

Digital destinations in the tourist sector: a path model for the impact of e-services on tourist expenditures in Amsterdam

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Abstract Innovations in information and communication technologies (ICT) in recent decades have had profound implications for tourism services, promotion, or distribution. We apply a Structural Equations Model (SEM) to analyse the relationships between the characteristics of tourists visiting Amsterdam, the importance they attach to different kinds of information contents available on the Internet, and the actual performance of the city as a tourism destination, measured by the expenditures and the duration of stay of the visitors. Findings indicate that the choice of e-services depends on the travel motive, age, education, income, gender, nationality, and length of stay. Furthermore, use of e-forums and virtual tours was found to significantly affect local expenditure.

Keywords ICT · Internet · Mediatisation · Destination · Tourism performance

JEL Classification C51 · M31 · L83

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1 Introduction and analytical framework

The unprecedented development of information and communication technologies (ICT) in the last few decades has exerted a profound impact on tourism activities. The development of the Internet, multimedia production, and other ICT applications have created new opportunities for marketing and distribution strategies, as well as new sources of competitive advantage (Singer et al. 2010). These opportunities are especially important in light of the process of massification that has led to the creation of multiple segments for tourism demand, according to characteristics (e.g. nationality, cultural background, social status, or education), and motivations (see also Matias et al. 2011). Those technologies have led to an increased bargaining power of consumers thanks to the existence of direct communication channels with suppliers, an improved flexibility in customer–supplier relations, and an abundance of available information. Singala et al. (2011) refer to the potential of social networks (Web 2.0) to personalize the processes of communication, and to enhance the possibilities to develop customer relationship management strategies. The tourist can collect information from multiple sources before the visit and produce his/her own information during and after the visit (Mansson 2011). This process of convergence implies an interdependence between different media supports and multiple ways of accessing media content (Jenkins 2006).

These new tendencies in the processes of production and acquisition of information about tourist destinations have been the subject of various recent studies (e.g. Buhalis and Law 2008; Aldebert et al. 2011; Chang and Caneday 2011). It has been shown, for example, that the general use of social networks tends to significantly reduce the role of the informative websites managed by Destination Management Organizations (Parra-López et al. 2011). Other studies have focused on personal travel blogs (Lin and Huang 2006), or photography websites (Lo et al. 2011), showing the diversity of independent and complex information available for the tourists when choosing a destination.

There is clearly a need for solid, evidence-based research. The purpose of the present study is to analyse the relationships between the characteristics of the tourists visiting a major tourism destination (i.e. Amsterdam), the importance of the different e-services used by them before the trip, and the actual performance of the city as a place for tourism (measured by the total expenditures made by the tourists in the city and by the length of their visit). These various relations are depicted comprehensively in Fig. 1 and clarified below.

- (1) Every tourist characteristic (i.e. holiday/business motive, nationality, age, education, income, and gender) is regressed with every e-service (i.e. interactive map, personalized information, booking services, journey planners, e-forums, virtual tours, and interactive games). While other studies (e.g. Colesca and Dobrica 2008; van Dijk et al. 2007) have generally treated e-services as a singular variable, thus overlooking possible differences between different types of e-services, we presume that the empirical relationships could be more complicated. Therefore, no a priori signs are presumed and it is merely expected that the importance of different

