International Journal of Business and Management; Vol. 10, No. 2; 2015
ISSN 1833-3850 E-ISSN 1833-8119
Published by Canadian Center of Science and Education

Impact of Information Technology on Tehran's Tourism Agencies' Business Model's Components

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Received: October 20, 2014 Accepted: December 8, 2014 Online Published: January 20, 2015

doi:10.5539/ijbm.v10n2p107 URL: http://dx.doi.org/10.5539/ijbm.v10n2p107

Abstract

This study was conducted to assess the impact of information technology on the components of the tourism agencies' business models. A questionnaire was administered to tourism agencies in Tehran (Iran) in 2013 (n=110). To achieve the goals of the study structural equation modeling (SEM) using SmartPLS 2.0 software was applied. The findings indicated that information technology had a positive effect on three of components of the tourism agencies' business models. Information technology affected the element of target customer ($P < 0.01$), the element of partner network ($P < 0.01$), and the element of core competencies ($P < 0.01$). The findings showed that the business models of tourism agencies are affected by how much their value creation and value offering activities are due to the application of information technology. Managers should be concerned about their information technology infrastructures to enhance the potential of value creation in their business systems.

Keywords: business model, information technology, structural equation modeling (SEM), SmartPLS 2.0, tourism agencies

1. Introduction

A business model provides managers critical points to monitor, and changes in these points lead to changes in the logic of the business. Thus, the recognition of the effective factors for each of the components in the business model helps managers make timely changes in their business models (Osterwalder, Pigneur, & Tucci, 2005). However, due to the accelerating pace in the growth of information and communication technologies and their effects on these critical points, traditional businesses have had to develop new business models in order to explore new opportunities made possible by technological innovation. That is why there have been recent increases in the debates concerning business models and concerning the effects of the Internet on them (Pateli & Giaglis, 2003).

Information technology (IT) have been able to create a viable link between the different fields of science. The authors identified IT as collecting, organizing, storing, and publishing various forms of information, such as audio, images, texts, and numbers, and this is accomplished by using computers and telecommunication tools (Longley & Shain, 1985). The rapid changes in modern IT have had a significant effect on the way tourism agencies are functioning (business model). Technology has improved the internal efficiency and the effectiveness of tourism agencies and enhanced the services they are able to provide (Namasivayam & Siguaw, 2000). Thus, in recognition of the skills required to use technology effectively, greater concentration has been focused on improved coordination of and concentration on marketing, operations, and human resource activities so that customers receive a better service. In this case, the tourism agencies, which have been reticent about accepting and using advanced technologies, such as IT and e-commerce, would be more likely to miss the business opportunities and to imperil their own competitive advantages (Kandampully, 2006). Cabiddu, Lui, & Piccoli (2013) expounded on the role of information technology in value creation. They also pointed out how IT has affected the tourism industry in various areas, causing revolutionary changes in this industry. They also believed that the role of IT was vitally important in value creation in the tourism industry. The business model concept enables firms to capture economic value through novel technologies. In fact, Chesbrough and Rosenbloom (2002) and Cavalcante (2013) posited that the business model must be modified in keeping with changes in technology. Nevertheless, in the extensive literature that deals with business models, no research has been conducted to assess the quantitative impact of IT on the tourism industry's business model. Also, it has not illustrated clearly

the components of the business model that have been affected by IT and to what extent.

Past studies concerning business models and the IT area can be classified into three categories, i.e., 1) research to design business models in IT-based businesses (Onggo, Soopramanien, & Pidd, 2006; Stieglitz, Fuch, & Lattemann, 2009; Reuver, Stein, Hampe, & Bouwman, 2010; Nieuwenhuis & Kijl, 2010); 2) research that considers technology as an important element of the business model and posits that business models must be analyzed so that they can be innovative and adaptable based on technological changes (Hanafizadeh & Shafiei Nikabadi, 2011; Chesbrough & Rosenbloom, 2002); and 3) research that conducts case studies of IT-based businesses irrespective of the aims of the studies (Sainio, Saarenketo, Nummela, & Eriksson, 2011). Unlike recent studies, this study uses a quantitative approach, considering IT as the independent variable and the components of the business model as the dependent variable. In other words, the aim of this research was to denote which components of the business model were affected by IT and what percentage of the changes in the business model was related to the application of IT.

