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ORIGINAL RESEARCH

# Technology double gender gap in tourism business leadership

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## Abstract

The evolution of the Information and Communication Technologies (ICTs) continues generating paradigm-shifts in the tourism industry, and the incorporation of gender diversity in the managing bodies of hospitality and tourism firms can become a factor of critical success. Nevertheless, women's under-representation on decision-making positions in ICT or high-tech organizations (double gender gap) in the tourism industry has been hardly evaluated. The aim of this paper is to extend the understanding of the impact of this double level of discrimination at a vertical and horizontal level. The impact of stereotypes, gender roles and gendered organizations become the theoretical framework on this study. The biggest multinationals in the tourism industry were classified according to Eurostat's definition of high-tech services in three intensive technological levels (High-Tech Knowledge Intensive; Knowledge-Intensive and Less Knowledge-lntensive). The composition of their Board of Directors (BOD) and Management Teams (MT) was analysed, through their annual reports and online public related documents, and evaluated through Content Analysis. Based on a total of 55 tourism related firms, the results confirm the direct relationship between the technological level of the companies and the lower participation of women on MT and BOD. Results also show that Gender Diversity Programs promote women representation on the BOD and that this relation is bi-directional, i.e. more women on BOD imply more gender diversity programs.

**Keywords** Women · Corporate Governance · Technology · Tourism · Double gender gap · Board of Directors · Decision making

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## 1 Introduction

The under-representation of women in decision-making position in organizations in general (e.g. Glass and Cook 2016; Stainback et al. 2016; Askehave and Zethsen 2014; Hatmaker 2013, Palomo et al. 2017; Laguna-Sánchez et al. 2014), and in tourism in particular (e.g. Segovia-Pérez et al. 2019a; Costa et al. 2017; Pritchard and Morgan 2017; Laguna-Sánchez et al. 2014) has been extensively studied. There is also an important research field and practitioners' actions concerned about women's gender gap in Science, Technology, Engineering and Mathematics (STEM) course-taking (Wang and Degol 2017; Beede et al. 2011) and their limited participation in Information and Communication Technology (ICT) organizations, mainly in management positions (e.g. Ashcraft et al. 2016; Michie and Nelson 2006; Dasgupta and Stout 2014). However, the limited participation of women in ICT or high-tech organizations in the tourism industry has been hardly evaluated (Segovia-Pérez et al. 2012; Figueroa-Domecq et al. 2019), restraining the understanding around the so-called double gender gap in the tourism industry, i.e. the double level of discrimination for women as they try to rise along organization's hierarchy and the limited participation of women in ICT and high technology firms or positions.

Tourism core business evolves around the development of big data and intelligent data analysis (Fazzolari and Petrocchi 2018), ICTs (Neidhardt and Werthner 2018; Talón-Ballestero et al. 2014), smartphones (Ribeiro et al. 2018; Tussyadiah 2016) or artificial intelligence (Tussyadiah and Miller 2019). Technology has increased tourism organization's capability to keep global markets, redesigning products, addressing consumers' needs and satisfactions and bringing together service providers, customers and other stakeholders (Bethapudi 2013). For this reason, a proper ICT integration between consumers, employees or entrepreneurs and technology is more important than ever. In this process women have had a limited participation and they are essential as decision-makers in families and as individuals (Barlés-Arizón et al. 2013; Rojas-de-Gracia et al. 2018; Segovia-Pérez et al. 2012) as well as employees, entrepreneurs and managers (e.g. Santero-Sanchez et al. 2015; Costa et al. 2017).

Globalization, workforce diversity and technological advances in tourism (Bharwani and Talib 2017; Baum 2013; Suh et al. 2012) require for a new management scenario where gender diversity is crucial for success and creativity, both for tourism firms and for the industry in general (Hewlett et al. 2008; Shields 2015).

Both social justice and business case arguments support balanced representation of women and men in decision-making positions (Teigen 2012; Figueroa-Domecq et al. 2019). From a social justice perspective, women should represent their proportional share of decision-making positions in organizations: 50%. Business case arguments confirm several positive impacts: better organizational performance (e.g. World Economic Forum 2016; Robnik 2015; Díaz-Fernández et al. 2015; Yeo and Grant 2019; Dezsö and Ross 2012), higher ethical, financial performance and company's reputation (e.g. Yeo and Grant 2019; Ferreira 2015; Bear et al. 2010), better understanding of stakeholder needs (Samara and Jamali 2018), innovation and creativity (Miller and Triana 2009; Brieger et al. 2019) and more people-oriented organizations (Broadbridge and Simpson 2011; Valenduc 2011).

The evaluation of the double gender gap in the tourism industry is a complex phenomenon that requires a multidimensional perspective (Segovia-Pérez et al. 2019a). This requirement is based on the impact of gendered notions and gendered organizations (Acker 1990), gender roles and stereotypes in the tourism and ICT industry (Costa et al. 2017; Belgorodskiy et al. 2012; Valenduc 2011). Stereotypical opinions relegate women to second hold positions, as an extension of their traditional domestic roles in the tourism sector (Campos-Soria et al. 2011; Santero-Sanchez et al. 2015), or 'periphery' or 'technically soft' in ICT profession (Holtgrewe 2014; Valenduc 2011). Gender roles influence conceptualization of women as less competent, with a lack of self-confidence, experience and capacity for leadership positions (Cuadrado et al. 2015; Reskin and Bielby 2005), but also as not interested in STEM positions and less confidence on their technological capacity (e.g. Sáinz et al. 2016; Yeo and Grant 2019).

This article aims to evaluate the impact that organization's technological level has on women's participation as leaders in tourism companies, as well as measuring the real impact of action's towards gender diversity in their governing bodies.

This aim drives into the following Research Objectives (RO):

RO1. To assess how the organization's technological level influences women's participation on governing bodies.

RO2. To assess the relationship between gender diversity programs and women's level of participation on governing bodies, while accounting for the organization's tech-level.

RO3. To evaluate the relationship between gender diversity on governing bodies and the implementation of gender diversity programs, while accounting for the organization's tech-level.

The article will be organized as follows. The following section outlines the theoretical reasons behind the underrepresentation of women in top management positions, paying especial attention to the impact of technology and the double gender gap. In the following section, the methodology applied in the analysis is presented. This section is trailed by the results and discussion sections. Finally, conclusions along with management implications.

## 2 Theoretical framework: women, technology and discrimination

Framing the conceptual meaning of the double gender gap (technology & tourism) requires a multidimensional approach that allows making connections between gender, sectors/contexts, societal norms (structural) and organizational norms (organizational) arising a system of privilege for male groups above women (Mooney et al. 2017). Gender, as a category socially constructed (Risman 2004), is at the root of the different dynamics between females and males about segregation in sectorial and technological context. Different contexts do not act independently of each other

and the multidimensional perspective brings the possibility to analyse the intersection between institutional and social process and practices that influence individual's actions and opportunities (Zander et al. 2010).

Gender and technology in tourism face both access and development discrimination in organizations with a double negative effect on female careers. This impact can be evaluated through women's position on managing bodies like Management Teams (MT) and Board of Directors (BOD); two important administration bodies with different tasks and structures, but that are essential and complementary for globalized multinationals.

Literature focused on issues related to gender diversity on BOD and MT is important and continuously growing (González-Rodríguez et al. 2015; Brammer et al. 2007). Research supports that women's underrepresentation in governing bodies has not changed (Brammer et al. 2007): Across all industries women currently make on average up to 9% of CEOs and 15% of senior level staff (World Economic Forum, 2016); and the reasons behind this situation are multidimensional and interactional (Segovia-Pérez et al. 2019a; Risman 2004): gender stereotypes at a structural and individual level, and organizational and sectorial segregation at a tourism level.

### 2.1 Connections between gender stereotypes, segregation and ICT

Stereotypes representations and gender roles are social constructions about how a person must act, behave, speak, or think based upon their sex. Stereotype theories and Social Role Theory (Eagly and Wood 1999) associate men with power, success, achievement, leadership and control, while women are connected with emotions, relationships, and communication. As a consequence, the workplace is not gender neutral, inequalities are embedded in the organizational process (Acker 1990) and stereotypes have an impact (e.g. Kinnaird and Hall 1996; Ramos et al. 2002; Sinclair 1997) on horizontal and vertical gender segregation.

