

Impact of Tourism on the Economy of Rwanda Input-Output Approach

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Abstract

Tourism has emerged as a driver for economic progress and social development in Rwanda. The sector has strong linkages in the national economy, producing economic and employment benefits in related sectors, thereby promoting economic diversification and strengthening the country's economy. This paper analysed the impacts of changes in tourism demand; policies and regulations that affect tourism directly or indirectly; beyond the direct control of the industry; public and private investment proposals; resource allocation; and policy and management of tourism development strategies. The primary objective of this study was, to evaluate the economic impact of tourism and assess the strength of tourism inter-industry linkages in Rwanda's economy for the year 2013/2014. The input-output model was used to estimate the impact on production, employment generation, labour income earnings and total value creation. The relationships between expenditure and output, and income and employment (direct and indirect) are described by multipliers. Data for analysis was sourced from multi-region input-output table (MRIO) database: <http://www.worldmrio.com/> and the Rwanda Tourism Satellite Accounts (2014). All impacts have a starting point in the economy, defined as the direct effect. The direct effect sets off iterations of indirect (inter-industry production) spending. Internal tourism consumption, an aggregate that describes the size of direct visitor acquisition within a country of reference was used as basis for calculating tourism multipliers and their associated effects. There are several different types of multipliers depending on the secondary effects included and the measure of economic activity used. The common multipliers computed were associated with output, income, value addition and employment in the economy for the year 2013/2014. Multipliers were decomposed into their various multiplier effects: initial and production effects.

This study quantified the impact and effects of internal tourism expenditure/consumption. With total expenditure of \$286 million, the tourism sector

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supported about 569 thousand jobs and generated \$120 million as labour income, \$238 million in value addition and \$522 million output. In this report, internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating relevant multipliers and associated effects; thus future studies can re-estimate the multipliers by considering internal tourism consumption in its entirety. Attempts should be made to integrate other components of total tourism internal demand (i.e. tourism gross fixed capital formation and tourism collective consumption) into the analysis. More robust methodologies such as Social Accounting Matrix (SAM) and Computable General Equilibrium (CGE) models could be considered for further analysis.

Keywords: Total Impact, Tourism, Economy, Rwanda, Input-Output Approach.

Introduction

Rwanda is a member of the East African Community (EAC), a regional economic block whose membership includes Kenya, Uganda, Tanzania, Burundi and Southern Sudan. Agriculture is a key sector of Rwanda's economy and contributed on average 33 % of GDP between 2009 and 2014, employed 71% of the population and generated 45% of the country's export revenues. The main crops are coffee and tea (NISR, 2016; World Bank, 2011). The country's manufacturing sector contributed 15% of GDP annually between 2009 and 2014. Rwandese service sector is sub-divided into trade and transport services which on average contributed 15% of GDP annually and other services including tourism which accounted for 32% of GDP. In 2014, Rwanda's GDP was estimated at RWF¹ 5,395 billion translating to GDP per capita of RWF 491,000.

Rwanda's Tourism Industry

By 2011, the Rwandese tourism industry was contributing 63% of the country's service export earnings and supporting balance of payments. The sector

ranked highly in Foreign Direct Investment (FDI) attraction accounting for up to 40% of total FDI into the country (UNTAD, 2014).

Table 1 summarizes international tourist arrivals in Rwanda between 2011 and 2014 by region and shows an aggregate 9.3% growth over the period with visitors from Africa forming 85-89% of inbound tourists on account of improved intra-regional accessibility. Poor connectivity with major international capitals explains lower arrivals from European, American and Pacific regions over the period (UNWTO, 2016, UNWTO, 2017 and UNWTO, 2018).

