European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.5, No.17, 2013

The Role of ICT in Tourism Industry on Economic Growth: Case study Iran

Sadr, Seyed Mohammad Hossein
Ph.D student in Management Information Technology, Department of Management and accounting, University of Allame Tabataba'I (ATU)

Abstract
This paper investigated the ICT effect on tourism industry in Iran economic growth over 1350-1390 period using co-integration and error correction methodology. As economic growth and ICT implication on society variables used in empirical analysis was integrated of one, employed Granger causality test. This study examines how the ICT and Internet gradually change the tourism industry structure in Iran; how important such changes are, and to where such changes will lead Iran's tourism industry. So far, little research has been done to explore the ICT and Internet adoption status in the other country tourism industry and the impact of ICT on the structure of the industry. Iranian tourism makes an important and increasing contribution to economic growth and it represents one of the best opportunities to create income and employment for our country. In his paper, we illustrates how such trends apply to the tourism industry and describes the way ICT can support or enable such strategies. Then we analyses the role of ICT in tourism industry on Iran economic growth by introducing a framework to classify and analyze related organisations around three dimensions, distinguishing what happens (1) at the boundary of the firms, (2) in their relations with their customers and suppliers and (3) on the markets they reach. The results show that in the short-run, the Granger causality runs from e-tourism to economic growth In Iran. However, in the long run there is bi-directional Granger causality relationship for this country. In other words, if unidirectional causality runs from tourism to income, increasing in investment in e-tourism industry could lead to an increase in economic growth.
Keywords: E-Tourism, Economic Growth, Iran, Cointegration.

1- Introduction

Tourism sector is one of the first services sectors to adapt and use information and communication technology (ICT) for promoting its services. Nowadays, ICT has deeply affected the way business is performed and organizations compete (Porter, 2001; Mavri and Angelis, 2009).
Tourism is usually defined as services for people travelling to and staying outside their usual environment for less than one consecutive year for leisure or for business purposes. Tourism involves transport, accommodation, restaurants, cultural activities and leisure and could be more effectively viewed and evaluated as a market rather than an industry (Mavri and Angelis, 2009).
Buhalis (2004) defines e-tourism as: "e-Tourism reflects the digitalization of all processes and value chains in the tourism, travel, hospitality and catering industries. At the tactical level, it includes e-commerce and applies ITs for maximizing the efficiency and effectiveness of the tourism organization. At the strategic level, e-Tourism revolutionizes all business processes, the entire value chain as well as the strategic relationships of tourism organizations with all their stakeholders" (Andersen and Henriksen, 2000).
Similar to many other services, e-tourism products are almost exclusively dependent upon audio-visual presentation and descriptions, that is, they cannot be physically displayed or inspected at the point of sale. This is, in itself, a challenge for the tourist industry at the origin of the customer where information about the tourist destination has to be presented in an attractive and convincing manner. Traditionally, the tourist industry has used ads and brochures with intriguing photos of hotels, local attractions, nature and culture to sell its products. In the era of the Internet an alternative channel for advertising is introduced (Andersen and Henriksen, 2000).
The constantly growing number of travel destinations and the enhanced quality of existing ones are putting great pressure on those responsible for Iran's destinations to find better ways to compete in the tourism marketplace and to do so in a sustainable manner. The negative impacts upon our environment, culture and Romanians' ways of life have given rise to this demand for a more sustainable development in tourism, too.
New forms of tourism are emerging in the place of traditional tourism. Competitive advantage is no longer natural, but increasingly man-made, driven by science, technology information and innovation. The new tourism takes into accounts the complexity and segmentation of tourism demand; the greater flexibility of supply, distribution and consumption; and the search for new sources of profitability in the industry.
have been especially influential in the realm of tourism, the discourse changed.

It is now generally acknowledged by government, leading industry and professional associations, employers and the education and training sector that there is an urgent need for improved targeting of information and advice on ICT courses and careers to school students. Thus Romanian Government has major roles in providing basic ICT skills in compulsory schooling, and an important role in conjunction with education institutions, business, and individuals in providing the framework to encourage ICT skill formation at higher levels, in vocational training and in ongoing lifelong learning.

Strategies to improve advice on ICT courses and careers to school students could include improved research and marketing and new approaches in order to:

Improve the understanding of school students at all levels, and of teachers, career advisers and parents, of potential career and study opportunities in ICT.

Therefore the Romanian Government's policy should include:

Move beyond policies for basic connectivity and ICT readiness to facilitate more widespread uptake and use of complex ICT applications and e-business uptake by firms.

Encourage rollout of affordable quality broadband networks to underpin the competitiveness.

