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Determinants of innovation in tourism evidence from Australia

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HIGHLIGHTS

- Explores the innovation process in tourism usinga logistic regression model and longitudinal database.
- Relationships between innovation inputs andservice and marketing innovation outputs are examined.
- Of the inputs, collaboration, human capital, foreign ownership, and firm size positively influence service innovation.
- Collaboration, firm size, information technology, funding and market competition positively influence marketing innovation.
- Increasing firm size and greater competition among tourism enterprises have a decisive impact on the propensity to innovate.

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ABSTRACT

This study explores innovation processes in tourism within the context of Australian tourism enterprises. A coherent conceptual framework, drawing on the existing literature, is developed to analyse the innovation process. Using a longitudinal database and logistic regression model, the relationship between innovation inputs or determinants and two of the widely adopted innovation outputs in tourism—service and marketing innovation—are examined. Of the innovation inputs, the most important one is collaboration, followed by human capital, information technology, and funding. Among institutional factors, foreign ownership is a key driver, followed by market competition, firm size, and environment. The results provide new insights into the role and effects of the various inputs and related institutional factors that drive innovation efforts by tourism enterprises. Findings of this study should inform policy discussions and the development of strategies to enhance innovation capacity among tourism businesses.

1. Introduction

Innovation, the 'creative destruction', proposed by Schumpeter (1934) in the 1930s has become the cornerstone of modern industry analysis. Innovation is seen as the solution to economic woes experienced by both developed and developing nations across various industry sectors. The need to be innovative has almost become a precondition for the survival, sustainability, and future growth of modern industries operating in a highly competitive global marketplace. Of the different sub-sectors of the global economy, tourism is among the most competitive; and its phenomenal growth over the last few decades has been accompanied by intense competition (Backman, Klaesson, & Oner, 2017; Cirstea, 2014; Vodeb, 2012). It is unsurprising, therefore, that the adoption of innovation is suggested as the optimal coping mechanism to counter intense competition as well as an efficient response to ever-changing demands to achieve sustainable growth for tourism firms (OECD, 2008; Simonceska, 2012). The universal acceptance of this proposition is mirrored in the growing literature on tourism innovation over the last decade (Deegan, 2012; Dhar, 2016; Hjalager, 2010; Nieves & Diaz-Meneses, 2016; Razumova, Ibáñez, & Palmer, 2015; Tejada & Moreno, 2013).

Much of the existing literature on innovation in tourism focuses on conceptual and theoretical issues, including the need, drivers and obstacles of innovation (Birgit, Mike, & Chung-Shing, 2018; Najda-Janoszka & Kopera, 2014); determinants of innovation (Orfila-Sintes & Mattsson, 2009); the concept of innovation and its usefulness for tourism and tourism systems (Hall & Williams, 2008); integrative model for innovativeness in tourism (Omerzel, 2015) and internationalisation and innovation in tourism (Williams & Shaw,

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2011). These studies have contributed to the advancement of our understanding of unique features associated with innovation in tourism. The same, however, cannot be said about the empirical research on innovation in tourism. Compared to other economic sectors, there is a dearth of empirical knowledge on tourism innovation in general, and quantitative analysis, in particular (Alsos, Eide, & Madsen, 2014; Deegan, 2012; Hjalager, 2010; Sundbo, Orfila-Sintes, & Sørensen, 2007). While the last decade evidenced the emergence of an increasing volume of empirical studies on innovation in the tourism sector, their scope is limited in particular aspects. As Hjalager (1994, p. 9) noted, tourism innovation has mainly been examined in 'a piecemeal, case-by-case manner'.

Of the available empirical studies, several have studied the effect of involving employees and visitors in the innovation process (López-Fernandez, Serrano-Bedia, & Gómez-López, 2011; Orfila-Sintes & Mattsson, 2009; Ottenbacher & Gnoth, 2005). Another area of focus has been the role of information and communication technology (ICT) for innovation generation (Aldebert, Dang, & Longhi, 2011; Buhalis & Law, 2008; Jolly & Dimanche, 2009). Martínez-Román, Tamayo, Gamero, and Romero (2015) and Lee, Hallak, and Sardeshmukh (2016) examine a related issue—the relationship between innovation and business performance. The former explores the impact of product and process innovation on the profitability of SMEs in the Andalusian hospitality industry (in Spain), and the latter examines the relationship between innovation, entrepreneurship, and restaurant performance in Australia. Other studies focusing on various aspects of innovation and related issues in the hotel sector include Razumova et al. (2015) who explore determinants of environmental innovations and Backman et al. (2017) who investigate determinants of innovation in the hospitality industry; Dhar (2016) who examines the effect of ethical leadership on service innovative behaviour; and Nieves and Diaz-Meneses (2016) who analyse the influence of knowledge on marketing innovation and the effect of marketing innovation on the financial performance of hotels.

Most studies on tourism innovation are descriptive and (or) analytical, and the need for more empirical research and quantitative evidence has widely been emphasised. Many advocates that there is an obvious quest for better empirical evidence about innovation in tourism and, further, that such quantification is essential (Clausen & Madsen, 2014; Hall & Williams, 2008; Hjalager, 2010). The limited empirical knowledge of the innovation process and its determinants in the tourism sector is a major obstacle to the development of appropriate strategies and policies that facilitate innovation. The issue is critical in ensuring the long-term growth and competitiveness of national tourism sectors. This study is carried out with the aim of bridging this information gap, by analysing and quantifying determinants of innovation in tourism in the Australian context. This is achieved by developing and estimating a model of the innovation process in tourism. The model is fitted to two of the widely adopted innovation outputs in tourism: service and marketing innovation. The study adopts a logistic regression approach to quantify the relationships and use a longitudinal database as the key source of data. The study provides quantitative evidence on the various determinants and institutional factors that drive innovative activities among tourism firms.

The remainder of this paper is organised as follows. Section 2 reviews the existing literature and elaborates the conceptual model used. Section 3 describes available data, research methodology, and modelling strategy. Section 4 presents empirical results. In Section 5, we place our work in context with the previous work in this area and discuss broad policy implications from the research. The final section summarises major findings, highlights contributions of the study and draws conclusions.

