The applicability of economic models in estimating the economic impacts of tourism in a local economy

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Abstract

The economic impacts of tourism have received substantial attention and have been documented by many researchers due to its ability to generate economic benefits to local economy. To date, there is no standard model to estimate economic impact study and most of the studies modify the original model to meet the interest of researchers. This paper aims to discuss the applicability, strength and limitations of four techniques frequently employed in estimating economic impacts of tourism 1) Input-output model, 2) Social Accounting Matrix, 3) Computable General Equilibrium, and 4) Tourism Satellite Account. Next, the rationale of choosing the suitable model to be used in estimating the economic impacts of tourism will be discussed. This paper concluded that IO models are suitable to estimate the economic impacts of tourism in a local economy.

Keywords: Economic impacts, Input output model, Social Accounting Matrix, Computable General Equilibrium, Tourism Satellite Account

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1. Introduction

The significance of travel and tourism has been recently recognised by G20 leaders as a driver of economic growth during the G20 Leaders' Declaration held in Los Cabos, Mexico (UNWTO, 2012a). In 2011, there were 982 millions of international tourist arrivals while tourism receipts recorded US$103 billion worldwide (UNWTO, 2012b). The direct contribution of tourism to the world’s Gross Domestic Product (GDP) recorded was US$2 trillion and supported 98 million jobs (WTTC, 2012). Thus, the role of tourism as an engine to generate GDP, income, and employment is evidence (WTTC, 2012).

The benefits gained from tourism are usually cited in terms of jobs opportunities, incomes, tax revenues, investment, financial security, improve standard of living (Durbarry, 2002; Fletcher, 1989; Hall & Lew, 2009; Mayer et al. 2010; Shuib, 1995; Wagner, 1997; Yacob, Shuib, Mamat, & Radam, 2007). Spencer and Nsiah (2013) content that the benefits derived from economic development should be understood by local communities so that they will support tourism development. For example, some studies (Liu & Var, 1986; Shuib, 1995) reported that majority of the local residents agreed that tourism brought the community more investment and more local business.

Economic benefits of tourism may not be as always positive as tourism may bring negative economic impacts such as providing unskilled and low paid jobs (Tosun, 2002), increased cost of living (Faulkner & Tideswell, 1997; Lawson, Williams, Young, & Cossens, 1998; Liu & Var, 1986; Tatoglu, et al., 2002), and increased costs of land and real estate (Liu & Var, 1986), increases property value and housing prices (Perdue, et al., 1987; Tosun, 2002; Weaver & Lawton, 2001), general prices (Mohamed, Som, Jusoh, & Wong, 2006; Shuib, 1995), leakage (Kokkranikal, McLellan, & Baum, 2003; Mbaia, 2005; Sathiendrakumar & Tisdell, 1989; Walpole & Goodwin, 2000; Yacob, Shuib, Mamat, & Radam, 2007; Yu & Turco, 2000). Therefore, there is a need to understand the economic impacts of tourism in a local economy so that actions can be put forward to help improving the benefits than the cost to the local economy.

2. Measuring the economic impacts of tourism

The economic impact of tourism on an economy can be estimated via various approaches (Ahlert, 2008; Pratt, 2011). Over the years, there are abundant of studies conducted to estimate the economic impact of a destination (e.g. Bowker, Bergstrom, & Gill, 2007; Cela, Lankford, & Knowles-Lankford, 2009; Cesar, & Janssen, 2003; Huaquin, & Herrero, 2009; Mayer, Muller, Woltering, Arnegger, & Job, 2010; Mazumder, Ahmed, & Al-Amin, 2009; Mazumder, Ahmed, Murad, & Al-Amin , 2011; Mules, 2005; Rashid & Bashir, 2004; Shuib, 1995; Shuib, Edman, & Yaakub,
Stynes (1997) listed out five reasons why economic impact study should be conducted:

1. To find out how much tourists spend
2. To determine how tourism impacts local businesses’ sales
3. To find out how much income tourism generates for area households and businesses
4. To measure the number of jobs supported by the tourism industry
5. To calculate the amount of tax revenue generated by tourism

