

IMPACT OF TOURISM ON THE ECONOMY OF RWANDA: SOCIAL ACCOUNTING MATRIX (SAM) ANALYSIS

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Abstract

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 SAM model was used to estimate the impacts and linkages of tourism in terms of output production, employment generation, labor income earnings and total value creation. The economic models identified and quantified the linkages between different sectors of the economy. The relationships between expenditure and output, and income and employment (direct and indirect) were described by multipliers. Data for analysis was sourced from EORA multi-region input-output table (MRIO) database: <http://www.worldmr.io.com/>. 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). Total tourism expenditure/consumption, which triggers direct effects, consists of internal tourism consumption. Internal tourism consumption is an aggregate that describes the size of direct visitor acquisition within a country of reference. Therefore, internal tourism expenditure (a portion of internal tourism consumption) was used as a 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 years 2013/2014. Multipliers were decomposed into their various multiplier effects: initial and production effects. About \$286 million worth of internal tourism expenditure/consumption in the economy created 72,000 jobs (13% of economy-wide employment) and generated \$195 million in labour income (6.4% of national labour income), \$381 million in total value addition (6.8% of national total value) and \$803 million in output (7.3% of national output). This study analyzed the effects of changes in tourism expenditure/consumption, effects of policies and regulations that affect tourism activity either directly or indirectly, resource allocation, policy and management of tourism development strategies. Internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating relevant multipliers and associated effects. Future studies should estimate the multipliers by considering internal tourism consumption in its entirety and a more robust methodology such as Computable General Equilibrium (CGE) models be considered for further analysis.

Keywords: Tourism Satellite Accounts, Tourism Internal Expenditure/Consumption, Social Accounting Matrix, Rwanda.

Introduction

The Rwandan economy has annually recorded 8 percent average GDP growth since 2001 and GDP per capita increased more than three-fold from about US\$211 per capita in 2001 to about US\$718 in 2014 (National Institute of Statistics of Rwanda, NISR) [1]. The service sector accounted for 47% of GDP compared to 33 percent of the primary sector (agriculture, forestry and fishery). The growth of services was almost 9% by 2014 against 7% for industry and 4% for agriculture. The main sub-sectors in the service sector are wholesale and trade, transportation, storage and communication services. Trade and transport services contributed to the share of services in gross domestic product at Rwf 159 billion in 1999 which increased to Rwf 784 billion in 2014. Wholesale and retail trade had Rwf615 billion in 2014 against Rwf133 billion in 1999. Other services including hotels and restaurants, information and communication, and financial services increasingly contributed to GDP from Rwf430 billion in 1999 to Rwf 1,505 billion in 2014. The service sector's contribution grew to Rwf 2,290 billion in 2014 as compared to Rwf563 billion in 1999 (2011 prices).

In 2011, Rwanda tourism industry contributed 63% of the country's service export earnings and therefore significantly supported the country's balance of payment accounts. This sector ranks highly in Foreign Direct Investment (FDI) attraction accounting for up to 40% of total FDI into the country (United Nations, 2014) [2]. Rwanda is reliant on wildlife-based tourism for 90% of its tourism generated revenues (MoTI, 2009) [3]. The principal wildlife attractions are the Volcanoes National Park that offers an opportunity for gorilla tracking, Nyungwe tropical forest (the largest remaining track of mountain forest in East and Central Africa) and Akagera National Park which provides a typical savanna experience.

Internal Tourism Demand

Internal tourism consumption encompasses tourism expenditure and other components of tourism consumption. Tourism Satellite Accounts (TSAs) Tables 1 and 2 describe tourism expenditure¹. TSA Table 1 presents tourism expenditure by inbound international visitors covering both overnight and same-day visitors (excursionists). Rwanda's international inbound tourism arrivals have been increasing steadily from 908,009 in 2011 to 1,219,529 in 2014. Most visitors arrive and depart by road. For instance, in 2014 almost 90% of arrivals used land transport. Traders, employees and other cross-border visitors are excluded since they do not leave their 'usual environment'. The average length of stay (ALOS) refers to the number of days, on average, taken by a specific group of visitors at a destination. In 2014, the average length of stay was estimated at 6.5 nights weighted according to purpose of visit and mode of transport. The average expenditure per visitor is the amount of money spent in relation to the length of stay by the visitors. As a result, 1,013,607 tourists generated 6,605,211 nights and total expenditure of RWF 202,800 million in 2014.

The total expenditure by same-day and overnight visitors was estimated at RWF 208.1 billion (2014). Domestic tourism expenditure includes not only the expenditure of visitors on domestic trips, but also the expenditure within Rwanda by residents that undertake outbound trips. About 22% of Rwanda's population participated in domestic tourism. Almost 24% of those who participated in domestic tourism were urban-based. The female participation rate was almost 50.6%. In 2014, domestic tourism generated RWF 53.1 billion in 2014 (TSA Table 2).

