

## Article

# Innovation and Technology in Hospitality Sector: Outcome and Performance

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**Abstract:** This article aims to explain the innovative behaviour of large Spanish companies by comparing the hospitality industry with other service providers and industrial manufacturers. Several hypotheses are proposed and tested for different innovation stages: innovation effort, outcome and performance. The sample includes 2944 Spanish companies with 200 or more employees. Using one-way ANOVA analysis, this study fills an important gap in the impact of innovation and technology on the performance of the hospitality sector. The results show that catering establishments have differentiated innovation behaviours not only to manufacturers but also compared to service providers. The findings support the hypothesis and suggest that hotel companies complement in-house R&D with other innovative activities. Furthermore, hospitality organisations have the highest percentage of innovation revenue due to fewer innovation efforts and innovation outcomes, mainly due to the organisation's innovations.

**Keywords:** innovation; technology; hospitality



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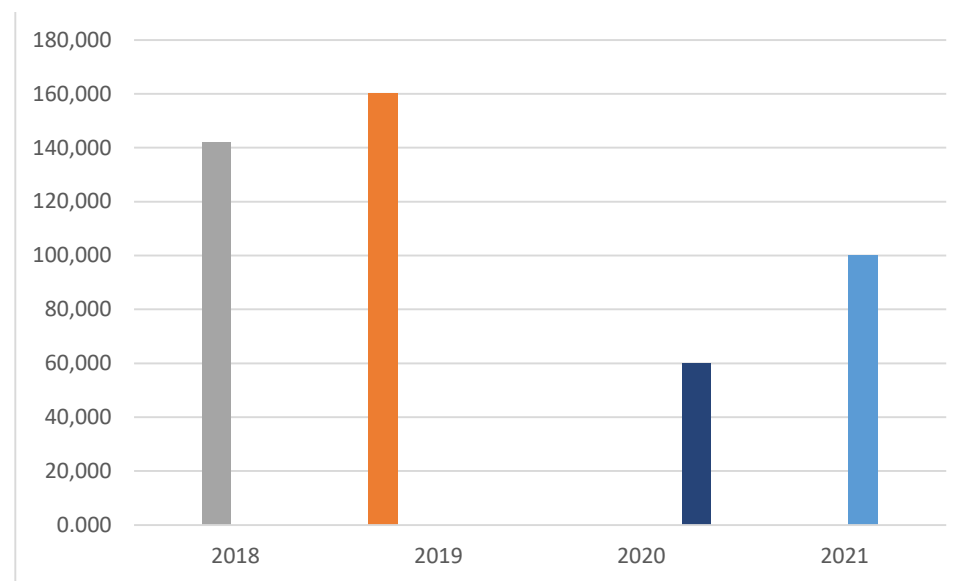
## 1. Introduction

The hospitality sector is experiencing continuous diversification and expansion over time, becoming one of the world's fastest and largest-growing sectors [1]. Spain was second in tourism earnings worldwide (and first in Europe) with US\$ 74 billion in 2018 and with 83 million overnight visitors in arrivals. If we analyse the available economic data, tourism activity reached 97,126 million euros in 2021, 8% of the Gross Domestic Product (GDP). This information translates into 2.2 points more than the previous year (a year marked by the COVID crisis). If we speak in terms of employment generated, the areas covered by tourism and hospitality generated 2.27 million jobs (in percentage terms, 11.4% of total work in Spain), so we can affirm that it is a crucial sector in the generation of employment given that it is "people-intensive" [2].

Innovation in this sector is crucial to reformulate the business model and being more competitive [3]. However, there are still many doubts about its competitiveness [1] and innovation behaviour [4]. Moreover, when this research was written, the COVID-19 pandemic severely impacted the hospitality sector in Spain. Indeed, we are still far from the economic data of the years before the pandemic. The following graph (Figure 1) shows the sector's evolution in Spain and clarifies how much effort will be made to return to figures similar to 2019. Of course, innovation will be vital to achieving this goal.

As a result, the impact of innovation on performance in hospitality companies is still a puzzle [5], and very few studies have tried to shed any light on innovation behaviour in the hospitality sector [4]. In a study by [6], innovation is considered a relevant topic in tourism research, mainly because of its positive impact on the economic sphere. This position coincides with that of [7]. Therefore, we should see innovation as core to the success of hospitality organisations as it enables them to improve product quality, increase efficiency, reduce costs, meet customers' changing needs and increase sales and profits.

Moreover, [8] recently stated that business model innovation is vital for changing and turbulent environments, and the tourism sector is highly variable since we can define it as a dynamic sector that is in permanent transformation, which requires a very high capacity to adapt to the environment, which we will undoubtedly achieve through innovation. If, in addition to the above, we take into account, as pointed out by [2], that the service sector is the most critical sector of the Spanish economy in terms of its contribution to GDP, we can affirm that betting on innovation in the hospitality sector will be crucial for the economic development of the country. The study by [9] points to a survey of senior corporate-level R&D managers at 27 of Spain's largest hotel chains, revealing a general trend towards innovation since most have formal R&D departments and offer incentives for innovative concepts.



**Figure 1.** Contribution of tourism (millions of euros) to GDP since 2018. Source: INE (National Institute of Statistics) 22 December 2022.

There is no doubt that innovation is at the heart of the success and survival of the hospitality sector [8] because it enables them to improve product quality, increase efficiency, reduce costs, meet customers' changing needs and increase sales and profits, thereby growing and gaining a larger market share and standing out from competitors [4]. To better understand this phenomenon, it is vital to consider the true nature of this sector, which is mainly based on services. It is widely accepted that innovation in services firms differs from manufacturing [9]. Unfortunately, to date, the literature about innovation in the service sector is still minimal [10], and it is even rarer, theoretically and empirically, for the tourism industry [11,12]. The service sector has been traditionally divided into two groups: the Hospitality Industry, which includes the restaurant, accommodation, entertainment and transportation businesses [5] and the Rest of the Services. The former is distinguished by being more people-oriented and less technologically intensive.

In particular, the hospitality sector has a differentiating innovative behaviour compared to manufacturers [8]. Furthermore, service companies active in tourism are seen as less innovative than other service or manufacturing sectors [10]. Surprisingly, to the best of our knowledge, only a few studies have addressed in some depth the implications of innovation in the hospitality and tourism sectors [5]. Because of this, there are severe conceptual problems related to service characteristics in hospitality firms [13]. Moreover, there is a lack of available data to gain further knowledge about innovation behaviour in the hospitality sector, and most of this innovation is considered intangible [4].

Another shortcoming of the previous literature is related to the partial study of innovation [14]. In such a way, innovative behaviour is analysed by considering inputs (effort) and

outputs (product and process innovations). According to several approaches, innovation inputs and outputs are disentangled to reconcile the conflicting views about innovation in the hospitality sector [4]. Moreover, innovation performance analysis has not been adequately addressed, not considering this sector's financial performance and competitiveness [14]. In addition, there is also a lack of deep analysis by countries [10]. Empirical studies on innovation in the Spanish hospitality industry are limited for different reasons: they show qualitative evidence based on case studies with limited power of generalisation of results; they focus only on a subsector of the hospitality industry, such as hotels [15].

According to the literature review and analysis of the hospitality sector, a significant gap has been found related to how innovation and technology are integrated into the hospitality sector in Spain and what is the real impact on performance. So far, most of the studies in this field have been qualitative, and a few have been tempted to approach this by using accurate data in this sector.

