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# APPLICABILITY OF ECONOMIC MODELS IN ESTIMATING TOURISM IMPACTS

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***Abstract***

In many countries, tourism is perceived as a tool to generate income and employment to a country and local economy. Therefore, many researchers attempt to estimate the economic impacts of tourism through different kind of methods. Economic impact studies can be carried out using primary or secondary data. However, there is no universally accepted model to estimate the economic impact because different models give different results based on the interest of the researchers. The objective of this paper is to discuss the strengths, weaknesses, and the applicability of four commonly techniques used in estimating economic impacts of tourism: Input-output model, Social Accounting Matrix, Computable General Equilibrium, and Tourism Satellite Account. Subsequently, the justification of choosing an appropriate model in estimating the economic impacts of tourism is discussed.

***Key words***

*Economic impact; Input-Output models; Social Accounting Matrix; Computable General Equilibrium; Tourism Satellite Account.*

## INTRODUCTION

The importance of travel and tourism has been recently acknowledged by G20 leaders as a driver of economic growth during the G20 Leaders' Declaration held in Los Cabos, Mexico (UNWTO, 2012). The positive impacts of tourism are usually quoted in term of employment opportunity, incomes, tax revenues, investment, improve standard of living (Durbarry, 2002; Fletcher, 1989; Hall and Lew, 2009;

Mayer et al, 2010; Ahmad, 1995; Wagner, 1997; Mohd et al, 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. Local residents agreed that tourism bring more investment and local businesses (Liu and Var, 1986; Ahmad, 1995).

Economic benefits of tourism may not be as always positive as tourism may bring negative economic impacts. For example, the negative economic impacts include leakages (Kokkranikal et al, 2003; Mbaiwa, 2005), increase of prices (Weaver and Lawton, 2001; Tosun, 2002), increase of cost ling (Tatoglu et al, 2002), low paid jobs (Tosun, 2002). Sometimes, tourism does not bring much benefit to the local people (Mbaiwa, 2005). Hence, understand the economic impacts of tourism in a local economy are vital so that actions can be taken by tourism planners to help improving the tourism benefits. The aim of this paper is to discuss the strengths, weaknesses, and the applicability of four commonly techniques used in estimating economic impacts of tourism 1) Input-output model, 2) Social Accounting Matrix, 3) Computable General Equilibrium, and 4) Tourism Satellite Account. The details of each model is discussed in the following sections.

## RELATED LITERATURE

The contribution of tourism can be estimated by applying economic model to trace the economic impact. The results of the impact studies allow stakeholders to identify the direct and indirect sectors within the study region. These results are vital for future development and policies formulation and implementation.

### *Measuring economic impacts of tourism*

The economic impacts of tourism on an economy can be estimated via various approaches (Ahlert, 2008; Pratt, 2011). According to Stynes (1997), there are five reasons why economic impact study should be carried out:

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; and
5. To calculate the amount of tax revenue generated by tourism

Economic impact analysis can be conducted using different types of 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). Although there are many techniques, input output models and multiplier are two popular techniques to quantify the tourism impacts (Mohd et al, 2008). 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 sections.

***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 undertaken to estimate regional economic of tourism (Archer and Fletcher, 1996; Hanly, 2012; Heng and Low, 1990; Loomis, 1995; Saayman and 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). In Malaysia, IO analysis is popular among researchers to estimate the economic impact of some sectors (Bekhet, 2009; Bekhet and Abdullah, 2011; Ismail, 2007; Kamaruddin et al, 2008; Mazumder et al, 2009; Mazumder et al, 2011).

Often, IO models are popular to be used to estimate the income and employment generation through multiplier (Mazumder et al, 2009, 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 hand, Kamaruddin et al (2008) used input output analysis to examine the source of growth and key sectors in Malaysia. The economic impacts of several mega events have been conducted using IO analysis, such as 2002 FIFA World Cup (Lee and Taylor, 2005). Although there are arguments on the models, Robinson (2009, 2) pointed out that "if approached and applied correctly, IO models 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."

Generally 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 et al, 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 et al, 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 et al, 2004; Zhou et al, 1997). Dwyer et al (2004) commented the limitations of IO are incomplete, ignores the key aspects of the economy and only consider the directly affected industry. As a result, it fails to evaluate fiscal policies (Partridge and Rickman, 2010) and the negative impacts on expenditure could not be or partially captured by IO models (Dwyer et al, 2006).