Strengthen the infrastructure for trust, security, privacy and consumer protection.

Strengthen cross-border co-operation between stakeholders and the development of rules with cross-border application.

Although we agree that innovation is becoming a key element to survive and compete in a dynamic and radically changing environment, we also have to specify that the impact of a technological innovation will generally depend not only on its inventors, but also on the creativity of the eventual users of the new technology.

2- Role of ICT in Tourism

Information and Communication Technologies (ICT) is umbrella term for technological developments for the Umbrella term for technological developments for the Production, analysis, storage, search, distribution and use of information ICT includes a combination of hardware, software, telecommunications, Netware, groupware Human-ware (Waghmode and Jamsandekar, 2013).

ICT enables effective data processing & communication, organisational benefit, ICT, provide enormous capabilities for consumers. ICT played an outstanding role for development of modern tourism. It has provided new tools and enabled new distribution channels, thus creating a new business environment. ICT tools have facilitated business transaction in the industry by networking with trading partners, distribution of product services and providing information to consumers across the globe. On the other hand consumers are also using online to obtain information and plan their trip and travel. Information is the key element in the tourism industry.

It can be used by tourist professionals to define the boundaries of the proposed tourist site as well its surrounding areas and the communities living in it. It can also get information on roads linking to the sites and availability of other utilities like water, power, market etc (Waghmode and Jamsandekar, 2013).

Such technologies are also useful for site management and monitoring. The role of ICT tools in the industry for marketing, operation, and management of customer is widely known.

Marketing techniques can be more innovative through ICT tools.

The Internet, in particular, has been useful in many regards to the travel and tourism sector. It is used to provide multimedia information about destination to prospective travelers (Waghmode and Jamsandekar, 2013).

It also affects auxiliary industries, such as the transport sector, which plays a major role in the tourism industry. With the aid of ICT applications, prospective travelers can view a destination, book accommodation, book the flight and other forms of transport and pay for all these without leaving their homes. The use of ICTs has spread the travel and tourism industry. ICTs in this industry consist of various components that include computerized reservation systems, teleconferencing, video, video brochures, management information systems, airline electronic information systems, electronic funds transfer, digital telephone networks, smart cards, mobile communication, e-mail, and Internet (Waghmode and Jamsandekar, 2013).

3- Literature Review

Ekanayake and Long (2012) investigated tourism development and economic growth in developing countries. The objective of this study was to investigate the relationships between tourism development and economic growth in developing countries using the newly developed heterogeneous panel co-integration technique. This study examines the causal relationship between tourism development and economic growth using Granger causality tests in a multivariate model and using the annual data for the 1995–2009 period. The study

finds no evidence to support the tourism-led growth hypothesis. The results of the FMOLS show that, though the elasticity of tourism revenue with respect to real GDP is not statistically significant for all regions, its positive sign indicates that tourism revenue makes a positive contribution to economic growth in developing countries. The results of the study suggest that governments of developing countries should focus on economic policies to promote tourism as a potential source of economic growth.

Çaglayan and et al (2012) investigated relationship between tourism and economic growth: a panel granger causality approach. This paper investigated the causal relationship between tourism revenue and gross domestic product (GDP) using the panel data of 135 countries for the period 1995–2008. For this purpose, Panel Granger causality analysis was applied to 11 groups of countries. This classification was created as America (30 countries), Asia (34 countries), Europe (37 countries), East Asia (13 countries), South Asia (6 countries), Central Asia (5 countries), Latin America & Caribbean (28 countries), Oceania (7 countries), Middle East & North Africa (11 countries), Sub Saharan Africa (24 countries) and the world (135 countries). Results indicated bidirectional causality in Europe between tourism revenue (TR) and gross domestic product (GDP). Findings showed that there is a unidirectional causality in America, Latin America & Caribbean and World from GDP to tourism revenue. While in case of East Asia, South Asia and Oceania the reverse direction of causality was found from tourism revenue to GDP. No causal relationship was found in Asia, Middle East and North Africa, Central Asia and Sub Saharan Africa.

Maria and Vasilis (2009) investigated the forecasting the growth of e-Tourism Sector: the case study of Mediterranean countries. They told Tourism is one of the first services sectors to adapt and use Information and Communication Technology (ICT) for promoting its services. ICT enable travelers to access reliable and accurate information, as well as to make reservations in a fraction of the time and the cost. The objective of this work is to measure the impact of ICT on the tourism sector growth. Assuming that the increase of e-tourism sector depends on the increase in tourism demand and internet penetration, we examine the case of all Mediterranean EU member countries, and forecast the growth of online tourism services.