Economic impact analysis can be conducted using economic models, such as Money Generation Model; Economic Base Model; Input-Output (IO) model with economic multipliers, Social Accounting Matrix (SAM), Tourism Satellite Account (TSA); and Computable General Equilibrium Model (CGE). Bonn and Harrington (2008) compared three economic impact models to test their applicability in the field of tourism and hospitality. Although there are various methods in studying economic impact, the final choice is determined by a number of factors (Fletcher, 1989). The details of each model and the choice of selection will be discussed in the following section.

3.1 Input output models

Wassily Leontief, a Nobel Prize Economic winner in 1973, developed input output model in the late 1930s. The newer model (dynamic model) was further modified in 1953 by him. Today, there are many economists attempt to develop or modify the models. Input-output (IO) model has been traditionally been undertaken to estimate regional economic of tourism (Archer & Fletcher, 1996; Hanly, 2012; Heng & Low, 1990; Loomis, 1995; Saayman & Saayman, 2006; Wagner, 1997) and guides policy decisions (Gravino, 2012) by explaining how industry’s product is distributed within a particular region or economy (Zhou et al., 1997) and predicting how the changes in that sector will affect other sectors (Reece, 2009). IO analysis is popular among researchers to estimate the economic impact of some sectors on Malaysian economy (Bekhet, 2009, Bekhet & Abdullah, 2011; Ismail, 2007; Kamaruddin, Rashid, & Jusoff, 2008; Mazumder et al., 2009, 2011).

Often, IO models are popular to be used to estimate the income and employment generation through multiplier (Mazumder et al., 2009; Mazumder, Ahmed, & Raquib, 2011; Vanhove, 2005) and present the linkages among sector in the industry, personal income, and total employment. Mazumder et al (2009, 2011) carried out a study to examine the contribution of tourism to Malaysian economy using input output technique by deriving several multipliers (e.g. output, income, employment, value added, and import). On the other hands, Kamaruddin et al. (2008) used input output analysis to examine the source of growth and key sectors in Malaysia. The economic impacts of several hallmark or events have been conducted using IO analysis, such as 2004 World Rally Championship (Jones, 2008). Although there are arguments on the models, Robinson (2009, p.2) pointed out that “if approached and applied correctly, IO can
be a very powerful and helpful tool for informing decisions—allowing planners to determine where dollars will have their highest economic and workforce impacts.”

General speaking, the models are able to quantify the total economic effects (e.g. direct and secondary) that occur in the economy, describes the interrelationship tourism sector with other sectors and the size of tourism in the economy (Chhabra, Sills, & Cubbage, 2003; Reece, 2009). Nevertheless, the models are famous among economists for its ability to provide accurate, detailed information.

Loomis and Walsh (1997) found that the major strength of IO analysis is that it provides detailed information on direct, indirect and induced effects of visitors’ expenditure on all economic measures for different industries in the economy. Fletcher (1989) also asserted that the IO model is particularly valuable for the measurement of second and further round economic effects of tourism. IO analyses are transparent in term of the theoretical underpinning and easier to understand and used by policy makers (Jones, Munday, & Roberts, 2003). It can also be used to estimate multipliers (Jones et al., 2003).

Despite the many strengths cited by researchers, the models have several limitation that need to be highlighted (Archer, 1996; Dwyer, Forsyth, & Spurr, 2004; Zhou et al., 1997). Dwyer, Forsyth, & Spurr (2004) commented the limitations of IO are incomplete, ignores the key aspects of the economy and only consider the directly affected industry. IO models are argued that fails to evaluate fiscal policies (Partridge & Rickman, 2010) and the negative impacts on expenditure could not be or partially captured by IO models (Dwyer, Forsyth, & Spurr, 2006).