*Horizontal segregation* refers to over or under representation by one gender on certain sectors or activities. ICT's professionals or jobs related to technology and engineering are a paradigmatic example of male-dominated fields. Gender stereotypes play a fundamental role as mediators in women ICT's use, educational decision and professional careers in technological fields. Literature has explained the low representation of women in STEM education and technical positions due to their lower perception of their scientific abilities, their own self-conscious and social expectations, lack of interest and negative attitudes towards technology fields (Sáinz et al. 2016; Yeo and Grant 2019). Less women with ICTs degrees impacts on female ICTs sectorial workers, producing an insufficient critical mass that might be promoted. Likewise, the fourth technological revolution have split ICT profession into two profiles, technical or non-technical with hybrid skills (Whitehouse and Diamond 2005) where women tend to gravitate towards 'technically soft' areas where is harder to climb by the leader escalator (Yeo and Grant 2019; Segovia-Pérez et al. 2019b; Tabuwe et al. 2013; World Economic Forum 2016). Similarly, in the tourism

industry, there are feminized jobs in positions linked to their traditional home roles (Carvalho et al. 2019; Costa et al. 2017) and with less possibilities to progress.

Women also experience discrimination at a vertical level (vertical segregation) as a consequence of institutional and structural barriers restraining female presence on management positions or on BOD or MT (Grosvold and Brammer 2011; Terjesen et al. 2009). Male-dominated organizational culture supported by the "think manager-think male" phenomenon (Schein 2001), influence on the perception of women leadership capacity (Hatmaker 2013). Women are associated to lesser focus in achievement, power, autonomy and leadership skills or technological capabilities compared to men's (Eagly and Wood 2012; Brieger et al. 2019; Lewellyn and Muller-Kahle 2019). Also, the "ideal worker" paradigm with flexibility and constant availability, added a family-related factor to women underrepresentation in top management, due to their primary role in family duties (Costa et al. 2017; Boone et al. 2013). Furthermore, hidden organizational beliefs about women influence women is self-perception as less capable, experienced and qualified preventing them from their intention to moving up into the management ladder.

Therefore, the relationship between stereotypes and vertical and horizontal segregation in ICTs and tourism influences female participation on top management positions, in tourism firms, according to their ICT level. Based on these the following two hypotheses are proposed:

H.1.a. The technological level of tourism organizations influences the number of women on the BOD.
H.1.b. The technological level of tourism organizations influences the number of women on the MT.

### 2.2 Connections between intergroups relationship, the critical mass and gender diversity actions

Psychology and sociology research results provide a framework to understand how intergroups relationship, social categories and attractions and similarities have an impact in the presence of women on top management positions and boards of directors.

Social categorization and similarity/attraction theories (Walster et al. 1978) highlight how people are more attracted to others who are like them. On an organizational context, it means that similar social demographics groups prefer to work together (gender, age, race, nationality) (Harjoto et al. 2018) suggesting that in a male-dominated environment with mainly male managers, women are perceived as dissimilar, decreasing their probabilities to get a promotion, the so-called "only one member" (Krivkovich et al. 2018). Token theory highlights (Bear et al. 2010) that groups with a single minority member (e.g. a female director) may consider that minority member to be a token. The group may perceive the minority individual as less competent and of lower status. Consequently, the group may fail to take the token's opinions or contributions seriously (Brewer and Kramer 1985; Lord and Saenz 1985). The token phenomenon may have a stronger influence on a lesser number of women in top management positions.

Critical Mass theory (Kanter 1977) adds to the previous approaches that social interactions and influence also depends on the size of group. Women difficulties climbing the leadership ladder depend on the possibilities to reach a certain threshold, as a critical mass, where their degree of influence increases. This critical mass in decision-making positions facilitates the requisite resources to overcome their token status and improve their possibilities to gain leadership positions (Glass and Cook 2018). Hence, at a corporate decision-level, gender diversity has a positive impact on women's likelihood of being promoted to top leadership positions (Cook and Glass 2014). However, the predominance of men in decision-making positions and social interaction inertia becomes a vicious circle that prevents women from reaching such critical mass. A study performed on the S&P 1500 companies (Chang et al. 2019) identified that women only represented 16.3% of the members of the BOD, and that companies may stop focusing on gender diversity once they reach a threshold of two women on the BOD. Nevertheless, authors have estimated that on corporate boards the critical mass tipping point is reached when there is a minimum of three women on the BOD (Torchia et al. 2011; Erkut et al. 2008).

However, the key question is how to increase the number of women in decision-making positions like on the BOD and the MT, and what is the impact of the organization's tech-level. On this direction, the following hypotheses are proposed:

H.2.a. Gender Diversity Programs promote women representation on BODs.
H.2.b. Gender Diversity Programs promote women representation on MTs.

Based on the Critical Mass theory, more women as board members might have a positive effect to maximize equity policies and gender programs to promote women to managing bodies. The potential capacity of women to impact firm is equity outcomes, based on their representation in decision-making positions, inspire the following hypotheses, while accounting for the impact of the organization's tech-level:

H.3.a. Gender Diversity on the BOD affects positively Corporate Social Performance related to gender activities.
H.3.b. Gender Diversity on the MT affects positively Corporate Social Performance related to gender activities.

## 3 Methodology

### 3.1 Sample

To understand the impact of the double gender gap, meaning the impact of technology on women's already low participation on BOD and MT, the study is based on a sample of tourism firms classified according to Eurostat's definition of high-tech level and services categories. Eurostat uses the following aggregation according to technological intensity, based on NACE Rev. 2: High-Tech knowledge-intensive services (HT); Knowledge-Intensive market services (KI) and; Less Knowledge-Intensive services (LKI). The HT category includes e-commerce, marketing, shopping, billing or auctions, meaning that in the tourism sector it includes Online Travel

Agencies (OTAs), Global Distribution Systems (GDS) and meta-researchers. The KI category comprises, among others, Water and Air Transport, hence, airlines and cruise lines are included in this category. Finally, LKI includes, at a hospitality and tourism level, travel agencies, tourism operator reservation services and related activities, and accommodation and food service activities.

Since this article aims at understanding women's participation in the highest level of decision-making positions, BOD and MT, it was necessary to focus the sample on the world largest tourism organizations. On each of the three categories (HT, KI, LKI), approximately 20 organizations were identified, and within each category, if possible, 10 organizations of each type of business were included (see Table 7 in "Appendix"), based on their economic power (revenue). The initial sample comprised 66 organizations but, after excluding companies that were part of bigger organizations or sharing the same MT and BOD, the final list of evaluated organizations contained 55 organizations (see Table 1 for full details).

The HT category includes 3 GDS, 1 meta-searcher and 10 OTAs (18.2% of the sample). KI includes 10 airlines (18.2% of the sample), and 4 cruise lines (the low number of cruise lines is due to the high level of business integration in this sector). LKI includes 13 hotel chains (23.6% of the sample), 2 tour operators and 12 travel agencies (21.8% of the sample). Therefore, almost half of the sample (27) belongs to the LKI category (49.1%), 25.5% to the HT, and the other 25.5% to the KI category. US is the country where most of the general headquarters are based (52.7%), followed remotely by China (12.7%) and the UK with 7.3%.