The aim of this study was to assess the effect of the application of information technology on the components of Tehran's tourism agencies' business models. The following specific objectives were set for the study:

- To assess the effect of information technology on the value proposition of Tehran's tourism agencies.
- To assess the effect of information technology on target customers of Tehran's tourism agencies.
- To assess the effect of information technology on the relationships of Tehran's tourism agencies.
- To assess the effect of information technology on the core competency of Tehran's tourism agencies.
- To assess the effect of information technology on the partner network of Tehran's tourism agencies.
- To assess the effect of information technology on cost structure of Tehran's tourism agencies.
- To assess the effect of information technology on the revenue models of Tehran's tourism agencies.

2. Method

2.1 Research Design and Setting

This quantitative study was conducted on tourism agencies in Tehran, Iran, in 2013. Both primary and secondary data were used in this research. The primary data were collected through a questionnaire designed by the authors of the current study. The secondary data were obtained from the extensive literature related to business models, information technology, and tourism.

2.2 Participants and Procedures

According to the Iranian Cultural Heritage and Tourism Organization, there were 1103 active tourism agencies in Tehran in 2013. The formula below was used to determine the sample size, which was approximately 108 agencies.

$$n = N(Z_{\alpha/2})^2(\delta_x)^2 \div [\varepsilon^2(N-1) + (Z_{\alpha/2})^2(\delta_x)^2] \quad (1)$$

Where:

N = Population size, Zα/2 = Z-value, δx = standard deviation of the population, and ε = sampling error.

Since the standard deviation of population did not exist, the standard deviation of the sample was generalized to the population. For this purpose, a sample size of n = 30 was chosen, and the standard deviation of these samples, which was used in the formula, was determined to be equal to 0.39. Of course, the data of these 30 samples also were counted in the final samples. $Z_{\alpha/2}$ was considered at the 95% confidence level, and the value of ε was considered to be equal to 0.07. Thus, the equation took the following form:

$$N = 1103(1.96)2(0.39)2 \div [(0.07)2(1103-1) + (1.96)2(0.39)2] = 107.7 \quad (2$$

Simple random sampling was used in this study. As previously indicated, the appropriate minimum sample size for the study was determined to be 108 tourism agencies, and 110 agencies were used actually. The 110 tourism agencies that were used were chosen randomly from the list of tourism agencies released by the Iranian Cultural Heritage and Tourism Organization.

2.3 Data Collection

The questionnaire to evaluate the effect of information technology on components of the business models of Tehran's tourism agencies was developed and distributed to 110 of Tehran's tourism agencies. Of course, some agencies refused to participate in this study, and those were replaced randomly with other agencies. The head managers or the CEOs were asked to complete the questionnaires. A member of the research team was present

while the questionnaires were being completed in order to deal with any possible questions or misunderstandings. The questionnaires were returned to the research team as soon as they were completed. Ultimately, after almost 50 days, data from all 110 of the tourism agencies had been collected (100% response rate).