In contrast to prior research on innovation in the hospitality industry focusing only on SMEs [14] or reporting preliminary results, the present paper studies the innovative effort, outcomes and performance in hospitality firms in comparison to other sectors and shows statistical analyses' results based on quantitative data collected in 2944 Spanish companies with 200 or more employees. We aim to explain the innovative behaviour of large Spanish companies by comparing hotel companies [16] with other service providers and industrial manufacturers. Data are provided for different stages of innovation: innovation effort, outcome and performance.

In light of these data, important research goals must be achieved. This study can provide new insights into how different types of innovation and technology are used in the hospitality sector to create value and meet customer needs. It will also give a better understanding of the impact on the bottom line of this type of company and, if necessary, help to redefine the business model to be more profitable. Finally, it could be an exciting starting point for further studies to go deeper into the different types of companies that define the hospitality sector by analysing market niches and considering the peculiarities of these businesses.

The remaining paper is structured as follows. First, research on innovation in hospitality firms is reviewed, and hypotheses regarding innovation effort, innovation outcome and innovation effects on performance are proposed. Next, sample information and methodology are detailed. Later, the results of the empirical analysis are presented and discussed. Finally, conclusions and further research are summarised.

## 2. Literature Review and Hypotheses

### 2.1. Innovation in the Hospitality Industry

From an organisational perspective, innovation means finding and implementing novel products and services to save money and create a competitive advantage [15]. Innovation surveys have a long history. However, the focus of these surveys has historically been on innovation in manufacturing, while technological innovation has received greater attention in these sectors [11].

Services innovation is organised in a variety of ways. However, the way service providers innovate appears to be different from manufacturing in many ways. For example, R&D spending has long been considered critical to the innovation success of manufacturing firms but is relatively less important for service sector firms. Specifically, hospitality firms show less inclination to R&D [5], preferring investments in non-traditional R&D [17]. On the other hand, service companies place more emphasis on organisational innovation than manufacturing companies, which tend to introduce more product and process innovations [8]. For instance, the most common innovations in hotels are service and marketing innovations [16–18], a few of them being disrupted by technological innovations [11]. Moreover, organisational aspects of service innovation activities differ considerably from those of the goods production sector. Furthermore, service innovations are likely to be at least as crucial as product innovations in explaining differences in performance across countries.

We consider all these arguments and defend service innovations, especially hospitality innovations [13], which differ from industrial innovations in several ways.

Service innovation is quite different to process innovation [19]. However, tourism businesses and the broader service sector share specific characteristics that influence innovation [20]. The hospitality industry, which includes catering, accommodation, entertainment and transportation businesses, is facing increasing competition. Furthermore, unlike other service industries, a competitor in the hospitality industry exists between firms in the same geographic destination and companies with different goals. Innovation is at the heart of the success of hospitality organisations [4] as it enables them to improve product quality, increase efficiency, reduce costs, meet customers' changing needs, increase sales and profits, gain more significant market share and differentiate themselves from competitors. Innovation is, therefore, a means of gaining a competitive advantage in the travel and hospitality industry, especially in times of crisis.

Although some studies focus on non-technological innovations in the tourism industry [11], there is a tendency for the hospitality sector to adopt disruptive technologies, sometimes with the aim of sustainability or sharing economy approaches [13]. In specific countries, combining technology and innovation has created the conditions for change in hospitality [4]. While differentiation in hospitality services diminishes, innovations are needed to renew their competitive advantage. Some hospitality companies have recommended incorporating social media technologies [21] to generate spaces for co-created innovations with consumers [11]. Some combine technological and non-technological innovations to create a competitive advantage [5]. Disruptive innovation cannot involve major technological innovations. However, the generation of technical and non-technical innovations will be equally crucial while providing some protection against imitation and exploitation of these innovations by competitors with different business models. Being true that any investment in technological innovation involves risk, various studies, such as the one by [1], have shown how smart tourism has contributed to facilitating customer experiences and making customer experiences more enjoyable [22]. Thus, the results provide a meaningful vision of smart tourism for hospitality and other services companies [13].

Nonetheless, internal innovations in tourism [22] and hospitality are mainly non-technical, making them a significant challenge for researchers of service innovation in tourism and hospitality and the food industry.

## 2.2. Theories in the Context of the Hospitality Industry

Several theories could be applied to innovation and technology in the hospitality sector (Table 1).

Rogers' theory of diffusion of innovations [23] is one of the best-known theories to explain how the end users of the invention finally adopt an innovation launched in the market. According to their technology adoption, users can be classified as innovators, early adopters, early majority, late majority and laggards. In the hospitality industry context, this theory could be used to explain the impact of the technology in the sector and to intuit the diffusion of the same in the short and long term.

Another interesting theory, Service-Dominant Logic (SDL), is put forward by [24]. According to the principles of this theory, users of new technology can perceive and determine the use value of the technology. However, it is more difficult for companies to obtain this perception, and they tend to limit themselves to making value propositions about the new technology. Therefore, in the hospitality industry, this could mean that companies should enhance customer experiences and interactions rather than merely streamlining operations.

A widely known theory has been applied in the business field, but this has also proven helpful in explaining customer behaviour. For example, the technology acceptance model (TAM) enunciated by [25] explains that behavioural intentions to use new technology are based on two main characteristics of the technology: perceived usefulness and perceived ease of use. Thus, before adopting new technology, the end user will assess whether it will

improve his work performance and whether it will be easy to use in his daily life. In the hospitality industry, this theory can be instrumental in understanding why the end-users perceive a new technology used in the company as more or less attractive.

In line with the TAM theory, there is a theory that goes beyond the mere perception of the technology and explains the adoption of the same from the experiences it generates in its users, the experience economy theory [26]. According to the experience economy theory, customers are willing to pay more for products or services if they receive additional experiential value [26]. For example, in the hospitality sector, consumers tend to pay more for a product or service if they perceive that the experienced utility is higher. Thus, innovations introducing new experiential features to products and services could be rewarded with higher income for firms in the industry.

Finally, another essential theory describes the interconnection of technology, including the “Internet of Things” (IoT). Ref. [27] defines the Internet of Things (IoT) as “a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies”. This theory could be interesting to explain how the interconnections that are generated between different types of technology applied in the hospitality industry are perceived by users. In this way, it is crucial to the technology itself and the relationships it generates.

**Table 1.** Theories in the context of the hospitality industry.

	Authors	Main Contributions
The diffusion of innovations	[23]	It suggests that adopting new technologies follows a predictable pattern among individuals, organisations and communities. According to this theory, innovation diffuses among different groups following stages that make it possible to identify the response of these agents to the new technology that has been launched on the market.
The Technology Acceptance Model (TAM)	[25]	Focuses on individual adoption and use of technology. Thus, behavioural intentions to use <i>new</i> technology are based on two main characteristics of the technology: perceived usefulness and perceived ease of use. For example, explaining why end users find a new technology more or less attractive in the hospitality sector could be helpful.
Service-Dominant Logic (SDL)	[24]	It suggests that collaboration with customers can provide a competitive advantage when launching a new technology or reducing the time to develop it. Therefore, technology in the hospitality sector should enhance customer experiences and interactions rather than merely streamlining operations.
Experience economy	[26]	Propose that customers will pay more for products or services if they receive additional experiential value. For example, in the hospitality sector, consumers tend to pay more for a product or service if they perceive that the experienced utility is higher.
The “Internet of Things” (IoT)	[27]	Focuses on the interconnection between different technologies. Therefore, it is crucial not only to the technology itself but also to the relationships it generates. In the hospitality sector, this could offer a new frontier to analyse the adoption and perception of new technology.