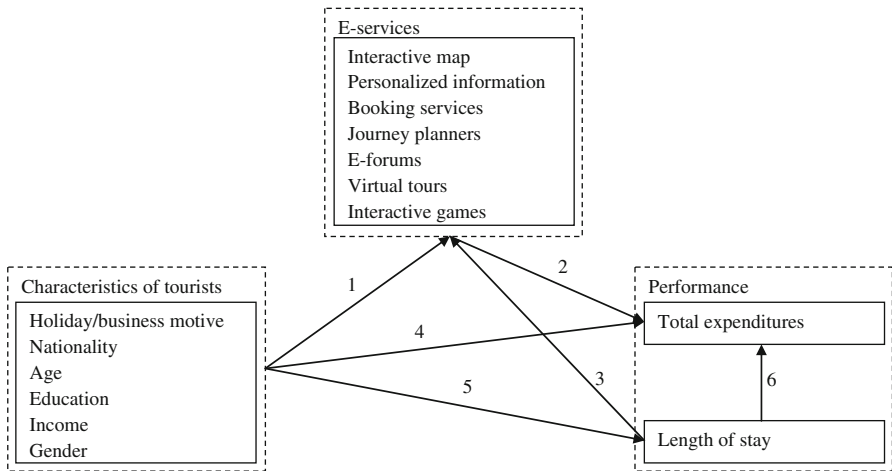


Fig. 1 Conceptual path model

- e-services is contingent upon nationality, visitor motive, gender, age, education, and income.
- (2) The use of e-services could influence the tourist expenditures in the destination city, as suggested by [Tsotsou and Vlachopoulou \(2011\)](#). However, given their specific attention to e-marketing, their study might fail to identify possible negative relationships where tourists use certain e-services in order to ‘shop’ for the cheapest alternatives.
 - (3) Length of stay might have an effect on the e-services used. It is expected that longer stays implicate an increased use of different information sources to plan the trip.
 - (4) The six personal characteristics distinguished in an analysis all have a presumed direct influence on expenditure. While a positive relationship between income and expenditure seems reasonable to expect (e.g. [Mudambi and Baum 1997](#)), and national visitors could be hypothesized to spend less, the relationships with other variables are unclear and, to a certain extent, dependent on the type of expenditure (e.g. see [Suh and McAvoy 2005](#); [Lehto et al. 2004](#), for the different effects of business tourism on total and shopping expenditure).
 - (5) The personal characteristics are associated with the length of stay. This is especially true for the motive for travelling and the nationality variable, with Dutch people more likely to visit Amsterdam as a day trip as a result of their proximity.
 - (6) Finally, the length of stay can be expected to have a positive influence on total trip expenditure since a longer stay requires more expenses on food and accommodation.

This theoretical path model is analyzed statistically in our study. A first model aims to estimate every possible relationship as described in supra. Next, the most parsimonious model is sought and the discussion of the results is limited to the theoretical paths that were found statistically significant.

2 Data and methodology

A sample of 645 visitors was collected for the study. The participants were national and international tourists in the city of Amsterdam, the Netherlands. The data was mainly collected within the Sixth Framework Programme of the European Union (FP6 EU) project, “Integrated e-Services for Advanced Access to Heritage in Cultural Tourist Destinations” (ISAAC), with the aim to evaluate the advantages, reasons for failure, and barriers related to the introduction of integrated e-services in tourist places. Visitor surveys were carried out by trained interview teams from the University of Nottingham between August and November 2007. The questionnaires used both online and face-to-face interview modes (stand-alone computer versions or paper versions), with an eventual response rate of 31 % online responses, 24 % stand-alone lap-top surveys, and 45 % completions on paper (see also [ISAAC D1.4 2007](#)).

The information collected in the survey that is of primary importance for this study comprises: personal characteristics, the appreciation of different e-services, and the expenditures made with respect to the visit. [Table 1](#) provides an overview of the personal variables concerned and their frequencies. These personal characteristics

Table 1 Frequency of personal variables

Variable	Frequency (%)
Gender (Female)	52.5
Age	
<18	6.4
18–34	62.8
35–54	22.2
55–74	8.4
>74	0.3
Education	
Pre high school	5.3
High school	22.0
Vocational	11.9
Bachelor degree	35.0
Higher degree	25.7
Income	
<€15,000	27.3
€15,001–€25,000	15.2
€25,001–€35,000	11.5
€35,001–€45,000	7.9
€45,001–€55,000	4.7
>€55,000	16.9
Nationality (Dutch)	20.2
Purpose	
Holiday	74.0
Business	10.5

were either dichotomized (gender, nationality, holiday purpose, business purpose) or could be measured on an ordinal measurement scale (age, education, income). Both the number of nights spent in Amsterdam (mean 2.63; SD 2.35) and the tourist expenditure at the holiday destination (mean 105,337.48; SD 1,288,638.26) were the subject of open, continuous questions. The mean value and standard deviation of the expenditure variable was a cause of concern, since the initial results showed a large influence of outlier values on the mean statistics, possibly caused by the open nature of the question. Deletion of the 5 % upper and lower expenditure values resulted in a more plausible mean value of 564.25 (SD 731.04) for 525 observations. In the section concerning the importance of e-services, tourists were asked to indicate the relevance of interactive maps, personalized information, booking services, journey planners, e-forums, virtual tours, and interactive games on an ordinal five-point Likert scale.