2.4 Measurement Tool

In order to collect the initial data, a questionnaire were designed that allowed assessing the impact of information technology on the components of the tourism agencies' business models. In fact, this questionnaire was designed to assess simultaneously both the dependent variables (the business models' components) and the independent variable (information technology). The literature related to business models was studied to determine the types of business models used by tourism agencies, but no such models were found. Therefore, the business model proposed by Osterwalder et al. (2005) was used as the basic model for this study. According to the tourism industry, some changes were needed in the model. As a result, two of the basic elements in the model were omitted, i.e., value configuration and distribution channels, because they were not used in the tourism agencies' business models. Thus, the business model that was used in this study to analyze the business models used by the tourism agencies in Tehran included their value proposition, target customers, relationship, core competency, partner network, cost structure, and revenue model. 'Value proposition' provides a comprehensive view of a company's combination of products and services. The 'target customer' component explains the segments of customers to which the company wants to offer value. 'Relationship' describes the type of links a company creates between itself and its different segments of customers. 'Core competency' illustrates the competencies necessary to perform the company's business model. 'Partner network' depicts the network of cooperative agreements with other companies necessary to efficiently offer and commercialize value. 'Cost structure' outlines the monetary consequences of the means used to implement the business model. 'Revenue model' summarizes the way a company makes money through a variety of revenue flows (Osterwalder et al., 2005). According to the definition of information technology, there are three aspects that were considered when assessing the extent of the application of information technology, i.e., collecting information, storing information, and using information. The Likert scale was used to evaluate the participants' responses to the questionnaire. The numbers 1, 2, 3, 4, and 5 represented responses of Never, Rarely, Occasionally, Frequently, and Always, respectively. This questionnaire contained 42 questions, and Table 1 provides the structure of the questionnaire.

Table 1. Structure of the questionnaire

Questionnaire	Numbers	Questions
Value Proposition	10	9-14, 27-30
Target Customer	4	15-16, 31-32
Relationship	3	24-26
Core Competency	4	33, 40-42
Partner Network	3	34-36
Revenue Model	8	1-8
Cost Structure	4	19-22
Information Technology	6	17-18, 23, 37-39
Sum	42	

The validity of the questionnaire was verified by three assistant professors at Persian Gulf University. In addition, Fornell and Larcker (1981) suggested that average variance extracted (AVE) be used to count the convergent validation. The value of 0.5 is acceptable for AVE, and it means that a special latent variable is able to describe more than half of the variance of its own observed variables. The values of AVE for all of constructs exceeded 0.5 and were in the acceptable range, as shown in Table 2. To evaluate the reliability of the questionnaire, Cronbach's alpha and composite reliability coefficients were used. For each variable, the values of these coefficients must be greater than 0.7 to be considered suitable. The average Cronbach's alpha was 0.79, and the average composite reliability was 0.89. As Table 2 shows, both Cronbach's alpha and the composite reliability for all constructs were acceptable.

Table 2. AVE, Alpha, and composite reliability results

Latent Variables	AVE	Cronbach's Alpha	Composite Reliability
Value proposition	0.6	0.81	0.89
Target customer	0.73	0.88	0.90
Relationships	0.64	0.76	0.76
Core competency	0.57	0.77	0.86
Partner network	0.57	0.88	0.88
Revenue model	0.67	0.82	0.74
Costs structure	0.65	0.7	0.67
Information technology	0.68	0.76	0.77
Questionnaire	0.63	0.79	0.89

2.5 Ethical Consideration

The items on the questionnaire were designed carefully to avoid offending the participants in any way, and special care was used in constructing the questions about the agencies' revenue models. Thus, the questions of a balanced scorecard were used to obtain information about their revenue models. Also, the managers of the tourism agencies were assured that these data would be used only for research and for no other purpose.

2.6 Statistical Analyses

Structural Equation Modeling (SEM) was used to assess the fitness of the conceptual model used in this study. Hence, SmartPLS software was used to analysis data of SEM. These computer-based software programs analyzed the structural equation models based on Partial Least Squares (PLS), which is one of the iterative methods to assess the fitness of a conceptual model in the SEM method. The PLS method explores the best predictor for dependent variables among the independent variables. Like all SEM methods, PLS has a structural model, which shows the relationships among latent variables; it also has a measurement model, which represents the relationships between the observed variables and the latent variables (Human, 2008).

2.7 Evaluation of Reflective Model

The measurement equation (measurement model) is related to the reflective model. In other words, the loading factors between observed variables and latent variables are called the measurement equation (Hanafizade & Zare Ravasan, 2012). The first factor that must be considered for testing the reflective model is that all of the indices must be one-dimensional, meaning that each index must be loaded to just one latent variable with a large and acceptable loading factor. Therefore, loading factors greater than 0.6 are acceptable, and loading factors less than that are omitted and their indices are ignored. In addition, all accepted loading factors must be significant at least at the 95% confidence level in order to ensure the indices' Indicator Reliability. Three others coefficients suggested for evaluating the reflective model are Cronbach's alpha, Composite Reliability coefficients, and Average Variance Extracted index. The first two are two important factors for evaluating the reliability of internal consistency, and the third is used to validate convergence. (Hanafizade & Zare Ravasan, 2012).