Andersen and Henriksen (2006) consideration the Impact analysis of e-tourism in Bhutan. E-tourism is in this report assessed as a mean to maintain the current positive development in tourism and as a driver for extending tourism to new markets. Effective use of information, communication, distribution and transactions through the new media, such as the Internet, can lead to an increased level of economic activity in the tourism sector in Bhutan. Also, the indirect economic impacts on transportation, accommodation and the retail/ handicraft industry can be substantial. The macro-economic impacts of e-tourism in terms GDP growth, improvement of the foreign exchange balance, and increased employment are in this report described in three scenarios based on a forecasted annual increase in tourism by 15%. In the event driven scenario where the Bhutanese tourism industry manages to increase the number of bed nights per tourist and their consumption by 15% and to increase the number of international arrivals by 5%, there is a short term increase in the GDP output from the tourism sector and the dependent sectors by 22.4%, an improvement of the foreign exchange balance by 1.2 million USD, and an increase in the employment in the tourism sector and the dependent sectors by 5.1%. In the transition driven scenario the Bhutanese tourism sector manages to use the internet and other technologies to increase the number of international arrivals by 15% but the number of bed nights increases by only 5% and the consumption by 5%. In this scenario, the GDP output increases by 8.7% and employment by only 2.3%, whereas the foreign exchange balance increases by 623,000 USD. In the tourism consumption spending driven scenario, there is an increase in the number of international arrivals and bed nights by 5% only, but the consumption by tourists increases by 15%. Thus, the GDP contribution from the tourism sector and the dependent sectors increases by 15.5% and employment by 6.7%, whereas the foreign exchange balance increases by 873,000 USD. There are several challenges to be met in order for the full scale benefits of e-tourism to materialize. Effective online visa procedures and marketing training of tour operators are being implemented as part of the E-Bhutis project. Economic incentives for the tour operators and the scale of economics benefits are less visible in the current business structure. The relative limited international orientation of the tour market and the lack of international players at the Bhutan market are other inhibiting factors for e-tourism to materialize in the Bhutanese economy. This report also highlights several facilitating factors for e-tourism to flourish: the commitment by the Association of Bhutanese Tour Operators (ABTO) and the willingness of the various institutional players to facilitate a smoother visa application process.

4. Econometric Methodology

4.1. Cointegration – ARDL-Bounds Testing Procedure

In this regard, by applying the model suggested by Odhiambo, 2010; Gudarzi and Sadr, 2012 the recently developed Autoregressive Distributed Lag (ARDL)-Bounds testing approach is used to examine the long-run relationship between e-tourism and economic growth. The ARDL modelling approach was originally introduced by Pesaran and Shin (1999) and later extended by Pesaran et al. (2001).

$$\Delta lnET_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\Delta ET_{t-i} + \sum_{i=0}^{n} \beta_{2i}\Delta LNY_{t-i} + \beta_3 LNET_{t-1} + \beta_4 LNY_{t-1} + \mu_t \quad (1)$$

$$\Delta lnY_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta LNY_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta LNET_{t-i} + \delta_3 LNY_{t-1} + \delta_4 LNET_{t-1} + \mu_t \quad (2)$$

Where: $In\ ET$ = log of e-tourism; $In\ y/N$ = the log of real per capita income; μ = white noise error term; Δ = first difference operator.

The bounds testing procedure is based on the joint F-statistic (or Wald statistic) for cointegration analysis. The asymptotic distribution of the F- statistic is non-standard under the null hypothesis of no cointegration between examined variables. Pesaran and Pesaran (1997) and Pesaran et al. (2001) report two sets of critical values for a given significance level. One set of critical values assumes that all variables included in the ARDL model are I(0), while the other is calculated on the assumption that the variables are I(1). If the computed test statistic exceeds the upper critical bounds value, then the Ho hypothesis is rejected. If the F-statistic falls into the bounds then the cointegration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, then the null hypothesis of no cointegration cannot be rejected (Odhiambo, 2010, Gudarzi and Sadr, 2012).

4.2. Granger Non-Causality Test

The existence of cointegration relationships indicates that there are long-run relationships among the variables, and thereby Granger causality among them in at least one direction. The ECM was introduced by Sargan (1964), and later popularized by Engle and Granger (1981). It is used for correcting disequilibrium and testing for long and short run causality among cointegrated variables. The ECM used in this paper is specified as follows:

$$\Delta lnY_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta LNY_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta LNET_{t-i} + ECM_{t-i} + \mu_i \quad (3)$$

$$lnET_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\Delta LNET_{t-i} + \sum_{i=0}^{n} \beta_{2i}\Delta LNY_{t-i} + ECM_{t-i} + \mu_i \quad (4)$$

Where ECM_{t-i} = the lagged error-correction term obtained from the long-run equilibrium relationship.

