most heated debates in the social sciences currently revolves around the impact of modern information and communication technologies (ICTs) on employment. Communication media (Morgenstern, 2016), institutions (World Economic Forum, 2016), consultancy firms (Chui, Manyika, & Miremadi, 2015), popular science books (Brynjolfsson & McAfee, 2011), and academics (Autor & Salomons, 2018) have extensively addressed this issue. However, predictions about how technologies such as artificial intelligence, machine learning, big data, and robotics will influence employment are not conclusive.

There are two main views regarding this issue: pessimistic and optimistic. The pessimistic perspective considers that modern ICTs will destroy more jobs than they will produce. An example can be found in the well-known study by Frey and Osborne (2017). The optimistic view also admits that modern ICTs will displace workers, but to a significantly lesser extent, while simultaneously creating new and additional jobs that will offset those replaced by technology (Autor, 2015). Both views agree that some jobs have a high probability of being automated: those whose content is mostly routine. In fact, recent research focused on the USA and the EU15 (Marcolin, Miroudot, & Squicciarini, 2019) confirmed that, between 2000 and 2010, employment growth was mainly driven by non-routine occupations that primarily belonged to the service sector.

Bernstein (2011, 2013) published a graphic (Fig. 1) showing that, in the USA in the 21st century, companies' productivity does not seem to rely on work. In contrast, during the second half of the 20th century, companies' productivity growth was supported by employment growth. This graphic has been called the jaws of the snake or the great decoupling (Brynjolfsson & McAfee, 2013). Bernstein (2011) initially presented some explanations for the detected detachment between two traditionally highly correlated variables (namely, productivity and work), such as the increase in outsourcing and offshoring by companies.

Two important authors in the field of the relationship between modern ICTs and employment (Brynjolfsson & McAfee, 2013) used this chart to hypothesize another possible explanation: that current ICTs allow companies to be more productive without increasing work because workers are being displaced by technology. This possibility was also mentioned by Bernstein (2013) in his later analysis. In fact, in Fig. 1, the greatest decoupling between productivity and work appears in the years in which the Internet, and all the technologies based on it, began to be present in society.

Tourist-based businesses have traditionally been intensive in terms of human resources. Nevertheless, companies in this industry have also been impacted by technological progress (Buhalis & Law, 2008; Bulchand-Gidumal and Melián-González, 2015). In this regard, Eurostat (2019) shows that, for example, in the case of Spanish accommodation firms, the use of ERP has grown from 16% in 2010 to 45% in 2017, and online selling, which accounts for at least 1% of turnover, has increased from 66% in 2009 to 89% in 2018.

Indeed, ICTs have collectively been recognized as one of the greatest forces of change in the hospitality industry (Law, Leung, & Lee, 2013). Among many others, the following can be mentioned: online check-in and check-out systems, self-service technologies (SSTs) such as kiosks for information, check-in, and check-out, online bookings, robots that cook, concierge robots, chatbots, automated systems for luggage

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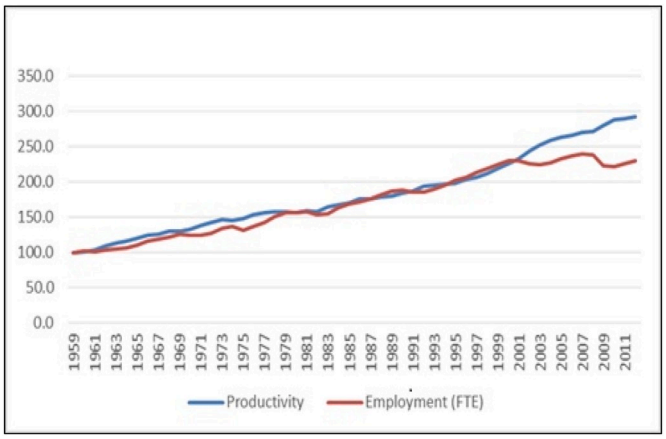

Fig. 1. The jaws of the snake.
Source: Bernstein (2013).

storage, the Internet of things, big data, and channel managers. A hotel client could currently book a room, enter it, stay, pay, and leave the hotel without any human staff support. Therefore, according to Brynjolfsson and McAfee (2013), regarding the gap between companies' productivity and employment, a jaws-of-the-snake phenomenon could also be taking place in tourism.