2.8 Evaluation of the Formative Model

The structural equation is related to the formative model, which means that the path coefficient between the latent variables is called the 'structural equation.' So, the structural equation (path coefficients) and the R^2 coefficient of determination are used to test the formative model in SEM. Path coefficients are acceptable when their significance is at least at the 95% confidence level by T-Student testing. The R^2 coefficient of determination is a representation of the extent of the effect of the independent variable on the dependent variable. R^2 indicates the percentage of the dependent variable's or variables' treatment that can be explained by the independent variable(s). One of the most important factors in evaluating the formative model is *effect size or Cohen's* f^2. Effect size refers to whether the latent independent variable has a considerable effect on the dependent variable. This amount can be computed using the values of R^2 as shown below:

$$f^2 = R^2/(1-R^2) \quad (3)$$

If f^2 is between 0.02 and 0.15 (or $0.0196 < R^2 < 0.130$), the independent variable's effect on the dependent variable is poor; if f^2 is between 0.15 and 0.35 (or $0.130 < R^2 < 0.260$), the effect is medium, and, if $f^2$is more than 0.35 (or $0.260 < R^2$), the independent variable has an intense effect on the dependent variable (Cohen, 1988).

2.9 Conceptual Model

Modeling is one of the most important steps in SEM, and it is more than a statistical process. In this step, the

latent variables and observed variables are delineated, and, afterwards, the internal relationships between the latent variables and also the relationships between the latent and observed variables are defined. The design of such model is based on the literature, current theories, and the author's knowledge and experience. All research variables are either latent or observed variables. Researchers have directly assayed the observed variables. The latent variables are not assayed directly; rather, they are derived based on the relationships or correlations among the evaluated variables. The latent variables describe theoretical structures, such as abstract concepts, which are not observable, and they are observed and created based on the other observed variables. Latent variables have been divided into two categories, i.e., 1) endogenous or downstream variables and 2) exogenous or upstream variables. Each latent variable in a structural equation system can be considered as an endogenous variable or an exogenous variable according to the study's goal. An endogenous variable is a variable that is affected by other latent variable(s). However, an exogenous variable is a variable that has an effect on other latent variables and the treatment of which does not depend on other variables. In this study, IT is regarded as an exogenous variable, because this study aimed to evaluate the effects of IT on the components of business models. Thus, the components of the business models (i.e., value proposition, target customer, relationship, core competency, partner network, cost structure, and revenue model) were the endogenous variables of this study. Relationships between observed variables and latent variables have been called *reflective models*, and the relationships between latent variables have been called *formative* models (Hanafizade & Zare Ravasan, 2012). In the SEM, the existence of relationships between observed variables is illogical, and one of the conditions of SEM is that no relationships exist among the observed variables, because this ensures that the observed variables are independent and are suitable predicates for evaluating the latent variables. Figure 1 shows the conceptual model of this study and the formative model just is considered in the figure.

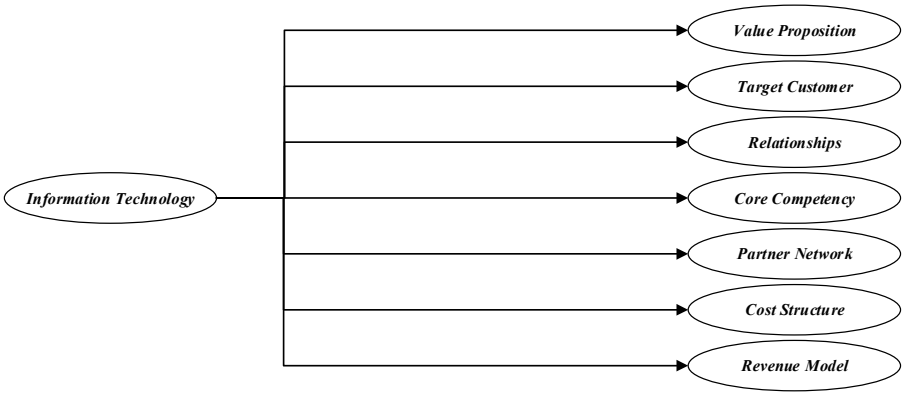

Figure 1. Conceptual model: the effect of IT on the components of business models