3.2 Social Accounting Matrix

SAM is popular among developing countries for its policy analysis (Akkemik, 2012; Jones, 2010). It has been extensively utilized to analyse a variety of issues, including energy (Akkemik, 2011; Hartono & Resosudarmo, 2008), fisheries (Seung & Waters, 2009), foreign direct investment (Harun, Mat, & Jalil, 2012) climate change (Pal, Pohit, & Roy, 2011), tourism (Akkemik, 2012; Li & Lian, 2010) and other issues. In Malaysia, SAM is usually utilized to understand the impact of foreign direct investment on income distribution (Harun, Mat, & Rahman, 2004) or examine the income inequality and poverty among ethnic groups across geographical areas (Jamal & Rahman, 2004). However, the application of SAM in studying economic impact of tourism is limited (Li & Lian, 2010) and typically used for economies with high unemployment (Oosterhaven & Fan, 2006).

SAM is constructed to disaggregate the interaction among institutions (e.g. purchasers), productive units (e.g. suppliers), and factors of production (e.g. labor). SAM is an extension of IO tables and being used for study the economic impacts of tourism after the introducing of IO tables and TSA (Akkemik, 2012; Jones, 2010). SAM extends the intersectoral links in IO tables by showing the links between production sectors and all institutions within the economy (Akkemik, 2012). In other words, the interrelationship between production structure, incomes distribution and household expenditures
can be examined using SAM (Pal, Pohit, & Roy, 2011).

The strength of SAM compare to other models lies in its ability to detail the supply and demand and who benefit from increased visitor spending and indicates the secondary effects. On top of that, various types of multipliers can be derived from a SAM (Jones, 2010) to capture the direct, indirect, and induced impact on output (Pal, Pohit, & Roy, 2011).

Although there are many advantages of using SAM, it also experiences some limitations. First, SAM model is a demand-driven model and deal with a few assumptions (Akkemik, 2012). Second, it is not a good tool to make practical policy recommendations (Akkemik, 2012). Third, it requires large number of data, especially input data. In addition, it requires household data, which is often costly and may be not available.

3.3 Computable General Equilibrium

Computable General Equilibrium (CGE) or known as applied general equilibrium models is “an economy-wide model that includes the feedback between demand, income and production structures and where all prices adjust until decisions made in production are consistent with decisions made in demand (Rossouw & Saayman, 2011, p. 757).” CGE can be carried out at various levels, from national down to town level. The theory underpinning CGE modeling is general equilibrium, which indicates that a set of equilibrium prices appears to show the markets has reached equilibrium (Markusen, 2002). It converts the general equilibrium economic theory into a mathematical formulation. CGE models are of interest mainly due to the strengths they offer in evaluating the impact of policy changes and the results provide a snapshot of the economy. On the other hands, various scenarios can be defined based on the before and after effects.

One of the earliest economic impact analyses of tourism using CGE models was carried out in the late 1980s (Frechtling & Smeral, 2010). CGE models were used to “estimate the economic impact of tourist expenditures using behavioral equations of the model which specify demand, supply, resource constraint, and price determination in a general environment (Akkemik, 2012 p.792)” In Malaysia, CGE analysis was used to examine the effectiveness of carbon tax (Jaafar, Al-Amin, & Siwar, 2008), external price shocks (Al-Amin, Siwar, & Jaafar, 2008), environmental policies (Al-Amin, Jaafar, & Siwar, 2008) on Malaysian economy.

Several pieces of research have attempted to outline the strengths of utilizing CGE versus other models (Dwyer, Forsyth, & Spurr, 2005; Liu, 2006). CGE extends the SAM structure and merges the advantages of IO, SAM, econometric to establish an accurate policy analysis and allow prices to vary and resources to be reallocated between production sectors. In contrast to IO models, CGE allows issues involve for changes in relative prices and overcomes the drawbacks in IO models. CGE also allows complex interaction and specify how economic agents react to change in the economy. It incorporates feedback effect that other models do not and takes into account of feedback effects from other markets.

