

Sustainable Tourism Development in the Seychelles:

**Economic effects of possible tourism development scenarios for the Seychelles**

DIPLOMA THESIS

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## C List of abbreviation

<b>CBS</b>	Central Bank of Seychelles
<b>CECE</b>	Commission of the European Communities-Eurostat
<b>EEZ</b>	Exclusive Economic Zone
<b>ETH</b>	Swiss Federal Institute of Technology
<b>GDP</b>	Gross Domestic Product
<b>IMF</b>	International Monetary Fund
<b>MIDS</b>	Management and Information Divisions System
<b>MTT</b>	Ministry of Tourism and Transport
<b>NGO</b>	Non Governmental Organisation
<b>NIE99</b>	National Income and Expenditure 1999
<b>OECD</b>	Organisation for Economic Cooperation and Development
<b>PUC</b>	Public Utility Corporation
<b>SNA93</b>	System of National Accounts, 1993
<b>SMB</b>	Seychelles Marketing Board
<b>SDAS</b>	Statistics and Database Administration Section
<b>STTWB</b>	Seychelles Trade and Tourism Weighted Basket
<b>TSA</b>	Tourism Satellite Account
<b>UN</b>	United Nations
<b>WTO</b>	World Tourism Organisation
<b>WB</b>	World Bank

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# 1 Introduction

## 1.1 Background

**"Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems."** (World Tourism Organisation (WTO), 2002)

The above definition considers the three main pillars of sustainability defined in Agenda 21: Ecological, social and economical sustainability (United Nations Environment Programme (UNEP), 2004) These three aspects need to be considered when elaborating new policies for the future, especially when the development has to meet the needs of present generations, without compromising the ability of the future ones to meet their needs (Klauer, 1998).

In many island republics where the economy mainly depends on tourism revenues, it is important not only to maximise welfare today but to consider that only a sustainable management of the resources, such as a beautiful landscape, cultural attractions and secluded beaches, is essential to give future generations the possibility to stay in the country and still profit from the natural phenomena (Poon, 1998).

Especially for a country like Seychelles, which is often defined as the paradise on earth, the conservation of natural resources is essential to survive. Therefore, the policy-making authorities are interested in the effect of different possible developments of tourism on the island. The Geobotanical Institute and the Natural and Social Science Interface of the Swiss Federal Institute of Technology in Zurich (ETH) in collaboration with SEED Sustainability elaborated a study on a sustainable development of tourism in the Seychelles (Günther, 2004). The present master thesis is based on this study and will make a further analysis of the economic aspects of a sustainable development of tourism.

## 1.2 Objectives

Seychelles efforts to develop themselves in a sustainable way was analysed in the study mentioned, done by Ms. Saskia Günther. Her focus was especially on the third most developed island of the Seychelles, La Digue. In the first part of her study she analysed possible scenarios for the development of tourism on the Seychelles. In a second part the sustainability of the four elaborated scenarios was analysed. In the tourism branch very often sustainability only focuses on ecological aspects, disregarding the social and economic ones (Schneider, 2004).

The analysis done for the island La Digue integrates all three aspects, and two of the scenarios emerged to be very sustainable.

The present study focuses on the economic aspect of sustainability. In the above-mentioned study, the economic effects have been analysed only in a very superficial way. This should not be regarded as a criticism of the study. For the purpose of the study, the selected method was sufficient, but the adopted way totally disregards the secondary effects of changes in tourism demand on the national economy.

Considering that tourism sectors produce about 17% of the Gross Domestic Product (GDP), it is important to understand the linkage between the different economic sectors and to be aware of the consequences induced by the different scenarios. Therefore our objective is:

### **What are the total economic effects of the different scenarios?**

To investigate the main objective, two sub-objectives needs to be defined:

- a) *How is the linkage between the economic sectors in Seychelles economy?*
- b) *What are the effects induced by demand changes in the different scenarios?*

At the end, the results should be utilised as a supplementary decision support to find the optimal scenario for a sustainable development.

## 1.3 Structure of the study

To analyse the requested effects, first a compatible model had to be found and afterwards the necessary data had to be collected. How this was done is presented below in four chapters. An additional chapter contains different materials concerning the stay on the Seychelles.

**Chapter 2, Seychelles:** In this chapter, an overview of the situation in the Seychelles is given. The reader will be introduced briefly to Seychelles geography, history, economy and tourism. This information will put the project into a broader context.

**Chapter 3, Input-Output model:** The methodology used in this study is presented. It shows how an economy can be presented in an input-output table and hence multipliers can be derived. In the third part of the chapter, the assumptions of the model are discussed.

**Chapter 4, Data collection:** In this chapter, the way the data for this study was collected is explained. In a first part, different constraints encountered in the Seychelles are presented. In the second part, the sources of the data for the input-output table are revealed and finally the data concerning the scenarios presented in Ms. Günther study is discussed briefly and afterwards adapted to our study.

**Chapter 5, Results:** Finally, the effects of the different scenarios on Seychelles economy are presented. The appropriateness of the methodology is discussed and possible conclusions are drawn. In addition, possible recommendations for further investigations are given.

**Chapter 6, Appendix:** Different information, tables and other articles regarding the stay on the Seychelles are presented. A short introduction to the Tourism Satellite Account (TSA) examined for the Ministry of Tourism and Transport also forms part of it.

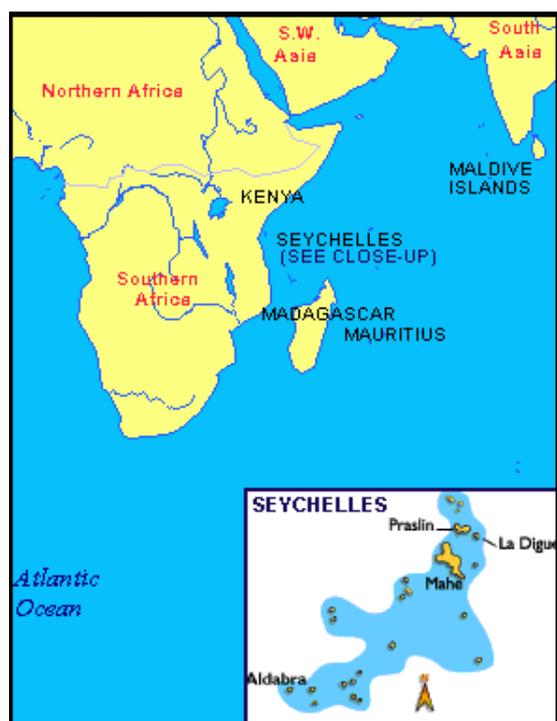
## 2 General information about the Seychelles islands

As already mentioned in the introduction, the study focuses on the Seychelles islands. The experience collected in the last few months showed that most people know these islands as a holiday destination, but have difficulty to locate them on the world map; usually the Seychelles are confused with Mauritius or the Maldives. For a better understanding of the working environment and the basic conditions for this study, the next chapters will give a short introduction to Seychelles' geography, history, economy and tourism.

### 2.1 Geography

The Seychelles are an archipelago occupying the western part of the Indian Ocean and spreading out over an Exclusive Economic Zone (EEZ) of no less than 1.3 million square kilometres. The main part of this island group is situated between 4 and 5 degrees south of the equator at a longitude between 55 and 56 degrees east. The main island of Mahé lies some 1800 kilometres east of the East African coast of Kenya and north-east of Madagascar.

Figure 2.1 Map of the Seychelles island



Source: World live, 2004

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There are over a 100 named islands forming the Seychelles group. Most are coralline and are spread over a large area towards the south and south-east. Some 40 of these islands, however, are granitic and are found within a radius of 50 kilometres from the main granitic island of **Mahé** (Jumbo guide, 1998). It is the principal island (153 km<sup>2</sup> with 80% of the total population). The town of Victoria, the busy commercial and administrative capital of the Seychelles, nestles below the mountains on the east coast.

The second-largest granite island of the Seychelles is **Praslin**, about 40 kilometres north-east from Mahé. The island has a population of about 8'000. Praslin is not as mountainous as Mahé – the highest point being 330 metres – but it has similarly great granite outcrops surrounded by beautiful beaches, and a coral reef enclosing the crystal-clear waters which are so typical of the Seychelles. One of the eternal symbols of the Seychelles, the huge coco-de-mer nut, grows in the Vallée de Mai forest of Praslin. This World Heritage Site is also home to one of the world's rarest birds, the Black Parrot. **La Digue** is the third-largest granite island in the Seychelles in terms of population, housing about 2'000 people and it covers an area of 10 km<sup>2</sup>. It is 5 km away from Praslin, or three hours by schooner from Mahé (50 km). The pace of life is slow, about the same speed as its traditional way of transport – the ox cart. Despite being the third-largest island of the granitic Seychelles by size, **Silhouette** has a population of only 130 people. It lies 19 km to the north-west of Mahé and is only developed to a minor extent (Mair, 2001).

The total **population** of the Seychelles was estimated at 80'800 people in 2002 (Management and Information System Division (MISD), 2004). As mentioned before, the main part of the population, 70'000 people that is, lives on Mahé. Another 8'000 people live on Praslin and 2'000 on La Digue. The remaining inhabitants are scattered on the rest of the islands.