The debate on how technology affects employment has been going on for many years. For example, in the case of SSTs, Morisi (1996) presents a graph that shows how the growth of ATM transactions in the 1990s contrasted significantly with the decline in employment in the banking industry. Also in the case of banking at ATMs, Ou et al. (2009) found that ATMs can replace simple tasks that add little value, but they cannot as easily replace more skilled labor. Additionally, several authors explain that ATMs would not be the main force behind the decline in employment in the bank industry, but instead this decline would be led by software developments and online banking/home banking (Campanella, Della Peruta, & Del Giudice, 2017). In the specific case of the tourism industry, some authors mention that SSTs have been found to have an impact on labor costs (Oh, Jeong, & Baloglu, 2013), but there is a need for further research in this area.

Tourism is currently a key activity in many countries and regions. In these territories, a large percentage of the workers are employed by tourism companies. For example, in the case of Spain in the year 2017, 12.96% of all workers were employed by companies in the tourism industry (TURESPAÑA, 2019), whereas in some regions (e.g. Canary Islands and Balearic Islands), this figure was around 30%. Therefore, in the current context of automation and constant technological progress, it is important to understand whether important employers such as tourist-related businesses will continue to require workers with the same intensity. Otherwise, in some territories, employment figures could be seriously affected.

2. Objective

Although the data are inconclusive, there are signs that modern ICTs could be substituting workers, not only in industrial environments, but also in the services sector and, more specifically, in the tourism industry. In turn, in recent years, important technologies have been developed for tourist-related businesses' activity. Therefore, the objective of this research is to explore the current importance of workers in the activity of tourism-based companies.

3. Methodology

Data on all the hotels in Spain from 1999 to 2018 were analyzed. To represent hotels' activity, their occupied bed-places were calculated based on the Hotel Occupancy Survey (2019) data from the Spanish National Institute of Statistics. In the case of the number of employees in the hotels, these data are provided directly by the Hotel Occupancy Survey (2019). The survey classifies hotels into the five categories that are officially available in Spain, ranging from one-star (economy) to five-star (luxury) establishments. Table 1 lists the number of hotels in Spain in 1999 and 2018.

Given that high-category hotels tend to adopt more ICTs than those in a lower category (Sahadev & Islam, 2005), hotels were classified into two groups: high-category hotels (five- and four-star hotels) and medium- to low-category hotels (three-, two-, and one-star hotels). If technological progress is affecting the hotel industry, its effects should be more significant in high-category hotels.

To estimate changes in hotels in terms of the relationship between occupied bed-places and the number of employees, a logarithmic double model was applied: $\ln Y = \beta_0 + \beta_1 \ln X + \varepsilon$, in which Y is the number of hotel employees and X represents the hotels' number of occupied bed-places.

In order to test the consistency of our results and avoid limiting the analysis to Spain, we also analyzed three other geographical territories: the whole European Union (EU28), France, and Germany. France is one of the main tourist destinations in Europe, together with Spain and Italy. Germany has a very high number of nights spent in hotels in the country, in 2018 the second highest in Europe, only behind Spain. Furthermore, Germany is one of the most industrialized countries in Europe and in the world, and so we thought the process of implementing technology might have advanced at a faster speed than in Spain.

Thus, we accessed data from Eurostat (European Statistical Office). Specifically, we accessed the number of nights spent in the accommodation industry, which includes hotels and other types of accommodations, and the total number of employees in accommodations. These data were available for the 2009–2018 period. Data from before 2009 on employees per economic activity only include a category that groups together "Hotels and restaurants", and so they could not be used in our analysis.