### 2.3. Hypothesis: Innovation Effort

The first challenge when considering service innovation is measurement [9]. Economic research pays more attention to innovation inputs and finds that innovation efforts positively impact performance. Innovation effort is defined in the literature as R&D effort or R&D expenditure [28]. R&D spending is the amount each team invests in product



development and licensing, and R&D is outsourced to other companies. Regardless of the measure used, the literature seems to support the idea that innovation efforts are tested against R&D. We also propose to define innovation efforts as R&D efforts to distinguish internal from external R&D.

Innovation is mainly devoted to internal R&D and external R&D [10]. However, the type of services a company provides and other factors can influence the decision between internal and external R&D. For example, by performing a cluster analysis, it is generally accepted that firms engaged in the production of physical services for producer markets place greater emphasis on external sources of knowledge, indicating that their geographical proximity to knowledge institutions, such as universities, research laboratories and governments, is increasingly important, and they are more likely to adopt new information and communication technologies (ICT).

The innovation activities of hotel establishments may also vary [16,29]. Evidence suggests that R&D decisions (whether to conduct R&D in-house or finance R&D elsewhere) are not trivial issues, and there are significant sectoral differences in the extent to which external R&D is absorbed. Although in-house R&D is the more well-known approach to innovation, others include technology adoption [30], incremental change, imitation and combining existing knowledge in new ways [31]. No previous research has analysed hotel companies' decisions about innovation activities [16]. For these reasons, the actions of hotel companies to innovate, with or without R&D, are of great interest.

Internal and external R&D have been studied as complementary innovation activities, which means that even the largest innovative organisations today cannot rely solely on internal procurement [3]; they also need knowledge beyond their limits when developing innovations. However, the literature also highlights significant differences between the two types of R&D. Studies have shown firms that conduct their R&D are better able to use externally available information, which means that absorptive capacity may emerge as a by-product of firm R&D investment [32]. In addition, the lack of in-house R&D capabilities may reduce the ability of factories to innovate. As far as external R&D is concerned, companies usually tap knowledge sources outside the company through licensing, R&D outsourcing, company acquisitions or hiring qualified researchers with relevant knowledge. Leveraging external R&D can benefit firms as they overcome the constraints of internal R&D budgets and gain economies of scale and economies of scale available to specialised research organisations [33]. Moreover, external R&D can leverage the efficiencies of internal R&D activities, at least if the firm is open to outside ideas and knowledge. However, as described more fully in [26], the external route also has potential disadvantages, and firms may choose to conduct in-house R&D.

Furthermore, we agree with other studies that R&D is not the only means of innovation [3]. Different approaches include technology adoption, incremental change, imitation and combining existing knowledge in new ways. All of these approaches require the creative efforts of the company's employees. Thus, they will develop the company's internal innovation capabilities, which may lead to increased productivity, competitiveness and new or improved products and processes that other companies can adopt. Thus, innovation efforts come in two ways: whether the firm conducts internal or external R&D activities and through spending that invests in different R&D activities (internal, external and other).

The hospitality industry is an example of a provider-dominated category of the personal services industry [19]. The hotel service is characterised by low technical content and limited internal ability to develop new products and processes [9]. These firms have little in-house R&D [19] and may be willing to engage in innovative activities other than R&D, thereby supplementing internal R&D with other creative activities. Their dominant innovation strategy is usually based on acquiring machinery, equipment and other external knowledge produced by suppliers [9,29]. Based on previous discussions, we expect hotel companies to complement their in-house R&D with other innovative activities.

**H1:** *Hospitality firms complement internal R&D with other innovation activities compared to manufacturing and service firms.*

**H2:** *Hospitality firms invest proportionally more in other innovation activities and less in internal R&D than manufacturing and service firms.*

#### 2.4. Hypothesis: Innovation Outcomes

Innovation efforts lead to specific innovation outcomes. Innovation outcomes include innovation frequency or the number of newly developed and marketed products. It is defined as the number of new products and services that a company launches [31]. The nature of services may explain the limited research examining innovations and their implementation. As a service industry active in tourism [9], hospitality is considered less innovative than other service or manufacturing industries. The percentage of HORECA companies (hotels, restaurants and catering) implementing technical and organisational innovations is among the lowest [34]. Data from the Spanish hotel industry support this less innovative behaviour over the past decade. In 2000, the proportion of the hotel industry engaged in some technological innovation (12.3%) was significantly lower than that of other service industries (26.3%) and manufacturing (41.8%). Various reasons may lead to less innovative behaviour of hospitality establishments, namely the specific characteristics of the services they provide. The configuration of hotel service characteristics is as follows: (1) production and consumption occur at the same time and in the same place; (2) tangible (room) and intangible (right to sleep in a quiet, clean, comfortable room for one night) elements; (3) cannot be transported and stored; (4) variability (not exactly repeatable because the circumstances, conditions, configuration or resources allocated are not the same). These specific characteristics of hospitality services can influence the way hotel companies innovate. We aim to analyse the innovative activities and outcomes of hotel companies theoretically and empirically to understand the creative behaviour of Spanish hotel companies.

The literature suggests that hotel companies may exhibit innovative behaviours more similar to manufacturing companies than other service companies. In particular, [19] states that some service sectors are oriented towards physical transformation, e.g., catering, transport and trade services, including manufacturing and agriculture, have a high proportion of low-skilled workers. [9] Consider hotels and restaurants as examples of individual goods and services in an industry category, i.e., vendor-led services. This type of enterprise is characterised by low technological content, weak internal ability to develop new products and new processes as well as weak innovation ability [29].

Product/service and process are two categories of innovations in tourism management [22] and the hospitality literature [12,31]. The product/process innovation mix is considered an essential dimension of a firm's innovation strategy and is examined in innovation surveys [34]. However, the literature on process and product innovation in the hospitality industry is unclear [29]. Some researchers believe that hotel companies mainly focus on process innovation [9], while other scholars [17] find that hotels focus most of their energy on innovation related to management and product innovation. Based on previous discussions, hotel companies are expected to be less innovative than manufacturing and service companies. Additionally, hotel companies are expected to focus more on process innovation than product innovation.

**H3:** *Hospitality firms are less innovative than manufacturing and service firms.*

**H4:** *Hospitality firms are more process innovators than product innovators compared to manufacturing and other service firms.*

#### 2.5. Hypothesis: Innovation Performance

Innovation efforts and outcomes affect business performance and revenue. Compared with non-innovators, innovators believe that entrepreneurial success factors are more important. However, other studies are skeptical about the positive impact of innovation efforts on performance. For example, ref. [31]'s studies have shown that innovation efforts do not affect firm performance. In their research, all shared market knowledge helps

small firms earn better returns from innovation efforts than large firms. In the hospitality industry, the impact of innovation on performance is unclear. Recent work in this area has shown that a hotel's propensity to innovate does not have an immediate positive impact on short-term performance but can positively impact mid- to long-term performance. In addition, there is evidence that the productivity of firms' R&D efforts varies across sectors. Ref. [28], noting the relationship between innovation and performance versus context, it is pointed out that factors such as firm age, type of innovation and cultural background strongly influence the impact of innovation on performance.

According to the literature in the hospitality industry, product/service innovation refers to changes directly observed by customers and seen as new. In contrast, process innovation usually refers to back-office initiatives aimed at improving efficiency, productivity and mobility, such as implementing ICT; this has been the backbone of many process innovations in recent decades [31]. Although narrowly focused, new product sales are a standard indicator of innovation success. Some firms find it relatively difficult to estimate the impact of innovations on the economy, for example, in terms of increased sales [10]. Due to the relative difficulty of measuring the turnover share of process innovations, only the innovation success of product innovators is assessed. In the hospitality industry, most innovative hotels measure innovation outcomes as revenue growth from innovation. Based on the Oslo Manual and previous research, we define the impact of product innovation as the percentage of sales from new or improved products.