The Seychellois have a charming Creole **culture** which stems from the African, European and Asian roots of people. Families are generally large and everyone seems to be related to, or at least know, everyone else. The woman is often the head of the household, where children tend to stay, due to the fact that there is a free and easy approach to marriage. Partner changes are quite acceptable and many couples often never marry. The Seychellois believe that life is to be enjoyed – these relaxed islanders do not know the word “hurry”. Tomorrow, very often, does just as well as Today.

Being equatorial, the Seychelles **climate** is hot and humid all year round, without much seasonal variation. The average temperature on the Seychelles is 29°C, with 12 hours of daylight. Rainfall is recorded during the two monsoons, the south east from May to October and the north west from November to April. The heaviest rainfall is usually during mid-December to mid-January. But in general this archipelago enjoys stable weather year-round, due to the fact, that it lies outside the cyclone belt.

The **vegetation** remains green throughout the whole year, but suffers a little during the dry season. The most common Seychelles soil has a greyish-brown colour and contains only 1% organic matter; the red coloured soil has even less organic matter. Fertilisers must be added to the soil to assist in the growing of high yield crops. The soil has a low retention capacity for water and is constantly washed down to the sea leaving sand granules or exposing bare granite rocks.

In the Seychelles, there are many species of birds, fish and other marine life together with a rich flora, some of which is unique. Two of the outstanding species of birds to be found only in the Seychelles are the black parrot and the paradise fly-catcher.

## 2.2 History

British citizens first made their way to the Seychelles in 1609. They made no claim to the islands, which remained uninhabited, although they might have been used as a secret refuge by pirates.

In 1742, the Frenchman Lazare Picault landed on Mahé. He named the islands after Mahé de Labourdonnais, the governor of Mauritius who had sent him. Fourteen years later, Mahé and the inner islands were formally claimed in the name of the King of France. Mahé was named Isle Séchelles, which later became the name of the group.

During the long revolutionary war between Britain and France, several British men-of-war called at Seychelles. At the end of the war in 1814, Mauritius and the Seychelles were ceded to Britain under the Treaty of Paris.

In 1903 the Seychelles became a crown colony in its own right, detached from Mauritius. After the abolition of slavery in 1835 liberated slaves were brought to the Seychelles to begin new lives, swelling the population by nearly 3'000. The two world wars during the 20<sup>th</sup> Century touched the Seychelles only lightly: The island in the Indian Ocean was used as refuel-

ling base for British ships and flying boats. In 1948, representatives were elected in the Seychelles government for the first time.

In March 1975, a new constitution was drawn up and a coalition government established ready for independence in June 1976, when James Mancham became president and Albert Rene prime minister. Following a coup d'état in 1977, the Seychelles became a one-party state, with Albert Rene as president and the Seychelles' People's Progressive Front as the ruling party. Multi-party elections were restored in 1993, when René again returned as president and Mancham (Democratic Party) was elected leader of the opposition. René was re-elected in 1998 and the parliamentary elections in 2002 saw another victory for René's party, but the oppositional Seychelles National Party managed to increase its representation from one to eleven seats (Därr, 1996). The "René era" finally came to an end in April 2004, when the president resigned and was succeeded by former vice-president James Michel.

### 2.3 Economy

If not otherwise stated, all the figures given in this section are based on MISD online publications (MISD, 2004).

In 2002, the GDP in market prices of the Seychelles was estimated at about US\$ 696 million<sup>1</sup>. With a total population of 80'800 (MISD, 2001), this represents a GDP per capita of US\$ 8'615. Compared with 1976, when the Seychelles became independent, the GDP per capita had a sevenfold increase (Commercial Data international, 2000). In the same time Swiss GDP increased by 285% (Economiesuisse, 2004a).

Until 1991, parastatal<sup>2</sup> companies proliferated in many sectors of the economy. State-owned and parastatal companies accounted for more than half the country's GDP and about two-thirds of formal employment. The parastatals enjoyed mixed success, and by 1992 the government had begun with the privatisation of selected enterprises.

Tourism, agriculture, and fishing are the principal sectors of the economy. Earnings from tourism amounted to \$128 million in 2002, when 132'000 tourists visited the nation. Until the end of the century, the increase was led by the tourism sector and in the last years by the fishing industry. In 2000, industrial fishing surpassed tourism as the most important foreign exchange earner. Earnings are growing annually from licensing fees paid by foreign trawlers fishing in the Seychelles' territorial waters.

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<sup>1</sup> All figures calculated with the par exchange rate of 10<sup>th</sup> September 2004, where 1 US\$ = 5,5 SCR

<sup>2</sup> Mixed companies owned by government and privates

**Agriculture and fishing:** The primary sector contributes to less than 3% of the GDP and employs only about 6% of the workforce.

**Manufacturing, Electricity & Water and Construction:** The secondary sector contributes to 30% of the GDP and employs 22% of the workforce. The production of canned tuna, the most flourishing industry, contributes to 85% of the exports and is the second major source of foreign exchange earning (MISD, 2002a). Electricity and water supply is controlled by one parastatal company.

**Services:** The tertiary sector accounts with 65% for the largest share of GDP and employs the largest proportion of the workforce, approximately 72%. Since the opening of Mahé International Airport in 1971, the tourism industry has grown rapidly, currently providing almost three-fourths of all foreign exchange.

Despite attempts to improve its agricultural base and emphasise locally manufactured products and indigenous materials, the Seychelles continue to import 90% of what it consumes. Trade is controlled by the importation and re-export of petroleum; other exports include canned tuna, fish, prawn, other fish products and cinnamon bark. Seychelles imports a broad range of foods, manufactured goods, machinery, and transportation equipment (International Monetary Found (IMF), 2000). The largest single category is petroleum fuels and lubricants, although much of this is re-exported through servicing of ships and aircraft (U.S. Library of Congress, 2004). The main export destinations for national products in 2002 are: United Kingdom (47,9%), France (34%), Italy (11%) and Germany (10%). Imports of all kind are still controlled by the Seychelles Marketing Board (SMB), a parastatal company which operates all the major supermarkets and is the distributor and licensor of most other imports. The main import partners in 2002 were Saudi Arabia (15,6%), France (12,8%), Spain (9,9%), Italy (9,7%), South Africa (8,4%), Singapore (7,3%) and the United Kingdom (6,1%) (Geography IQ, 2004).

In the last years the trade balance deficit has continuously grown from 955 million Rupees in 1997 to 1'165 million Rupees in 2001. 44.1% of the external debt were accumulated by bilateral creditors, 23.7% by multilateral institutions and the remainder from commercial sources

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(IMF, 2000). In the same period of time, the governmental budget deficit decreased visibly from 453 millions Rupees in 1997 to 342 millions Rupees in 2001 (Günther, 2004).

Since the 13<sup>th</sup> of May 1996, the Seychelles rupee is pegged to the Seychelles Trade and Tourism Weighted Basket (STTWB). The STTWB now comprises six currencies. The weights are as follows: Euro (37.7), US Dollar (25.7), UK Sterling (15.7), South African Rand (10.5), Singapore Dollars (7.7) and Japanese Yen (2.7). This official rate is used by the Central Bank of Seychelles (CBS) for official transactions and the commercial banks are bound to the regulation to transact foreign exchange strictly within these rates.

Due to chronic lack of foreign exchange, the rates on the parallel market are twice as high as the official ones, for instance for Euros or US Dollars.

To stem the growth of parallel market in foreign currency and limit its exports, the government introduced several measures in 1999 (IMF, 2000):

- Introduction of import permits
- Bans on import of second hand motorised vehicles and nonessential goods
- Reimposition of withholding taxes on dividends and interests remitted abroad
- Amendment requiring tourist to settle their bills in foreign exchange
- Prohibition for residents to possess foreign currency not obtained through the banking system
- All foreign exchange earners have to surrender all their earnings in foreign exchange to the commercial banks and are only allowed to keep 15% of the amount for their own import needs<sup>3</sup>.

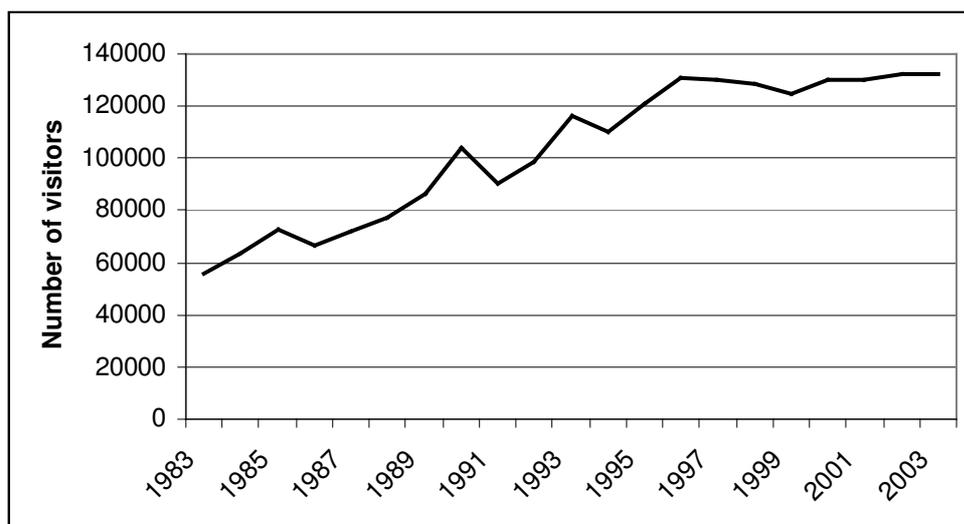
## 2.4 Tourism

The beginning of modern tourism in the Seychelles dates back to the opening of the international airport on Mahé in 1971. From 3'175 visitor arrivals in the same year the number increased to about 132'000 visitors in 2003. According to Figure 2.2 visitor arrivals increased rapidly from 1983 until 1997 with two peaks in 1990 and 1994. In 1996 the tourist arrivals stabilised at about 130'000 visitors. This does not correspond with the growth of the vacation destinations Mauritius and La Reunion, where tourist arrivals have grown consistently since 1995.