CGE modeling is not without its limitations (Dwyer, Forsyth, & Spurr,
For example, there is no universal accepted and known standard CGE structure. Moreover, it does not present the actual changes in macroeconomic variables (GDP, employment) as a result of policy change. Thus, the economic reality is questionable (Frechtling & Smeral, 2010). Despite CGE models provide an internally consistent and detailed description of an economic system (Berrittella, Bigano, Roson & Tol, 2006); CGE is arguable to give an internally consistent representation of regional economic structure than IO and SAM (Liu, 2006).

Although CGE is always being used, these models are expensive and need time and money to manage it (Ritchie & Dickson, 2007). On top of that, it is complex to build as it requires extensive and updated input data, too many and complex assumptions required.

### 3.4 Tourism Satellite Account

The implementation and development of Tourism Satellite Account (TSA) is growing rapidly throughout the world and have been discussed by a number of researchers (Libreros, Massieu, & Meis, 2006). The TSA is deemed as the most appropriate method of measuring the size of the economic contribution of tourism to a country. TSA is demand-side concept as it deals with the expenditures by different parties for the tourism goods and services. It is also an extension to the input-output framework (Diakomihalis, 2007; Jones, Munday, & Roberts, 2003; Smeral, 2006) and is popular to measure the direct contribution of tourism consumption (Frechtling, 2010).

Many countries are developing TSA based on a number of manual (Libreros, Massieu, & Meis, 2006). The recent TSA manual title *Tourism Satellite Account: Recommended Methodological Framework* was published by the United Nations World Tourism Organization in 2008 (IRTS, 2008) to elaborate the concept and the data requirements for conducting TSA study. The second publication, *International Recommendations for Tourism Statistics 2008 (International Recommendations 2008)* uses both monetary and non-monetary indicators to measure the activities carried out by visitors. There are 10 tables outlined in TSA (Jones, Munday, & Roberts, 2009).

The advantages of adopting TSA were discussed by many researchers (Jones & Munday, 2007; Smeral, 2006). TSA measures the employment directly dependent level of value added upon tourism consumption within domestic industries and separates the tourism activities from national accounts (Jones et al., 2009; Jones & Munday, 2007). TSA calculates the day visitors and tourists staying overnight. The expenditure by visitor or tourist is seen as adding value to tourism related activities compare to the expenditure by local communities (Smeral, 2006). It provides guidance for countries to update and develop the tourism statistics system (IRTS, 2008). The measured activities in TSA can be compared on the same basis (Smeral, 2006).

However, it does not measure the indirect contribution of tourism and tourist demand (IRTS, 2008; Smeral, 2006) and fails to capture the price and qualities to estimate the sales volume and the value added. Thus, the GDP obtained may not accurate (Smeral, 2006). Also, the construction of the
account is costly, methodologically complex, and requires national accounts expertise (Jones et al., 2003; Jones, 2010).

4. Selection of Model

Previous sections discussed the available economic analysis tools that can be used to estimate economic impacts of tourism. In this section, the selection of models will be considered for this paper. As mention earlier, there is no standard model to estimate economic impact study and most of the studies modify the original model to meet the interest of researchers. Though there are variety of modelling options exist for the tourism sector, the selection are entirely reliant on what the researcher attempt to model.

As Akkemik (2012) stated, “the selection of the appropriate modeling technique depends on the research question.” For example, if the aim is to study the impact of changes in taxes (supply shock) or changes in the number of tourists (demand shock); CGE models are more useful (Oosterhaven & Fan, 2006). If the objective is to examine the importance of the tourism sector in an economy, SAM is appropriate. In fact, all these models take into consideration of the final demand and input-output relations (Archer, 1996; Briassoulis, 1991; Fletcher, 1989).

Table 1 compares the characteristics, strengths and boundaries of the Tourism Satellite Account, the Input-Output Model, the Social Accounting Matrix, and the Computable General Equilibrium Model.

Although TSA could have provided wider results, it requires a comprehensive and detailed primary data for the study. TSA measures only the direct contribution of tourism to a natural economy (Frechtling, 2010). Nonetheless, constructing a regional TSA requires the aid of regional Input–Output framework (Jones et al., 2009).