2. Review of the literature and conceptual framework

The concept of 'innovation' needs to be distinguished from the term 'invention', as often these terms are used interchangeably (Fagerberg, 2004). From an economics point of view, an invention is a new idea that may or may not be economically useful, whereas an innovation is an application and implementation of a new idea or a new application of an existing idea that results either in a new kind of product, or a new and better process for producing an existing product (Schumpeter, 1934). Joseph Schumpeter (1934), the father of the economic theory of innovation, refers to innovation as the critical dimension of economic change and 'a creative destruction'. Creative destruction refers to the incessant product and process innovation mechanism by which new production units replace outdated ones. The mechanism refers to the introduction of new products, new methods of production, the opening of new markets, development of new sources of the supply of inputs, and the creation of new market structures in an industry (Schumpeter, 1934). The version of the concept that we employ here, as defined in the Oslo Manual (OECD & Eurostat, 2005, p. 46), refers to innovation as 'the implementation of a new or significantly improved product (good or service), process, a new marketing method, or a new organisational method in business practice, workplace organisation or external relations'. This modified version of the Schumpeterian definition of innovation has important implications—the concept can be adapted to the service industries, including tourism (Carvalho & Costa, 2011; OECD, 2013). Innovation in the tourism sector has general characteristics like those in any other economic sector, as well as the tourism-specific ones. Service and marketing are the two main categories of innovation in tourism (Deegan, 2012).

In the absence of an established conceptual framework within which to study the innovative behaviour of tourism firms, the model due to Crépon, Duguet, and Mairesse (1998)—known as CDM—is used as the foundation for developing the conceptual framework of the study. This model—widely used in modelling the innovative behaviour of firms in various industries (mainly manufacturing)—is the standard for such work (Deegan, 2012). It provides the link between a firm's decision to innovate, innovative activities and outputs, and economic performance. Once the decision to innovate is made, the next stage involves identifying the factors that drive innovation or the determinants of innovation activities, which is the focus of this study. The literature offers various explanations that drive innovative activities among tourism firms.[1] They include (i) collaboration (Carlsen, Liburd, & Edwards, 2010; Gokovali & Avci, 2012; Wang & Fesenmaier, 2007), (ii) human capital (Grissemann, Pikkemaat, & Weger, 2013; Orfila-Sintes & Mattsson, 2009; López-fernandez et al., 2011), (iii) information technology (Buhalis & Law, 2008; Deegan, 2012; Sevrani & Elmazi, 2008), (iv) funding (Hall & Williams, 2008), and (v) factors specific to firms, and market characteristics—institutional factors.

It is argued that 'innovation rarely occurs in isolation' (OECD, 2011, p. 27). Having a new idea will not yield results by itself; collaboration or networks are necessary for the development, implementation, diffusion, and on-going success of innovation (Carlsen et al., 2010). Martinez-Fernandez (2004) suggests that collaboration is a decisive factor in collective learning and innovation. Collaboration facilitates the use of local knowledge, together with partners' knowledge, to create well-informed decisions and

[1] Business research and development (R&D) expenditures for a long time were supposed to be the crucial and direct determinant of a firm's innovation activity in general, and its ability to absorb external knowledge. However, R&D expenditures have little significance in analysing innovation activities among tourism firms, as such firms hardly invest in R&D (Flikkema, Jansen, & Van, 2007; Miles, 2008).

solutions (Yuksel, Bramwell, & Yuksel, 1999). Collaboration adds value for firms through gathering information, building on accumulated knowledge, practice, experience, the capabilities of stakeholders in co-producing integrated tourism services, and improving the attractiveness of tourism packages and tourist destinations (Bramwell & Broom, 1989; Wang & Fesenmaier, 2007). Also, collaboration ensures the adequate supply of skilled personnel, which is considered a key factor for innovation among tourism and hospitality firms (Gokovali & Avci, 2012).[2]

With tourism being a labour-intensive industry, human capital—the set of knowledge, skills, and abilities that are possessed by employees—plays a pivotal role in innovation and is a conducive factor for the innovation performances of tourism and hospitality firms (Grissemann et al., 2013; Orfila-Sintes & Mattsson, 2009). An educated and skilled workforce is essential for successful innovation, because 'such a workforce is more likely to be able to generate and implement new ideas and to adopt new technological and organisational change' (Australian Government, 2012, p. 4). Further, employees' knowledge is closely linked to a firm's products and services; thus, the ability of a firm to introduce new products or services is dependent on its human capital (López-fernandez et al., 2011; McKelvie & Davidsson, 2006).[3]

According to the OECD (2005), the tourism industry today has been proactive in adopting new technologies. ICT is probably 'the strongest driving force for changes in tourism' (Sevrani & Elmazi, 2008, p. 22). It supports internal and external coordination and communication, e-marketing, and the online sales of services. At the firm level, ICT creates a substantial opportunity for re-engineering operations, such as back-office or reservation systems and e-business (Stamboulis & Skayannis, 2003). ICT also enhances the mobility of passengers, luggage, and goods and information, thus reducing the burden of travel and resulting in greater efficiency for both firms and tourists (Deegan, 2012). Finally, innovation usually requires large amounts of investment; therefore, the financial capability of firms plays a decisive role during the innovation process. However, most tourism firms are small-scale enterprises, and their capacity to invest in innovation activities is limited. Therefore, the need for external funding to encourage tourism firms to engage in innovative activities has been emphasised (Hall & Williams, 2008). Of the various funding sources, government funding seems to be the most effective form of support to stimulate innovation within the tourism industry.

In addition to the key determinants discussed above, the literature offers several other explanations that affect innovation, namely, institutional factors relating to firm and market characteristics. Of the various institutional factors, firm size is known to be important in affecting the propensity to innovate (Mel, McKenzie, & Woodruff, 2009; Soames, Brunker, & Talgaswatta, 2011). Specifically, larger firms are more likely to be innovative. Along with firm size, ownership pattern is conjectured to have some bearing on the propensity to innovate (Castellani & Zanfei, 2004). Foreign-owned firms are known to have a higher propensity to innovate than have domestic firms (Balcet & Evangelista, 2005). Thomas and Guadalupe (2012) indicate that multinational firms conduct more product and process innovation and adopt more foreign technologies than domestic firms do.