Recent studies analysing the relationship between innovation efforts and innovation outcomes conclude that the link is complex and that the literature may be biased to show mostly positive results. Some researchers do not think the relationship is direct. Some authors believe that the product innovation process (how innovation is organised or integrated into the organisational mechanism) is a facilitator of the relationship between "innovation input and output", and innovation input is defined as the ratio of R&D expenditure to sales or R&D intensity. Other studies have shown that innovation efforts have little effect on income since aggregate innovation spending and skills training do not affect income growth. Furthermore, given that adverse outcomes are not discussed in the literature, innovation-oriented effects are generally considered favourable and desirable [32]. On the other hand, the impact of innovation on performance has been understudied in the service innovation literature, especially in the hospitality industry, which leaves a significant gap in existing innovation research.

In the hotel industry, sales volume is the primary indicator to measure innovation success [4]. Most Spanish hotel managers rely on growth in gross operating profit and sales revenue to measure the effectiveness or profitability of innovations, even process innovations. However, hotel innovation is a vendor-led personal service that has been shown to have the lowest sales of new and improved products [9]. Recent studies have shown that in provider-led services, different types of innovations have a negligible impact on sales [5]. This means hospitality companies may have lower innovation scores than other service companies and manufacturers.

**H5:** *Hospitality firms achieve lower turnover due to innovation than manufacturing and service firms.*

While product innovations are often associated with creating new markets or improving the quality of existing products, process innovations are constantly introduced to reduce costs and rationalise or increase the flexibility and efficiency of production processes. Therefore, we believe that different aspects of performance, namely product-related (product range and quality), process-related (flexibility and production capacity) and others (environmental impact and regulatory requirements), should be considered better to map the effect of innovation on significant performance impact. There is less research on the hotel industry. The result of innovation on hotel performance is related to both financial (market share) and non-financial (customer retention or loyalty) objectives [4]. In their study on innovation in hotels, [35] evaluates innovation success as a composite structure



that includes productivity gains, cost reductions, decision-making improvements, efficiency gains, staff skills improvements, job satisfaction improvements and increased profitability. Ref. [14] hypothesise that hotel innovation positively impacts financial performance, customer loyalty and reputation [36].

The data they collected from small hotels in alpine tourism supports the significant positive impact of innovation on financial performance and customer retention. Ref. [4] presents an exhaustive list of defining factors for new hotel projects related to different dimensions: product, market, process and organisation. However, they do not take into account their impact on performance. To our knowledge, hospitality research does not differentiate between product-related and process-related performance implications.

Based on the above discussion, it should be more evident that the literature so far fails to draw educated conclusions about the relationship between innovation effort, outcome and performance, especially in the context of hotel innovation. Given that hotel companies are likely to focus more on process innovation and detailing the results above, we note the following:

**H6:** *Hospitality firms achieve more innovative process-related performance and less product-related performance than manufacturing and other service firms.*

### 3. Materials and Methods

#### 3.1. Sample

Data of this research are extracted from a panel of firms from the Spanish Statistics Institute following the European Community Innovation Survey (CIS) according to the guidance of Eurostat (European Commission). The CIS questionnaire draws on a long tradition of innovative research. It is widely used in most European countries, notably the UK, France, Spain and Italy [37–39], becoming an exciting source of data to research complementarities between different forms of innovation [40]. Furthermore, this data source has often been used for scientific research in the hospitality industry [5]. The panel is composed of different samples; one of them comprises companies with 200 or more employees. Data included 3391 companies of this size in the sample, which stood for  $\frac{3}{4}$  of the total population of Spanish firms of that size. Due to the high proportion of these companies in the panel and the fact that they are compelled to innovate due to their size, this is the profile of companies used in this study. Questionnaires are mailed to a selected representative sample of firms based on size and activity. Companies have 15 days to complete the survey, and each company is asked to provide truthful information. The response rate rose to 91.8%, with no information on the position of the respondents.

Another consideration of the definition of our sample is taken concerning the activity sectors. With this in mind, 88.3% of firms with 200 or more employees on the panel are in the manufacturing and service sectors. These are the sectors chosen for our study. Hospitality firms are separated from the rest of the services. Specifically, it includes restaurant, accommodation, entertainment and transportation businesses. A priori, firms in these industries may have less innovative behaviour as they spend less on innovation [34] and are mainly focused on marketing [10,18] and incremental innovations. Through the differentiation between incremental and radical innovation, we refer to the degree of novelty: we see incremental innovations as low in novelty, risk and cost; radical innovations disrupt previous structures, processes and activities. Several authors have shown that, to achieve excellence in the hospitality industry, we must encourage both types of innovation. However, as noted above, incremental innovation is by far the most widespread in the studied sectors. Moreover, hospitality industry innovations may be related to new equipment, products or concepts and are mostly intangible [31], making learning innovation efforts and results more challenging. In short, the sample includes firms of 200 or more employees belonging to the Manufacturing, Hospitality and Rest of the Service sectors with the following distribution (Table 2).

**Table 2.** Sample distribution.

	<i>n</i>	%
Manufacturing	1258	42.0%
Hospitality	506	16.9%
Rest of Services	1230	41.1%
Total	2994	100%

In Table 3, the average information about firms comprising the sample is shown. Within the range of firms with more than 200 employees, companies belonging to the hospitality sector are more prominent in terms of turnover and employees, but they have a lower percentage of employees with higher education, and their investment in tangible assets is the smallest. Differences are statistically significant with service companies.

**Table 3.** Profile of sample.

	Turnover	Gross Investment in Tangible Assets	Employees	% Women	% Higher Education
Manufacturing	239,027,479.26	16,394,655.85	603.70	26.4	13.30
Hospitality	310,020,138.14	10,556,331.36	1311.40	54.5	7.40
Services	195,526,552.65	21,374,103.76	1276.20	48.5	20.80
Total	233,154,448.42	17,453,616.68	999.60	40.2	15.40
F	3.76	2.74	27.33	361.84	85.31
Sig	0.02	0.07	0.00	0.00	0.00

### 3.2. Measures

All elements used in this study come from the European Community Innovation Survey based on the Oslo Manual [41]. Variables and scales are described in Table 4. An innovation effort is defined as the completion of an innovation activity. They include all scientific, technical, organisational, financial and commercial steps that lead or should lead to the implementation of the innovation. Some of these activities may be innovative in their own right, while others are not new but necessary for performance. Therefore, each innovation activity is measured in terms of completion, not as a percentage of total innovation activity spending. Broader definitions of the innovation variables used in this study can be found in the Appendix A.

The European Community Innovation Survey defines innovation as introducing a new or significantly improved product (good or service) on the market or introducing a new or significantly improved process in a company. Innovations are based on the results of developing new technologies, new combinations of existing technologies [30] or using other knowledge acquired by the firm. An innovative company or another company can develop innovations. However, merely selling an innovative product entirely manufactured and designed by another company is not recorded as a creative activity. Innovations should be new to the respective companies. In the case of product innovation, they are not necessarily unique to the market. In the case of process innovation, the company is not necessarily the first to introduce the process. Innovation outcomes are measured on a binary scale according to whether product or process innovations were achieved during the study period. Finally, innovation performance is measured in two ways. First, selling based on product innovation makes a distinction between innovations new to the firm and innovations unique to the market. Sales growth resulting from innovations is measured in euros and percentages. Second, innovation performance is measured on a scale of 1 to 4 regarding the various impacts of product, process and other business innovations.