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<sup>3</sup> Special bilateral agreements with higher retention rates were established with international companies

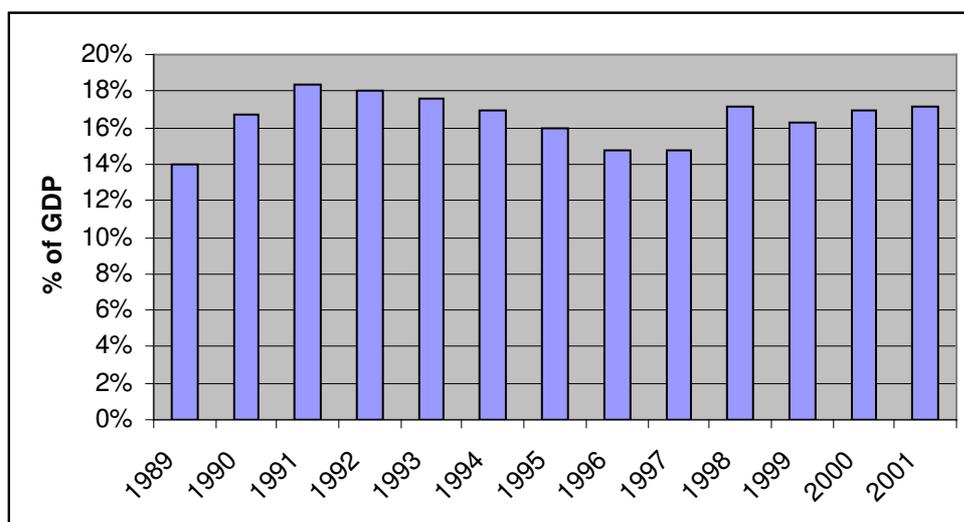
**Figure 2.2 Growth of visitor arrivals from 1983 until 2003**



To counteract this development, the Seychelles' authorities elaborate a new tourism policy in 2000 called Vision 21, with the aim to convert the Seychelles into a three to five star destination and thus increase the annual tourist arrivals to about 200'000 visitors (MTT, 2000).

The contribution of tourism-related industries to the GDP varied in the last 15 years from a minimum of 12% to a maximum of 18.4% in 1991 (see Figure 2.3). The tourism industry is also one of the major employers on the islands. In 2002 about 17% of the total workforce was employed in tourism-related enterprises.

**Figure 2.3 Contribution of tourism to GDP**



Europe is the predominant market area for the Seychelles, providing about 63% of all visitors in 1981 and 80% in 2002. Within Europe, the principal tourism-generating countries are France, Italy, Germany and the United Kingdom. Europe is followed by Africa with almost 11% of all visitors and Asia with 6.5%.

As one of the most important source for foreign exchange, the tourism sector is of vital importance to the Seychelles. Therefore, two ministries are directly involved in tourism policy. On the one hand, there is the Ministry of Tourism and Transport (MTT), which issues licenses to tourism facilities, takes care of a sustainable development of tourism infrastructures and facilitates international cooperation. On the other hand there is the Seychelles Tourism Marketing Authority, which is responsible for the promotion of the Seychelles as a tourism destination.

### 3 Input-output model

#### 3.1 Introduction

An Input-Output Analysis is an analytic framework developed by Professor Wassiliy Leontief in the late 1930s for which he received the Nobel Prize in Economy, although its roots have been traced back to the eighteenth century (Proops, 1993).

The main tool for an input-output analysis is the input-output table, which describes the flows of money between sectors within a region's economy (Miller, 1985). Based on this table an input-output model can be drawn up. Input-output models' main purpose is to analyse the effect of change in demand in one particular sector on the whole economy. The model is generally constructed for a specific geographic region such as a nation, state, county, etc.

The model is based on a system of linear equations (Proops, 1993) that describes the flows between different industry sectors in an economy (Miller, 1985). The output of particular sectors is sold to other industry sectors within the analysed economy, which will record the purchasing as input for their own production. This information is collected in the inter-industry-transaction table which illustrates the trade network within the economy.

The transaction table is one part of an input-output table illustrated in Figure 3.1. The diagram shows a division into four quadrants. Quadrant A is the already mentioned transaction table, which shows the monetary flows between the different sectors. The column entries can be interpreted as the input of goods and services required by the local production sector from the other sectors. On the other hand, the rows explain how the output of a particular sector is shared among the other sectors. The cells in quadrant B take account not only of expenditures for primary inputs such as labour or capital<sup>4</sup>, but also government revenues<sup>5</sup>. Quadrant C shows how the industries sell their outputs to final consumers such as the government, private consumers or customers from abroad (exports). It also records the formation of fixed capital as investments in durable equipment, plant construction, residential construction and inventory change. Finally, the last quadrant shows the Gross Domestic Product of the analysed economy.

It is indispensable to assume that there is a general equilibrium in the described economy, that the sum of each row is equal to the sum of the corresponding column. It can be compared to a

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<sup>4</sup> Include wages, salaries, profits, rent, interest and dividends

<sup>5</sup> Include direct and indirect tax revenues, duty and fees.

financial statement of a company. A column represents the expenses side and the row is the revenue side of the statement. It is therefore indispensable, that rows and column are balanced. The table is not yet an operational model but just an accounting table. It shows the structure of the economy, the possible bottlenecks and the relationship between the sectors with the key economic variables such as government revenue and imports (Fletcher, 1999).

**Figure 3.1 Structure of an input-output table**

		PRODUCERS								FINAL DEMAND				
		Agriculture	Mining	Construction	Manufacturing	Trade	Transportation	Services	Other	Personal Consumption Expenditures	Fixed Capital Formation	Imports of Goods and Services	Exports of Goods and Services	Government Purchases of Goods and Services
PRODUCERS	Agriculture													
	Mining													
	Construction													
	Manufacturing				A							C		
	Trade													
	Transportation													
	Services													
	Other													
PRIMARY INPUTS	Employees									Gross Domestic Product (GDP)				
	Owner of Business & Capital				B									
	Government													

Source: Fletcher, 1999

To transform the input-output table in an operational model, endogenous and exogenous variables have to be defined. We can see in Figure 3.2 that industry 1 purchases inputs from sector  $X_{11}$  to  $X_{m1}$  and these purchases are regarded as endogenous, but also for industry 1 the endogenous sales are from  $X_{11}$  to  $X_{1m}$ . All other purchases and sales ( $H_{1-m,C}$ ,  $I_{1-m,C}$ ,  $M_{1-m,C}$ ,  $E_{1-m,C}$ ,  $G_{1-m,C}$ ,  $W_{1-m,C-G}$ ,  $P_{1-m,C-G}$ ,  $T_{1-m,C-G}$ ) are regarded as exogenous.

If the economy is divided into  $m$  sectors and  $Y_i$  is total final demand of sector  $i$ , then the total output  $X_i$  of sector  $i$  is defined by

$$X_i = Z_{i1} + Z_{i2} + \dots + Z_{im} + Y_i \quad (3-1)$$

The  $Z$ -terms are the intermediate sales of sector  $i$  to the other sectors. Therefore the right-hand of the equations represents the total sales of sector  $i$  to final and inter-industry consumers. This equation describes the production function in the sector  $i$ . Further information about the production function in a given sector will be discussed later on in this chapter.