Although the existence of a long-run relationship between ET and y/N suggests that there must be Granger-causality in at least one direction, it does not indicate the direction of temporal causality between the variables. The direction of the causality in this case can only be determined by the F-statistic and the lagged error-correction term. It should, however, be noted that even though the error-correction term has been incorporated in all the equations (3) – (4), only equations where the null hypothesis of no cointegration is rejected will be estimated with an error-correction term (Odhiambo, 2010, Gudarzi and Sadr, 2012).

In each equation, change in the endogenous variable is caused not only by their lags, but also by the previous period's disequilibrium in level. Given such a specification, the presence of short and long-run causality could be tested (Aktaş, Cengiz and Yılmaz, Veysel, 2008).

4.3. ADF Unit Root Test

Nelson and Plosser (1982) argue that almost all macroeconomic time series typically have a unit root. Thus, by taking first differences the null hypothesis of nonstationarity is rejected for most of the variables. Unit root tests are important in examining the stationarity of a time series because nonstationary regressors invalidates many standard empirical results and thus requires special treatment. Granger and Newbold (1974) have found by simulation that the F-statistic calculated from the regression involving the nonstationary time-series data does not follow the Standard distribution. This nonstandard distribution has a substantial rightward shift under the null hypothesis of no causality.

Thus the significance of the test is overstated and a spurious result is obtained. The presence of a stochastic trend is determined by testing the presence of unit roots in time series data. Non-stationarity or the presence of a unit root can be tested using the Dickey and Fuller (1981) tests.

The test is the t statistic on φ in the following regression:

$$\Delta Y_t = \beta_0 + \beta_1.trend + \rho Y_{t-1} + \sum_{i=0}^{m} \varphi_i \Delta y_{t-i} + \varepsilon_t \quad (5)$$

Where Δ is the first-difference operator, ε_t is a stationary random error (Chang, at all, 2001).

4.4. Tests of Cointegration

The cointegration test is based in the methodology developed by Johansen (1991), and Johansen and Juselius (1993). Johansen's method is to test the restrictions imposed by cointegration on the unrestricted

variance autoregressive, VAR, involving the series. The mathematical form of a VAR is (Gudarzi and Sadr, 2012)

$$y_t = \theta_1 y_{t-1} + \cdots + \theta_p y_{t-p} + \vartheta X_t + \varepsilon_t \quad (6)$$

where y_t is an *n*-vector of non-stationary *I(1)* variables, x_t is a *d*-vector of deterministic variables, $\theta_1, \ldots, \theta_p$ and ϑ are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated with each other but are uncorrelated with their own lagged values and other right-hand side variables. We can rewrite the VAR as (Eq. (7)):

$$\Delta_{y_t} = \prod_{y_{t-1}} + \sum_{i=0}^{m} \Gamma_i \Delta_{y_{t-i}} + \beta_{xt} + u_t \quad (7)$$

Where (Eq. (8))

$$\Pi = \sum A_i - I_t \quad that \quad \Gamma_i = -\sum A_j \quad (8)$$

Granger's representation theorem asserts that if the coefficient matrix n has reduced rank r<n, then there exist *n* x *r* matrices α and β each with rank r such that $\pi = \alpha \beta'$ and $\beta' y_t$ is stationary. Here, *r* is the number of cointegrating relations and each column of β is a cointegrating vector. For *n* endogenous non-stationary variables, there can be from (0) to (*n*-1) linearly independent, cointegrating relations (Yin and Xu, 2003; Gudarzi and Sadr, 2012).

5. Data and empirical results

5.1 Data

The data used in this study consist of annual time series of GDP and e-tourism for Iran 1980 to 2010. Annual time series data were utilized in this study. The series for Iran cover the period 1980-2010; the data are obtained from *Iran central bank and World Bank indicators.*

5.2 Result of unit Roots and Cointegration Test

The results of the unit root tests for the series of e-tourism and GDP variables are shown in Table 1. The ADF test provides the formal test for unit roots in this study. The p-values corresponding to the ADF values calculated for the two series are larger than 0.05. This indicates that the series of all the variables are non-stationary at 5% level of significance and thus any causal inferences from the two series in levels are invalid.

Table 1. Results of ADF Test for Unit Roots

Variables	Trend and Intercept	first difference	Critical values (5%)	
L e-tourism	-2.65	-5.88	-3.63	-3.64
LGDP	-1.85	-5.67	-3.57	-3.58

Note: The optimal lags for the ADF tests were selected based on optimising Akaike's information Criteria AIC, using a range of lags. We use the Eviews software to estimate this value.