TSA Table presents other components of tourism consumption in addition to tourism expenditure². The internal tourism consumption for the year 2014 was estimated at RWF 261.2 billion at market prices. At basic prices this translated to RWF 209.2 billion. However, these "other" components were not captured in the TSA for Rwanda.

The Objectives of the Study

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The primary objective of this study is to evaluate the economic impact of internal tourism consumption on Rwanda's economy for the year 2014. The specific objectives are to estimate the impacts of tourism in terms of output, employment generation, and labour income, total value generation and the strength of tourism inter-industry linkages.

Significance of the Study

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

Methodology

The economic impacts of tourism can be estimated using economic models that identify and quantify the linkages between different sectors of the economy (Dwyer et al, 2004 [4]; Hara, T., 2008 [5]; Styne, D., 1999) [6]. The relationship between expenditure and output, income and employment can be described by multiplier effect (Frechtling and Horvath, 1999) [7]. The standard approach is to estimate the economic impacts of tourism by using SAM models in order to derive appropriate multipliers³.

Tourism Satellite Accounts (TSAs) provide input data for entry into an economy's input-output model (Hara, T., 2012) [8]. TSAs are constructed to aggregate a country's tourism activities into a single industry. The ten TSA tables are built according to the National Accounting System (NAS). The aggregated tourism industry is inserted as one explicit industry in the I-O table, thus avoiding double counting. Data from Rwanda TSA (2014), surveys by NISR and BNR was used to estimate the macroeconomic and inter-industry linkages of the tourism industry. TSA is used in compiling the intermediate and final consumption (demand) vector based on tourism expenditure.

SAM methodology focuses on induced effects besides the direct and indirect ones, giving it some advantages over the I-O modeling methodology Miller and Blair, 2009 [9]; Surugiu, C., 2009 [10]; Hasan GÜL, 2013 [11]). SAM describes the structure of an economy in terms of links

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between production, income distribution and demand (Akkemik, A.K. 2012) [12]. However, SAM is a demand-driven model with an excess capacity assumption. The model assumes that any increase in demand is immediately met by increased supply due to availability of unemployed resources. Such models are robust for economies with high unemployment and unused capacity in all industries (Akkemik, 2012) [12].

A SAM capturing an economy's expenditure and income linkages is derived by modifying the appropriate I-O table. SAM square matrix records flows of all transactions in an economy and provides an accounting system of an economy for a given year. Besides I-O and TSA tables, public sector accounts, national income accounts and balance of payments are used to construct SAM. Table 1 and 2 present modified input-output accounting table for the input output model and the matrix structure of input coefficient and value added coefficient respectively.

Table 1: Modified Input-Output Accounting Table for the Input-Output Model

	Intermediate Demands (Output)				Final Demand	Total Final Demand	Imports	Total Gross Output
Intermediate Supplies (Input)	X_{11}	X_{12}		X_{1n}	F_1	$\sum_{F_1}^{X_{1j}+}$	M_1	X_1
	X_{21}	X_{22}		X_{2n}	F_2	$\sum_{F_2}^{X_{2j}+}$	M_2	X_2
	$:$	$:$	X_{ij}	$:$	$:$	$:$	$:$	$:$
	X_{n1}	X_{n2}		X_{nn}	F_n	$\sum_{F_n}^{X_{nj}+}$	M_n	X_n
Value-Added	V_1	V_2		V_n				
Total Gross Outlays	X_1	X_2		X_n				

Table 2. Matrix Structure of Input Coefficient and Value-Added Coefficient

Input Coefficient	$a_{11}(=X_{11}/X_1)$	$a_{12}(=X_{12}/X_2)$		$a_{1n}(=X_{1n}/X_n)$
	$a_{21}(=X_{21}/X_1)$	$a_{22}(=X_{22}/X_2)$		$a_{2n}(=X_{2n}/X_n)$
	:	:	$a_{11}(=X_{11}/X_1)$	:
	$a_{n1}(=X_{n1}/X_1)$	$a_{n2}(=X_{n2}/X_2)$		$a_{nn}(=X_{nn}/X_n)$
Value-Added Coefficient	$a^v_1(=V_1/X_1)$	$a^v_2(=V_2/X_2)$		$a^v_n(=V_n/X_n)$
Total	1	1		1

Table. 3 multiple simultaneous equations of total gross output for each industry sector from industry $f-1$ to industry $f-n$ are set up as follows:

$$\begin{aligned}
 X_1 &= X_{11} + X_{12} + \dots + X_{1n} + F_1 - M_1 \\
 X_2 &= X_{21} + X_{22} + \dots + X_{2n} + F_2 - M_2 \\
 &\vdots \\
 X_n &= X_{n1} + X_{n2} + \dots + X_{nn} + F_n - M_n
 \end{aligned}
 \quad \text{Equation (1)}$$