**Table 4.** Variables and scales.

Variable	Scale
<b>Innovation effort (fulfilment of innovation activities)</b>	
In-house R&D (IR&D).	
Extramural R&D (ER&D).	
Acquisition of machinery, equipment and software (MAC).	Yes (1)–No (0)
Acquisition of other external knowledge (EXK).	and
Training (TRA).	% total expense
Market introduction of innovations (MKT).	
Other preparations (PRE).	
<b>Innovation outcomes</b>	
<b>Product innovation (PRDCT)</b>	Yes (1)–No (0)
Goods	
Services	
<b>Process innovations (PRCSS)</b>	Yes (1)–No (0)
Methods	
Logistic	
Support	
<b>Innovation performance</b>	
Turnover due to innovation. Firms innovating in a product are asked to distribute their total turnover among the following categories:	
unchanged goods and	€ and %
goods and service innovations new to the firm (NEWFIRM)	
goods and service innovations new to the market (NEWMKT)	
<b>Product-oriented effects</b>	
Efect1: Increased range of goods or services (EF1)	
Efect2: Entered new markets or increased market share (EF2)	(1 = not relevant; 2 = low;
Efect3: Improved quality of goods or services (EF3)	3 = intermediate; 4 = high)
<b>Process-oriented effects</b>	
Efect4: Improved flexibility of production or service provision (EF4)	
Efect5: Increased capacity of production or service provision (EF5)	(1 = not relevant; 2 = low;
Efect6: Reduced labour costs per unit output (EF6)	3 = intermediate; 4 = high)
Efect7: Reduced materials and energy per unit output (EF7)	
<b>Other effects</b>	
Efect8: Reduced environmental impacts or improved health and safety (EF8)	(1 = not relevant; 2 = low;
Efect9: Met regulatory requirements (EF9)	3 = intermediate; 4 = high)

Means, standard deviations and Pearson correlations are reported in Table 5.

**Table 5.** Means, standard deviations and correlation analysis.

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) IR&D	0.38	0.485	1																			
(2) ER&D	0.24	0.429	0.525 **	1																		
(3) MAC	0.19	0.392	0.172 **	0.176 **	1																	
(4) EXK	0.05	0.211	0.128 **	0.136 **	0.244 **	1																
(5) PRE	0.06	0.241	0.193 **	0.129 **	0.212 **	0.193 **	1															
(6) TRA	0.13	0.341	0.332 **	0.268 **	0.347 **	0.243 **	0.327 **	1														
(7) MKT	0.11	0.317	0.304 **	0.203 **	0.277 **	0.171 **	0.364 **	0.362 **	1													
(8) PRDCT	0.41	0.493	0.564 **	0.422 **	0.257 **	0.173 **	0.212 **	0.318 **	0.405 **	1												
(9) PRCSS	0.53	0.499	0.475 **	0.349 **	0.393 **	0.163 **	0.185 **	0.287 **	0.235 **	0.496 **	1											
(10) NEWFIRM	8.22	21.906	0.181 **	0.133 **	0.090 **	0.072 **	0.074 **	0.087 **	0.135 **	0.446 **	0.226 **	1										
(11) NEWMKT	5.35	17.182	0.249 **	0.188 **	0.067 **	0.051 **	0.062 **	0.146 **	0.153 **	0.370 **	0.178 **	0.058 **	1									
(12) EF1	2.70	1.155	0.354 **	0.185 **	0.071 **	0.072 **	0.112 **	0.207 **	0.251 **	0.478 **	0.040	0.098 **	0.162 **	1								
(13) EF2	2.51	1.146	0.347 **	0.207 **	0.077 **	0.084 **	0.105 **	0.212 **	0.221 **	0.424 **	0.065 **	0.088 **	0.171 **	0.723 **	1							
(14) EF3	2.97	1.092	0.245 **	0.169 **	0.105 **	0.085 **	0.067 **	0.170 **	0.170 **	0.375 **	0.126 **	0.120 **	0.138 **	0.519 **	0.544 **	1						
(15) EF4	2.79	1.040	0.088 **	0.066 **	0.128 **	0.073 **	0.071 **	0.158 **	0.094 **	0.125 **	0.375 **	0.018	0.059 *	0.279 **	0.277 **	0.360 **	1					
(16) EF5	2.78	1.056	0.102 **	0.129 **	0.126 **	0.081 **	0.062 **	0.123 **	0.093 **	0.111 **	0.387 **	0.007	0.047 *	0.270 **	0.297 **	0.354 **	0.647 **	1				
(17) EF6	2.36	1.053	0.167 **	0.119 **	0.094 **	0.045	0.081 **	0.121 **	0.105 **	0.180 **	0.279 **	0.040	0.048 *	0.316 **	0.382 **	0.370 **	0.522 **	0.587 **	1			
(18) EF7	2.13	1.011	0.208 **	0.161 **	0.061 **	0.016	0.077 **	0.112 **	0.130 **	0.167 **	0.224 **	0.060 **	0.057 *	0.297 **	0.351 **	0.347 **	0.391 **	0.441 **	0.655 **	1		
(19) EF8	2.24	1.141	0.273 **	0.222 **	0.066 **	0.038	0.057 *	0.117 **	0.144 **	0.193 **	0.158 **	0.041	0.088 **	0.330 **	0.373 **	0.395 **	0.277 **	0.346 **	0.419 **	0.579 **	1	
(20) EF9	2.36	1.181	0.235 **	0.188 **	0.080 **	0.082 **	0.032	0.144 **	0.110 **	0.206 **	0.162 **	0.033	0.085 **	0.362 **	0.392 **	0.408 **	0.308 **	0.340 **	0.416 **	0.452 **	0.646 **	1

\*  $p < 0.05$ ; \*\*  $p < 0.01$ .

#### 4. Results

This paper analyses hospitality firms' specific innovation behaviour (effort, outcomes and performance) compared to the rest of the services and manufacturing companies.

The primary analyses performed are means comparisons where industry (manufacturing, hospitality and rest of services) are the independent variables while different innovation variables are the dependent ones. In some cases, an one-way analysis of variance (ANOVA) has been performed to check for the statistical significance of the differences using the F statistic.

##### 4.1. Innovation Effort

Companies that invest in innovation are those accomplishing some innovation activity. However, 48.5% of enterprises with 200 employees do not innovate (Table 6). Again, some statistical differences are found; manufacturing firms invest much more than service firms, especially those dedicated to hospitality (82.5%). Those data support H3 and reinforce the idea that hospitality business firms are less innovative compared to other service providers and, especially, the manufacturing sector.

**Table 6.** Innovative firms by industry.

	In-House R&D	Other Innovation Activities Different from In-House R&D	No Innovation	Total
Manufacturing	63.3%	14.5%	22.2%	100.0%
Hospitality	8.7%	8.9%	82.4%	100.0%
Services	23.4%	15.2%	61.4%	100.0%
Total	37.7%	13.9%	48.5%	100.0%

Among innovation activities, in-house R&D is fundamental since it is a definite purpose for innovation. It was found that 37.7% of firms invest in in-house R&D, and 13.9% do not invest; however, they do invest in other innovation activities. Considering only innovative firms, 26.9% do not invest in in-house R&D, although they do invest in other innovation activity. In hospitality, innovative firms without in-house R&D are 50%, meaning H1 is supported. Table 2 shows significant statistical differences ( $X = 751.073$ ,  $p < 0.000$ ), and manufacturing companies overcome those in service sectors in in-house R&D investment.

Table 7 includes the percentage of firms accomplishing each one of the innovation activities. Again, three groups are differentiated, those investing in in-house R&D, those investing in any of the rest of activities and, finally, no-innovation companies.