Table 1: International Regional Inbound Tourists Arrivals; 2011-2014

Regional ITA ('000)							
Year	Africa	Americas	E. Asia &		Middle East		Total
			Pacific	Europe	East	Others*	
2011	774	38	13	67	2	14	908
2012	936	33	12	62	2	16	1,061
2013	988	38	15	61	3	17	1,122
2014	1,088	35	12	61	3	21	1,220
*Others include arrivals from South Asia and other non-classified markets							

Source: (RTSA, 2014; UNWTO, 2016)

Rwanda is reliant on wildlife based tourism for 90% of its tourism generated revenues (MoTI, 2009). The principle wildlife attractions are Volcanoes National Park which offers opportunity for gorilla tracking, Nyungwe tropical forest, the largest

remaining track of mountain forest in East and Central Africa and Akagera National Park which offers a typical Savannah experience.

Rwanda's Tourism Statistics (2014)

Rwanda's international inbound tourism arrivals increased steadily from 908,009 in 2011 to 1,219,529 in 2014². During the year 2014 almost 90% of arrivals used land transport.³ The average length of stay was estimated at 6.5 nights as weighted according to purpose of visit and mode of transport.⁴ Almost 1,013,607 tourists generated 6,605,211 nights' stays and total expenditure of RWF 202,800 million in 2014⁵. The total expenditure by same-day and overnight visitors was estimated at RWF 208.1 billion. About 22% of Rwanda's population participated in domestic tourism and approximately 24% of those who participated in domestic tourism were urban-based. Female participation rate was approximately 50.6%. Domestic tourism generated RWF 53.1 billion in 2014.⁶

The internal tourism consumption for the year 2014 was thus estimated at RWF 261.2 billion at market price. At basic price, this translated to RWF 209.2 billion.⁷ However, only tourism expenditure was covered in the survey. "Other" components of tourism consumption were not captured in the TSA for Rwanda.⁸

The primary objective of this study was to evaluate the economic impact of tourism on Rwanda's economy for the year 2014. The specific objectives were to estimate these impacts in terms of output, employment generation, and labour income, and total

value generation. The significance of the current study is mainly related to policy formulation, implementation, monitoring and evaluation.

Empirical Review

The relevance of tourism as a socio-economic growth and development tool has continued to motivate scholarly attention. Briassoulis (1991) pointed out that rigorous study of economic impact is necessitated by the truism that tourism bears economic costs that discount associated benefits. Real tourism benefits are thus often at variance with what is envisaged in development policy blue prints, hence economic impact studies are necessary as a policy monitoring and evaluation tool.

A range of alternative approaches for assessing tourism economic impacts have thus been developed. However, these methods are premised on estimation of tourism demand changes and subjecting the change to a model or set of multipliers that trace its reverberations in the economy, Stynes (1999). Methods include expert judgment, surveys, off-the-shelf multipliers and econometric models. Kumar and Hussain (2014) states that the decision on multiplier methods and models to use is based on precision expected, data availability, complexity of technique and assumptions underpinning the analysis.

Multiplier studies speculate that a shock introduced by tourism expenditure leads to additional activities in related industries which magnifies the overall change from the initial shock; the analyst's task is thus to estimate this magnification. Input-Output (I-O) analysis technique has been widely applied in deriving multipliers. The technique is used to analyze direct and indirect impacts, simulate *ex ante* or *ex post* effect of tourism demand at national, sub-national, industry or sub-sector levels, (Dwyer, Forsyth & Spur, 2004; Frechtling, 2013). Other methods used to study economic impacts include Social Accounting Matrix (SAM) and Computable General equilibrium model (CGE).

Due to its design elegance, simplicity and reliance on observed economic data, I-O models have been popularized in tourism economic impact analysis since their first use in the 1960s (Frechtling, 2013).

Atan and Arslanturk, (2012) used I-O analysis to examine significance of tourism in the Turkish economy to establish the link between tourism and economic growth. The study computed total output multipliers for 16 sectors of the Turkish economy to assess the relative significance of tourism in increasing output. Results showed that tourism specific sectors; hotels and restaurants, auxiliary transport activities and travel agency activities had high output multipliers or backward linkages (between 1.85 and 1.90). It was further noted that hotels and restaurants sector (1.90) was second to manufacturing (2.02) in terms of total output multiplier. The researchers asserted that tourism had a high capacity to grow other sectors of the economy on account of the high quantity of input from other sectors required to generate a unit tourism output.