3. Results

3.1 Socio-Demographic Information

Sixty-seven of 110 participants, i.e., 61% of them, were male, and 39% were female. Seventy-three (66.4%) of the participants had Bachelor's degrees, and 37 of them (33.6%) had Master's degrees. Thirty percent of the participants had less than five years of experience in management of a tourism agency; only 7% of them had more than 20 years of experience. Thirty-one percent of the tourism agencies had been in business less than five years, while only 3% of them had been in business more than 20 years.

3.2 Evaluation of Reflective Model

Figure 2 is another output of Smart PLS that shows the amount of T-Student testing that was conducted for the loading factors and path coefficients. Figure 3 is one of the outputs of the Smart PLS software, and it shows the loading factors, path coefficients, and the values of R^2. The numbers between observed variables (rectangles) and latent variables (circles) are loading factors, the numbers between latent variables are path coefficients, and the numbers in the circles are the values of R^2. The loading factors and the results of T-Student testing for the loading factors are summarized in Table 3. The loading factors are shown in the 'LF' columns, and the observed variables of that special construct are shown in the 'OV' columns. Table 3 shows that the loading factors of all of the observed variables were greater than 0.6 (acceptable), and all of the loading factors were significant.

Table 3. Loading factors of the observed variables

Core Competency		Relationships		Target Customer		Value Proposition	
LF	OV	LF	OV	LF	OV	LF	OV
0.907*	CC1	0.911***	CI1	0.718*	TM1	0.919***	Vp1
0.795*	CC2	0.636***	CI2	0.816*	TM2	0.834***	Vp2
0.780**	CC3	0.702***	CI3	0.725*	TM3	0.951***	Vp3
0.768***	CC4	-	-	0.964***	TM4	0.926***	Vp4
-	-	-	-	-	-	0.693***	Vp5
-	-	-	-	-	-	0.815***	Vp6
-	-	-	-	-	-	0.782***	Vp7
-	-	-	-	-	-	0.779*	Vp8
-	-	-	-	-	-	0.967***	Vp9
-	-	-	-	-	-	0.747***	Vp10
Information Technology		Revenue Model		Costs Structure		Partner network	
LF	OV	LF	OV	LF	OV	LF	OV
0.734**	T1	0.834***	IM1	0.692***	CS1	0.979***	PN1
0.813***	T2	0.991**	IM2	0.888*	CS2	0.872***	PN2
0.927***	T3	0.726***	IM3	0.956***	CS3	0.719***	PN3
0.757**	T4	0.762***	IM4	0.954***	Cs4	-	-
0.927**	T5	0.762**	IM5	-	-	-	-
0.698**	T6	0.862***	IM6	-	-	-	-
-	-	0.862***	IM7	-	-	-	-
-	-	0.928**	IM8	-	-	-	-

Note. * Significant at $p < 0.05$; ** Significant at $p < 0.01$; *** Significant at $p < 0.001$.

Cronbach's alpha, composite reliability coefficients, and average variance are three other indices for assessing the evaluation of reflective model. These indices were discussed above, and Table 2 provides their amounts.