To schematize a distribution ratio of the amount of input of each industry for industry f from industry $f-1$ to industry $f-n$, the following equations are formulated along with Table 2 representing input coefficients of each industry and equation (1) driven by **Table 6**.

$$\begin{aligned}
 X_1 &= a_{11} X_1 + a_{12} X_2 + \dots + a_{1n} X_n + F_1 - M_1 \\
 X_2 &= a_{21} X_1 + a_{22} X_2 + \dots + a_{2n} X_n + F_2 - M_2 \\
 &\vdots \\
 X_n &= a_{n1} X_1 + a_{n2} X_2 + \dots + a_{nn} X_n + F_n - M_n
 \end{aligned}
 \quad \text{Equation (2)}$$

To simplify equation (2), when the input coefficients from each industry are grouped into the same section, equation (2) is presented as the following equation.

$$[X_1 : X_n] = [a_{11} a_{12} \cdots a_{1n} : a_{n1} a_{n2} \cdots a_{nn}] [X_1 : X_n] + [F_1 : F_n] - [M_1 : M_n]$$

Equation (3)

To represent a more simplified equation (3), equation (3) is formulated as the following mathematical input-output model:

$$X = A \times X + F - M \quad \text{Equation (4)}$$

Where X is vector of total gross output from industry $f-1$ to industry $f-n$; A is input coefficient matrix from industry $f-1$ to industry $f-n$; F is a vector of final demand from industry $f-1$ to industry $f-n$; M is a vector of import from industry $f-1$ to industry $f-n$. To extract the invert matrix or the Leontief inverse, which is a multiplier explaining direct, indirect and induced effects, all elements from equation (4) are transposed to X as the following equation (6) as going through equation (5):

$$(1 - A)X = F - M \quad \text{Equation (5)}$$

$$X = (1 - A)^{-1}(F - M) \quad \text{Equation (6)}$$

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

The computerized software from the MIG, Inc. time-efficiently helps to produce the inverse matrices, which is 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 a given mathematical input-output model (Equation 6). Each set of multipliers creates four types of multipliers: Type 1, Type 2, Type 3, and Type 4 multiplier within the IMPLAN system⁴. This paper is based on Type 4 multipliers.

Data Sources

The Input-Output Table was sourced from *EORA multi-region input-output table (MRIO) database*: <http://www.worldmr.io.com/>

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Data for the direct impacts of tourism on the national economy of the country was extracted from the Rwanda Tourism Satellite Account (TSA) for the year 2014.

Software Package for Analysis

This study used the IMPLAN (Impact analysis for PLANning) software to evaluate the economic impact of the tourism sector on Rwanda's economy. The IMPLAN economic analysis framework is comprehensive and adaptive. 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

The results in this section encompass the direct, indirect and induced effects arising from demand (Frechtling and Smeral, 2010 [13]; Kumar and Hussain, 2014 [14]; Michalkova et al. 2018 [15]; Pratt, S., 2015 [16]; Song et al, 2012[17]; Arndt, et al. 2000 [18]. Under direct effects, for every one million dollars of production: Food and Beverage sector generated \$70,401 in labour income and \$143,815 in value addition and created 22 jobs. The 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 and \$345,873 in value addition and created 243 jobs. Under indirect effects, for every one million dollars of production: Food and Beverage sector generated \$218,322 in labour income and \$727,579 in value addition and created 5,260 jobs.

The Hotels and Restaurants sector generated \$172,155 in labour income and \$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. Under induced effects, for every one million dollars of production: Food and Beverage sector generated \$180,422 in labour income and \$348,064 in value addition and created 387 jobs.

The Hotels and Restaurants sector generated \$247,364 in labour income and \$685,873 in value addition and created 530 jobs. Transport sector generated \$336,913 in labour income and \$693,017 in value addition and created 722 jobs. For every one dollar of output: Food and Beverage sector induced \$0.7, the Hotels and Restaurants sector \$0.9, and Transport sector \$1.3.

Tourism expenditure in the year 2014 (Table 3) was decomposed into accommodation (\$124 million), food and drinks (\$54 million), passenger transport (\$35 million), travel agency and tour-operations (\$4 million) and shopping (\$71 million). Accommodation sub-sector is estimated to have supported about 298 thousand jobs and generated \$84 million as labour income, \$163 million in value addition and \$353 million as output due to \$ 124 million spending in the sub-sector. Food and drinks sub-sector supported about 289 thousand jobs and generated \$25 million as labour income, \$65 million in value addition and \$148 million as output due to \$54 million spending in the sub-sector.