The hypothesized relationships between the exogenous and endogenous variables were subsequently tested in the AMOS 19.0 Structural Equations Model (SEM) package for SPSS, using the Maximum Likelihood (ML) method of parameter estimation. SEM allows for both the simultaneous estimation of a series of multiple regression equations and the incorporation of latent variables. Such latent factors could serve to account for measurement errors (Hair et al. 1998), simplify the proposed model, and account for multicollinearity in the data. By investigating the multicollinearity diagnostics of both the seven e-services, and the collection of personal characteristics, it can be concluded that the correlation patterns do not indicate a statistical necessity to combine variables, with all variance inflation factors between 1.02 and 1.61, and tolerance values between 0.62 and 0.99. Even though the seven different e-services might be presumed to underlie a set of higher-order constructs (see Van Leeuwen and Nijkamp 2010) in order to simplify the model, in order to be able to identify a larger number of possible significant relationships, the path model of personal characteristics, e-services, and expenditures critically distinguishes between all seven e-services independently. As a result of the non-latent construction of the model, the preliminary measurement model stage of SEM does not have to be performed and the statistical analysis is limited to (a) a structural model to test the relationships; and (b) a series of nested models testing to identify the most parsimonious model.

A number of goodness-of-fit indicators can be reported as well. The χ^2 -statistic reflects the statistical difference between the observed matrix of covariances, identified from the data, and the ideal covariance matrix predicted from the model structure. While Barrett (2007) states that the χ^2 -statistic should be considered the only reliable test in order to accept or reject a proposed model, other authors (e.g. Fan et al. 2011; Kenny and McCoach 2003; Schumacker and Lomax 1996) have noted that the χ^2 -value is dependent on sample size, model complexity, and deviation from multivariate normality in the data. Therefore, alternative model fit indices may have to be employed. In this paper, the root-mean-square error of approximation (RMSEA) and the comparative fit index (CFI) are reported as alternative fit statistics.

3 Results

The initial tested path model showed inferior goodness-of-fit indices, but this was to be expected, since the exploratory nature of the study had as its main objective to

Table 2 ML estimates between characteristics and e-services

	Unstandardized estimates (SE)
Interactive map	
Nature holiday	0.217 (0.104)**
Age	-0.157 (0.065)**
Educational level	0.078 (0.039)**
Dutch nationality	-0.540 (0.125)***
Personalized information	
Age	-0.140 (0.061)**
Educational level	-0.109 (0.037)***
Dutch nationality	-0.486 (0.109)***
Booking service	
Age	-0.145 (0.062)***
Educational level	0.078 (0.036)***
Dutch nationality	-0.362 (0.123)***
Length of stay	0.049 (0.020)**
Journey planner	
Income	0.050 (0.024)***
E-forum	
Age	-0.260 (0.056)***
Educational level	-0.129 (0.036)***
Virtual tours	
Nature business	0.425 (0.134)***
Gender	-0.177 (0.082)**
Educational level	-0.075 (0.038)**
Dutch nationality	-0.263 (0.107)**
Interactive games	
Gender	-0.176 (0.082)**
Age	-0.257 (0.057)***
Educational level	-0.181 (0.035)***

* p-value <0.05;

** p-value <0.01;

*** p-value <0.001

identify the significant paths from a large number of initial estimates. For that reason, the original model was modified based on the t-test values of non-significant paths and the subsequent changes in the χ^2 -value, in order to come to a more parsimonious, good-fitting model. After the deletion of 44 insignificant paths, the resulting empirical model showed satisfactory fit indices on all reported tests with an χ^2 -value of 52.91 ($p = 0.292$) with 49 degrees of freedom, RMSEA 0.012, CFI 0.998, and CMIN/DF 1.1 (for a discussion of these thresholds, we refer to [Wheaton et al. 1977](#); [Tabachnick and Fidell 2007](#); [Steiger 2007](#)). Furthermore, Bollen–Stine’s bootstrap, which is often preferred in case of non-normality in the data, had a significant p-value of 0.353 for a bootstrap sample of 2,000 observations, giving a further indication that the model fits the data to a satisfactory degree.

Table 2 gives an overview of the relationships between personal characteristics (including number of nights) and the seven e-services which were found to

Table 3 ML estimates between characteristics and length of stay

	Unstandardized estimates (SE)
Length of stay	
Nature holiday	0.524 (0.195)***
Dutch nationality	-2.487 (0.213)***

* p-value <0.05; ** p-value <0.01; *** p-value <0.001

Table 4 ML estimates between characteristics, e-services, length of stay, and expenditure

	Unstandardized estimates (SE)
Expenditure	
E-forum	-59.203 (21.638)***
Virtual tours	67.028 (20.478)***
Length of stay	112.899 (10.973)***
Income	90.560 (13.189)***
Educational level	-55.780 (19.225)***
Dutch nationality	-257.387 (64.840)***