The hospitality sector shows lower numbers for each innovation activity. Some interesting results may be drawn concerning the innovation effort of firms not investing in in-house R&D. When this occurs; they concentrate on machinery and information technology investment (MAC). In hospitality, 69% of firms do that. Proportionally, hospitality firms invest in machinery and information technology investment (MAC), training (TRA), market introduction of innovations (MKT) and other preparations (PRE) more than manufacturing and other services companies, thus supporting H2. Knowledge of innovation efforts is completed with information about the expense of different innovation activities. It is interesting to know whether they invest or not, as well as the quantity. Tables 8 and 9 show this expense's distribution and the investment amount. Internal R&D, Machinery and IT (MAC) and External R&D, in this order, are the activities concentrating almost 90% of innovation investment. As mentioned before, the hospitality sector has a particular behaviour because of the importance of MAC investment and training and Marketing activities, thus supporting H1 and H2.



**Table 7.** Detailed innovation activities by industry.

Sector	Innovation Activity	IR&D	ER&D	MAC	EXK	PRE	TRA	MKT
Manufacturing	In-house R&D	100	59	29	08	13	28	25
	Other innovation activities	00	44	53	07	11	15	18
	No innovation	00	00	00	00	00	00	00
	Total	63	44	26	06	10	20	18
Hospitality	In-house R&D	100	30	27	09	02	20	20
	Other innovation activities	00	22	69	07	11	22	13
	No innovation	00	00	00	00	00	00	00
	Total	09	05	08	01	01	04	03
Services	In-house R&D	100	41	24	09	11	29	20
	Other innovation activities	00	20	68	17	12	26	17
	No innovation	00	00	00	00	00	00	00
	Total	23	13	16	05	04	11	07
Total	In-house R&D	100	53	28	08	12	28	24
	Other innovation activities	00	31	62	12	12	21	17
	No innovation	00	00	00	00	00	00	00
	Total	38	24	19	05	,06	13	11
F		405.468	266.749	42.678	8264	30.16	48.245	61.291
Sig		0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Table 8.** Expense in innovation activities by industry (%) and ANOVA.

Sector	Innovation Activity	IR&D	ER&D	MAC	EXK	PRE	TRA	MKT
Manufacturing	In-house R&D	73.84	11.82	7.67	1.43	1.65	0.64	2.96
	Other innovation activities	0.00	36.42	41.72	4.54	5.06	3.26	9.00
	Total	60.04	16.42	14.03	2.01	2.29	1.13	4.09
Hospitality	In-house R&D	69.40	8.06	15.10	2.90	0.22	0.83	3.49
	Other innovation activities	0.00	18.51	54.91	1.63	8.74	8.94	7.27
	Total	34.31	13.34	35.23	2.26	4.53	4.93	5.40
Services	In-house R&D	77.65	9.27	6.11	1.79	1.28	1.41	2.48
	Other innovation activities	0.00	15.49	54.32	7.00	6.03	8.77	8.38
	Total	47.08	11.72	25.09	3.85	3.15	4.31	4.80
Total	In-house R&D	74.64	11.02	7.56	1.58	1.50	0.84	2.86
	Other innovation activities	0.00	25.05	48.83	5.33	5.90	6.36	8.53
	Total	54.56	14.79	18.66	2.59	2.68	2.33	4.38
F		299.789	70.786	5.942	3.148	2.579	3.174	8.612
Sig		0.000	0.000	0.003	0.043	0.076	0.042	0.000

**Table 9.** Expense in innovation activities by industry (€).

Sector	Innovation Activity	IR&D	ER&D	MAC	EXK	PRE	TRA	MKT	Total
Manufacturing	In-house R&D	3,816,650	611,035	396,484	73,710	85,353	32,936	152,874	5,168,964
	Other innovation activities		784,100	898,116	97,664	108,910	70,231	193,775	2,152,796
	Total	2,764,741	756,160	646,332	92,447	105,378	51,941	188,224	4,605,166
Hospitality	In-house R&D	612,757	71,177	133,283	25,625	1,906	7,344	30,822	882,935
	Other innovation activities		156,239	463,484	13,767	73,768	75,437	61,351	844,028
	Total	296,186	115,202	304,111	19,506	39,070	42,562	46,626	863,263
Services	In-house R&D	6,597,182	787,276	519,305	152,393	108,439	120,150	211,038	8,495,783
	Other innovation activities		452,264	1,586,288	204,544	176,077	256,215	244,597	2,920,046
	Total	2,966,491	738,190	1,581,012	242,279	198,333	271,673	302,673	6,300,704
Total	In-house R&D	4,367,241	644,937	442,485	92,301	87,742	49,336	167,194	5,851,179
	Other innovation activities		590,265	1,150,717	125,695	138,938	149,914	201,061	2,356,606
	Total	2,679,802	726,597	916,514	127,092	131,717	114,303	215,292	4,911,291

#### 4.2. Innovation Outcome

The outcome is the number of new products and services that a company launches [14]. Table 10 shows that manufacturers are the most innovative, while hotel companies are the least innovative, as predicted in H3. Two-thirds of the hospitality industry has not innovated any products or processes.

**Table 10.** Product and process innovation by industry (% total).

	No Product No Process	Product No Process	No Product Process	Product Process
Manufacturing	20.19 %	9.54%	17.5%	53.58%
Hospitality	67.6%	4.3%	17.4%	10.7%
Services	49%	7%	20.4%	23.6%

Table 10 also shows that organisations in the hospitality industry are more process innovators than product innovators. Only 4.3% of hospitality firms invest in product innovations alone, while 17.4% innovate only on processes. Thus, the evidence presented here supports Hypothesis 4 and suggests that hotel firms exhibit more manufacturer-like innovative behaviour than other service firms. Ref. [19] found that the manufacturing industry seems more prone to process innovation and the combination of product and process innovation. Similar results can be found in our sample of hospitality establishments.

Table 11 shows that 41% of firms are product innovators. Goods innovation is more frequent, especially in the manufacturing sector, which has the highest rates of innovative outcomes. Service companies are focused on service innovations. Hospitality shows the lowest rate of product innovation, in line with H4. A significant result is companies innovating in products but not fulfilling any innovation activity. Eleven per cent of companies are product innovators without any innovation activity. This result stands for 27% of product innovators. In the hospitality sector, this number reaches 60% of companies.

**Table 11.** Product innovators by industry (%).

	Innovation	Product (Good and/or Service)	Good	Service
Manufacturing	In-house R&D	82	78	32
	Other innovation activities	51	45	15
	No innovation	16	14	5
	Total	63	59	23
Hospitality	In-house R&D	57	48	27
	Other innovation activities	33	29	18
	No innovation	9	5	6
	Total	15	11	9
Services	In-house R&D	68	39	59
	Other innovation activities	52	19	48
	No innovation	11	5	8
	Total	31	15	26
Total	In-house R&D	77	67	39
	Other innovation activities	50	32	30
	No innovation	11	7	7
	Total	41	33	22

Process innovation (53%) is higher than product innovation (41%). Among process innovations in the hospitality and services sectors, the most important innovation is support (Table 12). Again, hospitality is the least innovative sector. Twenty per cent of companies

are process innovators without any innovation activity. This result stands for 37.7% of process innovators, more prominent than the rate of product innovators. In the hospitality sector, this number reaches 57.7% of firms.