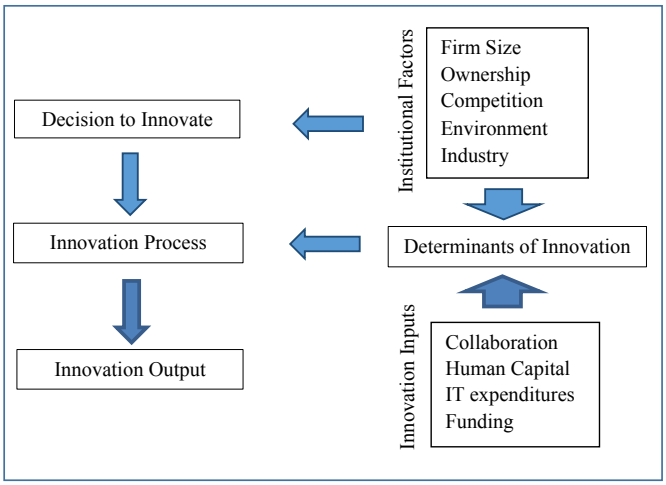

Fig. 1. The conceptual framework.

Of market characteristics, the nature and intensity of the prevailing competition are acknowledged to be a key driver of innovation, particularly in tourism (OECD, 2006). Strong competition puts firms under pressure to reduce costs, resulting in greater innovation efforts (Soames et al., 2011). Pirnar, Bulut, and Eris (2012) add that innovation helps increase the efficiency of operations, satisfies customers' needs, and creates more flexibility in responding to demand, thus facilitating firms' ability to gain a competitive edge.[4] A final factor claimed to have an impact on the innovative behaviour of tourism firms is the environment (Du Cluzeau, 2006; Dwyer & Edwards, 2009; Razumova et al., 2015). The tourism industry is largely environment-based and to maintain destination competitiveness, there is an incentive for tourism firms to be innovative. On the other hand, the environment significantly affects the provision of tourism services. The adverse environmental effects discourage firms from undertaking risky innovations.

To summarise, collaboration, human capital, information technology and funding are often cited as key determinants of innovation in tourism. In addition, the literature suggests several institutional factors associated with the decision of tourism firms to adopt innovations. These include firm size, ownership patterns, the degree of competition, and environment. Furthermore, the nature of an industry may also influence the propensity to innovate. Along with the institutional factors, which we treat as controlled variables influencing decisions to innovate, the four major determinants identified above are hypothesised to determine the innovation process. These arguments are summarised in Fig. 1, which forms the conceptual framework of the study.

3. Model specification, data, and methodology

Inspired by the CDM model (Crépon et al., 1998) and the conceptual framework above, the innovation activities of tourism firms are modelled as a two-stage process. The first stage concerns the firm's decision to engage in an innovation process—the process that leads the firm to decide whether to undertake or invest in

[2] So far, there have been very few empirical studies on the relationship between collaboration and innovation in the tourism industry. The evidence from available studies is mixed. For example, Backman et al. (2017) and Dyer (2000) suggest a positive relationship between collaboration and innovation. Tether (2002), however, suggests that this relationship is not straightforward.

[3] Tugores (2012) shows that hotel firms that conducted training for employees are more likely to innovate than others are. Chun-Yao, Hui-Yueh, and Shou-Shiung (2008) find employee training to be a key determinant of innovation in the Taiwanese hotel industry; and Ottenbacher, Shaw, and Lockwood (2006) find it too in independent hotels in Germany.

[4] These sentiments, however, are in sharp contrast to the view of Schumpeter (1934); the benefits from innovation are fewer in a strongly competitive market compared to a situation where competition is weaker, suggesting a negative relationship between competition and innovation.

innovative activities. The institutional factors are hypothesised to influence the decisions to engage in innovative activities. Once the decision to innovate is made, the next stage involves the engagement in the innovation process by the firm. The process may include research and development of new or improved products, processes, or managerial or operational systems. In order to produce the desired innovation outputs, the firm needs to invest in appropriate innovation inputs such as information technology, human capital, and so on. Depending on the firm's objectives, the resulting innovation output could be a new product (a good or a service), a new process that improves the firm's efficiency (process innovation), a new or improved organisational or managerial method (organisational innovation), and (or) new marketing techniques (marketing innovation). Before the specification of the empirical model, we comment on the available data as the choices of the model and the appropriate estimation method are governed by the nature and availability of data.

3.1. Data

The key source of data for the study is the Business Longitudinal Database (BLD) developed by the Australian Bureau of Statistics (ABS). Major input to this database comes from the annual Business Characteristics Survey (BCS) conducted by the ABS. As in the case of the European Community Innovation Survey (CIS), which is based on the Oslo Manual, the BCS collects data on various aspects of innovative activities undertaken by Australian businesses. It also gathers data concerning business performance, finance, market competition, and firm organisational structures (for details about survey methods, sample choice and questionnaire, see ABS, 2013). The latest compilation of this database provides innovation-related data for the five-year period 2006/07 to 2010/11. The BLD uses the 2006 Australia and New Zealand Standard Industry Classification (ANZSIC) to categorise businesses under 20 different industry groups. However, ANZSIC 2006 does not identify tourism as an industry, and many of the tourism characteristics and tourism-related industries are coded under broad industry divisions. This makes it impossible to identify all sub-sectors that comprise the broader tourism sector. Consequently, two major 'tourism characteristic' industries are chosen for the current study. They are (i) Accommodation and Food Services (which includes accommodation, cafes, restaurants and takeaway food services, clubs, pubs, and taverns and bars); (ii) Arts and Recreation Services (which includes cultural services, casinos and other gambling services, as well as sports and recreation services). The sample consists of 389 firms, 167 operating in the Accommodation and Food Services industry, and 222 in the Arts and Recreation Services industry. The relevant microdata on innovative activities of the chosen industry sectors is accessed from the 2013 edition of the BLD Confidential Unit Record Files (CURF). A summary of the sample data is presented in Table 1 and definition of each variable is detailed in Table 2.