Figure 3.2 A basic input-output transaction table

SALES TO:		INTERMEDIATE DEMAND					FINAL DEMAND Y					X Total Output	
		Industry 1	Industry 2	Industry 3	Industry 4	.....	Industry m	H Household consumption	I Fixed capital formation	M Imports	E Exports		G Government Consumption
PURCHASE FROM:													
PRODUCERS	Industry 1	Z <sub>11</sub>	Z <sub>12</sub>	Z <sub>13</sub>	Z <sub>14</sub>	.....	Z <sub>1m</sub>	C <sub>1</sub>	I <sub>1</sub>	M <sub>1</sub>	E <sub>1</sub>	G <sub>1</sub>	X <sub>1</sub>
	Industry 2	Z <sub>21</sub>	Z <sub>22</sub>	Z <sub>23</sub>	Z <sub>24</sub>	.....	Z <sub>2m</sub>	C <sub>2</sub>	I <sub>2</sub>	M <sub>2</sub>	E <sub>2</sub>	G <sub>2</sub>	X <sub>2</sub>
	Industry 3	Z <sub>31</sub>	Z <sub>32</sub>	Z <sub>33</sub>	Z <sub>34</sub>	.....	Z <sub>3m</sub>	C <sub>3</sub>	I <sub>3</sub>	M <sub>3</sub>	E <sub>3</sub>	G <sub>3</sub>	X <sub>3</sub>
	Industry 4	Z <sub>41</sub>	Z <sub>42</sub>	Z <sub>43</sub>	Z <sub>44</sub>	.....	Z <sub>4m</sub>	C <sub>4</sub>	I <sub>4</sub>	M <sub>4</sub>	E <sub>4</sub>	G <sub>4</sub>	X <sub>4</sub>
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Industry m	Z <sub>m1</sub>	Z <sub>m2</sub>	Z <sub>m3</sub>	Z <sub>m4</sub>	.....	Z <sub>mm</sub>	C <sub>m</sub>	I <sub>m</sub>	M <sub>m</sub>	E <sub>m</sub>	G <sub>m</sub>	X <sub>m</sub>
PRIMARY INPUTS	Wages and Salaries	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	.....	W <sub>m</sub>	W <sub>C</sub>	W <sub>I</sub>	W <sub>M</sub>	W <sub>E</sub>	W <sub>G</sub>	W
	Profits/Dividends	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	.....	P <sub>m</sub>	P <sub>C</sub>	P <sub>I</sub>	P <sub>M</sub>	P <sub>E</sub>	P <sub>G</sub>	P
	Taxes	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	.....	T <sub>m</sub>	T <sub>C</sub>	T <sub>I</sub>	T <sub>M</sub>	T <sub>E</sub>	T <sub>G</sub>	T
	X Total Inputs	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	.....	X <sub>m</sub>	C	I	M	E	G	X

Source: Miller, 1985

The equation system for the entire economy will therefore show the following structure:

$$\begin{aligned}
 X_1 &= Z_{11} + Z_{12} + \dots + Z_{1m} + Y_1 \\
 X_2 &= Z_{21} + Z_{22} + \dots + Z_{2m} + Y_2 \\
 &\vdots \\
 X_m &= Z_{m1} + Z_{m2} + \dots + Z_{mm} + Y_m
 \end{aligned}
 \tag{3-2}$$

The fundamental assumption of the input-output model now is that the flows from sector  $i$  to  $j$  depends entirely on the output in sector  $j$ ; it is a so-called demand side model (Miller, 1985). This means that if sector  $j$  increases its output, there will be increased demands from sector  $j$  (as purchaser) on the sectors whose products are used as inputs to production in  $j$ .

It is important to transform the transaction table in a more operational form. To normalise the flows  $Z_{ij}$  in the transaction table, we calculate the ratio  $a_{ij}$

$$a_{ij} = \frac{Z_{ij}}{X_j} \tag{3-3}$$

<sup>6</sup> Observing now the calculation of the different coefficient  $X_j = \frac{Z_{1j}}{a_{1j}} = \frac{Z_{2j}}{a_{2j}} = \dots = \frac{Z_{mj}}{a_{mj}}$  a prob-

lem can occur, when the production of a particular output does not require one of the inputs. This means that

This coefficient measures the relationship between sector's output and inputs and is assumed that this coefficient is fixed<sup>7</sup>.

The equations system (3-2) can now be rewritten, replacing each  $Z_{ij}$  by  $a_{ij}X_j$ .

$$\begin{aligned} X_1 &= a_{11}X_1 + a_{12}X_2 + \dots + a_{1m}X_m + Y_1 \\ X_2 &= a_{21}X_1 + a_{22}X_2 + \dots + a_{2m}X_m + Y_2 \\ &\vdots \\ X_m &= a_{m1}X_1 + a_{m2}X_2 + \dots + a_{mm}X_m + Y_m \end{aligned} \quad (3-4)$$

it can now be summarised in a matrix form, namely

$$\mathbf{X} = \mathbf{A}\mathbf{X} + \mathbf{Y}$$

$$\mathbf{A} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1m} \\ a_{21} & a_{22} & \dots & a_{2m} \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mm} \end{bmatrix}, \quad \mathbf{X} = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_m \end{bmatrix}, \quad \mathbf{Y} = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_m \end{bmatrix}$$

afterwards, we transform the matrix equation into a mathematically useful form for the input-output analysis,

$$\mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{Y} \quad (3-5)$$

$$(\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} \alpha_{11} & \alpha_{12} & \dots & \alpha_{1m} \\ \alpha_{21} & \alpha_{22} & \dots & \alpha_{2m} \\ \vdots & \vdots & & \vdots \\ \alpha_{m1} & \alpha_{m2} & \dots & \alpha_{mm} \end{bmatrix}, \quad (3-6)$$

---

$a_{ij} = 0$  and hence  $Z_{ij} / a_{ij}$  is infinitely large. This means that the production function included in the input-

output model is defined as  $X_j = \min\left(\frac{Z_{1j}}{a_{1j}}, \frac{Z_{2j}}{a_{2j}}, \dots, \frac{Z_{mj}}{a_{mj}}\right)$

<sup>7</sup> Cf. chapter 3.3

Equation (3-5) is the fundamental matrix representation of input-output analysis.  $(I - A)^{-1}$  is known as the 'Leontief inverse'. Note that  $\alpha_{ij} = \partial X_i / \partial Y_j$ . Increased demand from sector  $j$  by one unit will increase output from sector  $i$  by  $\alpha_{ij}$ .

We will now return to our input-output table to understand the relation between this table and the national accounts. The aggregated information of the table is visible in the entries in the bottom row and the last column.

If we sum up the last row of Figure 3.1, the total output through the economy is

$$X = X_1 + X_2 + \dots + X_m + C + I + G + (E - M) \quad (3-7)$$

The components of the final demand are grouped into domestic final demand (Private consumption  $C$  + Fixed capital formation  $I$  + Governmental consumption  $G$ ) and net foreign final demand (Exports  $E$  – Imports  $M$ ).

Summing up the last column, the left-hand side of the equation is also defined by

$$X = X_1 + X_2 + \dots + X_m + W + P + T \quad (3-8)$$

The total output is the addition of the intermediate outputs  $X_i$  plus the value added (Wages  $W$  + Profit and Dividends  $P$  + Government revenues  $T$ ).

Now, the left-hand side of the equation (3-7) is substituted with equation (3-8).

$$T + P + W = C + I + G + (E - M) \quad (3-9)$$

The left-hand side represents the total factor payments, known in the National Accounts as Gross Domestic Income and the right-hand side represents the Gross Domestic Product. Consequentially the information to fill out the input-output table is derived from the National Accounts of the analysed economy, normally of a country. If we want to employ the input-output for a regional analysis, the data collection may be more complex, due to the scarcity of regional information<sup>8</sup>.

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<sup>8</sup> Cf. chapter 4.1

### 3.2 Multipliers

One of the major uses of input-output information, in the form of an input-output model, is to assess the effect on an economy of changes in elements that are exogenous to the model of that economy (Miller, 1985). Several summary measures, derived from the elements of the Leontief inverse  $(\mathbf{I} - \mathbf{A})^{-1}$ , also known as the multipliers matrix, are often employed in impact analysis; these are known as input-output multipliers. All of them measure the total change throughout the economy from one unit change for a given sector.

The multipliers' advantage is, that they do not only measure the initial effect of an exogenous (final demand) change, but they also consider secondary effects. The multiplier reflects the total impact on the economy of a demand change. The total effect has three components: a direct, an indirect and finally an induced effect. Indirect and induced effects are often summarised in secondary effects (Stynes, 1997).

**Direct effects** are changes in production associated with the immediate effects of changes in final demand. For example, an increase in the number of tourists staying overnight in hotels will increase revenues in the hotel sector. This will have a direct impact on the hotel expenditure for salaries, taxes and supply of services and products, which have to be raised in order to meet the higher final demand.

**Indirect effects** can be traced back to the effects on production in other sectors caused by an increase in final demand for one sector's output. In our example, the additional room demand in the hotel will increase the demand of the hotel for laundry services<sup>9</sup>. To meet the additional demand, the laundry sector has also to increase their inputs. These repercussions represent the indirect effect.

The direct and indirect effects generate an increase in income for the households, leading the households to increase their final demand. This effect is known as **induced effect**.

Direct and indirect effects of a change in any category of final demand are captured by the Leontief inverse or inverted technology matrix. To measure the induced effects generated by households, they need to be treated as a production sector. This means that the private consumption column has to be integrated as additional column in the transaction matrix and the salaries and profits rows have to correspond to the respective rows in the production quadrant.

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<sup>9</sup> We assume, that laundry services are outsourced

Inverting this new expanded matrix, we will now receive multipliers measuring indirect, indirect and induced effects of a change in demand in a particular sector.