Micháľková *et al.*, (2018) applied the I-O model to quantify direct and secondary economic benefits of a cultural event in Bratislava, Slovakia. The study borrowed multipliers previously calculated from Slovakian I-O table and applied them on aggregated tourism expenditures obtained from survey data. They were able to estimate total economic contribution generated by final tourism consumption during the coronation event held in Bratislava at €3,347,023.

Ivandić and Šutalo (2018) used data from Croatian TSA and I-O tables to estimate tourism's contribution to GDP and measured multiplicative effects of tourism demand on the economy. The study evaluated impact of a tourism boom on structural changes in the economy comparing three periods between 2005 and 2013. It applied a vector column of internally produced domestic tourism consumption on the Leontief inverse matrix to compute output and gross value added (GVA) multipliers for seven tourism related sectors. Results showed marked volatility in output multipliers in the 3 periods and that "air transport" had the largest backward influence (output multiplier =2.08) on the economy. The findings indicated that "hotels and restaurant" sector had the lowest share of intermediaries in total output implying that it drew weakly from others slowing down potential overall growth. The study observed volatility in GVA multipliers similar to output multipliers. However, they showed that "hotels and restaurants" had the highest total GVA multipliers in all the periods

leading to a conclusion that tourism demand gainfully impacted on other non-tourism sectors of the economy due to overall inter-sector connections.

Surugiu (2009) used IO analysis to estimate the economic impacts of tourism on the hotel and restaurant sector in Romania over the period 2000 and 2005. Output and employment multipliers were found to have increased but those of value added and income had declined. The analysis showed that hotels and restaurants had one of the lowest interdependence levels in the economy. The researcher suggested that transport infrastructure needed to be strengthened and services diversified in order enhance the respective linkages.

Elsewhere, Archer and Fletcher (1996) using IO analysis, examined the impact of tourism on income, employment, public sector revenue and balance of payments in Seychelles. They used 18 aggregated IO sectors with separate industries related to tourism and concluded that tourism impact was distributed over several productive sectors with different magnitudes. Results revealed tourist groups that maximize economic benefits and the sectors tourists should be encouraged to spend in.

Whereas Frechtling and Horvath (1999) concluded that tourism multipliers are relatively high for income and employment but low for output compared with other sectors;

Jones and Munday (2004) in yet another study observed that the level of backward linkages (multipliers) varies among tourism related industries.

Structure of the 1-0 Table

I-O tables track the output generated by an industry as the intermediate input in the production process of another industry or the final purchase by the various consumers (Miller and Blair, 2009).

I-O models focus on the industry under study and its direct relationships with other parts of the economy, ignoring other key aspects of the economy. This, however, leads to over-estimates of specific and general impacts in the economy (Dwyers et al, 2004).

The following mathematical input-output model was adopted for the study:

$$X = A \times X + F - M \quad \text{Equation (1)}$$

Where X is vector of total gross output from industry $j=1$ to industry $j=n$;

A is input coefficient matrix from industry $j=1$ to industry $j=n$;

F a vector of final demand from industry $j=1$ to industry $j=n$; and

M a vector of import from industry $j=1$ to industry $j=n$.

In order to extract the invert matrix or the Leontief inverse, which is a multiplier explaining direct and indirect effects, all elements from equation (1) are transposed to X as the following show (2):

$$(1 - A)X = F - M \quad \text{Equation (2)}$$

$$X = (1 - A)^{-1}(F - M) \quad \text{Equation (3)}$$

Where $(1 - A)^{-1}$ is the inverse matrix.