3.2. Empirical Model—the innovation production function and variable specification

The relationship between innovation output and its determinants, as specified in the conceptual framework above, may be defined as;

$$I = \beta_0 + \sum_{i=1}^{m} \beta_i x_i + \varepsilon \quad (1)$$

where I is an innovation output, x_i is a vector of variables that determines/influences the innovation output (innovation inputs and institutional factors), β_i is a vector of corresponding coefficients and ε is an error term.

Table 1
Descriptive sample summary.

Variables	Unit records	Mean	Std. Dev.
Service innovation	389	0.15	0.35
Marketing innovation	389	0.22	0.42
Human capital	389	0.09	0.28
Collaboration	389	0.12	0.32
Funding	389	0.23	0.42
ICT	389	0.15	0.36
Firm size	389	1.40	1.13
Degree of competition	389	2.12	1.11
Foreign ownership	389	0.01	0.10
Environmental factors	389	0.07	0.25

Source: BDL (Compiled by Authors)

Table 2 shows the description of all the variables included in the model. The dependent variable and all of the explanatory variables except for firm size and market competition are binary dichotomous. For example, the dependent variable 'innovation output' takes the value (1) if the firm introduced or implemented innovations in the previous year and (0) if it did not. The same applies to independent variables collaboration, human capital, information technology, funding, ownership and environment. The two remaining independent variables firm size and market competition are ordinal categorical variables; the former is categorised into four size groups and the latter into four levels of competition (see Table 2). Given the binary nature of the dependent variable, we use logistic regression to estimate the model. Equation (1) can be estimated for different types of innovation outputs, and the focus of this study is service (product) and marketing innovation. Product or service innovation is the introduction of a product or service that is new or significantly improved with respect to its characteristics or intended uses (ABS, 2013). Product innovation is important for tourism firms, as it is more related to product differentiation and the creation of new markets leading to an increase in firm sales. Marketing innovation refers to the implementation of a new or significantly improved marketing method, concept, or strategy, such as a new way of advertising or promoting tourism products or offering alternative tour packages (ABS, 2013). Marketing innovation is aimed at better addressing customer needs, opening new markets, or newly positioning a firm's product on the market, with the objective of increasing firm sales. Both types of innovation strengthen a firm's competitive position and growth.

3.3. Modelling strategy and model evaluation

The empirical version of the model—logistic regression equation—used for estimation takes the following form:

$$\begin{aligned}\log\left(\frac{\widehat{\rho}_i}{1-\widehat{\rho}_i}\right) = {} & \beta_{0i} + \beta_{1i}Collaboration + \beta_{2i}Human\ Capital \\ & + \beta_{3i}ICT + \beta_{4i}Funding + \beta_{5i}Size \\ & + \beta_{6i}Competition + \beta_{7i}Ownership \\ & + \beta_{8i}Environment + \beta_{9i}Industry + \varepsilon_i \end{aligned} \quad (1.1)$$

Where $\widehat{\rho}_i$ is a measure of the probability of introducing the ith type of innovation, β_i are parameters to be estimated, and ε_i is an error term.

Estimation of the model is carried out using the STATA software package, and results are reported in Table 3. The estimated models

Table 2
Variable description.

Dependent variable/innovation output	
1. Service innovation	Business introduced or implemented any new or significantly improved services during the last financial year (0 = No; 1 = Yes)
2. Marketing innovation	Business implemented any new marketing methods during the last financial year (0 = No; 1 = Yes)
Key predictors or determinants or explanatory variables	
x_1 Collaboration	Business collaboration for innovation purposes (0 = No; 1 = Yes)
x_2 Human capital (Employee training)	Compared to the previous year, amount of structured or formal training for employees increased (0 = No; 1 = Yes)
x_3 ICT	Compared to the previous year, expenditure on IT increased (0 = No; 1 = Yes)
x_4 Funding	Business received any financial assistance during the last financial year (0 = No; 1 = Yes)
Institutional factors/Control variables	
x_5 Firm size	Number of employees 0 = non-employer, 1 = 1 to less than 5 employees 2 = 5 to less than 20 employees 3 = 20 or less than 200 employees
x_6 Degree of competition	Number competitors 1 = Captive market or no effective competition 1 = One or two competitors 2 = Two or three competitors 3 = Five or more competitors
x_7 Foreign ownership	Business has any degree of foreign ownership (0 = No; 1 = Yes)
x_8 Environmental factors	Environmental factors significantly hampering other business activities or performance during the last financial year (0 = No; 1 = Yes)
x_9 Industry dummy	0 = Accommodation and Food Services firm 1 = Arts and Recreation Services firm

Source: BLD (ABS, 2013)

Table 3
Model estimates.

Explanatory variables	Dependent variables – Innovation Outputs		VIF
	Service Innovation	Marketing Innovation	
Constant	−3.50	−4.16	
Collaboration	1.88***	1.64***	1.08
Human capital	1.13**	0.68	1.20
ICT	0.39	0.67*	1.25
Funding	0.35	0.62*	1.17
Foreign ownership	3.37**	1.34	1.02
Market competition	−0.04	0.47***	1.06
Size	0.47*	0.54***	1.09
Environment	−1.61*	−0.56	1.06
Industry	0.62	0.66**	1.08
Log-likelihood	−167.65	−165.13	
LR $chi^2(9)$	27.78***	83.24***	
HL test (*Prob > chi-squared*)	0.65	0.07	

Note: ***, **, and *: statistically significant at 1%, 5%, and 10%, respectively.

are evaluated for their overall goodness of fit using the Likelihood Ratio (LR) and Hosmer-Lemeshow (HL) tests. The statistical significance of each predictor or explanatory variable is assessed using the Wald test statistic (z-values). Among diagnostic tests, the Variance Inflation Factor (VIF) is used to test for multicollinearity. The overall goodness of fit of the two models is satisfactory; the LR tests are significant at 1%, and the HL tests at 5%. The VIF statistic is around one in magnitude, so no evidence of multicollinearity is detected.