We adapt equation (3-5) in following way:

$$\mathbf{X}^* = (\mathbf{I} - \mathbf{A}^*)^{-1} \mathbf{Y}^* \text{ with}$$

$$\mathbf{A}^* = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1m} & a_{1,m+1} \\ a_{21} & a_{22} & \cdots & a_{2m} & a_{2,m+1} \\ \vdots & \vdots & & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mm} & a_{m,m+1} \\ a_{m+1,1} & a_{m+1,2} & \cdots & a_{m+1,m} & a_{m+1,m+1} \end{bmatrix}, \mathbf{X}^* = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_m \\ X_{m+1} \end{bmatrix}, \mathbf{Y}^* = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_m \\ Y_{m+1} \end{bmatrix}$$

where the leontief inverse with households is

$$(\mathbf{I} - \mathbf{A}^*)^{-1} = \begin{bmatrix} \alpha_{11}^* & \alpha_{12}^* & \cdots & \alpha_{1,m+1}^* \\ \alpha_{21}^* & \alpha_{22}^* & \cdots & \alpha_{2,m+1}^* \\ \vdots & \vdots & & \vdots \\ \alpha_{m+1,1}^* & \alpha_{m+1,2}^* & \cdots & \alpha_{m+1,m+1}^* \end{bmatrix},$$

There are three most commonly used types of multipliers (Var, 1985):

a) Output multiplier  $O_j$

An output multiplier for sector  $j$  is defined as the total value of production in all sectors of the economy that is necessary in order to satisfy a dollar's worth of final demand for sector  $j$ 's output. It can be obtained by summing the coefficients in that industry  $j$ 's column of the inverted technology matrix.

$$O_j = \sum_{i=1}^m \alpha_{ij}$$

b) Income multipliers  $H_j$  and  $H_j^*$

Income multipliers attempt to translate the impacts of final-demand spending changes into changes in income received by households for labour supply. We distinguish three levels of income multipliers. Type I income multipliers show the amount of direct plus indirect income created by an additional unit of final demand. Adding the induced effect of changes in final demand we receive Type II income multipliers. Finally, a Type III income multiplier exists that is similar to Type II, except for the fact that the

household sector is subdivided into income groups and a distinction is made between changes in income of existing households and changes in income of new employees<sup>10</sup>.

We can find the income Type II multipliers in the last row of the Leontief inverse with households

$$H_j^* = \alpha_{m+1,j}^*$$

otherwise they can be calculated in the following ways

$$H_j^* = \sum_{i=1}^{m+1} a_{m+1,i} \alpha_{ij}^*$$

consequently Income Type I multipliers are defined as

$$H_j = \sum_{i=1}^m a_{m+1,i} \alpha_{ij}$$

c) Employment multipliers  $E_j$  and  $E_j^*$

These multipliers show the effect of changes in final demand upon the level of employment. Normally, it is expressed in number of jobs created by additional final demand. In this case, it is possible to differentiate Type I and Type II multipliers, with the same differences explained under point b)

For this purpose we first need to calculate the physical labour input coefficients

$$w_{m+1,i} = \frac{e_i}{X_i}$$

Denoted by  $e_i$  is the number of employees in sector  $i$  and  $X_i$  the total output of sector  $i$ . Hence,  $w_{m+1,i}$  represents the employees per unit's<sup>11</sup> worth of output. In general for a  $m$ -sector input-output model, one could find

$$\mathbf{W}_R = [w_{m+1,1}, w_{m+1,2}, \dots, w_{m+1,m}]$$

<sup>10</sup> Due to lack of information Type III-multipliers will not be calculated in this paper.

<sup>11</sup> For example US\$, SR, CHF, etc.

The calculation of the employment multipliers is done in the same way as for the income multiplier. The difference is that we substitute the monetary labour input  $a_{m+1}$  with the physical measure  $w_{m+1}$ .

Hence, the multipliers can be calculated in the following way

$$E_j = \sum_{i=1}^m w_{m+1,i} \alpha_{ij}$$

for type I multipliers and

$$E_j^* = \sum_{i=1}^{m+1} w_{m+1,j} \alpha_{ij}^*$$

for employment Type II multipliers.

d) Government multiplier  $G_j$  and  $G_j^*$

To visualise the total effect of a unit change in final demand upon government revenues, we calculate the government multipliers (Fletcher, 2003).

As for the income multipliers, the government multipliers can be calculated in the following way

$$G_j^* = \sum_{i=1}^{m+1} a_{m+3,j} \alpha_{ij}^*$$

with  $a_{m+3,j} = \frac{T_j}{X_j}$ , which can be defined as the tax input-coefficient.

Consequentially to Income multipliers, Government type I multipliers are defined

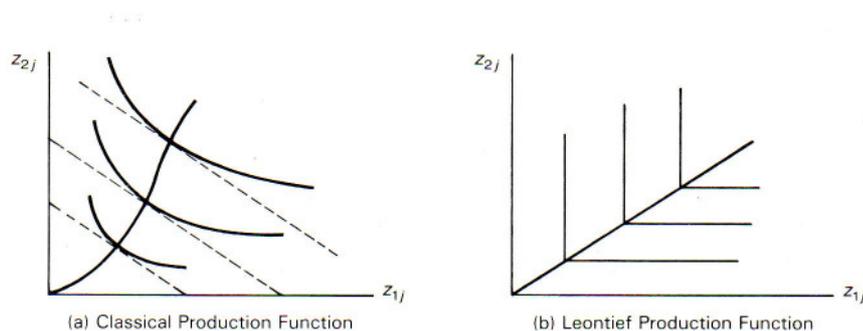
$$\text{as } G_j = \sum_{i=1}^m a_{m+3,i} \alpha_{ij}$$

### 3.3 Assumptions

The last part of this chapter focuses on the different assumptions made for this model and which should be considered when interpreting the results of an input-output analysis. Like all economic models with the aim of modelling reality, it is indispensable to make a number of assumptions. The main part of the assumptions regards the production functions in the different industries. The basic ones are:

- A1. The production function described with equation (3-1) is representative for all firms in a given industry. We therefore assume that all the firms in a given sector have the same production technology and produce identical products (Stynes, 1998).
- A2. The production in an input-output model in a Leontief system is essentially linear. As is visible in Figure 3.3 a Leontief production curve obviously differs from a classical production function. Two main differences can be described as follows (Miller, 1985):
- The inputs in a Leontief production curve are assumed as complements. It is therefore not possible to substitute one input with another one.
  - The observed proportion between inputs is constant  $P_{12} = z_{1j}/z_{2j} = const.$ , consequentially it is only possible to increase output if we increase all inputs by the same ratio.

**Figure 3.3 Production Functions**



Source: Miller, 1985

- A3. An additional assumption is that there are no economies or diseconomies of scale in production.
- A4. The model assumes that the economy operates without spare capacity. This means that any increase in final demand is met by an increase in sectoral output.
- A5. Regarding the labour input, the model assumes that in the economy of reference unemployment exists. Thus, it is possible to meet any additional demand for labour by simply increasing the number of employed persons (Brissaoulis, 1991).
- A6. Although the model is normally based on activities within a single year, the model does not explicitly keep track of time.
- A7. Induced effects of an increase in demand should always be treated with caution. Multipliers of Type II which also consider the induced effect, generally assume that jobs created by additional spending are new jobs involving new households. Addi-

tionally, induced effects are computed assuming a linear change in household spending with changes in income. These assumptions is often violated, therefore induced effect should be used with caution.

Results of the input-output model should always be analysed carefully, due to the strong assumption made in the model. Particularly in the interpretation of the multipliers, caution is advisable. Very high multipliers needs to be analysed meticulously, otherwise the can mislead to wrong interpretations.

### 3.4 Input output model to predict tourism effects

The input-output model explained in chapter 3.1 will now be adapted for the analysis of changes in tourism demand.

As discussed, the following equations explain the interrelationship between final demand and industries output

$$\mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{Y} \quad (3-10)$$

and additionally the interrelationship between primary input and output is defined as

$$\mathbf{P} = \mathbf{B}\mathbf{X} \quad (3-11)$$

where  $\mathbf{X}$  is a vector of gross output,  $\mathbf{A}$  is a ( $m \times m$ ) matrix of production coefficients,  $\mathbf{Y}$  is a vector of final demand,  $\mathbf{I}$  is a ( $m \times m$ ) identity matrix<sup>12</sup>,  $\mathbf{P}$  is a vector of primary factors and  $\mathbf{B}$  is a matrix of factor coefficients (see Figure 3.1).

$$\mathbf{P} = \begin{bmatrix} W \\ P \\ T \end{bmatrix}; \mathbf{B} = \begin{bmatrix} a_{m+1,1} & a_{m+1,2} & \cdots & a_{m+1,m} \\ a_{m+2,1} & a_{m+2,2} & \cdots & a_{m+2,m} \\ a_{m+3,1} & a_{m+3,2} & \cdots & a_{m+3,m} \end{bmatrix} \text{ with } a_{m+2,j} = \frac{P_j}{X_j}$$

<sup>12</sup>

All elements are 0 excepted for the one in the diagonal, which are 1.

where  $W$  are salaries,  $P$  Profits and  $T$  Taxes.