## 4 Method

Content analysis was applied to the Annual Reports, online public related documents (Corporate Governance, Inclusion Reports, etc.), and to the corporate website of the previously selected companies. The reason to select these

**Table 1** Distribution of types of organization in the sample

| Type of technology level | Type of business (num. companies) | HQ country (num. companies) |
|---|---|---|
| High-Tech knowledge-intensive services (HT) | Online Travel Agency (10)<br>Meta-searchers (1)<br>Global Distribution Systems (3) | United States (US) (5);<br>United Kingdom (UK) (2);<br>Spain (2); Germany (1);<br>India (1); Argentina (1);<br>Netherlands (1); China (1) |
| Knowledge-Intensive market services (KI) | Cruise Line (4)<br>Airline (10) | US (7); China (2); UK (1);<br>United Arab Emirates (UAE) (1); Germany (1);<br>Switzerland (1); France (1) |
| Less Knowledge-Intensive services (LKI) | Hotel chain (13)<br>Travel agency (12)<br>Tour operator activities (2) | US (17); China (4);<br>Australia (2); France (1);<br>UK (1); Thailand (1);<br>Netherlands (1) |

Source: authors

sources of information is that the collection of process or management data is usually easier both for the company to gather and for stakeholders to understand (Bonilla-Priego and Font 2014). This methodology allows to evaluate the implementation of gender diversity programs and to identify the number of women on senior decision-making positions. It is acknowledged that the reviewed documentation cannot always confirm the lack of such policies, however, this bias is not expected to be relevant since the narrative communication in the evaluated documents is generally viewed as the crucial element in achieving quality of corporate reporting, and stakeholders are focusing their attention on the statements made in the annual reports and/or websites (Windscheid et al. 2018; Beattie et al. 2004). Also, qualitative content analysis, as an alternative to quantitative natural language processing (e.g. Montalvo et al. 2018; Manning et al. 2014), is a suitable research method for the subjective interpretation of the content of text data through the systematic classification process of coding and the identification themes or patterns (González-Rodríguez et al. 2015).

A basic element in this methodology is the identification of codes and the variables to be analysed. These codes and variables have been the basis for hypotheses operationalization. Two initial descriptive variables were identified: headquarters location (country) and; size, according to the company's revenue. The following variables were crucial for hypothesis testing and were mostly coded as dichotomous (Yes/No) based on the information identified in the sources: (a) If the CEO was women or men; (b) number of members on the MT and BOD, and number of women on each position; (c) transparency about number of women on decision-making positions; (d) transparency about gender pay gap; (e) specific programs to promote gender equality within the organization and; (f) specific programs to promote gender equality in society.

### 4.1 Statistical analysis

Hypotheses testing, operationalised as presented above, and all data analyses have been performed with the statistical software R. Regression analysis summarizes the type of applied analysis. In particular, linear regression, logistic regression and multinomial logistic regression were used.

As an attempt to measure women's level of engagement on decision making positions in this sector or group of organizations, the *gender-index*, a Hirsch-type index is proposed. The h-index (Hirsch 2005) was originally proposed to synthetically compare the scientific output of researchers, where an individual with index $h$ indicates that, out of his or her total $N$ papers, there are $h$ papers that have at least $h$ citations each and the rest, i.e. the remainder N–h papers, have less than $h$ citations each. In order to compare groups of organizations or sectors, in this paper the tourism sector, the gender-index is defined as the number $w$ of companies within a group or sector with number of women on decision-making positions higher or equal than $w$. The proposed *gender-index* becomes a powerful classification method as shall be presented in the following section.

## 5 Results

### 5.1 Women's participation on BOD and MT

Women are clearly underrepresented on these organization's managing bodies. The majority of evaluated organizations have between 0 and 10% (21.8% of the organizations in BOD; 25.5% in MT) and 11–20% (38.2% in BOD; 29.1% in MT) of female representation in their management bodies (Fig. 1). The number of members of the MT ranges from 2 to 41 people (average 10.16 and median 9 members) and the number of women ranges from 0 to 11 (average of women 2.29 in MT and median 2 women). Women's participation ranges from a 0%, identified in 14 organizations (25.5% of the evaluated companies), to 64% in just one organization. The size of the BOD ranges between 2 to 23 people, with an average of 9.6 participants, and women range from 0 to 7 participants, with an average of 2 women. The number of organizations with no women's participation is 10 (20% of the evaluated companies), 4 companies reach 40% and 2 organization reach equality (50%). Consequently, a higher percentage of women is found on the BOD.

The proposed *gender-index* is capable of further characterization of women's level of participation; Table 2 and Fig. 2 present the rank of companies by the number of women on BOD and MT (for clarity purposes we only present the first 10 rows, see Table 8 in "Appendix" for the full data). The *gender-index* for the BOD is 5, since there are 5 companies with 5 or more women on their Board. In terms of proportion of women on the BOD, a *gender-index* equal to 5 implies a women's participation between 30.4% and 46.2%, with average of 37.5% and median 35.7%. The

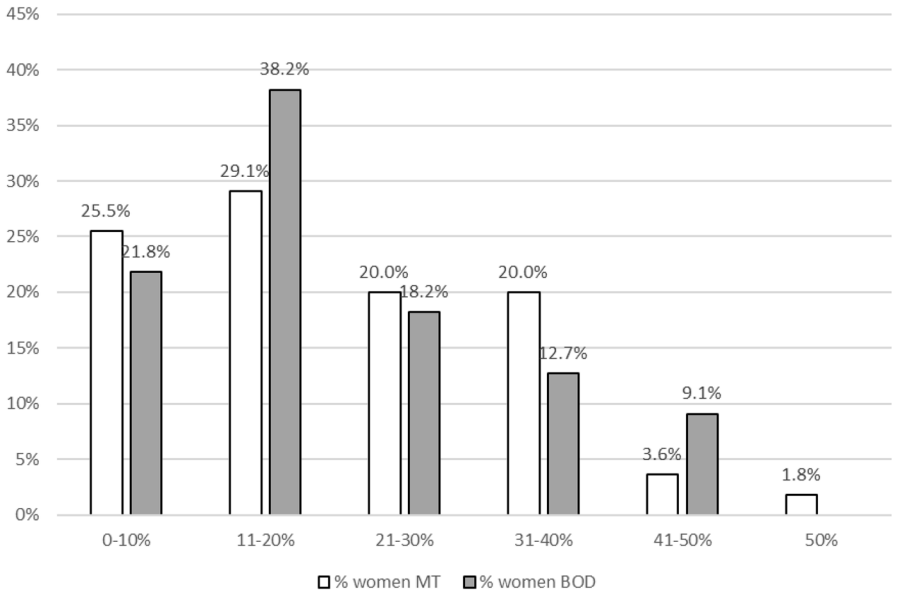


**Fig. 1** Percentage of women on the MT and the BOD. Source: authors

**Table 2** Rank of companies by number of women on the BOD and MT, with highest number of women on that position

| Num. Women BOD | Num. BOD | % Women BOD | Num. Women MT | Num. MT | % Women MT |
|---|---|---|---|---|---|
| 7 | 23 | 30.43 | 11 | 41 | 26.83 |
| 6 | 18 | 33.33 | 7 | 21 | 33.33 |
| 6 | 13 | 46.15 | 7 | 15 | 46.67 |
| 5 | 14 | 35.71 | 7 | 11 | 63.64 |
| 5 | 12 | 41.67 | 7 | 20 | 35.00 |
| 4 | 14 | 28.57 | 6 | 24 | 25.00 |
| 4 | 12 | 33.33 | 6 | 14 | 40.00 |
| 4 | 12 | 33.33 | 6 | 14 | 40.00 |
| 4 | 9 | 44.44 | 5 | 15 | 33.33 |
| 3 | 13 | 23.08 | 5 | 13 | 38.46 |

Source: authors

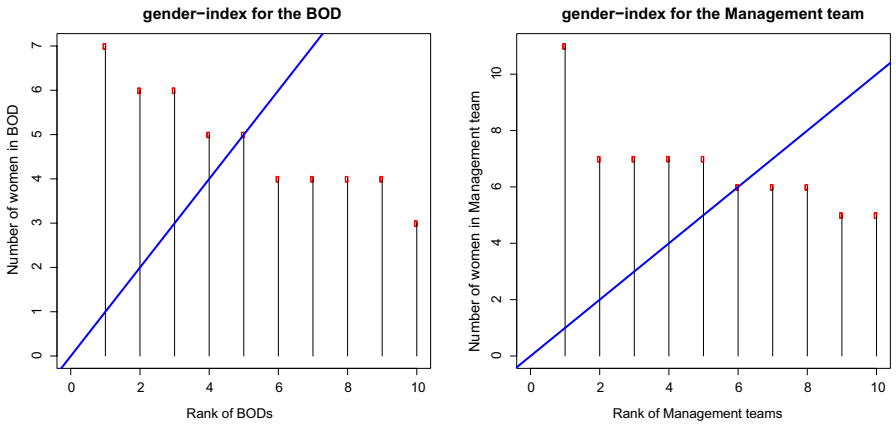


**Fig. 2** The *gender-index* for the BOD and the MT. Source: authors

*gender-index* for the MT is 6, since there are 6 companies with 6 or more women on the team. In terms of proportion of women on the MT, a *gender-inde*x equal to 6 implies a participation between 25.0% and 63.6%, with average of 38.4% and median 34.2%. These differences between BOD and MT are due to the higher number of members in the MT, which leads to a higher variance in the participation of women.