The analysis of the first differenced variables shows that the ADF test statistics for all the variables are less than the critical values at 5% levels (Table 1). The results show that all the variables are stationary after differencing once, suggesting that all the variables are integrated of order I(1).

As indicated, the basic idea behind cointegration is to test whether a linear combination of two individually non-stationary time series is itself stationary. Given that integration of two series is of the same order, it is necessary to test whether the two series are cointegrated over the sample period. The results of the Johansen cointegration test for the series e-tourism and GDP are reported in Table 2.

Table 2. Results of Johansen's Cointegration Test

Null Hypotheses	Alternative Hypotheses	Trace Statistic	Critical Value (5%)
H0	H1		
r=0	r=1	18.97	16.23
$r \leq 1$	r=2	4.56	5.12

Source: We use the Eviews software to estimate this value.

The likelihood ratio tests show that the null hypothesis of absence of cointegrating relation (r = 0) can be rejected at 5% level of significance, and that the null hypothesis of existence of at most one cointegrating relation ($r \leq 1$) can be rejected at 5% level of significance. We can see that both tests suggest the existence of two cointegrating vectors driving the series with two common stochastic trends in the data. Thus, we can conclude that e-tourism and GDP are cointegrated. That is, there is a long-run relationship between e-tourism and GDP for Iran.

5.3 Cointegration Test

The cointegration relationship between [e-tourism and GDP= y/N] is examined using the ARDL bounds testing procedure. Two steps are used in this procedure. In the first step, the order of lags on the first differenced variables in equations (1) - (3) is obtained from the unrestricted models - using the Akaike Information Criterion (AIC) and the Schwartz- Bayesian Criterion (SBC). The results of the AIC and SBC tests (not reported here) show that while in the case of e-tourism equation the optimal lag is lag 1, in y/N equation, the optimal lag is lag 3. In the second step, we apply bounds F-test to equations (1) – (3) in order to establish whether there exists a long-run relationship between the variables under study. The results of the bounds test are reported in Table 3.

Table 3: Bounds F-test for Cointegration

Dependent variable	Function			F-test statistic		
$\Delta ln\, y/N_t$	y/N (e-tourism)			5.987		
$\Delta ln\, e-tourism_t$	e-tourism (y/N)			2.067		
	Asymptotic Critical Values					
	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Pesaran et al (2001), p. 300, table CI(ii) Case II	4.24	5.21	3.89	3.94	2.75	3.28

5.4. Results of Error-Correction Model

If the series of two variables are non-stationary and the linear combination of these two variables is stationary, then the error correction modeling rather than the standard Granger causality test should be employed. Therefore, an ECM was set up to investigate both short-run and long-run causality. In the ECM, first difference of each endogenous variable (GDP and e-tourism) was regressed on a period lag of the cointegrating equation and lagged first differences of all the endogenous variables in the system, as shown in Eq. (3). The results of error correction model are presented in Table 4.

Table 4. The Result of Error Correction Model

	Lag Lengths	F Statistics	t statistics for ECMt-1
$\Delta GDP - \Delta ET$	m=2 n = 2	5.12	-3.43
$\Delta ET - \Delta GDP$	m=1 n =1	2.45	2.42

Notes: The lag lengths are chosen by using AIC information criterion.

According to results of the Table 3, short-run causality is found to run from economic growth to e-tourism. That is, there is bidirectional short-run Granger-causality economic growth to e-tourism. The coefficient of the ECM is not be significant in Eq. (3) and (4), which indicates that no exists bidirectional Granger causality between e-tourism and economic growth in long run. In other words, if unidirectional causality runs from energy consumption to income, reducing e-tourism could lead to a fall in economic growth.

6. Conclusion

This paper has investigated the ECM model to examine the causal relationship between e-tourism and GDP in Iran using the annual data covering the period of 1980- 2010. Prior to testing for causality, the ADF test and Johansen maximum likelihood test were used to examine for unit roots and cointegration. Our estimation results indicate in short run that there are bidirectional short-run causality between economic growth and e-tourism.

The results show that in the short-run, the Granger causality runs from e-tourism to economic growth In Iran. However, in the long run there is bi-directional Granger causality relationship for this country. In other words, if unidirectional causality runs from tourism to income, increasing in investment in e-tourism industry could lead to an increase in economic growth.

Among the types of tourism in Iran, ecotourism have grown recently. Ecotourism entails the sustainable preservation of a naturally endowed area or region. This is becoming more and more significant for the ecological development of all regions that have tourist value.

The types of tourism in Iran have grown and this has boosted the Iran economy.

The tourism sector contributed to the nation’s GDP.

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