TABLE 3: TOURISM IMPACT INDICATORS- Tourism Consumption/Expenditure (US\$)

		Accommodation	Food and Drinks	Passenger Transport	Travel Agencies etc.		Shopping and Other Expenses
Employment	Direct	9,227 (03%)	1,125 (0.4%)	8,294 (23%)	967 (23%)		31,152 (33%)
	Indirect	226,394 (76%)	268,588 (93%)	3,814 (10%)	444 (10%)		19,123 (20%)
	Induced	62,772 (21%)	19,747 (07%)	24,602 (67%)	2,867 (67%)		43,057 (46%)
	Total	298,393	289,461	36,710	4,278		93,332
Labour Income	Direct	32,751,790 (39%)	3,732,906 (15%)	8,280,379 (34%)	965,007 (34%)		28,589,182 (48%)

	Indirect	21,168,706 (25%)	11,576,146 (47%)	4,318,360 (18%)	503,268 (18%)		9,511,111 (16%)
	Induced	30,416,588 (36%)	9,567,640 (38%)	11,919,732 (49%)	1,389,141 (49%)		20,861,994 (35%)
	Total	84,337,084	24,876,692	24,518,472	2,857,416		58,962,287
Total Value Added	Direct	48,221,296 (30%)	7,625,564 (12%)	12,236,761 (27%)	1,426,088 (27%)		42,408,300 (41%)
	Indirect	55,678,634 (34%)	18,578,658 (60%)	9,360,071 (21%)	1,090,835 (21%)		20,955,463 (20%)
	Induced	58,671,289 (36%)	18,455,483 (29%)	22,992,550 (52%)	2,679,583 (52%)		40,241,589 (39%)
	Total	162,571,219	64,659,705	44,589,382	5,196,507		103,605,352
Output	Direct	123,599,999 (35%)	53,733,333 (36%)	33,466,667 (34%)	4,133,333 (35%)		71,466,664 (37%)
	Indirect	114,843,291 (32%)	57,684,622 (39%)	20,034,833 (20%)	2,334,886 (20%)		40,721,915 (21%)
	Induced	115,048,607 (33%)	36,188,569 (25%)	45,085,104 (46%)	5,254,279 (45%)		78,908,436 (41%)
	Total	353,491,897	147,606,524	100,586,605	11,722,498		191,097,015

Source: Compiled from IMPLAN OUTPUT

Passenger transport sub-sector supported about 37 thousand jobs and generated \$25 million as labour income, \$45 million in value addition and \$101 million as output due to \$33 million spending in the sub-sector. Travel agency and tour operations sub-sector supported about 4 thousand jobs and generated \$3 million as labour income, \$5 million in value addition and \$12 million as output due to \$4 million spending in the sub-sector. Shopping activities

supported about 93 thousand jobs and generated \$59 million as labour income, \$104 million in value addition and \$191 million as output due to \$71 million spending in the sub-sector.

Policy Implications

Employment creation was as a result of 7% direct effects, 72% indirect and 21% through induced effects. Therefore, if the target is to increase employment by 100,000 jobs, the tourism sector needs to create 7,000 direct jobs. Labour income generation was a combination of 38% direct effects, 24% indirect and 38% induced effects. If labour income was to increase by \$1,000,000 then the tourism sector should generate \$380,000 through direct effects. Total value addition in the economy was generated through 29% direct effects, 33% indirect and 38% induced effects. If value added in the economy was to increase by \$1,000,000 then the tourism sector should generate \$290,000 worth of value addition through direct effects.

Total output of tourism goods and services in the economy was derived through 36% direct effects, 29% indirect and 33% induced effects. If required increase in the economy's total output is \$1,000,000 then the tourism sector should generate \$360,000 worth of output through direct effects.

Conclusion

This paper covers general multipliers (direct, indirect and induced) in the economy of Rwanda for the year 2013/2014. Three sectors closely associated with tourism expenditure/consumption are considered in this report. These are Food and Beverage (FandB), Hotels and Restaurants (HandR), and transport sectors. The paper covers specific multiplier effects (initial, production and consumption-induced) with respect to internal tourism demand. Internal tourism demand encompasses tourism expenditure/consumption, gross fixed capital formation and collective consumption.

Almost \$286 million worth of internal tourism consumption in the economy created 722 thousand jobs (13% of economy-wide employment) and generated \$195 million in labour income (6.4% of national labour income), \$381 million in total value addition (6.8% of national total value) and \$803 million in output (7.3% of national output).

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APPENDIX: Rwanda Implan Model

Rwanda IMPLAN Model		Copyright 2017 Minnesota IMPLAN Group, Inc.				
Model Information						
Model Year		2013		<i>Value Added</i>		
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				
				<i>Final Demand</i>		
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				