## 5.2 The impact of tech-level on women's participation on the BOD and MT

As technology increases in the core business of tourism organizations, the number of women on the BOD and MT decreases (Fig. 3). Only LKI companies have between

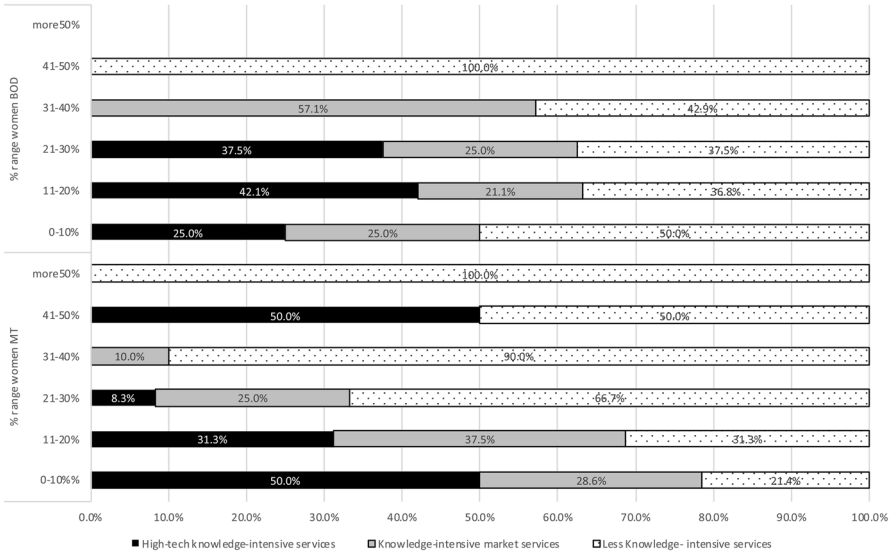


**Fig. 3** Percentage of women on the BOD and MT, according to tech-level Source: authors

41–50% women on the BOD, and in the MT the percentage of women decreases as technological level increases (NOTE: there are two organizations that have between 41–50% women on BOD, one is LKI and the other one is HT; for that reason, the percentage distribution changes here).

From a technological perspective, the median of the proportion of women on the BOD is 18.18%, and above the median we have 12 companies (52.17%) of LKI type (7 hotel chains, 4 Travel agencies and 1 Tour operator), 6 companies (26.09%) of KI type (2 Cruise lines and 4 Airlines) and 5 companies (21.74%) of HT type (all OTAs), see Table 3. The hypothesis H.1.a has been tested through the regression model: $proportionWomenBOD = \lambda_1 HT + \lambda_2 KI + \lambda_3 LKI + \epsilon$ and it has been found statistically significant (p-value 8.013e−12) and adjusted R-squared 0.664. The coefficients for the different technological levels show the decreasing impact of the technology level on the proportion of women's participation, i.e. the higher technology level the

**Table 3** Distribution of women on the BOD and MT

| | Distribution of women on BOD | | | Distribution of women on MT | | |
|---|---|---|---|---|---|---|
| | HT (%) | KI (%) | LKI (%) | HT (%) | KI (%) | LKI (%) |
| Min | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Median | 18.18 | 18.18 | 20.00 | 7.14 | 2.78 | 30.00 |
| Mean | 15.45 | 19.07 | 21.72 | 11.65 | 14.30 | 27.46 |
| Max | 28.57 | 33.33 | 50.00 | 50.00 | 33.33 | 63.64 |

Source: authors

lower the proportion of women on BOD. These estimates are $\lambda_1 = 0.154$, $\lambda_2 = 0.191$, $\lambda_3 = 0.217$ for HT, KI, and LKI type, respectively.

The *gender-index* is also useful to highlight how the gender diversity gap varies between the three groups of companies, based on their technological level. For the BOD, the *gender-index* is 2 for the HT group, i.e. there are only 2 companies in the HT level with 2 or more women on their Board; the *gender-index* for the KI and LKI group is 4, respectively; see Table 9 in "Appendix" for full details. In terms of proportion of women on the BOD for each group, it ranges [23.08%, 28.57%] for the HT, [30.43%, 33.33%] for the KI, and [35.71%, 46.15%] for the LKI. Although the *gender-index* is double for the KI and LKI groups, compared to the HT, the intervals with the proportion of women on the BOD are increasing as the technological level of the group reduces. This is in line with the support of hypothesis H.1.a as tested above.

Women's participation on the MT is clearly defined by the tech-level of the organizations (Table 3). The median number of women on HT type organizations is 7.14% while it is 30% in LKI type. The median of the proportion of women on the MT is 20% and above the median we have 19 companies (76%) of LKI type (10 Travel agencies, 8 hotel chains and 1 Tour operator), 4 companies (16%) of KI type (all Airlines) and 2 HT type companies (8% all OTAs), see Table 3 for more details. The hypothesis H.1.b has been tested through the regression model: $proportionWomenMT = \lambda_1 HT + \lambda_2 KI + \lambda_3 LKI + \varepsilon$ and it has been found statistically significant (p-value 4.05e−14) and adjusted R-squared 0.696. As in the case of the BOD, the estimated coefficients show the opposite effect of the technology level on the proportion of women's participation in MT, $\lambda_1 = 0.116$, $\lambda_2 = 0.143$, $\lambda_3 = 0.275$ for HT, KI, and LKI type, respectively. Furthermore, when tested the regression model $Logit(LKItechLevel) = \beta_0 + \beta_1 numWomenMT + \varepsilon$, where $Logit(LKItechLevel)$ is the probability of having a company with technological level of LKI type and $numWomenMT$ is the number of women on the MT. It has been found statistically significant (p-value 0.022 and AIC 73.574) that the odds of being in the LKI type of company increases 1.4 times [with CI (1.08, 1.91)] with the number of women on the MT when compared to companies that have higher technological level, i.e. KI or HT. The *gender-index* for the MT is 2 for the HT group, 3 for the KI and 6 for the LKI group, i.e. there are 6 companies in the LKI level with 6 or more women on their MT; see Table 10 in "Appendix" for full details. In terms of women's participation on the MT, for the HT group it ranges [27.27%, 50%], for the KI [25%, 27.27%] and [33,33%, 63.64%] for the LKI group; the gender-index results support hypothesis H.1.b.

Based on these results, it can be concluded that the technological level of the company has an impact on women's participation on both the BOD and the MT, and we find less women as the tech level of the organizations increases. Therefore, hypotheses H.1.a and H.1.b have been found statistically significant.

### 5.3 The implementation of gender diversity programs and gender diversity impact

The main strategy for gender diversity of tourism organizations is transparency about the number of women in senior decision-making positions, as the vast

majority of companies (63.6%) share this information either on their website or through their Annual Reports. But this transparency does not extend to transparency around the gender pay gap, since only 20% of the companies provide this information. Furthermore, results show how only 34.5% of the analysed companies have programs within the organization to promote gender diversity, a figure that drops to 23.6% on programs to promote gender equality in the Society.

The inclusion of a tech layer on these results shows (Fig. 4) a lack of specific trends according to organization's tech-level. The most popular actions for HT and KI are transparency and specific company's programs (35.71%), as well as for LKI (71.4% and 33.3% respectively). The corresponding multinomial logit model, to analyse the relationship between the implementation of gender programs (company programs, society programs, transparency or other diversity indicators) and the three technological levels of the organizations (HT, KI and LKI), has not been found statistically significant (p-value 0.2169, R-squared 0.114).