**Table 12.** Process innovators by industry (%).

	ClasiID	Proc_Inno	Man_Inno	Log_Inno	Sup_Inno
Manufacturing	In-house R&D	84	73	32	52
	Other innovation activities	77	51	22	44
	No innovation	28	14	7	18
	Total	71	56	25	43
Hospitality	In-house R&D	77	50	25	48
	Other innovation activities	91	24	40	69
	No innovation	16	2	6	13
	Total	28	8	11	21
Services	In-house R&D	80	42	17	66
	Other innovation activities	87	27	20	77
	No innovation	20	5	2	16
	Total	44	17	9	37
Total	In-house R&D	83	64	28	55
	Other innovation activities	83	37	23	62
	No innovation	20	6	4	16
	Total	53	32	16	37

In comparison to manufacturers and other services companies, hospitality firms in the sample invest less in R&D and more in other innovation activities (H1 and H2), which may imply they are more likely to focus on process innovation. Our results support that reasoning and, also, H4. Furthermore, the higher prevalence of process innovations among non-R&D performers suggests more options for developing processes without conducting R&D.

#### 4.3. Innovation Performance

Only companies with innovative products are required to allocate their total sales to the following categories: (a) unchanged or only slightly modified goods and services (including reselling new goods or services purchased from other companies); (b) product and service innovations (nothing changed, just new to their company); (c) innovations in goods and services in the market. The results (Table 13) show that the hospitality industry has the highest innovation performance; innovations account for 45% of sales, mainly innovations within companies. This finding was unexpected as it supports the opposite effect predicted in H5.

**Table 13.** Distribution of total turnover by industry (%) and ANOVA.

	G/S Unchanged	Innovations New to the Firm	Innovations New to the Market
Manufacturing	69.45	18.25	12.30
Hospitality	54.99	35.31	9.69
Services	65.13	20.03	14.84
<b>Total</b>	<b>67.26</b>	<b>19.83</b>	<b>12.91</b>
F	198.944	24.099	26.756
Sig.	0.000	0.000	0.000

As there are sectors in which firms find it relatively difficult to estimate the economic impact of innovation in sales increase [10], the effects on the performance of product and process innovations are assessed here considering product-related, process-related and other effects shown in the Appendix A. The importance of each effect is measured by the degree of observed effect with the following scale: High (4), Medium (3), Low (2)

and Not relevant (1). For example, Table 11 shows that “improved quality of goods or services” (effect 3) is the most critical effect, followed by “improved flexibility” (effect 4) and “increased capacity” (effect 5) of product or service provision and “increased range of goods and services (effect 1). In hospitality, the first positions are occupied by effect four and effect 5, both process-oriented effects. Therefore, our data support H6. Data in Table 14 also show that, globally, the importance of each innovation effect on performance is higher when the firm invests in in-house R&D. The only exception is in effect 4 in hospitality.

**Table 14.** Innovation effects by industry.

Sector	Innovate	Product			Process			Other		
		Efect1	Efect2	Efect3	Efect4	Efect5	Efect6	Efect7	Efect8	Efect9
Manufacturing	In-house R&D	3.15	2.97	3.22	2.86	2.89	2.63	2.48	2.69	2.70
	Other innovation activities	2.31	2.11	2.63	2.52	2.74	2.25	2.13	2.13	2.13
	No innovation	2.27	2.16	2.65	2.47	2.61	2.30	2.13	2.21	2.12
	Total	2.93	2.75	3.07	2.77	2.84	2.54	2.39	2.55	2.55
Hospitality	In-house R&D	2.89	2.73	2.82	2.75	2.77	2.34	2.20	2.55	2.66
	Other innovation activities	1.98	2.00	2.58	3.00	2.91	2.42	1.91	1.80	2.13
	No innovation	1.93	1.86	2.27	2.83	2.67	2.04	1.73	1.70	1.78
	Total	2.19	2.12	2.49	2.85	2.76	2.22	1.90	1.95	2.10
Services	In-house R&D	2.78	2.49	3.17	2.90	2.84	2.19	1.86	1.96	2.27
	Other innovation activities	2.36	2.12	2.96	2.91	2.70	2.11	1.68	1.70	2.10
	No innovation	2.13	1.88	2.55	2.55	2.49	2.00	1.77	1.68	1.87
	Total	2.48	2.21	2.93	2.80	2.70	2.12	1.78	1.81	2.11
Total	In-house R&D	3.04	2.84	3.19	2.86	2.87	2.51	2.31	2.50	2.59
	Other innovation activities	2.29	2.10	2.77	2.75	2.74	2.21	1.90	1.90	2.12
	No innovation	2.12	1.95	2.51	2.59	2.56	2.09	1.86	1.82	1.92
	Total	2.70	2.51	2.97	2.79	2.78	2.36	2.13	2.24	2.36

## 5. Discussion

Results of the statistical analysis from a sample of nearly 3000 large firms support most of the hypotheses. Companies in the hotel industry show differentiated innovation behaviour not only for manufacturing but also for other service industries. Hotel companies supplement internal R&D with other innovative activities. Compared with manufacturers and other service providers, they invest in other innovative activities with a higher proportion and a lower degree of innovation. There are more process innovators than product innovators, achieving higher innovation results; their creations achieve more performance impact related to the process. All hypotheses are supported except H5.

The hospitality sector shows lower numbers for each innovation activity and is seen as less innovative. Ref. [34] also found that the hospitality industry is among the sectors which spend less on innovation. The proportion of Spanish hospitality firms engaged in some innovation is notably lower than for other services companies and manufacturers. Travel companies operate in a highly competitive industry where innovation is often a condition of survival [12,42]. Prior research shows that tourism firms’ innovation behaviour is related to size: the larger the firm, the more product/service and organisational innovations it adopts [17]. However, in our sample of large hospitality firms, they are found as less innovative. Thus, our data do not support a side effect but a sectoral effect on innovative behaviour.

A distinctive innovation activity by combining diverse innovation efforts is found in our sample of hospitality firms. Our findings are consistent with the conclusion that hospitality firms, as producers of personal services, more intensively acquire other external types of knowledge and more frequently organise training activities [9]. Moreover, our results are similar to those reported by [14]. Their data show that hotels in the Alpine tourism industry mainly invest in new information and communication technologies and marketing innovations [42]. Despite being low-tech services [11], evidence suggests that

hospitality services have evolved towards a more specialised service. The human element is critical in travel and hospitality companies. That is why we need highly educated and specially trained employees to create an environment conducive to innovation. This statement contrasts the results we obtained in Figure 1, which clearly shows that hospitality workers are the least educated (their proportion of highly skilled employees is only 7.4%) compared to manufacturing and other service industries. This will correlate with training investment needs and explain the investment in this variable (TRA) that we see in Tables 5 and 6.

Results show that hospitality firms do invest in machinery and IT innovations, in line with recent studies suggesting that new forms of IT travel-related services are developed and accepted by consumers and transforming the hospitality industry. Our data confirm the great potential of disrupted technological innovations in hospitality services [11] and show that hospitality firms' investment in innovation focuses on a combination of R&D and non-R&D efforts. Prior research also indicates that hotels' R&D expenditure is invested in diverse R&D activities (especially non-traditional R&D) and increases the likelihood of producing various types of innovations [17].

The hospitality industry uses innovations to increase the flexibility and capacity of production processes. This strategy can help extend the industry life cycle of these mature industries and create new technological opportunities [9]. The results are consistent with the idea that, compared with R&D performers, non-R&D innovators are more likely to focus on process innovations in management processes, practices, structures or technologies that are new to the firm and relevant to its performance, which would impact innovation, productivity and competitiveness.

Perhaps the most surprising result of this work relates to innovation performance, as it challenges previous research. Due to lower innovation efforts and outcomes, hospitality companies had the highest percentage of innovation sales (45%), mainly due to new company innovations (35.3%).