From these two equations it is possible to predict the change in gross output, employment of primary factor for a given change in final demand. Defining the change in final demand with  $\Delta F$  and applying it to eq. (3-10) and (3-11), then

$$\Delta X = (\mathbf{I} - \mathbf{A})^{-1} \Delta F \quad (3-12)$$

and

$$\Delta P = \mathbf{B} \Delta X \quad (3-13)$$

combining eq. (3-12) and (3-13), then

$$\Delta P = \mathbf{B}(\mathbf{I} - \mathbf{A})^{-1} \Delta F$$

Where  $\Delta P$  is a (3 x m) matrix in which each row now contains the effects of the items of export earnings on a particular primary factor, we now substitute the  $\Delta F$  with  $\Delta T$  a (m x m) matrix. The diagonals of this matrix record the given change in export earnings induced by tourists with the off-diagonals zeros.

$$\Delta P = \mathbf{B}(\mathbf{I} - \mathbf{A})^{-1} \Delta T \quad (3-14)$$

with

$$\Delta P = \begin{bmatrix} \Delta W_1 & \Delta W_2 & \cdots & \Delta W_m \\ \Delta P_1 & \Delta P_2 & \cdots & \Delta P_m \\ \Delta G_1 & \Delta G_2 & \cdots & \Delta G_m \end{bmatrix}$$

For example if we have a look at the first row of  $\Delta P$  we will find the effect<sup>14</sup> of changes in export earnings induced by tourists on the income of the residents on the islands  $\Delta W$

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<sup>13</sup> In national economics are multipliers often defined as  $\frac{\partial X}{\partial F}$  corresponding to  $\frac{\Delta X}{\Delta F}$

<sup>14</sup> Direct and indirect

$$\Delta \mathbf{W} = [\Delta W_1 \quad \Delta W_2 \quad \dots \quad \Delta W_m]$$

multiplying now  $\Delta \mathbf{W}$  with a unit vector  $\mathbf{U}' = [1 \quad 1 \quad \dots \quad 1]$ <sup>15</sup> of the same size we get the total effect on income  $\Delta W_{TOT}$  of residents

$$\Delta W_{TOT} = \Delta \mathbf{W} * \mathbf{U} \quad (3-15)$$

The same operation can be done with the row containing profits or taxes.

This method is useful in case we did not calculate in advance the multipliers discussed in chapter 3.2. In case we have already elaborated the multipliers, we can use them to calculate the effect of changes in export earnings.

If we are interested in the effect on income, we multiply the matrix  $\Delta \mathbf{T}$  with the corresponding income multiplier  $\mathbf{H}$  and  $\mathbf{H}^*$  respectively, depending on what effects we are interested in. Thus,

$$\Delta \mathbf{W} = \mathbf{H} \Delta \mathbf{T}$$

if we want to measure direct and indirect effect, or

$$\Delta \mathbf{W}^* = \mathbf{H}^* \Delta \mathbf{T}$$

if we add also the induced effect.

For the total effect we will again utilise equation (3-15). In accordance to the other multipliers we can also analyse the effect of changes in tourism demand on output, governmental revenues or employment.

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<sup>15</sup>  $\mathbf{U}'$  is the transposed version of  $\mathbf{U}$

## 4 Data collection

### 4.1 Introduction

Originally, we planned on investigating the economic effects of the scenarios constructed by Ms. Günther for La Digue's economy. In her study she identified four different possible scenarios on how the tourism situation and the local development of the infrastructure could look like in 2013. Two of them received a very high score in terms of sustainability. A further investigation would have provided information about the effect of tourism development on the local population's income, regional labour market and tax income for the government (Hewings, 1985). A further fiscal analysis would then investigate the ratio between tax revenues and additional public costs necessary to secure a sustainable development (The Haas Center for Business Research and Economic Development, 2001)

However, the first meeting with representatives of the Ministry of Tourism and Transport (MTT) made evident that the required data for the planned investigation was not available. Diverse in-depth information is collected annually on the visitor's consumption behaviour on the Seychelles and also information on national production. But the data is not arranged according to regional provenience. Therefore, it was impossible to reconstruct the economic network on La Digue. Due to the limited time for investigating and the element of uncertainty about the willingness of the local economic players to supply the requested data, the project of analysing the economic network of La Digue was abandoned.

But we did not want to give up the idea of analysing the economic effect of tourism by means of an input-output analysis. For this reason we concentrated on Mr. J. Fletcher's and Mr. Archer's paper (Archer, Fletcher, 1996), which analyses the tourism impact on the Seychelles with an input-output model for 1991. As mentioned in Chapter 1, many changes in the governmental structure were accomplished and new tourism policies implemented in the last decade. In 1995, the government decided to follow a Five-Star-Destination policy for the Seychelles. The building of luxury hotels was pushed and the marketing abroad concentrated on honeymooners and high-income tourists. Most of the biggest hotels were built between 1998 and 1999 and for this reason we decided to analyse the year 2000 with the same method Mr. Fletcher and Mr. Archer did for the year 1991 and to compare the results. Special emphasis

was on the differences between the multipliers of large hotels<sup>16</sup> and those of small hotels. By comparing these two multipliers, we attempted to understand which one has a greater impact and then based on this discuss the efficiency of governmental policy-making, selected for the years 1995-2000. For this purpose, it was important to obtain the methodology used by Mr Fletcher and Mr. Archer in the early nineties to reproduce the model with the data of 2000. We tried to approach Mr. Fletcher, but due to the changes in technology during the last 14 years and the huge amount of models he produced in this period, the only information he could give was the Leontief-Matrix he used for his investigation. Theoretically, an electronic version of his model, was deposit in the MISDs offices, but this file could not be retrieved. Therefore, it was impossible for us to use the same methodology and hence produce comparable data. Additionally, other constraints made it impossible to implement an input-output analysis for the year 2000. The information regarding National accounts 2000, have not been processed and published so far. For this reason it was not possible to obtain the information necessary to fill out the input-output table. All these obstacles made it impossible to go further on with the analysis of the year 2000. The most recent available data about the national accounts was of the year 1999. We therefore decided to complete an input-output table for the year 1999. But due to the fact that the biggest luxury hotels were built in the years 1998 and 1999, it did not make any sense to compare the figures of 1999 with those of 1991 and try to understand if the Five-Star-Destination policy of the government made sense.

As a consequence, another solution had to be found. In a new attempt we assumed that the development presented in the four scenarios would take place for the whole country and not only for the little island La Digue. Our investigation should provide an outlook on the direct and indirect economic effects, on the country's economy for the year 2013. For this reason we wanted to construct the input-output table as mentioned in chapter 3.1. For the model we decided to utilise the information of the year 1999, as it was the most recent one. Having the National account for the specific year, the aggregated information about Export, Import and final consumption were available, but the details about the distribution of goods and services throughout the different sectors, so-called intermediate consumption, were not published in the accounts. The main part of information for the National accounts was collected with the help on a questionnaire, which is delivered annually to most of the registered companies in the country. An empty copy of a questionnaire revealed that 95% of the necessary information to complete the transaction table in the input-output table is supplied by the companies. A

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<sup>16</sup> large hotels: more than 50 beds ( usually hotels with high standards)  
small hotels: hotels with less than 50 beds, guesthouses, self caterings,

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request for access to the completed questionnaires was rejected by MISD based to the law that does not allow third parties to consult data concerning singular companies. Third parties are only allowed to access aggregated information from which no inferences about individual companies may be drawn. After different requests for a special approval at different offices were denied, the possibility of studying the necessary questionnaires had to be given up. Therefore, we decided to carry out a survey by ourselves. In a first stage, MISD wanted to prohibit us the despatch of the questionnaire, on the ground that the information has already been collected by them and that it would create uncertainty within the companies, if the government collects the same information twice. After several discussions with different directors and other very important persons, we had the approval to use MISD's database with all the contact information about the national companies. 523 questionnaires<sup>17</sup> were sent out to the companies, asking them to complete and return it to the ministry of tourism. The scope of the survey was mentioned in the cover letter<sup>18</sup> and a strictly confidential handling of the information was assured. Additionally, an article in the local Newspaper was published, asking the Financial Managers of the companies to participate in the survey. After one month only eight questionnaires had been returned and only four of them were completed in a useful manner. The ambition to be able to complete the transaction table with empirical data from the Seychelles had to be dismissed. After an accurate evaluation of the situation, the decision was to go on with the input-output analysis, trying to find countries, which present, supplementary to the national accounts, an input-output table and which figures can be used as replacement for the missing real data of the Seychelles. An independent country could not be found, but an American State with similar characteristics was found: Hawaii.

## 4.2 Data for the Input-output table

Following the idea to estimate the economic effect of the different scenarios in ten years, we have to analyse the economy's structure in ten years.

As a first step we try to portray the present state of the economy. For this purpose we will use an input-output table, deriving from it the multipliers for the economy. Having an idea of the economical network, we will be able to analyse the effects on the economy in the different

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<sup>17</sup> Cf. Appendix 6.2

<sup>18</sup> Cf. Appendix 6.1

scenarios, assuming that the production function within the economy will not change in the next ten years.

#### **4.2.1 Data sources for national accounts**

To produce an input-output table it was necessary to find the most recent available data. Due to different constraints at the MISD the last processed and publicised data about the National accounts are from 1999.

The publication National Income and Expenditure presents the most important data about the local economy in an aggregated form. To understand how the estimates are done, the different approaches and assumptions used in the national accounts are presented briefly in Appendix 6.10 (MISD, 2002a).

#### **4.2.2 Data source for input-output table**

The publication of National Income and Expenditure presents the data in different tables. Main data source for compiling the input-output table<sup>19</sup> are two of the presented tables. For this study we concentrated especially on the Supply and Disposition of Goods and Services Table and the Gross Domestic Product by Kind of Economic Activity Table (MISD, 2002a). From the mentioned tables it was possible to derive the information for quadrants B-C (see Figure 3.1).

The Overview of Supply and Disposition of Goods and Services presents different figures related to the supply of and demand of goods in the economy. It shows the amount of domestically produced goods and how they are distributed between intermediate consumers, households, government and foreign consumers (exports). With this table we are able to complete the quadrant C. Due to the fact that the government expenditures are recorded as total payments from the different ministries and departments, but is not specified for what sort of services or goods, the final governmental demand is aggregated in one figure.