***Social Accounting Matrix***

Social Accounting Matrix (SAM) is popular among analysis (Akkemik, 2012) and has been extensively utilized to analyse a variety of issues, including energy (Akkemik, 2011; Hartono and Resosudarmo, 2008), fisheries (Seung and Waters, 2009), foreign direct investment (Harun et al, 2012) climate change (Pal et al, 2011), tourism (Akkemik, 2012; Li and Lian, 2010) and other issues. In Malaysia, SAM is usually utilized to understand the impact of foreign direct investment on income distribution (Harun et al, 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 and Lian, 2010) and typically used for economies with high unemployment (Oosterhaven and 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 (Akkemik, 2012; Jones, 2010). SAM extends the inter-sectorial 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 et al, 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 et al, 2011).

Although there are many advantages of using SAM, it also experiences some limitations. First, SAM model is a demand-driven model and deals 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.

***Computable General Equilibrium***

Computable General Equilibrium (CGE) or generally 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 and Saayman, 2011, 757). CGE can be carried out at various levels, from national down to town level. The theory underpinning CGE modelling 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 hand, 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 and Smeral, 2010). CGE models were used to "estimate the economic impact of tourist expenditures using behavioural 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 et al, 2008), external price shocks (Al-Amin et al, 2008), environmental policies (Al-Aminet al, 2008) on Malaysian economy.

Several pieces of research have attempted to outline the strengths of utilizing CGE versus other models (Dwyer et al, 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 modelling is not without its limitations (Dwyer et al, 2006). 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 debatable (Frechtling and Smeral, 2010). Although CGE models offer an internally consistent and detailed description of an economic system (Berrittella et al, 2006); it is questionable to present an internally consistent representation of regional economic structure than other models (e.g. IO and SAM) (Liu, 2006).

While CGE models are favour among researchers, these models are expensive and time consuming (Ritchie and Dickson, 2007). In addition, it is complex because it requires extensive updated input data.

***Tourism Satellite Account***

Tourism Satellite Account (TSA) is a popular method used to estimate economic impacts of tourism (Libreros et al, 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 tourism goods and services. It is an extension of input output framework (Diakomihalis, 2007; Jones et al, 2003; Smeral, 2006) and is used to estimate the direct tourism consumption (Frechtling, 2010).

Many countries are developing TSA based on a number of manual (Libreros et al, 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 et al, 2009).

The advantages of adopting TSA were discussed by many researchers (Jones and Munday, 2007; Smeral, 2006). TSA measures the employment directly dependent level of value added upon tourism consumption within domestic industries and separates tourism activities from national accounts (Jones et al, 2009; Jones and 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 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).

*Model selection*

As discussed in the previous sections, each model has its strengths and weaknesses but there is no universally accepted economic model used to estimate economic impact of tourism. The majority of the impact studies adjust the original model to meet the objective of the studies. Akkemik (2012) pointed out that "the selection of the appropriate modelling technique depends on the research question." For example, CGE models are useful to estimate the changes of supply and demand shock (Oosterhaven and Fan, 2006) while SAM is useful to estimate the significant of tourism sector. In contrast, IO models are considered as able to capture the direct, indirect, and induced impacts (Frechtling, 2011), however, the models need some assumptions to support the analysis.

While TSA shows extensive results, it needs detailed primary data which is very expensive. On top of that, Frechtling (2010) argued that TSA does not measure the indirect contribution of tourism. Like SAM, it requires detailed and expensive primary data. In addition, constructing a CGE model requires longer time compare to construct to other methods. In addition, the model requires large amount of input data and heavily dependent on assumptions (Frechtling, 2011). Nevertheless, Oosterhaven and Fan (2006) pointed out that SAM models are usually employed for economies with high unemployment. Therefore, there is no standard methodology or presentation of these models. Thus, the use of models are largely dependent on the objective and the need of the researcher or study.

## CONCLUSIONS

In some of the countries, tourism is the backbone of economy because it brings positive impacts to the local economy by injecting new money and creating new employments. Therefore, tourism stakeholders are interested to understand the economic impacts of tourism so that new policies can be implemented to boost up the economy. Previous literatures indicate a need to assess the economic impacts on a region. Thus, there is a need to review the methods employed to estimate the economic impacts of tourism. This paper has reviewed four popular methods in estimating the economic impacts of tourism. In conclusion, there is no universally accepted model to estimate the economic impacts of tourism. The selection of model depends on the objective of a study and the interest of researcher.

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