While the overall goodness of fit of the two models is satisfactory, not all the predictor variables are statistically significant. Except for the variable collaboration, which is highly statistically significant in both models, the relative significance of the other predictors varies. In the service innovation model, human capital is the second statistically significant variable whereas, in the case of marketing innovation ICT and funding are statistically significant. As with the four determinants, the relative importance of institutional factors also varies across the two models. In the service model, foreign ownership, firm size, and environment variable are statistically significant whereas, in the marketing model, competition, firm size and industry variables are statistically significant. These variations in the relative significance of the explanatory variables would suggest that the hypothesised factors influence the propensity to innovate differently across the two types of innovation outputs.

Logistic regression is known to provide a better fit to the data if it demonstrates an improvement over a model with fewer predictors. Accordingly, each model is tested to obtain a parsimonious model by removing statistically insignificant variables using the hierarchical selection method. Further tests are carried out to ensure the predictive capability of the parsimonious models. The procedure involves comparing the likelihood of the data under the full model against the likelihood of the data under the reduced models (parsimonious) with fewer predictors. The null hypothesis, H_0 holds that the reduced model is true. We test the null hypothesis using the Wald test.[5] The chi-square value generated by the Wald test, as well as the associated p-values are reported in Table 4. In the service model the P-value associated with the chi-square value of 2.66 (with 4 degrees of freedom) is 0.6154, and in the marketing model, the P-value associated with the chi-square of 3.82 (with 3 degrees of freedom) is 0.2820. Based on the p-values, at 5% level of significance, the null hypothesis that the excluded variables in both models are simultaneously equal to zero cannot be rejected. This implies that the exclusion of statistically insignificant variables does not affect the goodness of fit of the chosen parsimonious models or their predictive capability. Consequently, the two parsimonious models are used for further analysis in the following sections.

[5] The Wald test approximates the LR (Likelihood Ratio Test), but with the advantage that it only requires estimating one model. The Wald test works by testing that the parameters of interest are simultaneously equal to zero. If they are, this strongly suggests that removing them from the model will not substantially reduce the fit of that model, since a predictor whose coefficient is very small relative to its standard error is generally not doing much to help predict the dependent variable.

Table 4
Tests of predictive capacity of the estimated parsimonious models.

Service innovation	Marketing innovation
Null hypothesis	Null hypothesis
Ho: ICT = Funding = Competition = Industry = 0	Ho: Human capital = Ownership = Environment = 0
Wald Test Statistic: chi-squared (4) = 2.66	Wald Test Statistic: chi-squared (3) = 3.82
Prob > chi-squared = 0.6154	Prob > chi-squared = 0.2820

4. Empirical results

4.1. Determinants of service innovation

Table 5 presents the parameter estimates of the parsimonious model of service innovation along with associated odds ratios and marginal effects. Overall, the statistical fit of the model is satisfactory, with the LR test being significant at 1%, and the HL test indicating that the model fits the data (P > 0.05) well. The Wald tests for parameters indicate the five independent variables are significant in explaining the likelihood of introducing service innovation. Of the key inputs, collaboration and human capital are found to be the major determinants of service innovation. The variable collaboration is statistically significant at 1%, and the associated coefficient is positive; this suggests that engaging in collaboration increases the probability of introducing service innovation. The variable human capital (the amount of structured or formal training for employees) is positive and statistically significant at 5%, indicating that the increase in training for employees is more likely to result in service innovation. In addition, firms with foreign ownership have a greater propensity to introduce service innovation than do their counterparts that are wholly Australian-owned. Firm size also appears to have a positive impact on service innovation. In terms of the odds ratio, the odds of introducing service innovation are 15.1 times greater if the firm has some foreign ownership, 7.2 times greater if the firm collaborates, and 3.1 times greater if the firm increases training for their employees. While these four factors have a positive impact on service innovation, the estimated coefficient of the variable 'environment' is negative (−1.55). This suggests that negative environmental effects (that is, natural disasters such as drought, flood, bushfires, and tsunami) discourage firms from innovating.

The marginal effects associated with each of the statistically significant variables reported in Table 5 provide complementary insights into the impact of these variables on service innovation. The results indicate that the predicted probability of introducing service innovation is 37 percentage points higher for firms which collaborated for innovative purposes, relative to non-collaborating firms. Similarly, the marginal effect of the human capital variable suggests that increasing training for employees is associated with 18 percentage points higher probability of introducing service innovation. Of the institutional factors, the foreign ownership variable is found to be the most significant driver of service innovation, with a marginal effect of 57 percentage points. The marginal effect associated with the environment variable indicates that the predicted probability of implementing service innovation falls by 12 percentage points for firms affected by adverse environmental factors. The relative significance of each of the variables as a driver of service innovation—as revealed from associated marginal effects—is similar to the odds ratios. Both measures provide a similar ranking regarding the relative significance of each variable. Nonetheless, marginal effects can be used to gain a better understating about the effects of categorical variables, such as competition and firm size.

Firm size is often considered as an inducer of propensity to innovate, which reflects scale economies and firm's ability to access to finance. The observed positive impact of firm size is important; it is often argued that larger firms have more resources and are therefore more likely to engage in innovation. Given that firm size used in this study is a categorical variable representing four size groups (defined in terms of the number of employees), the marginal effects can be calculated for each group to examine how different firm sizes influence the propensity to innovate. The four size groups include (1) non-employing firms (owner operations); (2) firms with 1–4 employees; (3) firms with 5–19 employees; and (4) firms with 20–199 employees. The estimated marginal effect coefficients for the three size groups (2, 3 and 4) relative to group 1 are reported in Table 5 along with corresponding p-values. Except for the size group 4 (with P-value of 0.157), estimated marginal effect coefficients are statistically significant. They provide pairwise comparisons showing how increasing firm size is sensitive to the predicted probability. For example, the marginal effect associated with category (2) indicates that the firms in this category (1–4 employees) are four percentage points more likely to introduce service innovation than are non-employing firms. Similarly, in relation to category (3), firms with 5–19 employees are five percentage points more likely to introduce innovation compared with non-employing firms. As pointed out earlier, the estimated marginal coefficient for the size group 4 is statistically insignificant so no strong inferences can be made. Nonetheless, the magnitude of the corresponding coefficient (of seven percentage points) is indicative of the general trend that the larger the size of the firm, the higher is the probability that the firm will introduce or implement service innovation.