First step was to aggregate the available information in a useful version. We decided to work with an concise input-output of 16 sectors. For this reason we aggregated the different sectors and broke down other ones in sub-sectors to have a better representation of the companies involved in the tourism sector. We present the figures in the following way:

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<sup>19</sup> Cf. Appendix 6.5

**Figure 4.1 Aggregation of figures presented in the national accounts of the Seychelles**

16-sector Aggregation	34 sector aggregation <sup>20</sup>
Agriculture and forestry	2,3,6,7,9
Fishing	1
Food/beverage manufacture	4,5,8,11,12
Petroleum Products	15,16
Other manufacturing	10,13,14,17,18,19,20,21
Electricity and water	22
Construction	23
Distribution of goods	25
Hotels	26
Restaurants	26
Land transport (passenger)	27
Air transport	27
Sea transport	27
Communications	24
Other services	28,29,30,31,33,34
Government	32

In a second “phase” “the compilation of quadrant B in the input-output was analysed. For this part of the table, the data presented in National Income and Expenditures (NIE99) (MISD, 2002a) was already aggregated in a more appropriate way. Difficulties were encountered in the agriculture, fishing and petroleum sectors. For these no information about salaries and taxes were available. The sectors hotels and restaurant are presented as one sector and a disaggregation had to be done.

The biggest constraint in the collection of data was the total lack of information about the distribution of intermediate consumption among the different sectors. The last input-output table for Seychelles was published in 1993. Although quite a big number of figures for the construction are collected by MISD, they have never again been processed in a appropriated manner to fill out the transaction table.

Therefore we decided to use the information of another country to find out the distribution of intermediate goods and services between the different sectors.

After an intensive investigation trying to find useful input-output tables from other countries, the choice fell on the US-State of Hawaii.

<sup>20</sup>

Cf. Appendix 6.4

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There are different parallels between these two regions that justify the choice of Hawaii. First the fact that both regions are islands, with a low possibility of self-production. Both regions are constituted of several islands distributed around the main island. For both islands the service sector, especially the tourism industry, generates the biggest part of the GDP. The data concerning the output distribution of electricity and water<sup>21</sup>, shows an amazing similarity. Assuming that the production curve within the sector is similar on Hawaii and on the Seychelles, we take the input distribution for most sectors. In a few sectors we had to do different adjustments (comparing with Hawaii), to make sure that the picture of the economic network is as much representative as possible.

For this scope we used supply data of Public Utility Cooperation (PUC) concerning water and Electricity consumption and its cashflow statement to analyse their inputs. Also for the distribution of inputs in the air transport sectors, income statement of Air Seychelles was used as reference (Air Seychelles, 2000).

The singular assumption and methods to estimate the transaction tables are explained in the following paragraphs.

First the 131 sectors in the input-output table of Hawaii had to be aggregated in an appropriate way. The following table shows the way it was done.

The resulting inputs distribution was now calculated in percentages of the total goods & services used in each sector. Multiplying now this percentages with the total of goods & services presented in the NIE99, we receive the nominal distribution for the Seychelles. As a cross-check, the sum of the rows in the transaction tables was calculated and compared with the amounts from NIE99. Several differences were visible. We did the following corrections.

The elaborated table presents too small figures for the “hotels and restaurants sector”, therefore the figures were adapted to the ones published in the NIE99. To lower the differences we had to increase the outputs of hotels and restaurant and deduce the amounts from the sector “other services”. This is based on the assumption that in Hawaii companies are used to have a canteen, whereas this is not usual in the Seychelles. In the US State the costs for the canteens are registered as other services, for this reason we transferred the costs from the “other services” sector to the “restaurants and hotels” sector.

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<sup>21</sup> Data for the Seychelles were elaborated in collaboration with Mr. Mondo, chief accountant at Public Utility cooperation (PUC)

**Figure 4.2 Aggregation of figures presented in the national accounts of Hawaii**

<b>16-sector Aggregation</b>	<b>131 sector aggregation<sup>22</sup></b>
Agriculture and forestry	4-7, 19
Fishing	18
Food/beverage manufacture	29-38
Petroleum Products	44, 45, 46, 47
Other manufacturing	20, 21, 39-43, 48-51, 70, 71-75, 77- 82
Electricity and water	67, 68, 128
Construction	22-28
Distribution of goods	52, 53, 58. 69
Hotels	117
Restaurants	118
Land transport (passenger)	56, 57, 59, 89
Air transport	55
Sea transport	54
Communications	65, 66
Other services	60-64, 76, 83-88, 90-116, 119-127, 129-131
Government	132-134

In the calculated model there is an overestimation of other services, but the inputs from manufacturing and food sector is totally underestimated. For this reason, the figures regarding the inputs from the manufacturing sector and the food preparation sector were adapted to the circumstances in the Seychelles.

Due to the fact that the figures regarding the restaurant sector in the Seychelles are presented only in aggregation with those of the hotels, the input distribution was assumed to be the same as Hawaii.

Completing quadrant C, namely the composition of the final demand, different assumption had to be made. As mentioned before, the data regarding the Seychelles government expenditures are published only as one figure. For this reason, we assume, that the ratio between the government final consumption expenditures and the private consumption for each sector is the same as in 1992. Hence, it is possible to calculate the ratio, from the tables published in the National accounts of 1992 (MISD, 1993). For the private consumption, expenditures in the hotel and restaurant sector, information from the household income and expenditure survey were used (MISD, 2002b)

<sup>22</sup>

Cf. Appendix 6.4

The share of exported goods and services was deduced from the “supply and disposition of good and services table” (MISD, 2002a).

### 4.3 Multipliers Analysis

The direct multiplier values associated with each form of economic activity within the Seychelles economy are set out below. These are partial multiplier values in that they reflect the ability of each sector to generate output, income and government revenue, but also the ability to create jobs. These values should not be viewed judgementally. Variations between the direct income, government revenue or import impacts associated with one unit of output can be a result of many factors including the nature of the production function.

#### 4.3.1 Output Multipliers

Output multipliers are identical to the backward linkage between the different sectors. This inter-linkage among the various sectors of the Seychelles’ economy is presented in Figure 4.3 which base on the Leontief inverse Matrix presented in Appendix 6.8. The backward linkage shows the amount of purchases made by each sector in order to produce a unit of output. It is interesting to note that the principal tourism sectors have strong backward linkages within the economy. Thus a change in demand of the tourists will have strong repercussions on the other sectors.

**Figure 4.3 Output multipliers, Seychelles 1999**

Sector	Output multiplier <sup>23</sup>	Rank
Agriculture and forestry	1.89	10
Fishing	1.62	14
Food/beverage manufacture	2.14	9
Petroleum Products	2.17	8
other manufacturing	2.23	6

<sup>23</sup>

Direct & indirect

Electricity and water	2.28	5
Construction	2.19	7
Distribution of goods	1.74	13
Hotels	2.14	3
Restaurants	2.70	4
Land transport (passenger)	1.78	12
Air transport	2.59	2
Sea transport	1.47	15
Communications	2.63	1
Other services	1.81	11

### 4.3.2 Income Multipliers

As mentioned in chapter 3.2, the additional amount of income generated in a country by a change in demand of one unit in a particular sector is called income multiplier. We differentiate different income multipliers. In a first step we assume that the only income of the residents is that earned as salary, thus we exclude income such as dividends, interests, etc. Therefore we named these figures salary multipliers. In contrast we named the multipliers that include salaries as well as profits, salaries & input multipliers. In this case we assume that all profits are distributed among the residents in the country. Additionally, for both sort of multipliers type I as well as type II were calculated.

As in Figure 4.4 shown, the most important tourism related sectors like hotels and transports have a quite high effect on the residents salaries.

**Figure 4.4 Income multipliers based on salary distribution, Seychelles 1999**

Sector	Salary multiplier I	Salary multiplier II	Rank
Agriculture and forestry	0.53	0.58	1
Fishing	0.25	0.27	14
Food/beverage manufacture	0.36	0.39	11
Petroleum Products	0.44	0.49	7
other manufacturing	0.36	0.39	10

Electricity and water	0.59	0.55	3
Construction	0.45	0.49	6
Distribution of goods	0.31	0.34	12
Hotels	0.45	0.49	5
Restaurants	0.37	0.40	9
Land transport (passenger)	0.56	0.62	2
Air transport	0.49	0.53	4
Sea transport	0.37	0.41	8
Communications	0.30	0.33	13
Other services	0.22	0.24	15

Figure 4.5 shows that adding profits to households' income produces few remarkable shifts. Including profits to households' income, the multiplier in the fishing sector will be three times the salary multiplier. Considering that biggest tuna factory in the country is owned by foreigners, we should not be astonished. In other sector with more local rootage, like agriculture, there is no shift in ranking. Most of the companies in the agriculture sector are family enterprises, therefore for most of them, profits are their only income, which are not recorded as salaries.

Considering that different companies are owned by the government and others proprietor are foreigners, it would be careless to assume that profit will be distributed among the residents. Additionally, it has to be taken into consideration that in the Seychelles there is no stock exchange, therefore only few internationally targeted traders will be stakeholders and only a handful residents will take a stake in companies profits. Hence, for further analysis we assume that no profits are distributed to the residents and we will only analyse effects on salaries using the salary multipliers.