1-0 Multipliers

A computerized software helps to produce the inverse matrices, which are a set of multipliers. Analyses of four different sets of multipliers from the input-output system, namely total industry output, labour income, value added, and employment are conducted under given mathematical input-output model⁹. Each set of multipliers creates four types of multipliers namely: Type 1, Type 2, Type 3, and Type 4 multiplier within the IMPLAN system. A Type 1 multiplier shows the direct effect plus the indirect effect. When input-output model is exclusive of households, the model becomes open type (i.e. Type 1 multiplier).

Data

The data was sourced from a global supply chain database that consists of a multi-region input-output table (MRIO) model that provides a time series of high-resolution IO tables with matching environmental and social satellite accounts for the 190 countries including Rwanda: <http://www.worldmrrio.com/country/>

Rwanda's Input-Output Table 2013/2014

The study relies on Rwanda I-O tables 2014 (RI-O, 2014), the latest complete account of inter-industry transactions and final demand produced for Rwanda to derive an I-O model. The tables are available on <http://www.worldmrio.com/country/> which contains a database of high resolution multi-region I-O tables (MRIO) for 190 countries including Rwanda.

The first quadrant/intermediate usage sub-matrix or transaction tables of the Rwandese I-O tables, 2014 records flows between twenty-six (26) industries. Food and beverages, hotels and restaurants, retail trade and transport are industries that relate to tourism in the sub-matrix. The second quadrant shows output disposition to final demand categories which include household (96%), state and local government (14%), capital formation (41%), institutional sales (-29%) and net exports (-25%). The sum of row totals of this sub-matrix gives total final demand at \$5.378 billion in 2014. The third quadrant is made up of primary inputs to production by the 26 industries and includes returns to primary inputs such as compensation to employees, gross operating surplus, gross mixed incomes, imports and net taxes on production. The column total of row sums of this sub-matrix computes total value added at \$5.57 billion in 2014. The final quadrant shows all primary inputs into final demand by household, government, investment and exports.

Rwanda Tourism Satellite Account

The second set of data was obtained from Rwanda Tourism Satellite Accounts year 2014 (R-TSA, 2014 Appendix Table 1).¹⁰ In the TSA framework, “tourism industry” is identified from the demand side by commodities that serve tourists’ needs and linked to the supply side with tourism specific industries supplying such commodities. The R-TSA 2014 was used to compile the final consumption (demand) vector based on total internal tourism demand (TITD). R-TSA, 2014 identifies five tourism characteristic commodities i.e. accommodation, food and drinks, local tour packages, day tours/excursions and local transport.

Methodology

Tourism Satellite Accounts (TSAs) provide input data for entry into an economy's input-output model. TSAs are constructed to aggregate a country's tourism activities into a single industry. These accounts measure the direct economic contribution of tourism to the economy in a manner that is consistent with IO table (Frechtling, D. 2010 and Pratt, S. 2015). TSAs are not a modelling but an accounting tool that records annual activities of tourism as an industry (Hara, 2012). The ten TSA tables were built according to National Accounting System (NAS). The aggregated tourism industry was inserted as one explicit industry in the I-O table, thus avoiding double counting. Data from Rwanda TSA (2014) was used to estimate the macroeconomic and inter-industry linkages of the tourism industry. Final consumption by tourists was extracted from general output in a process referred to as 'fractionalization' in terms of matrix algebra and 'desegregation' in terms of national accounts. The values of the extracted parts of output together with accompanying inputs were separated into new vectors of 'tourism activities'. Vector components of tourism activity were then aggregated into an explicit new 'tourism industry'. This is the desegregation of outputs and inputs into tourism and non-tourism parts (Hara, 2008). Therefore, TSA is used in compiling the intermediate and final consumption (demand) vectors based on internal tourism consumption.

Tourism industry is related with several other industries in the economy (Hara, 2008) thus both the tourism demand and supply forces create primary (direct) and secondary (indirect) economic effects. The primary and secondary effects resulting from internal tourism demand can be captured by multiplier based input-output methods (Frechtling, 2013). Input-output models have advantages over econometric analyses since they simultaneously take into account inter-industry input-output relations and final demand (Blake, 2009). Final demand consists of consumption, investment, exports and imports (i.e. $Y = C + I + G + X - M$). Therefore, Input and output models are preferred over econometric analyses in examining the quantitative economic contribution of tourism demand to a country's general economy (Song, et al, 2012; Frechtling, 2013).