Table 5
Results of the parsimonious model for service innovation.

Explanatory Variables	Coefficient	Odds Ratio	Marginal effects
Constant	−2.9 ***	n. a	
Collaboration	1.98 ***	7.26	0.37 ***
Human capital	1.15 **	3.15	0.18 *
Foreign ownership	2.72 *	15.10	0.57*
Environment	−1.55 *	0.21	−0.12 ***
Firm size	0.40 *	1.49	
1) Non-employing firms			n.a
2) Firms with 1–4 employees			0.04 **
3) Firms with 5–19 employees			0.05 *
4) Firms with 20–199 employees			0.07
Log-likelihood	*−169.02*		
LR Test chi2(5)	*25.04***		
HL test: Prob > chi-squared	*0.097*		

Note: ***, **, and *: statistically significant at 1%, 5%, and 10%, respectively.

4.2. Determinants of marketing innovation

The parameter estimates drawn from the parsimonious model for marketing innovation are summarised in Table 6. Overall, the tests for goodness of fit indicate that the model is statistically significant at 1%. The Wald statistics for parameters suggest that collaboration, funding, ICT, firm size, market competition, and the type of industry positively influence the propensity to implement marketing innovation in tourism. Compared to service innovation,

Table 6
Results of the parsimonious model for marketing innovation.

Explanatory Variables	Coefficient	Odds Ratio	Marginal effects
Constant	- 4.09 ***	n.a	n.a
Collaboration	1.61 ***	5.01	0.32 ***
ICT	0.81 **	2.25	0.14 **
Funding	0.60 *	1.82	0.10 *
Industry	0.58 **	1.78	0.08**
Firm Size	0.53 ***	1.70	
1) Non-employing firms			na
2) Firms with 1–4 employees			0.07 ***
3) Firms with 5–19 employees			0.09 ***
4) Firms with 20–199 employees			0.12 ***
Market competition	0.47 ***	1.61	
1) Firms facing no competition			na
2) Firms facing 1 or 2 competitors			0.05 ***
3) Firms facing 3 or 4 competitors			0.07 ***
4) Firms facing 5 or more competitors			0.09 ***
Log-likelihood = −166.98			
LR chi2(5) = 79.54***			
HL test: Prob > chi-squared = 0.18			

Note: ***, **, and *: statistically significant at 1%, 5%, and 10%, respectively.

ICT is a factor unique to marketing innovation. The results indicate that the odds of implementing marketing innovation increase by 2.25 times for firms investing in ICT. This result confirms the crucial role of ICT in promoting tourism products across geographical and user boundaries. A second factor unique to marketing innovation is funding. Receiving financial support is associated with 1.8 times greater odds of implementing marketing innovation. A third factor unique to innovation in marketing is the type of industry; the associated odds ratio indicates that firms in Arts and Recreation Services have the odds of innovating in the marketing of 1.8 times greater than firms in Accommodation and Food Services. Along with firm size, market competition also has an impact on the propensity to innovate. As the corresponding odds ratio indicates, firms facing competition are on average 1.6 times more likely to innovate than those facing no competition.

Consistent with the impacts of the explanatory variables manifested in the odds ratio, associated marginal effects confirm the high significance of collaboration as a determinant of marketing innovation. The predicted probability of innovating is 32 percentage points greater for firms engaging in collaboration. Firms that are increasing their expenditure on ICT are 14 percentage points more likely to have implemented innovative marketing methods, and firms receiving financial support have a ten percentage points higher likelihood of implementing marketing innovation. Of the two categorical variables, marginal effects associated with the variable firm size confirm the earlier finding that the larger the size of a firm, the greater is the propensity to innovate. The associated marginal effects indicate that the probability of implementing marketing innovations increases by 7, 9, and 12 percentage points, respectively, as firm size increases.

Market competition is often considered an important institutional factor influencing innovation intensity, and there is considerable debate over its role. As with the firm size, competition is a categorical variable, and its marginal effects can be estimated at different levels of competition. The data allow the classification of market competition into four levels: (1) firms are facing no competition, (2) firms facing 1 or 2 competitors, (3) firms facing 3 or 4 competitors, and (4) firms facing 5 or more competitors. The calculated marginal effects for each level of competition, treating level (1) as the reference category, are reported in Table 6. They show that the predicted probability of implementing marketing innovation increases progressively with increasing levels of competition from 5, 7, and 9 percentage points respectively, compared to firms in a captive market (no competition).

5. Discussion and policy implications

5.1. Discussion

The results of the two binary logistic regression models exploring the determinants of service and marketing innovation presented above are broadly consistent with *a priori* theoretical expectations. However, the relative importance of the determinants varies across the two types of innovation. Of the key determinants, collaboration for innovation purposes is found to be the most significant factor and is positively correlated with both types of innovation. These confirm the crucial significance of collaboration on innovation in general. As widely discussed in the literature, collaboration benefits a firm through gathering and sharing information and resources, and it facilitates the transfer of knowledge and experience between partners, leading to the generation of new ideas along the path to innovation. The results from the two empirical models lend support to this view that firms taking part in collaboration are more likely to introduce innovations than are firms that do not collaborate.

Human capital is found to be the second significant determinant of service innovation. This finding accords with the prior expectation that an increased stock of human capital is positively correlated with innovation outcomes. In a labour-intensive service industry such as tourism, employees play the central role in providing services, and they interact with customers; thus, they have a good understanding of customers' behaviour and needs. Training and education are ways to develop and enhance the quality of the workforce—it updates and renews employees' capabilities to do well in the market and the business environment. Consequently, a highly qualified and well-trained workforce is more likely to recognise the value of previously unexploited knowledge, opportunities, and ideas that lead to the generation of innovation. This finding is confirmative and consistent with the theoretical prediction that a higher level of human capital is associated with the greater innovative capability.