4. Results

Fig. 2 portrays the evolution, in relative terms, of hotels' occupied bed-places and employees in Spain, respectively, for the two groups of hotels. Both groups demonstrated noticeable differences. Over the 19 years, three-, two-, and one-star hotels increased their staff in direct proportion to the increase in their occupied bed-places. By contrast, four- and five-star hotels displayed this trend only up to 2009. In the following years, the relative growth in occupied bed-places was stronger than the growth in the number of employees. This means that in those years, these hotels needed more staff when the number of occupied bed-places increased, but with less intensity than in the previous 11 years.

The logarithmic double model applied to the four- and five-star hotels' data in these two periods (1999–2009 and 2010–2018) indicates that, in the 1999–2009 period, a 1% increase in the number of occupied bed-places involved a 1.02% increase in staff. In turn, in the 2010–2018 period, a 1% increase in the number of occupied bed-places involved a 0.66% increase in staff. These figures are reflected in the evolution of the

Table 1
Number of hotels in Spain in 1999 and 2018.

Hotels	1999	2018
Five stars	76	297
Four stars	730	2.282
Three stars	1.721	2.485
Two stars	1.463	1.868
One star	1.189	1.170
Total	5.179	8.102

Source: Hotel Occupancy Survey (2019).

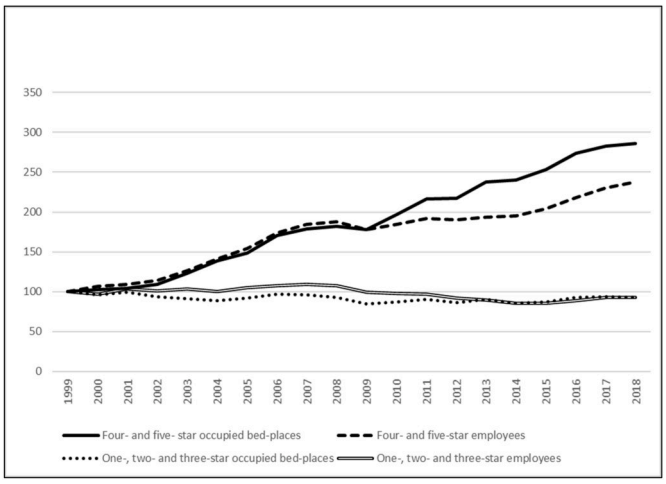

Fig. 2. Evolution, in relative terms, of hotels' occupied bed-places and employees in Spain.
Source: Own elaboration.

number of employees per occupied bed-place. From 1999 to 2009, the mean of this ratio was 0.34, whereas from 2010 to 2018, the mean was 0.28. More precisely, in 2018, this ratio was 0.27, and in 1999, it was 0.32. To understand the relevance of this change, if the ratio in 2018 was 0.32 (as in 1999) instead of 0.27, then there would be 23,327 more employees (17% more) than there were in that year.

Fig. 3 shows the evolution, in relative terms, of employees and nights spent in the accommodation industry for Spain, France, Germany, and the 28 current members of the European Union.

As the figure shows, a very similar effect to the one described in Fig. 2 is found in the four territories. In the case of Europe, whereas the number of nights has grown 41.12% from 2009 to 2019, the number of employees has only grown 16.71%. In the case of Germany, these figures are 33.57% vs. 16.07%; in Spain, 33.96% vs. 26.44%; and in France, 50.25% vs. 9.72%. All these figures are for the global accommodation industry. As can be observed in Spain, the country for which we have more detailed data, when the hotels are analyzed by category (Fig. 2), the effect is much more pronounced in the upscale hotels. We believe that a similar effect could be taking place in the rest of the geographical areas analyzed, but we were not able to access data on employees and nights spent by hotel category for countries other than Spain.