This study used the IMPLAN (Impact analysis for Planning) software to evaluate the economic impact of tourism sector on Rwanda's economy (Appendix Table 2). For a complete description of sources and methodology for construction of the IMPLAN database please refer to the IMPLAN Pro User's, Analysis and Data Guide.

Results

Total tourism internal demand consists of the sum of internal tourism consumption, tourism gross fixed capital formation and tourism collective consumption (TSA: RMF 2008). Internal tourism consumption is the central aggregate that describes the size of direct visitor acquisition within a country of reference.

Input-Output Multipliers

Four general sectors closely associated with tourism consumption were considered in this paper. Namely; Food and Beverage (F&B), Hotels and Restaurants (H&R), Transport and Retail Trade. Under the direct multipliers, for every one million dollars of production, Food and Beverage sector generated \$70,401 in labour income \$143,815 in value addition, and created 22 jobs. Hotels and Restaurants sector generated \$266,355 in labour income and \$392,161 in value addition, and created 77 jobs. Transport sector generated \$234,046 in labour income, \$345,873 in value addition and, created 243 jobs.

Under the indirect multipliers, for every one million dollars of production, Food and Beverage sector generated \$218,322 in labour income \$727,579 in value addition, and created 5,260 jobs. Hotels and Restaurants sector generated \$172,155 in labour income, \$452,808 in value addition, and created 1,912 jobs. Transport sector generated \$122,059 in labour income and \$264,563 in value addition, and created 112 jobs. For every one dollar of output; Food and Beverage sector generated \$1.1, the Hotels and Restaurants sector \$0.9, and Transport sector \$1.2.

Tourism Economic Impacts

Five tourism specific sectors; Accommodation, Food and Drinks (F&D), Passenger Transport, Travel Agency and Tour-Operations, and Shopping were considered under expenditure impact analysis.

Internal tourism expenditure in the year 2014 was segregated into accommodation (\$124 million), food and drinks (\$54 million), passenger transport (\$35 million), travel agency and tour-operations (\$4 million) and shopping (\$71 million). This study quantified the impact of internal tourism expenditure/consumption. With total expenditure of \$286 million, the tourism sector supported about 569 thousand jobs and generated \$120 million as labour income, \$238 million in value addition and \$522 million output.

Approximately \$124 million spending in the accommodation sub-sector of hotels and restaurants sector created 236,000 jobs and generated \$54 million in labour income, \$104 million in total value addition and \$238 million in output. Approximately \$54 million spending in the food and drinks sub-sector of food and beverage sector created 270,000 jobs and generated \$15 million in labour income, \$46 million in total value addition and \$111 million in output. Almost \$33 million spending in the passenger transport sub-sector of transport sector created 12,000 jobs and generated \$13 million in labour income, \$21 million in total value addition and \$54 million in output. Up to \$4 million spending in the travel agency and tour-operations sub-sector of transport sector created 1,400 jobs and generated \$1.5 million in labour income, \$2.5 million in total value addition and \$6.5 million in output. Nearly \$71 million spending in the shopping sub-sector of retail trade sector created 50,000 jobs and generated \$38 million in labour income, \$63 million in total value addition and \$112 million in output.

Conclusion

Contribution of tourism to Rwanda's economy includes direct and indirect effects classified as increase in domestic production, generation of labour income, creation of employment, foreign exchange earnings from inbound tourist expenditure, and other economic effects. The indirect effects of tourism are much larger than the direct effects. Both effects show that tourism contributes substantially to the economy of Rwanda.

Interventions to grow internal tourism demand such as increasing tourism arrivals or promoting high-end gorilla tourism may create higher value addition in the services sector in addition to higher labour incomes and output. Tourism has the potential to stimulate demand in other economic sectors and hence encourage growth.