As an example of such personal services, hospitality services are expected to have low innovation performance. However, our results show that hotel companies achieve the highest innovation performance regarding revenue impact, supporting the opposite effect expected in H5. This unexpected result is consistent with some previous studies. Due to innovation, hospitality companies generate higher returns than other service or manufacturing industries. Furthermore, [5] states that vendor-led services with hybrid innovation strategies can generate higher revenues. Vendor-led personal benefits have been reported to have the least revenue variation in product innovation [9].

Service providers innovate differently from manufacturing firms, being more noticeable in hospitality. Their figures in the innovative effort are lower in terms of fulfilment of innovation activities, especially in in-house R&D and innovative outcomes; nevertheless, they get higher innovative performance. Several authors point out the relationship between seller and purchaser in the services sector, which may be relevant to understanding the innovation more useful in the hospitality sector. They mention less traceability and more intangibility. Our research offers a broader field of innovation, overcoming the traditional emphasis on innovation input [43] and in-house R&D [35].

Finally, each innovation's impact on performance is higher when firms invest in internal R&D, with the only exception being the impact in the hotel industry. However, our data suggest differences between internal R&D innovators and firms investing in other innovation activities in terms of the effect of innovation on performance.

## 6. Conclusions

This research is focused on innovation providing data from Spanish firms with 200 or more employees. Special attention is paid to the hospitality sector, compared to other services companies and manufacturers. Although innovation is a field of research and practice that is truly relevant to firms, data are scarce. To contribute to this field, data are offered concerning different phases of innovation. Innovation effort refers to the fulfilment



and expenses of innovation activities. Innovation outcome is measured by innovation in product and process. Finally, innovation effects on performance consist of changes in sales due to innovation, product-related effects, process-related effects and other effects. Another contribution relates to our focus on R&D, which is hardly studied in tourism research [33]. Among innovation activities, in-house R&D is especially relevant.

### *6.1. Theoretical Implications*

Our research may have important implications for academics. First, compared to manufacturing and service companies, the hospitality industry has been proven to have a differentiating innovative behaviour in terms of innovation activities, outcomes and performance, with a particular focus on R&D. Few studies have specifically analysed R&D efforts in hospitality firms. Our results shed light on innovation in the service sector, differentiating one specific behaviour in more traditional activities such as hospitality. Other researchers may find our study helpful concerning significant aspects of hospitality firms and innovation. Second, our research contributes to the extant literature by focusing on internal R&D versus other innovation activities; the positing and testing of hypotheses about innovation effort, outcomes and effects on performance for hospitality firms in comparison to other sectors; the evidence of higher impact on sales that hospitality innovation has; and the distinction between product-related and process-related effects of innovation on performance. Hospitality research can be enriched by distinguishing between these two innovation types, although the applicability of the difference between product and process innovations in services is more questionable [34]. Third, the hypotheses are tested here based on panel data from the CIS and the Oslo Handbook, a method rarely used in tourism studies [42] and hospitality studies [17]. Exciting insights are gained here, which means it is applicable and rewarding to use this innovative survey and handbook in hospitality research.

### *6.2. Managerial Implications*

Hospitality is different from manufacturing and the rest of the services. Many firms innovate through other activities, especially in the hospitality sector. Managers must know that innovation in that sector differs from manufacturing and other services companies in many aspects: innovation activities, outcomes and effects on performance. Specifically, efforts based on machinery, IT, marketing and training innovations are found especially suited for the hospitality sector. Our findings may guide managers at hospitality firms in their innovation efforts and recommend them to invest in IT innovation as evidence suggest that hospitality services evolve towards a more technological type of service. Additionally, based on our results, we enhance hospitality managers to be more innovative because of innovation's great revenue potential in hospitality firms. Finally, our findings encourage managers to invest in alternative innovation efforts to leverage the demonstrated power of innovative behaviour in hospitality firms.

### *6.3. Limitations and Future Research*

The insights of this research can be expanded in different ways. The sample may be extended to include other countries, industries or company sizes. Moreover, the multi-variable analysis will identify the significant causal relationship between innovative effort, outcome and performance. Therefore, it could be interesting to explore, using regression analysis, the influence of manufacturing, service or hospitality industries on innovation variables. Furthermore, newer forms of innovation in the hospitality industry, such as disruptive technological innovations [11] or business model innovation for sustainability [1], are a claim for further research. These aspects overcome the objectives of this research and may be the focus of future works. As previously stated, countries also lack in-depth analysis, which should encourage authors to compare regions or countries to provide a meaningful recommendation to firms. It would also be exciting for future research to study how companies in the hospitality sector have coped with the COVID-19 crisis [3], as they

have been the most affected. It is possible that by studying these same sectors again in 2021, this industry would have had to innovate to a greater extent than manufacturing and other service companies to survive. Finally, understanding customers' perceptions of innovation in hospitality deserves further research.

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## Appendix A

Innovation Activities include:

1. In-house R&D (IR&D). Also called internal R&D, it includes creative work undertaken within their enterprise to increase the stock of knowledge and its use to devise new and improved products and processes (including software development).
2. Extramural R&D (ER&D). Same activities as above but performed by other companies (including other enterprises within your group) or by public or private research organisations and purchased by the enterprise. It is also named external R&D.
3. Acquisition of machinery, equipment and software (MAC). Acquisition of advanced machinery, equipment and computer hardware or software to produce new or significantly improved products and processes.
4. Acquisition of other external knowledge (EXK). Purchase or licensing of patents and non-patented inventions, know-how and different types of knowledge from other enterprises or organisations.
5. Training (TRA). Internal or external training for the personnel specifically for the development and/or introduction of new or significantly improved products and processes.
6. Market introduction of innovations (MKT). Activities for the market introduction of new or significantly improved goods and services, including market research and launch advertising.
7. Other preparations (PRE). Procedures and technical preparations to implement new or significantly improved products and processes that are not covered elsewhere.

Innovation Outcomes include:

1. Product innovations introduce new and significantly improved goods and/or services concerning their fundamental characteristics, technical specifications, incorporated software or other immaterial components, intended uses or user-friendliness. Changes of a solely aesthetic nature and the pure sale of product innovations wholly produced and developed by other enterprises are not included.
2. Process innovations are implemented in new and significantly improved production technologies or new and significantly improved methods of supplying services and delivering products. The outcome of such innovations should be significant concerning the output level, quality of products (goods or services) or production and distribution costs. Purely organisational or managerial changes are not included. Three types of process innovations are considered: (a) Manufacturing Innovation: new

or significantly improved methods of manufacturing or producing goods or services; (b) Logistic Innovation: new or significantly improved logistics, delivery or distribution methods for your inputs, goods or services; (c) Support Innovation: new or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting or computing.

Innovative performance

Turnover due to innovation

Firms innovating in the product are asked to distribute their total turnover among the following categories:

- (a) Goods and services that were unchanged or only marginally modified (including the resale of new goods or services purchased from other enterprises;
- (b) Goods and service innovations that were only new to their firm;
- (c) Goods and service innovations that were new to their market.

Product-oriented effects

Effect1 Increased range of goods or services;

Effect2 Entered new markets or increase market share;

Effect3 Improved quality of goods or services.

Process-oriented effects

Effect4 Improved flexibility of production or service provision;

Effect5 Increased capacity of production or service provision;

Effect6 Reduced labour costs per unit output;

Effect7 Reduced materials and energy per unit output.

Other effects

Effect8 Reduced environmental impacts or improved health and safety;

Effect9 Met regulatory requirements.

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