Of the key determinants, third in significance is ICT. The results show that increased adoption of ICT is positively associated with a higher probability of tourism firms implementing marketing innovation. Tourism being a demand-driven industry, the observed positive relationship between ICT and marketing innovation gives credence to the widely held views about the role of ICT in tourism marketing—new forms of ICT are increasingly affecting and resulting in numerous marketing innovations in tourism businesses

(Buhalis & Law, 2008; Deegan, 2012). Further, as revealed by the survey of Innovation in Australian Business 2012–13, innovations related to using media techniques are of the greatest importance and are the key to promoting tourism products and packages.

Finally, our finding of the positive impact of funding on marketing innovation is novel and an important result, as no comparable empirical evidence is hitherto available. Arguably, investment on innovation requires a large amount of funding that most small tourism firms are unable to secure. Thus, funding from government and other sources is crucial for the innovative activities of tourism firms. This result is also important from a policy perspective; it justifies the Australian government's policy of providing funding for marketing and promotion of the Australian tourism sector (Tourism Australia, 2014).

Of the institutional factors, firm size is found to be a key factor influencing the propensity to innovate. Most importantly, increasing firm size is found to be positively correlated with an increased propensity to implement both service and marketing innovations. This is an important and novel finding, which accords with theoretical expectations. According to Schumpeter (1950), larger firms have a greater capability to innovate, so they probably are readier and more likely to do so. Moreover, they also have greater financial capability and resources to support innovation activities or to access innovative technologies, which are too expensive for small-sized firms. Further, these firms have a broader business network, which is a valuable source of ideas, information, and support for innovation.

The second in significance among institutional factors is the ownership pattern. The results show that those firms with some degree of foreign ownership have a higher probability of introducing service innovation. This may reflect the foreign-ownership advantages, including greater availability of funding and resources, access to modern technology, and greater international experience enhancing the capacity to innovate. The relationship between foreign ownership and innovation is an issue discussed widely in the literature to date with little or inconclusive empirical evidence (Dachs & Ebersberger, 2009; Dachs, Ebersberger, & Lööf, 2007). In this context, the finding is important in its own right—the result provides conclusive evidence on the effect of foreign ownership on innovation intensity among tourism firms.

The third factor inducing the propensity to innovate is the degree of market competition. The results indicate that the higher the degree of competition, the greater is the propensity to innovate. On theoretical grounds, this is an important finding, which supports an 'anti-Schumpeterian' perspective, where stronger competition is associated with more innovation (Soames et al., 2011). Strong competition puts firms under pressure to create new and distinctive tourism products to attract customers and to reduce costs, resulting in a greater effort to undertake innovative activities. Most innovations in the tourism sector have been implemented to confront the intense competition faced by tourism firms (Tourism Australia, 2014). Thus, our finding is consistent with empirical realities.

Fourth in significance with implications for the propensity to innovate among tourism firms is the environment. The results indicate that adverse environmental factors negatively influence the propensity of a firm to create service innovation. This is an important finding, given that tourism and the environment are interrelated (Pigram, 1980). Natural disasters such as bushfires, floods, earthquakes, volcanoes, or diseases and epidemics have serious effects on inbound and domestic tourism, and thus on tourism businesses. These negative environmental impacts are more likely to keep tourists away from holiday destinations or to harm businesses in the affected areas. Therefore, adverse environmental effects discourage firms from undertaking risky innovations. Their primary focus following an environmental disaster is to recover the damages caused, rather than to introduce new services. In these contexts, the observed negative effects of environmental factors on service innovation are both theoretically and empirically plausible results.

Finally, we comment on the industry dummy variable included in the model to examine whether the industry characteristics have any bearing on the propensity to innovate. The results reveal that the nature and characteristics of industry have an impact on the propensity to innovate in marketing. As revealed, firms in the Arts and Recreation Services are more likely to innovate in marketing than are firms in the Accommodation and Food Services. One might argue that the Arts and Recreation Services, a key component of tourism services, are characterised by a high level of creativity. However, demands for such services by tourists are optional or luxury in nature, unlike the demand for Food and Accommodation Services, which are necessities for tourists visiting a destination away from home (Divisekera, 2010). Thus, only through extensive and innovative marketing efforts are the firms in Arts and Recreation Services able to attract customers, stimulating them to be more innovative. This may explain the model's result that why firms in Arts and Recreation Services are more likely to innovate in marketing than are those in Accommodation and Food Services.

5.2. Policy implications

The issues explored, inferences drawn, and findings of the study have significant practical and policy implications. Of the various findings, one with significant implications for policy formation is the observed strong relationship between collaboration and generation of innovations. Collaboration positively contributes to the generation of both types of innovation—service and marketing. On empirical grounds, such a strong relationship is expected, given that a destination includes natural, man-made, and cultural attractions, plus other attributes that do not belong to a single organisation but are part of a broader tourism system (Crouch & Ritchie, 1999). Such a system comprises many groups of independent firms working together to build the overall tourism product. In this context, arguably, collaboration among different firms is necessary to achieve innovation outcomes. Collaboration facilitates the exchange of knowledge and experience, as well as helping firms to overcome difficulties—such as insufficient financial resources, personnel, or infrastructure—when pursuing innovative activities (D'Angella & Go, 2009;; Haugland, Ness, Grønseth, & Aarstad, 2011). Thus, there is a need for tourism firms to collaborate actively with related institutions and groups to enhance their innovative capacity. In this context, there is a role to be played by government and industry policy-making bodies. That role is to develop appropriate policies and strategies to facilitate networking and coordination and collaboration among tourism firms. Such strategies should not be limited to the tourism value chain alone, but also to collaborative relationships between tourism firms and public research organisations. Further, it is widely acknowledged that a key source of information and ideas for innovation comes from customers (Schaarschmidt & Kilian, 2014). Thus, the collaboration between firms and customer needs to be further strengthened. As a demand-oriented industry, collaboration with customers enables firms to identify changing consumer preferences and emerging market trends leading to new ideas and opportunities to innovate and create new tourism products or to improve existing ones.