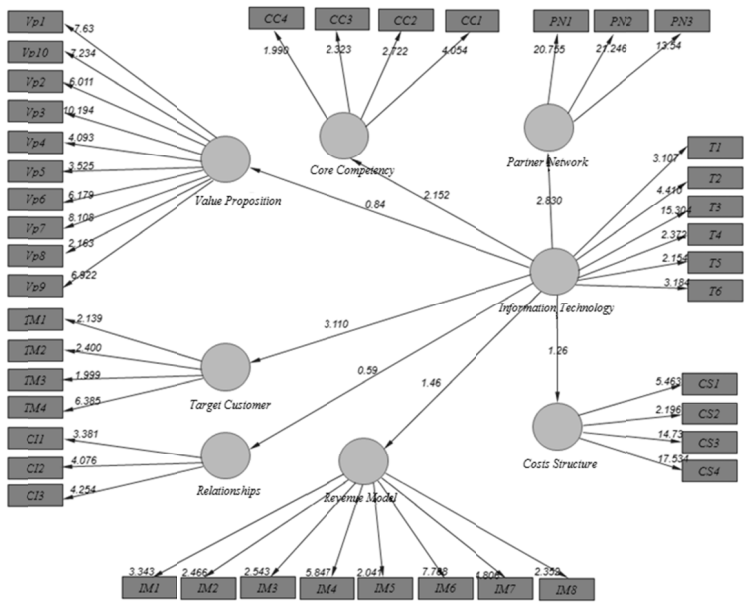

Figure 2. T-Student test values for loading factors and path coefficient

3.3 Evaluation of the Formative Model

Figure 1 shows that the seven hypotheses of this study were the same as the relationships in the formative model. In other words, hypothesis testing in this study is similar to testing the interrelations between latent variables of

conceptual model that has been presented. The results of Figure 2 and Figure 3 are summarized in Table 4, which shows that three of seven path coefficients were significant. The path coefficient of the construct of target customer was equal to 0.35 ($p < 0.01$), the path coefficient of the construct of partner network was equal to 0.346 ($p < 0.01$), and the path coefficient of the construct of core competency was equal to 0.246 ($p < 0.05$). Hence, the amounts of R^2 of these three constructs were just acceptable, and, since the path coefficients of the other four constructs were not significant, the R^2 values related to them were not considerable. The value of R^2 of the impact of information technology on target customer was equal to 0.433; the value of R^2 of the impact of information technology on partner network was equal to 0.467; and the value of R^2 of the impact of information technology on core competency was equal to 0.372.

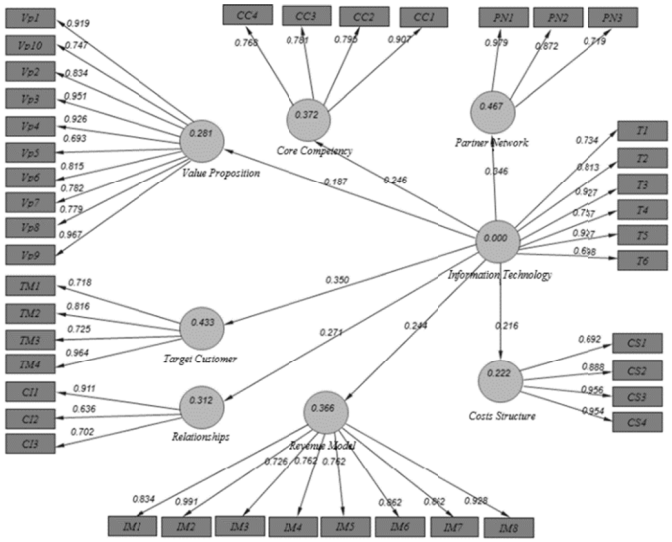

Figure 3. Output of SmartPLS software, the standard coefficient of effect of IT on the components of business models

However, the amounts of f^2 were counted for all constructs and are available in Table 4. Whereas the R^2 values related to just three of the constructs were acceptable, the f^2 of these constructs also were considerable. The f^2 associated with the R^2 of target customer was 0.764, the f^2 associated with the R^2 of partner network was 0.876, and the f^2 associated with the R^2 of core competency was 0.592.