Results show that *internal programs* to promote gender diversity within the organization (Table 4) have a positive impact (estimated linear coefficient $\lambda_1 = 1.34$) on the number of women on the BOD ($numberWomenBOD = \lambda_0 + \lambda_1 companyProgram$, p-value: 0.008537, adjusted R-squared 0.1175). However, such programs have almost no impact (estimated linear coefficient 0.067) on the proportion of women in the BOD (p-value 0.099, adjusted R-squared 0.0358). Furthermore, when tested the regression model $Logit(companyProgram) = \beta_0 + \beta_1 numWomenBOD + \varepsilon$, where $Logit(companyProgram)$ is the probability of having a program that promotes internally the participation of women and *numWomenBOD* is the number of women on the BOD, it has been found statistically significant (p-value 0.017 and AIC 61.307) that the odds of having such program increases 1.61 times [with CI (1.12, 2.48)] with the number of women on the BOD when compared to companies that do not include women.

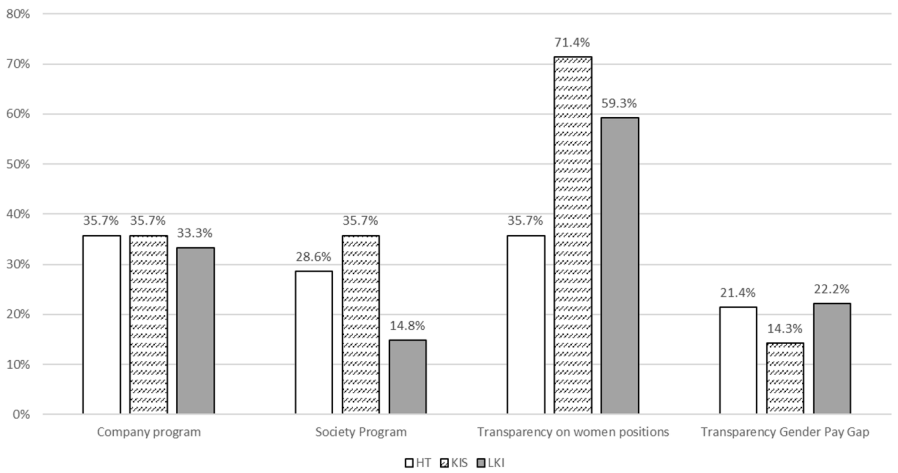


**Fig. 4** Gender equality programs by tech-level Source: authors

**Table 4** Company with specific programs to promote gender diversity inside

| | Companies with specific programs | | | | Companies without specific programs | | | |
|---|---|---|---|---|---|---|---|---|
| | BOD | | MT | | BOD | | MT | |
| | #Women | %Women | #Women | %Women | #Women | %Women | #Women | %Women |
| Min | 1 | 11.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Median | 2 | 20.0 | 2 | 20.0 | 1 | 18.2 | 2 | 18.2 |
| Mean | 2.9 | 23.7 | 2.1 | 20.4 | 1.5 | 17.0 | 2.4 | 19.9 |
| Max | 7 | 46.1 | 6 | 40.0 | 5 | 50.0 | 11 | 63.6 |
| No BOD | 2 | | 0 | | 3 | | 0 | |

Source: authors

On the other hand, based on equivalent models as presented before in the case of the BOD, the impact of the implementation of the above-mentioned programs on the number of women on the MT has not been found statistically significant (p-value 0.686).

When tested the programs to *promote gender equality in the Society* (Table 5), the model $numberWomenBOD = \lambda_0 + \lambda_1 programSociety$ has been tested and it has been found a positive impact (estimated linear coefficient $\lambda_1 = 1.64$) on the number of women on the BOD (p-value: 0.003246, adjusted R-squared 0.1493). The impact of having these programs on the proportion of women in the BOD has not been found statistically significant (p-value 0.242). When tested the regression model $Logit(programSociety) = \beta_0 + \beta_1 numWomenBOD + \varepsilon$, it has been found statistically significant (p-value 0.009 and AIC 51.154) that the odds of having such program increases 1.73 times [with CI (1.17, 2.76)] with the number of women on the BOD when compared to companies that do not include women.

As in the case of company specific programs, the impact of the implementation of the Society programs on the number of women on the MT has not been found statistically significant (p-value 0.457).

It is important to highlight that internal gender diversity programs, when present, are usually combined with the Society program (68.4% of the cases) and there is no single case that the company has a Society program without an internal program.

**Table 5** Society programs to promote gender diversity

| | Companies with Society programs | | | | Companies without Society programs | | | |
|---|---|---|---|---|---|---|---|---|
| | BOD | | MT | | BOD | | MT | |
| | #Women | %Women | #Women | %Women | #Women | %Women | #Women | %Women |
| Min | 1 | 14.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Median | 3 | 19.8 | 1 | 18.2 | 1 | 18.2 | 2 | 20.0 |
| Mean | 3.2 | 23.3 | 1.8 | 17.9 | 1.6 | 18.0 | 2.4 | 20.7 |
| Max | 7 | 44.4 | 6 | 38.5 | 6 | 50.0 | 11 | 63.6 |
| No BOD | 1 | | 0 | | 4 | | 0 | |

Source: authors

Therefore, it seems that both programs act as a unique global program promoting gender equality both internally and generally in society.

Regarding companies' *transparency policy* about the number of women on decision-making positions and gender pay gap, it should be noticed that, as in the case of the promotion programs, both policies are combined in 34.4% of the cases and there is one single company that implements a transparency policy on pay gap but not on women's positions.

The model $numberWomen = \lambda_0 + \lambda_1 transparencyWpos$ has been tested, where *transparencyWpos* represents the transparency policy about women's positions, and it has not been found statistically significant neither in the case of the BOD (p-value 0.136, adjusted R-squared 0.025) nor for the MT (p-value 0.661). Alternatively, the transparency policy on pay gap (Table 6) has been tested with the model $numberWomen = \lambda_0 + \lambda_1 transparencyPayGap$ and it can be concluded (close to significant p-value: 0.07681, adjusted R-squared 0.1493) that this transparency program could have a positive impact (estimated linear coefficient $\lambda_1 = 1.05$) on the number of women on the BOD. The impact of having this policy on the proportion of women in the BOD has not been found statistically significant (p-value 0.423). When tested the regression model $Logit(transparencyPayGap) = \beta_0 + \beta_1 numWomenBOD + \varepsilon$, it has been found close to statistically significant (p-value 0.087 and AIC 53.701) that the odds of having such transparency policy increases 1.39 times [with CI (0.96, 2.07)] with the number of women on the BOD when compared to companies that do not include women. As in the previous cases, the impact of this transparency policy on the number of women on the MT has not been found statistically significant (p-value 0.478).

As a result of the models tested, the hypothesis H.2.a is confirmed; almost all gender diversity programs have a positive impact on increasing the number of women on BOD, except gender programs devoted to the Society. Meanwhile, H.2.b is not confirmed and programs that promote women's participation and transparency do not increase the number of women in the MT.

Finally, the positive impact that the number of women have on the implementation of gender diversity policies and actions, is positive for women on the BOD (hypothesis H.3.a is confirmed), but not for the MT (H.3.b is not confirmed).

**Table 6** Transparency gender pay gap to promote gender diversity

| | Companies with transparency pay gap | | | | Companies without transparency pay gap | | | |
|---|---|---|---|---|---|---|---|---|
| | BOD | | MT | | BOD | | MT | |
| | #Women | %Women | #Women | %Women | #Women | %Women | #Women | %Women |
| Min | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 |
| Median | 2 | 18.2 | 1 | 18.2 | 2 | 18.2 | 2 | 21.1 |
| Mean | 2.8 | 22.2 | 1.8 | 18.1 | 1.8 | 18.4 | 2.4 | 20.6 |
| Max | 7 | 46.1 | 5 | 38.5 | 6 | 50.0 | 11 | 63.6 |
| No BOD | 0 | | 0 | | 5 | | 0 | |

Source: authors

## 6 Discussion

Although women have become an important opportunity for growth, positive public visibility and efficiency, the gender gap in decision-making positions is a reality in tourism firms, regardless of their technological level (e.g. Segovia-Pérez et al. 2019a; Costa et al. 2017; Pritchard and Morgan 2017). Results from this study demonstrate that in the biggest tourism companies in the world there is a limited participation of women on BOD and MT: women's participation is, on average, 20.1% on the MT and 19.3% on the BOD, and both bodies have similar standard deviations (15.5% and 13.6%, respectively). These results are aligned with previous studies, both in tourism (e.g. González-Serrano et al. 2018; Carvalho et al. 2018) and technology firms (e.g. Ahuja 2002; Ashcraft et al. 2016). The inclusion of the technological level is relevant since this study settles that women's limited participation on BOD and MT is affected by technology. The performed statistical tests confirm that technological level of tourism firms limits the number of women on BODs (hypothesis H.1.a. is confirmed; RO1) and on MTs (hypothesis H.1.b. is confirmed), and that HT type organizations have a lower number of women on decision-making positions than KI and LKI type organizations.