In other words, tourism-based industries are interlinked with other sectors of the economy in general. These industries, in turn, generate relatively high value added multiplier effects. However, lower labour income multiplier for tourism sectors suggest low quality jobs diminishing per capita impact of tourism created jobs in the economy.

World Tourism and Travel Council (2018) analysis is based on strong assumptions due to lack of data and consequently their figures are higher than the estimates of this study.

Way Forward

In this report, internal tourism expenditure was used as a basis for calculating relevant multipliers and their associated effects. Therefore, future studies can re-estimate the multipliers by considering internal tourism consumption in its entirety. More robust methodologies such as Computable General Equilibrium (CGE) and Social Accounting Matrix (SAM) models are recommended.

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Appendix

Table 1: Rwanda TSA Table 1 Internal Tourism Consumption by Products 2014 (RWF billion)

	Internal Tourism Expenditure				
	Inbound Tourism Expenditure	Domestic Tourism Expenditure	Internal Tourism Expenditure	Other Components of Tourism Consumption	Internal Tourism Consumption
Products	(1.3)	(2.9)	(4.1)=(1.3)+ (2.9)	(4.2)	(4.3)=(4.1)+ (4.2)
A.Consumption Products					
A.1 Tourism Characteristic Products					
Accommodation	101.2	2.9	104.1	-	104.1
Food & Drink	31.4	10.5	41.9	-	41.9
Local Tour Packages	7.5	26.8	34.3	-	34.3
Day Tours and Excursions	3.3	0.02	3.3	-	3.3
Other Local Transport	26.9	0.2	27.1	-	27.1
A.2 Other Consumption Products					
Shopping	25.1	9.2	34.3	-	34.3
Other	12.7	3.5	16.2	-	16.2
TOTAL	208.1	53.1	261.2	-	261.2

Source: Rwanda TSA (2014)

Table 2: Rwanda Implan Model

Rwanda IMPLAN Model		Copyright 2017 Minnesota IMPLAN Group, Inc.			
Model Information					
Model Year		2013	Value Added		
GRP		\$5 569 868 114	Employee Compensation		\$2 322 098 437
Total Personal Income		\$4 163 492 000	Proprietor Income		\$721 414 497
Total Employment		5 560 000	Other Property Type Income		\$2 520 215 134
			Tax on Production and Import		\$6 140 046
Number of Industries		26			
Land Area (Sq. Miles)		10 169	Total Value Added		\$5 569 868 114
Area Count		1			
			Final Demand		
Population		11 460 000	Households		5 182 582 010
Total Households		2 546 667	State/Local Government		\$
Average Household Income		\$1 635	Federal Government		\$876 256 173
			Capital		\$2 222 740 128
Trade Flows Method		Supply/Demand Pooling	Exports		\$285 053 232
Model Status		Multipliers	Imports		-\$1 622 100 303
			Institutional Sales		-\$1 566 862 485
Economic Indicators					
Shannon-Weaver Index		.51503	Total Final Demand:		\$5 377 668 756
Top Ten Industries					
Sector	Description		Employment	Labour Income	Output
1	Agriculture		3 254 281	\$85 003 670	\$428 973 500

2	Fishing		621 039	\$10 857 460	\$32 334 910
16	Wholesale Trade		265 049	\$226 165 000	\$525 059 800
17	Retail Trade		252 031	\$222 705 600	\$567 889 200
14	Construction		233 520	\$284 157 600	\$671 708 600
25	Others		227 915	\$3 451 336	\$27 185 530
23	Education, Health and Other Services		155 680	\$501 221 800	\$1 313 087 000
19	Transport		116 760	\$112 241 400	\$479 570 400
21	Financial Intermediation and Business Activities		94 520	\$692 705 900	\$3 013 000 000
3	Mining and Quarrying		61 160	\$4 785 626	\$119 032 400
Areas In the Model					
Rwanda	National				

Source: Implan Output