Table 4. Hypotheses testing results

Row	Hypotheses	Path coefficients (β)	(R^2)	t-value	f^2
1	IT → Value Proposition	0.187	0.281	0.84	0.391
2	IT → Target Customer	0.35	0.433	3.110**	0.764
3	IT → Relationship	0.271	0.312	0.59	0.453
4	IT → Partner Network	0.346	0.467	2.830**	0.876
5	IT → Core Competency	0.246	0.372	2.152*	0.592
6	IT → Cost Structure	0.244	0.366	2.46	0.577
7	IT → revenue Model	0.216	0.222	1.26	0.285

4. Discussion

This study's findings supported the overall assertion that IT affects business models (Osterwalder et al., 2005; Chesbrough & Rosenbloom, 2002). This is an important empirical finding given the ongoing debate concerning the link between IT, business models, and the continued investments that tourism agencies are making in advanced IT. Assessing the mediating process behind the overall direct relationship between IT and business model helped in the understanding of "how" IT may be impressive and have effects of the components of business models, and it illustrates the areas that are dependent on IT and to what extent. These understandings help the managers of tourism agencies supervise their areas depending on IT in order to respond to innovations

in IT punctually and accurately. It enables agencies to keep their business model updated and takes advantage of changes in technology to create additional value. Of contributions of this study is using quantitative research approach and statistical techniques in achieving the results. The results also provided evidence of the effectiveness of IT on three components of business models, i.e., target customer, core competency, and partner network).

4.1 The Positive Effect of IT on Target Customer

The findings showed that information technology was an independent variable for target customer (as a dependent variable). It was also illustrated that 43.3% of the changes of this variable were explained by the application of IT. It means that tourism agencies in which activities have relied on IT and performed successfully in collecting, saving, and publishing information were also the most successful in administrating of this component of their business models (Ahearne, Hughes, & Schillewaert, 2007; Jarahi, Ardakani, & Zareeian, 2009) and in responding to a wide variety of customers. IT helps tourism agencies recognize, segment, and interface with their customers (Jarahi, Ardakani, & Zareeian, 2009).

4.2 The Positive Effect of IT on Partner Network

The positive effect of IT on partner network was found to be consistent with previous research regarding the remarkable influence of this technology in commercial cooperation among tourism agencies and other players in the industry for co-creating value (Cabiddu, Lui, & Piccoli, 2013). Information technology acts as a catalyst in the co-creation of value by facilitating communications.

4.3 The Positive Effect of IT on Core Competency

According to the definition of core competency, the necessary resources and competencies to implement a business model have called core competency. These resources and competencies, typically, refer to sources that other agencies do not have (Osterwalder et al., 2005), which is why these are called 'competencies.' If both the internal process and the procedure of communicating with the external environment were more IT-based, it can be a favorable source to distinguish the business model. The findings show that IT has a positive effect on core competency. It means that higher reliance on IT increases the competency of a tourism agency in value creation, which is consistent with earlier reports in the literature.

4.4 Limitations of the Study

As previously mentioned, the population includes Tehran's tourism agencies, and the results obtained were based on this population's data, so the predominant cultural and economic conditions on this population can identify a limitation of this study as being the general nature of the findings. Because most of their services are very limited as the majority of destinations of tours are to a limited number of destination (e.g., Turkey, Malaysia, Thailand, and the United Arab Emirates), it can be hard to generalize the findings to populations in which the tourism industry has matured.

5. Conclusion

The findings of this study showed that IT affects the business models of tourism agencies and explains 43% of target customer behaviors, 46.7% of partner network's changes, and 37.2% of core competencies changes. Recognizing which areas are affected by IT and how the business model is affected provides managers a vision that enables them to respond punctually and accurately to the utilization of IT and helps them to become leaders in developing innovative business models. Thus, it is suggested that the managers of tourism agencies be more sensitive dynamically and use proper IT architecture to improve the performance of their business models. Future research should include conducting supplementary field research to assess the impact of IT on the overall performance of tourism agencies' business models.

Acknowledgments

This article was written to fulfill the requirements required for earning the Master of Art in Business Administration (MBA). The authors acknowledge Dr. Mehrdad Jalalian (http://www.MehrdadJalalian.com) for providing support in scientific writing (Jalalian, 2012).

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