The technology double gender gap, an infra-studied area (Figueroa-Domecq et al. 2019), is, consequently, a reality in the tourism industry. Globalization, technological advances and the need for workforce diversity in the tourism industry (Bharwani and Talib 2017; Baum 2013) coexist with gendered notions and gendered organizations around technology (Martinez Dy et al. 2017). Results can be explained by the Similarity/Attraction theories, that demonstrate how people tend to work with people that are similar to them, in all kinds of ways: gender, age, nationality, political ideas, etc. At the same time, technology tends to be associated to men, and women are reluctant to participate in STEM studies (e.g. Yeo and Grant 2019), defining stereotypes around technology. As a consequence, according to the current results, gender roles and stereotypes turn into steep stairs that women find difficult to climb, limiting women progression in the tourism industry (Segovia-Pérez et al. 2019a; Costa et al. 2017), and even more in high-tech organizations (Segovia-Pérez et al. 2019b).

It is interesting to notice that in HT and KI type firms, more women are found on BOD than on MT, while in LKI type the situation is the opposite. Results in Table 3 show that, for HT type, 15.45% of BOD and 11.65% on MT are women; for KI type, 19.07% and 14.03%, respectively. However, for LKI type the situation is quite different, and more women are found on MT (27.46%) than on BOD (21.72%). The reasons could be found in the very nature of BODs. When looking at the sample, HT and KI firms are bigger and publicly traded. Probably the legal framework that countries are building around BOD in publicly traded companies (Seierstad et al. 2017; Font et al. 2017; Terjesen et al. 2015) and the pressure received from different stakeholders to improve gender and diversity equality (Arayssi et al. 2016) justify the situation on BODs and the differences between HT&KI type and LKI tourism firms.

Regarding, firm's policies towards gender diversity, the large majority of firms (63.6%) are transparent about the number of women in decision-making positions, though these results are not replicated concerning the gender pay gap (20% of the

evaluated firms share this information). At a Corporate Social Responsibility (CSR) level, the implementation of gender equality programs is limited and only 34.5% of the analysed companies have programs within the organization to promote gender diversity; this figure drops to 23.6% on programs to promote gender equality in the Society. Though far from what policy-makers and researchers recommend about transparency and gender diversity programs (e.g. Grosser and Moon 2005; Calkin 2016) results are quite positive when compared to previous studies (e.g. Krivkovich et al. 2018).

Positive results arise when evaluating the impact of women on decision making positions on promoting gender diversity programs to attract and retain women, and the impact that these programs have on gender diversity; this relation, however, is not always certain. Though the technological level has not been found to influence the implementation of gender diversity programs, the number of women on the BOD does (RO2). A positive statistical significant relation has been found in the association between women's participation on BODs and the implementation of gender programs to promote gender diversity (hypothesis H.3.a. is confirmed). Interestingly enough, the gender structure of the MTs has no influence on the development of new programs (hypothesis H.3.b. is not confirmed), probably due to the different nature of this decision-making body. Reasons behind these results are defined by the impact of the Token theory and the Critical Mass theory about the impact that the number of women on the BOD and the MT have on the quality and quantity of these gender equality activities. The theoretical framework and previous statistical analyses have demonstrated that the higher the number of women on decision-making positions, the higher the probability of finding programs that promote gender diversity within the organization and beyond (Glass and Cook 2018; Bear et al. 2010; Brewer and Kramer 1985; Lord and Saenz 1985). Therefore, women on the BOD stimulate more actions to promote gender equality, and these actions entail more women recruitment. However, the number of women on MT does not have such impact, potentially due to the kind of activities developed by this management body, more concerned with the operational side of the business (e.g. Palomo et al. 2006).

Since these programs to hinder gender diversity have a direct impact on the growing number of women on the BOD (hypothesis H.2.a. is confirmed) this positive relation is bi-directional (RO3). In the case of MT, this relation is not statistically significant (hypothesis H.2.b. is not confirmed). Once again, the gender perspective of the considered governing bodies, BOD and MT, might be affected by their competencies (e.g. BOD is more strategical and bears the burden of dealing with stakeholders).

Concerning the implementation of gender diversity programs and transparency, even though KI companies have the lowest distribution of women on MT (2.78%, Table 3), they present the highest contribution in society and transparency programs on women positions (35.71% and 71.43% in Fig. 4). On the contrary, although LKI companies have the highest distribution of women both on BOD and MT, they present lower contribution, compared to the HT and KI types, in company and society programs (Fig. 4). On one hand, HT and KI types, being bigger and publicly traded companies, invest in the support of a gender perspective on CSR's internal and external actions; on the other, LKI type, being smaller and most of them not publicly-traded companies, often don't support these actions. To wit, although firms' technological level has not been found statistically significant to have an impact on the definition of

their gender CSR programs, the characteristics of the company might have an impact. Further details on these characteristics remain out of the scope of this study.

Gender mainstreaming programs to promote women are being implemented all around the world; nevertheless, results are not always as positive as expected (Krivkovich et al. 2018). Results that relate gender diversity programs with the percentage of women on the BOD are also aligned with other studies that show that the companies with a higher level of deployment of their Gender Social Responsibility practices, have a higher proportion of women on corporate boards, in top management and in middle management (Larrieta-Rubín de Celis et al. 2015). When the MTs are evaluated, the number of women has no positive relation with the activation of gender programs in their organizations; once again the different nature of this management body might be the reason.

## 7 Conclusions

The multidimensional aspects behind female underrepresentation in the highest levels of firms' hierarchy renders complex the evaluation of this reality. Personal, social, interactional and institutional issues influence the development of female careers in masculinized sectors and positions, including technology and ICTs. The aim of this study is to evaluate the impact that organizations' technological level has on women's participation in decision-making positions in tourism companies, as well as measuring the real impact of their actions towards gender diversity. For proper analysis and comprehension, the paper reinforces the necessity to interconnect a breadth of theoretical approaches in order to better understand the different dimensions of this gender problem. Results confirm the relevance of the Stereotype and Social Roles Theory in business managing bodies of some of the biggest firms in the tourism industry: women are under-represented in managing positions and this underrepresentation is amplified by the technological level of the organizations, a masculinized world. Other theories, which have been applied and supported by the presented results, are the Critical Mass Theory and the Token Theory, demonstrating that the higher the number of women on the BOD the higher the number of actions to promote gender diversity, and that these actions can increase the number of women on the BOD. The implementation of a holistic perspective in the evaluation of this phenomena shows impacts at different levels: at an individual level, women's underrepresentation in ICTs university degrees has an impact on the number of female ICTs sectorial workers, producing an insufficient critical mass that could be potentially promoted. Also, at a micro-level, the critical mass of women in decision-making positions is not reached and women do not overcome their token status and improve their possibilities. It is important to highlight that both levels have an impact or are affected by the women's discrimination at the macro level, including tourism and non-tourism organizations. These results help us to understand how women's participation is not only defined by their individual decisions, but also by the micro and macro environment organization's culture, and now by technology.

An important theoretical contribution is the design and implementation of a *gender-index*, proposed to evaluate the current situation of women's participation on

the main governing bodies (BOD and MT). The *gender-index* allows to measure the dynamics over time of a group of organizations and/or a sector, for example, measuring in two moments of time the *gender-index*, controlling whether or not it has increased, and evaluating the impact of the implemented policies during that period. Also, the *gender-index* provides a benchmark for women's participation in the companies that should guide the convergence of the group or business sector.