Despite CGE is considered as the cutting-edge tool to capture a wider set of economic impacts derived from an external shock or the implementation of a specific policy, the objective of the study is to estimate the economic impacts of tourism but not shock or policy implementation. Like SAM, it requires detailed primary data (e.g. business survey, household consumption survey) which is expensive. Furthermore, constructing a CGE model is time consuming compare to alternative quantitative methods. Frechtling & Smeral (2010) argued that even though IO analysis overestimates the value compare to CGE, the reality of CGE results is also seldom presented. On the other hands, Oosterhaven and Fan (2006) outlined that SAM models are normally fitting for economies with high unemployment and unused capacity. Thus, SAM models do not fit in this study as the unemployment rate in Malaysia is relatively low.

The reviews above suggest that IO models are appropriate to be used to analyse the economic impacts of tourism. This is supported by Chong (2011) that there are five rationales why IO model should be used. The five rationales are 1) comprehensiveness, 2) flexibility, 3) constant returns to scale, 4) mobility of small region resources, and 5) cost effectiveness.

5. Conclusions
Tourism brings significant benefits to a local economy by injecting income and creating jobs opportunities for local people. Although there are many limitations and weaknesses, some authors believe that economic impacts analysis serves a powerful and valuable tool to study impact studies (Crompton, Lee, & Shuster, 2001). A review of literature indicates that there is a need to assess the economic impacts on a region. Thus, there is a need to review these studies and evaluate the economic impact. This paper attempts to review the potential methods in estimating the economic impacts of tourism. In conclusion, four methods were reviewed and the analysis of IO model is perceived the most suitable model used as it is sufficient to explore the tourism impacts in the local economy through direct, indirect and induced effects on output, income and employment.
Table 1 Comparison of Characteristics of the Tourism Satellite Account, the Input-Output Model, the Social Accounting Matrix, and the Computable General Equilibrium Model

<table>
<thead>
<tr>
<th>Macroeconomic policy analysis tool</th>
<th>Level of effects on a macro economy</th>
<th>Shocks that can be analyzed</th>
<th>Results</th>
<th>Strengths</th>
<th>Boundaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism Satellite Account</td>
<td>Direct</td>
<td>Changes in visitor consumption by product</td>
<td>Tourism’s contribution to GDP and employment by industry for a given year</td>
<td>Explicitly incorporates visitor demand by product and industry TSA is an account that is often updated annually and benchmarked every 5 years</td>
<td>Certain elements of direct impact only; cannot present details for different types of firms, households or other institutions</td>
</tr>
<tr>
<td>Input-Output</td>
<td>Direct, indirect and induced effects on output, income and employment</td>
<td>Changes in consumption by product or industry</td>
<td>National output, income, employment, value added</td>
<td>Well-understood, standard methodology; standardized construction and presentation</td>
<td>Assumes no constraints on availability of factors of production; that prices and wages do not vary; that distribution of factor inputs required by outputs does not vary</td>
</tr>
<tr>
<td>Social Accounting Matrix</td>
<td>Indirect and induced effects on output, income and employment; by disaggregated households, firms</td>
<td>Changes in consumption by product or industry; changes in policy: tax rates, government</td>
<td>National output, income, employment, value added; product prices, wage rates; broken down by type</td>
<td>Disaggregates households, firms and other institutions, products, types of demand and other</td>
<td>No standard methodology or presentation; same boundaries as I-O model</td>
</tr>
</tbody>
</table>
| **Computable General Equilibrium models** | Indirect and induced effects on output, income and employment; prices and wage rates by industry | Changes in consumption by product or industry; changes in policy: tax rates, government spending, price inflation, | National output, income, employment, value added; product prices, wage rates; broken down by type of household, labor and capital source | Allows factor of production prices to vary; effects of resource constraints covered; all markets clear | No standard methodology or presentation; posited relationship equations, parameters, elasticities seldom made public; heavily dependent on assumptions requires massive input data that is seldom current; require validation against the actual economic

Source: Frechtling (2011)
6. References


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