The second finding with significant implications for policy is the relationship between human capital and innovation among tourism

firms. Not only does human capital have a positive impact on the probability of introducing innovations, but it is also an important factor affecting productivity. In the Australian context, however, the evidence suggests that tourism businesses are facing substantial recruitment and retention difficulties and skills shortages. In fact, the tourism workforce has a very low educational profile with more than half of the workers having no post-school qualification (TRA, 2015). Although labour-force issues in the Australian tourism sector have widely been acknowledged among industry and policy circles, they remain unresolved and have worsened over the years (TRA, 2015). This workforce-related issue hampers tourism firms from being innovative. Therefore, there is a need for the development of appropriate policy measures to enhance the skill-base of the tourism workforce through targeted training programs.

Thirdly, the study revealed that ICT has a positive impact on the likelihood of implementing marketing innovation. Undoubtedly, adoption and utilisation of ICT are among of the major drivers of the growth of tourism industry in the recent past. The promotion and marketing of tourism products heavily rely on ICT. However, there are barriers to ICT adoption/implementation: Firstly, an overwhelming majority of businesses in tourism and hospitality are SMEs with resource constraints, thus limiting their capacity to adapt ever-changing ICT (Mistilis & Gretzel, 2013; OECD, 2017). The other is the inadequate and inaccessible ICT infrastructures (particularly in remote regions). Thus, there is a need for policy intervention to enhance ICT capability as well as to support tourism businesses in adjusting to and adopting new technology. Finally, it was revealed that funding is a significant contributor to the generation of marketing innovation. Lack of funding has a negative impact on investment in innovative activities and (or) discourages firms from pursuing innovative ideas. Thus, policy intervention is needed to deal with this issue. Prevailing industry-assistance policies may need to be revised; targeted funding that facilitates innovation activities needs to be implemented.

6. Summary, contribution of the study and concluding remarks

The limited empirical knowledge of the innovation process and its determinants in the tourism sector is a major obstacle to the development of appropriate policy measures that enhance and facilitate innovation. The issue is critical in ensuring the long-term growth and sustainability of national tourism enterprises as it is only by being innovative and adopting innovations tourism enterprises can survive and confront the ever-increasing competition. Despite the growing literature, empirical research on innovation in tourism is in its embryonic state, and the need for quantitative empirical evidence has been widely acknowledged. This study aimed to contribute to the literature by analysing and providing quantitative evidence on the innovation process in tourism and its determinants in an Australian context. In the process, drawn from the contemporary literature, a conceptual framework to analyse the determinants of innovation in tourism was developed. The framework incorporated both determinants or inputs that generate innovations and institutional factors contribute or facilitate the propensity to innovate. Guided by the framework, an empirical model based on the logistic regression approach was developed and applied to two of the most widely adopted innovation outputs in tourism: service and marketing innovation.

The study makes several contributions to knowledge. The first is the development of a conceptual framework to analyse the innovation process in tourism. This is an important contribution given that an established conceptual framework capturing unique features of tourism activity has been lacking. The proposed framework can be used as a basis for similar empirical work, and (or) it can be modified and extended to suit specific research objectives. Secondly, as an empirical study, it provides useful information about the role of various inputs and institutional factors that drive innovation efforts by tourism enterprises. The results reveal that not all predicted input variables have similar impacts on the two types of innovation outputs. Of the key inputs, collaboration (for innovation purposes) is found to be the most important factor common to both types of innovations - service and marketing. Human capital, another input often cited in the literature as a major determinant of innovation in tourism, found to contribute significantly to generating service innovation but not to the marketing innovation. An adaptation of ICT, an often-noted factor that drives innovation efforts, was found to influence only marketing innovation and so was the variable funding. These findings may be justified on empirical grounds. For example, a highly trained workforce is necessary to develop new products/services that differentiate them from the existing ones, but such a skilled workforce may not necessitate in implementing innovative marketing. This is because innovative marketing methods could be outsourced instead in-house development of them as in the case of developing innovative and unique products. With regards to ICT, a similar explanation may be advanced. ICT is a key instrument for developing and adopting innovative marketing methods. Arguably, ICT may not necessarily have a direct impact on developing new tourism products. Finally, some comments on the variable funding are warranted. Note that most government funding is provided (in the Australian context) to launch marketing campaigns thus, the revelation that funding is a significant factor impacting marketing innovation reflects the empirical reality. Overall, the mixed results revealed about the impact of the key innovation inputs may partly be explained by referring to the Australian experience and some extent the adaptation of multiple innovation types by tourism enterprises. Unlike in the case of manufacturing where innovations are mainly focused on developing new products which are technology-based, tourism enterprises engage in all types of innovations - product, process, organisational and marketing.

With respect to institutional factors, the results are also mixed, except for the variable firm size, the relative importance of other factors varied between the two. Among the remaining institutional factors, foreign ownership and environment variables were found to have a significant impact on service innovation, while market competition and industry variables were found to be significant to the marketing innovation. An important highlight is that the results in relation to firm size which are consistent with theoretical expectations. As has often been argued, as the size of firm increases, the propensity to innovate increases as well. In contrast, the impact of market competition on innovation reveals an anti-Schumpeterian stance, the greater the competition, the greater is the propensity to innovate among tourism firms. Overall, the mixed nature of the results in relation to the role of key inputs and institutional factors are suggestive that innovation in tourism is better understood by examining different types of innovation individually. These findings are tentative; more research is necessary to generalise those factors that drive innovation efforts by tourism firms.

In conclusion, the study enhances the theoretical and empirical knowledge of the existing literature on innovation in tourism. This has been achieved by developing a conceptual framework incorporating unique features of tourism activity and empirically testing the determinants of service and marketing innovation in the context of Australian tourism enterprises. The findings of the study could aid in the development of policy measures and strategies to enhance the innovation capacity of tourism enterprises. While the

study makes a significant contribution to knowledge, it presents some limitations that could be dealt with in future studies. The limitations stem mainly from the inherent features of the BLD database used in this study. The BLD uses a highly aggregated industry classification and does not classify tourism as a discrete industry. Consequently, it was not possible to identify all subsectors that comprise the broader tourism sub-sector. Thus, there is a need for developing specific surveys (and other means) to gather innovation data specific to tourism enterprises. When more data become available, the conceptual framework developed, and the methods adopted in this study may be used for further rigorous analysis of innovation processes of tourism firms, and the study can be used as a benchmark for comparison with studies from other countries and (or) other industries.

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