Relevant managerial implications arise from these research results. Since the double-gender gap in tourism is a reality, there is a need to increase women's participation to rise their involvement in organizations, specifically in high-tech organizations. At a management level, organizations need to establish a "gender audit", so as to evaluate and understand the current situation in terms of gender diversity (the *gender-index* is an objective tool that could guide the way). The basic steps are reporting, accounting and transparency (Krivkovich et al. 2018; Al-Shaer and Zaman 2016; Upadhyay and Zeng 2014). Accountability needs to be followed by interventions and specific actions to ensure that hiring and promotions are fair, to make senior managers champions of diversity and to foster an inclusive and respectful culture. Also, there is a need to create role models that attract and settle women in decision-making positions.

However, gender diversity is just the tip of the iceberg. The combination of the double gender gap and an intersectionality approach become a limitation of the current study and also, a relevant future research line. Organizations need to consider diversity in general and the impact of intersectionality. Research in gender discrimination deals with three main challenges: limited access to data, sample selection bias and causal inference (Adams et al. 2015; Anitab.org 2019; Figueroa-Domecq et al. 2019). When dealing with causal inference, the theoretical approach helps to identify the relevant variables and to understand their impact on the final outcome (women's participation in management bodies); however, there are always more variables to consider, and intersectionality is key. Therefore, a future research line is to expand enquiry towards intersectionality. This could be combined with a longitudinal evaluation through the proposed *gender-index*, and the comparison between different sectors and economies. Gender equality is the road for innovation and sustainable growth, a research area with full potential.

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## Appendix

See Tables 7, 8, 9 and 10.

**Table 7** List of organizations included in the study

| | Technology level | Type of Business | Country (headquarters) |
|---|---|---|---|
| Booking Holding | HT | OTA | US |
| Expedia Group | HT | OTA | US |
| Ctrip.com International | HT | OTA | China |
| TripAdvisor | HT | OTA | US |
| Trivago | HT | OTA | Germany |
| MakeMyTrip | HT | OTA | India |
| eDreams Odigeo | HT | OTA | Spain |
| Despegar.com | HT | OTA | Argentina |
| Lastminute.com | HT | OTA | Netherlands |
| Onthebeach | HT | OTA | UK |
| Alphabet | HT | Metasearch | US |
| Amadeus IT Group | HT | GDS | Spain |
| Sabre Corporation | HT | GDS | US |
| Travelport Worldwide Limited | HT | GDS | UK |
| Carnival Corporation | KI | Cruise line | US |
| MSC Cruises | KI | Cruise line | Switzerland |
| Norwegian Cruise Line Holdings | KI | Cruise line | US |
| RCI Royal Caribbean International | KI | Cruise line | US |
| Deutsche Lufthansa AG | KI | Airline | Germany |
| American Airlines Group | KI | Airline | US |
| Delta Air Lines | KI | Airline | US |
| United Continental Holding | KI | Airline | US |
| Air France-KLM | KI | Airline | France |
| Emirates Group | KI | Airline | UAE |
| International Airlines Group | KI | Airline | UK |
| Southwest Airlines | KI | Airline | US |

**Table 7** (continued)

| | Technology level | Type of Business | Country (headquarters) |
|---|---|---|---|
| China Southern Airlines | KI | Airline | China |
| Air China | KI | Airline | China |
| Marriott International | LKI | Hotel chain | US |
| Hilton Worldwide Holding | LKI | Hotel chain | US |
| IHG (InterContinental Hotels Group) | LKI | Hotel chain | UK |
| Wyndham Hotels & Resorts | LKI | Hotel chain | US |
| Shanghai Jin Jiang International Travel | LKI | Hotel chain | China |
| AccorHotels | LKI | Hotel chain | France |
| Choice Hotels International | LKI | Hotel chain | US |
| Homeinns Hotels Group Co | LKI | Hotel chain | China |
| Huazhu Hotel Group | LKI | Hotel chain | China |
| Best Western Hotels & Resorts | LKI | Hotel chain | US |
| Hyatt Hotels Corp | LKI | Hotel chain | US |
| GreenTree Hospitality Group | LKI | Hotel chain | China |
| Radisson Hotel Group | LKI | Hotel chain | US |
| American Express Global Business Travel | LKI | Travel agency activities | US |
| BCD Travel | LKI | Travel agency activities | Netherlands |
| Carlson Wagonlit Travel | LKI | Travel agency activities | US |
| Flight Centre Travel Group | LKI | Travel agency activities | Australia |
| Travel Leaders Group | LKI | Travel agency activities | US |
| American Express Travel (AMERICAN EXPRESS) | LKI | Travel agency activities | US |
| Direct Travel | LKI | Travel agency activities | US |
| Corporate Travel Management North America | LKI | Travel agency activities | Australia |
| Fareportal | LKI | Travel agency activities | US |

**Table 7** (continued)

| | Technology level | Type of Business | Country (headquarters) |
|---|---|---|---|
| Travel and Transport | LKI | Travel agency activities | US |
| Frosch | LKI | Travel agency activities | US |
| Omega World Travel | LKI | Travel agency activities | US |
| Abercrombie & Kent | LKI | Tour operator activities | US |
| Diethelm Travel | LKI | Tour operator activities | Thailand |

Source: authors

**Table 8** Rank of all companies by number of women on the BOD and MT

| Num. Women BOD | Num. BOD | % Women BOD | Num. Women MT | Num. MT | % Women MT |
|---|---|---|---|---|---|
| 7 | 23 | 30.43 | 11 | 41 | 26.83 |
| 6 | 18 | 33.33 | 7 | 21 | 33.33 |
| 6 | 13 | 46.15 | 7 | 15 | 46.67 |
| 5 | 14 | 35.71 | 7 | 11 | 63.64 |
| 5 | 12 | 41.67 | 7 | 20 | 35.00 |
| 4 | 14 | 28.57 | 6 | 24 | 25.00 |
| 4 | 12 | 33.33 | 6 | 14 | 40.00 |
| 4 | 12 | 33.33 | 6 | 14 | 40.00 |
| 4 | 9 | 44.44 | 5 | 15 | 33.33 |
| 3 | 13 | 23.08 | 5 | 13 | 38.46 |
| 3 | 10 | 30 | 4 | 10 | 40 |
| 3 | 19 | 15.79 | 3 | 11 | 27.27 |
| 3 | 14 | 21.43 | 3 | 11 | 27.27 |
| 3 | 10 | 30 | 3 | 10 | 30 |
| 2 | 10 | 20 | 3 | 15 | 20 |
| 2 | 9 | 22.22 | 3 | 10 | 30 |
| 2 | 11 | 18.18 | 3 | 10 | 30 |
| 2 | 11 | 18.18 | 3 | 15 | 20 |
| 2 | 11 | 18.18 | 2 | 4 | 50 |
| 2 | 13 | 15.38 | 2 | 11 | 18.18 |
| 2 | 12 | 16.67 | 2 | 12 | 16.67 |
| 2 | 11 | 18.18 | 2 | 11 | 18.18 |
| 2 | 8 | 25 | 2 | 6 | 33.33 |
| 2 | 10 | 20 | 2 | 11 | 18.18 |
| 2 | 7 | 28.57 | 2 | 11 | 18.18 |
| 2 | 11 | 18.18 | 2 | 8 | 25 |
| 2 | 13 | 15.38 | 2 | 9 | 22.22 |
| 2 | 5 | 40 | 2 | 5 | 40 |
| 1 | 9 | 11.11 | 2 | 7 | 28.57 |
| 1 | 10 | 10 | 1 | 7 | 14.29 |
| 1 | 7 | 14.29 | 1 | 5 | 20 |
| 1 | 5 | 20 | 1 | 6 | 16.67 |
| 1 | 8 | 12.5 | 1 | 9 | 11.11 |
| 1 | 9 | 11.11 | 1 | 8 | 12.5 |
| 1 | 11 | 9.09 | 1 | 6 | 16.67 |
| 1 | 7 | 14.29 | 1 | 9 | 11.11 |
| 1 | 3 | 33.33 | 1 | 8 | 12.5 |
| 1 | 5 | 20 | 1 | 4 | 25 |
| 1 | 6 | 16.67 | 1 | 9 | 11.11 |
| 1 | 2 | 50 | 1 | 4 | 25 |
| 0 | 7 | 0 | 1 | 3 | 33.33 |
| 0 | 6 | 0 | 0 | 8 | 0 |