Thus, in all four geographical regions analyzed, in the 2009–2018 period, the number of nights spent increased significantly (depending on the area, but always above 33%), but the number of employees

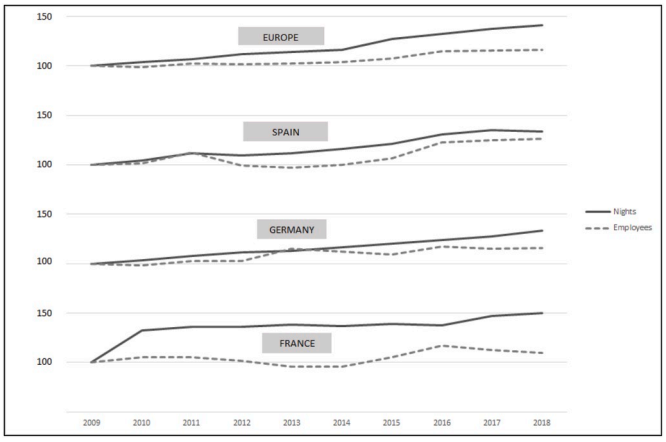

Fig. 3. Evolution, in relative terms, of nights spent and employees.
Source: Own elaboration.

increased at a much lower rate. Thus, there seems to be a situation where employment in the accommodation industry has grown, but more slowly than the growth in tourism. It can be expected that if tourism remains stable in the next ten years, or even decreases slightly in some of the analyzed territories, we could start to see a decline in the workforce required.

5. Conclusions and directions for future research

The main conclusion of this manuscript is that automation could be affecting service occupations and, more precisely, the hotel industry. The previous data are not sufficient to confirm that technological progress in the past nine years is replacing hotel employees in Spain and other territories. Nevertheless, these results are consistent with the global automation trend and with claims that this trend is reaching service occupations, which traditionally have been difficult to automate (Chui et al., 2015). Furthermore, the explanation that offshoring is one of the main causes of the jaws-of-the-snake effect is not applicable to the hotel industry because most jobs in hotels must be performed on-site. Additionally, the fact that mainly high-category hotels require fewer employees than a decade ago coincides with their greater adoption of ICTs, compared to lower-category hotels (Sahadev & Islam, 2005).

The results show that hotels increase their number of employees when their demand increases. However, what is remarkable is the drop in the intensity of the need for work. Only 19 years were analyzed in the case of Spain, and 10 years in the rest of the countries, and it is evident that the results only reflect a trend. However, considering that many places in the world rely on tourism for income and employment, it would be useful to conduct a more in-depth study of this phenomenon.

It must be noted that most of the current technologies do not directly affect the most labor-intensive area of most hotels: housekeeping. However, a series of technologies and ICT applications are being developed and will be deployed in the coming years that could significantly affect the intensity of human resources needed in housekeeping. Some of these technologies are anti-bacterial coatings, cleaning robots, and motorized caddies (Minett, 2019). In addition, some hotels are offering their guests the option of less frequency in cleaning their rooms in exchange for other benefits (CleanLink, 2019).

In this manuscript, we have analyzed how upscale and economy hotels differ. We believe it would also be interesting to analyze whether there are differences related to the size of the hotels. We were not able to locate data about accommodation activity (e.g., occupied rooms or bed-places, or nights spent) and employment in hotels depending on the size of the hotel. However, other methodologies, such as questionnaires, could be used to analyze this issue.

Finally, even if our results tend to indicate that the hotel industry may be reducing the human labor required to operate adequately, this does not mean that the jobs that are automated in the tourism industry will be definitively lost. Economic theory suggests that a decrease in employment in one industry is often followed by the generation of employment in other new industries, in what has been called creative destruction of employment (Schumpeter, 1942). However, because low skilled jobs are common in tourism (Baum, 2015), a significant number of the employees who may lose their jobs will not find it easy to get another job in the new industries that will appear in the coming years. This hypothesis would have to be tested in the future, once more data are available. In any case, policy makers should consider the possibility of launching retraining programs in order to improve the employability of those affected by technological displacement.

Contribution

Both authors have contributed to this research in a similar manner through the literature review, data analysis, and the manuscript writing.

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