* p-value <0.05; ** p-value <0.01; *** p-value <0.001

be significant by an ML estimation. Educational level appears to have the most significant relationships with the different types of e-services. The data suggest that higher educated people are more likely to attach importance to interactive mapping and electronic booking services, while personalized information, e-forums, virtual tours, and interactive games are considered less important for higher educated tourists. Age appears to negatively influence the evaluation of e-services, with negative estimates for the relationships with interactive maps, personalized information, booking services, e-forums, and interactive games, which confirms the idea that younger people are more open to the use of advanced e-services. Virtual tours and interactive games are both gender-related, with male travellers giving more importance to these services, while income and an electronic journey planner have a significant positive correlation. Another interesting observation is that Dutch tourists show less interest in the availability of e-services for the tourist destination of Amsterdam.

In Table 3, significant relationships are reported between the personal characteristics of the individual tourist and the number of nights spent in Amsterdam. As would be expected, Dutch tourists are less likely to spend more nights in Amsterdam, while travelling with a holiday motive is positively related to the number of nights spent in the destination city.

Table 4 shows the variables which were found to significantly influence the level of expenditure in Amsterdam. Of the seven e-services, only two had a significant effect on tourist expenditure, with e-forums having a negative influence, and virtual tours being positively related to tourist spendings. Number of nights and family income have a further positive influence on expenditures, while higher education levels are related to lower expenditures. Finally, there is statistical evidence that national tourists spend significantly less money in the destination.

While the previous tables have given an overview of all significant direct relationships, a number of variables have a further indirect influence on tourist expenditures through their interaction with intermediate variables. In addition to the direct effect

of the nationality characteristic, a significant negative indirect effect is found through its interaction with both the number of nights and the e-forum service. This implies that Dutch tourists spend less money per day or night than foreigners. Both the holiday (59.151) and the business (28.457) motive have a further positive indirect effect on money spent, compared with visiting friends or family, while gender indirectly negatively affects expenditure with a further regression value of -11.866 (meaning that men tend to spend more money in the destination city of Amsterdam). Finally, age (15.384) and education level (2.626) further influence the expenditure through an interaction with the e-forum variable.

4 Discussion and conclusion

The results obtained clearly show that e-services are much more relevant for foreign tourists than for Dutch persons visiting Amsterdam, which is probably related to the need for foreigners to collect a priori more systematic information about the destination and the choice to be made in the light of the possibility to visit several other cities around the world. This conclusion suggests that the tourist attractions in the city (including museums or cultural events) should reinforce their presence on the Internet, with a view to attract the attention of potential foreign visitors.

The fact that younger tourists tend to use e-services more intensively will probably have less impact in the future: it is likely that these younger tourists will continue to use e-services when they get older, together with a new generation. The clear differences between visitors with different levels of education regarding the choice of e-services suggest the importance of developing different types of information channels for different types of consumers: interactive maps and electronic book services tend to be used more by tourists with a high level of education, while e-forums, virtual tours, interactive games, or personalized information seem to be more attractive to tourists with lower levels of education, thus increasing the accessibility of information for these groups and providing an extra platform of tourism marketing to reach different subgroups.

This study has also shown that tourists with higher incomes tend to use electronic journey planners more intensively, which suggests a high level of systematic and planned orientation about the trip before the departure for this kind of tourists. On the other hand, the high importance of e-forums for tourists with the lowest level of expenditures in Amsterdam suggests that they use this platform in order to find more affordable ways to enjoy the city. This negative relationship therefore serves as an indication that e-marketing does not necessarily increase the profitability at the destination and especially informal channels that are difficult to manage could actually result in a decline of expenditure.

Curiously, people with higher levels of education tend to spend less in Amsterdam. These results might be related to the fact that many of the young tourists visiting Amsterdam are university students, meaning that they have high levels of qualification but not a very high spending power.

Globally, this analysis confirms the importance of information and communication technologies for tourism development, particularly those related to e-services (for

different purposes). The results also clearly show that different tourists have different objectives and use a variety of tools to collect information available on the Internet. This means that service providers and destination managers should develop different tools and provide varied information according to the characteristics and motivations of their customers. This can be advanced by the growing possibilities to collect large amounts of information about tourists and their motivations, preferences and behaviours with the generalization of e-services.

Despite the relevance of these findings, it should be stressed that the data used in this research do not yet include information about the use of social networks, since this kind of platform was not so popular at the time when the information was collected. Nevertheless, considering the massification of these tools in the last few years, including social networks in a similar framework might become an extremely important further development of this analysis.

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