**Table 8** (continued)

| Num. Women BOD | Num. BOD | % Women BOD | Num. Women MT | Num. MT | % Women MT |
|---|---|---|---|---|---|
| 0 | 9 | 0 | 0 | 5 | 0 |
| 0 | 6 | 0 | 0 | 3 | 0 |
| 0 | 8 | 0 | 0 | 10 | 0 |
| 0 | 7 | 0 | 0 | 3 | 0 |
| 0 | 5 | 0 | 0 | 6 | 0 |
| 0 | 3 | 0 | 0 | 3 | 0 |
| 0 | 8 | 0 | 0 | 4 | 0 |
| 0 | 5 | 0 | 0 | 11 | 0 |
| #N/A | #N/A | #N/A | 0 | 15 | 0 |
| #N/A | #N/A | #N/A | 0 | 19 | 0 |
| #N/A | #N/A | #N/A | 0 | 9 | 0 |
| #N/A | #N/A | #N/A | 0 | 6 | 0 |
| #N/A | #N/A | #N/A | 0 | 2 | 0 |
| 3 | 19 | 15.79 | 3 | 11 | 27.27 |
| 3 | 14 | 21.43 | 3 | 11 | 27.27 |
| 3 | 10 | 30 | 3 | 10 | 30 |
| 2 | 10 | 20 | 3 | 15 | 20 |
| 2 | 9 | 22.22 | 3 | 10 | 30 |
| 2 | 11 | 18.18 | 3 | 10 | 30 |
| 2 | 11 | 18.18 | 3 | 15 | 20 |
| 2 | 11 | 18.18 | 2 | 4 | 50 |
| 2 | 13 | 15.38 | 2 | 11 | 18.18 |
| 2 | 12 | 16.67 | 2 | 12 | 16.67 |
| 2 | 11 | 18.18 | 2 | 11 | 18.18 |
| 2 | 8 | 25 | 2 | 6 | 33.33 |
| 2 | 10 | 20 | 2 | 11 | 18.18 |
| 2 | 7 | 28.57 | 2 | 11 | 18.18 |
| 2 | 11 | 18.18 | 2 | 8 | 25 |
| 2 | 13 | 15.38 | 2 | 9 | 22.22 |
| 2 | 5 | 40 | 2 | 5 | 40 |
| 1 | 9 | 11.11 | 2 | 7 | 28.57 |
| 1 | 10 | 10 | 1 | 7 | 14.29 |
| 1 | 7 | 14.29 | 1 | 5 | 20 |
| 1 | 5 | 20 | 1 | 6 | 16.67 |
| 1 | 8 | 12.5 | 1 | 9 | 11.11 |
| 1 | 9 | 11.11 | 1 | 8 | 12.5 |
| 1 | 11 | 9.09 | 1 | 6 | 16.67 |
| 1 | 7 | 14.29 | 1 | 9 | 11.11 |
| 1 | 3 | 33.33 | 1 | 8 | 12.5 |
| 1 | 5 | 20 | 1 | 4 | 25 |
| 1 | 6 | 16.67 | 1 | 9 | 11.11 |

**Table 8** (continued)

| Num. Women BOD | Num. BOD | % Women BOD | Num. Women MT | Num. MT | % Women MT |
|---|---|---|---|---|---|
| 1 | 2 | 50 | 1 | 4 | 25 |
| 0 | 7 | 0 | 1 | 3 | 33.33 |
| 0 | 6 | 0 | 0 | 8 | 0 |
| 0 | 9 | 0 | 0 | 5 | 0 |
| 0 | 6 | 0 | 0 | 3 | 0 |
| 0 | 8 | 0 | 0 | 10 | 0 |
| 0 | 7 | 0 | 0 | 3 | 0 |
| 0 | 5 | 0 | 0 | 6 | 0 |
| 0 | 3 | 0 | 0 | 3 | 0 |
| 0 | 8 | 0 | 0 | 4 | 0 |
| 0 | 5 | 0 | 0 | 11 | 0 |
| #N/A | #N/A | #N/A | 0 | 15 | 0 |
| #N/A | #N/A | #N/A | 0 | 19 | 0 |
| #N/A | #N/A | #N/A | 0 | 9 | 0 |
| #N/A | #N/A | #N/A | 0 | 6 | 0 |
| #N/A | #N/A | #N/A | 0 | 2 | 0 |

Source: authors

**Table 9** Rank for each level of technology of all companies by number of women on the BOD

| High-tech knowledge-intensive | | Knowledge-intensive market | | Less Knowledge-intensive | |
|---|---|---|---|---|---|
| #Women BOD | %Women | #Women BOD | %Women | #Women BOD | %Women |
| 4 | 28.57 | 7 | 30.43 | 6 | 46.15 |
| 3 | 23.08 | 6 | 33.33 | 5 | 35.71 |
| 2 | 20 | 4 | 33.33 | 5 | 41.67 |
| 2 | 22.22 | 4 | 33.33 | 4 | 44.44 |
| 2 | 18.18 | 3 | 30 | 3 | 30 |
| 2 | 18.18 | 3 | 15.79 | 2 | 25 |
| 2 | 18.18 | 3 | 21.43 | 2 | 20 |
| 1 | 11.11 | 2 | 15.38 | 2 | 28.57 |
| 1 | 10 | 2 | 16.67 | 2 | 18.18 |
| 1 | 14.29 | 2 | 18.18 | 2 | 15.38 |
| 1 | 20 | 0 | 0 | 2 | 40 |
| 1 | 12.5 | 0 | 0 | 1 | 11.11 |
| 0 | 0 | 0 | 0 | 1 | 9.09 |
| 0 | 0 | N/A | N/A | 1 | 14.29 |
| N/A | N/A | N/A | N/A | 1 | 33.33 |
| N/A | N/A | N/A | N/A | 1 | 20 |
| N/A | N/A | N/A | N/A | 1 | 16.67 |
| N/A | N/A | N/A | N/A | 1 | 50 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |

Source: authors

**Table 10** Rank for each level of technology of all companies by number of women on the MT

| High-tech knowledge-intensive | | Knowledge-intensive market | | Less knowledge-intensive | |
|---|---|---|---|---|---|
| #Women MT | %Women | #Women MT | %Women | #Women MT | %Women |
| 3 | 27.27 | 11 | 26.83 | 7 | 33.33 |
| 2 | 50 | 6 | 25 | 7 | 46.67 |
| 2 | 18.18 | 3 | 27.27 | 7 | 63.64 |
| 2 | 16.67 | 2 | 18.18 | 7 | 35 |
| 1 | 14.29 | 2 | 33.33 | 6 | 40 |
| 1 | 20 | 2 | 18.18 | 6 | 40 |
| 1 | 16.67 | 1 | 11.11 | 5 | 33.33 |
| 0 | 0 | 1 | 12.5 | 5 | 38.46 |
| 0 | 0 | 1 | 16.67 | 4 | 40 |
| 0 | 0 | 1 | 11.11 | 3 | 30 |
| 0 | 0 | 0 | 0 | 3 | 20 |
| 0 | 0 | 0 | 0 | 3 | 30 |
| 0 | 0 | 0 | 0 | 3 | 30 |
| 0 | 0 | 0 | 0 | 3 | 20 |
| N/A | N/A | N/A | N/A | 2 | 18.18 |
| N/A | N/A | N/A | N/A | 2 | 25 |
| N/A | N/A | N/A | N/A | 2 | 22.22 |
| N/A | N/A | N/A | N/A | 2 | 40 |
| N/A | N/A | N/A | N/A | 2 | 28.57 |
| N/A | N/A | N/A | N/A | 1 | 12.5 |
| N/A | N/A | N/A | N/A | 1 | 25 |
| N/A | N/A | N/A | N/A | 1 | 11.11 |
| N/A | N/A | N/A | N/A | 1 | 25 |
| N/A | N/A | N/A | N/A | 1 | 33.33 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |
| N/A | N/A | N/A | N/A | 0 | 0 |

Source: authors

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