**Figure 4.5 Income multipliers based on salary and profit distribution, Seychelles 1999**

Sector	Salary & Profit multiplier I	Salary & Profit multiplier II	Rank
Agriculture and forestry	0.89	1.08	1
Fishing	0.91	1.09	15
Food/beverage manufacture	0.62	0.74	4

Petroleum Products	0.85	1.02	13
other manufacturing	0.76	0.91	8
Electricity and water	0.72	0.86	6
Construction	0.83	1.00	11
Distribution of goods	0.49	0.59	2
Hotels	0.77	0.92	9
Restaurants	0.65	0.78	5
Land transport (passenger)	0.86	1.03	14
Air transport	0.84	1.02	12
Sea transport	0.83	1.00	10
Communications	0.72	0.87	7
Other services	0.51	0.62	3

### 4.3.3 Employment multipliers

Employment generation or reduction respectively is another major consequence of demand changes. Of almost 31'800 workers in employment, over 28% were employed in the service sector, almost 10% in public administration, over 11% in manufacturing and about 7% are employed in agriculture, forestry and fishing. In the most important tourism sector, namely hotels, almost 11% of total workforce was employed, but not even 2% were working in the restaurant sector. Further 4% were working in the tourism-related transportation. Hence, more than 17% of employed were working to supply goods and services for visitors.

The following Figure 4.6 shows the effect of an increase in demand worth of one million Rupee, on the number of employees.

**Figure 4.6 Employment multipliers, Seychelles 1999**

Sector	Employment multiplier I	Employment multiplier II	Rank
Agriculture and forestry	21.38	22.62	1
Fishing	8.62	9.20	6
Food/beverage manufacture	8.46	9.30	7
Petroleum Products	7.55	8.60	9

other manufacturing	6.74	7.59	12
Electricity and water	9.23	10.40	3
Construction	7.47	8.53	10
Distribution of goods	6.11	6.83	13
Hotels	9.76	10.82	2
Restaurants	8.87	9.74	4
Land transport (passenger)	8.67	10.00	5
Air transport	7.00	8.14	11
Sea transport	5.62	6.50	14
Communications	7.94	8.66	8
Other services	5.59	6.11	15

To be able to meet an increase in demand worth one million in the hotel sector, it has to recruit about ten new employees. In other words, one full-time job is created for every 100'000 rupees spent for hotel services. Again we see that the tourism-related industry has the highest job-creation rate in the economy. This result has to be treated with caution, recalling that in the model we assume no spare capacity. Due to the fact that tourism demand varies depending on the season, the hotel manager will often try to meet the increased demand asking the employees to do overtime.

#### 4.3.4 Government multipliers

Similar logic is applied to the government multipliers presented in Figure 4.7 which show that for every additional SR1 of output produced by the hotel sector the government will receive almost 25 cents as a direct and indirect result of that increase. Including induced effects, mentioned increase will generate an additional increase for government revenues of 28 cents. The most profitable industries for the government are the distribution sector, followed by the “other services” sector. Not surprisingly the last rank of the list in Fig. 4.3.4 are occupied by the industries of the primary sector, considering that this sector in Europe, especially in Switzerland, often is subsidised by the government (Economiesuisse, 2004b).

**Figure 4.7 Government multipliers, Seychelles 1999**

Sector	Government multiplier I	Government multiplier II	Rank
Agriculture and forestry	0.12	0.16	15
Fishing	0.10	0.12	14
Food/beverage manufacture	0.42	0.44	3
Petroleum Products	0.17	0.20	12
other manufacturing	0.29	0.31	7
Electricity and water	0.32	0.35	5
Construction	0.19	0.22	10
Distribution of goods	0.56	0.58	1
Hotels	0.25	0.28	8
Restaurants	0.38	0.40	4
Land transport (passenger)	0.15	0.19	13
Air transport	0.21	0.25	9
Sea transport	0.18	0.21	11
Communications	0.30	0.32	6
Other services	0.52	0.53	2

### 4.3.5 Summary of multipliers values

The singular sectoral multipliers can draw a picture of singular effects. To be able to use the multipliers for policy making it is important to compare and weight the different effects on the different issues.

Is the government targeting to maximise the government revenues according to Figure 4.9 it should encourage the “distribution” and “other services” sectors, as an increase in demand in this sector will have a high positive repercussion on the revenues as tax and duties. But this policy will not be particularly helpful to lower the unemployment rate, as the employment multipliers in these sectors, probably cause of the high automation, are one of the lowest in the country.

**Figure 4.8 Overview of direct and indirect multipliers by sector, Seychelles 1999**

Sector	Output	Salary	Government I	Employment
Agriculture and forestry	1.89	0.53	0.12	21.38
Fishing	1.62	0.25	0.10	8.62
Food/beverage manufacture	2.14	0.36	0.42	8.46
Petroleum Products	2.17	0.44	0.17	7.55
other manufacturing	2.23	0.36	0.29	6.74
Electricity and water	2.28	0.59	0.32	9.23
Construction	2.19	0.45	0.19	7.47
Distribution of goods	1.74	0.31	0.56	6.11
Hotels	2.14	0.45	0.25	9.76
Restaurants	2.70	0.37	0.38	8.87
Land transport (passenger)	1.78	0.56	0.15	8.67
Air transport	2.59	0.49	0.21	7.00
Sea transport	1.47	0.37	0.18	5.62
Communications	2.63	0.30	0.30	7.94
Other services	1.81	0.22	0.52	5.59

Analysing the effects of the hotel and restaurant sector, pillars of the tourism industry, the high level of the different multipliers is remarkable. Therefore, an encouragement of this sectors will lead to a considerable increase of total output, salaries, employment and last but not least of the governmental revenues.

#### **4.4 The four scenarios**

This chapter presents the estimates done for the four possible tourism development scenarios, constructed by Ms. Günther in her study. In the first part, the basic assumptions done for the singular scenarios will be presented. Afterwards, expenditures per diem per visitor estimated for 2013 will be analysed and adapted to our needs.

#### **4.4.1 Introduction to the scenarios**

For 2013 four possible scenarios – each of them with a particular focus – have been constructed. An overview of the assumptions done by Ms. Günther is presented in the Appendix 6.9

The scenarios are constructed for one island of the Seychelles, La Digue. Due to different constraints presented in chapter 4.1, we assume that the scenarios apply for the whole country. The different developments concerning the facilities are not included in our study, because we assume the industry structure will not change considerably until 2013. This does not mean that the industry will not have any growth, but only, that all the industry sectors will grow in the same proportion.

##### **Scenario 1: Free development**

The islands continue to develop in the same way as in the last 10-15 years. New hotels are built around the coast and the demand for other facilities, like restaurants, night clubs, souvenir shops and diving centres increases. According to the increase of infrastructures new roads are built and also the number of cars increases. The estimated arrivals in 2013 are estimated in 170'000 arrivals.

New desalination plants must be constructed, to meet the increased demand for potable water and the landscape is more and more stamped with construction. The erosion of the beaches increases and the diversity of native plants and animals decreases. The environmental awareness is very low, due to the weak law enforcement.

##### **Scenario 2: Authentic Creole Style**

The main aim of this scenario is to promote the authentic Creole culture. Newly built guest-houses will be erected in Creole architectural style and the number of shops selling handicrafts and local souvenirs increases. Also the number of arrivals will increase by 10%. The road construction will be limited.

The environmental awareness within the population has a high increase compared to the actual situation. Beach erosion and the management of key natural area is strengthened. Therefore the number of native plants and animals can be kept constant.

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### **Scenario 3: Nature Conservation**

In this scenario, highest priority is given to the natural ecosystem. No more tourism facilities, like hotels or guesthouses and roads are built. To visit the natural areas, the visitors have to pay a fee of US\$15. The arrivals only increase by 3% and 60% of the areas are under protection.

To increase the heterogeneity of the landscape, native and endemic species of plants and animals are reintroduced and hence biodiversity of the island will also increase. Enforcing the environmental laws, also environmental awareness of the population increases strongly.

### **Scenario 4: Five-Star Eco-Tourism**

The trend of the smaller islands of the Seychelles is applied to the whole island group. The country will focus on eco-tourism “de luxe”. Very luxurious hotel infrastructures are built in very exclusive places. The tourists can choose between different sport activities like snorkeling, diving, eco-trails as well as educational activities like talks on different environmental themes. The arrivals increase by 18% compared to the actual number. Exclusive handicrafts and souvenirs shops will complete the expected tourism facilities. Environmental laws are strengthened and also the environmental awareness of the population increases considerably. As in scenario 3 endemic plants and animals are introduced, to increase the heterogeneity of the flora and fauna.

#### **4.4.2 Scenarios’ assumptions for visitors expenditures**

As mentioned in chapter 4.1 it was impossible to get detailed information about the economic situation on La Digue. Hence, we assume that the government decides to implement the different development strategies not only for the little island La Digue, but for the whole country. For this scope the development forecast done by Ms. Günther will be assumed as relevant for the entire Seychelles economy.

The data collected for CBS shows that total tourist expenditures per diem per visitor for 2002 done in foreign exchange in the Seychelles were SR530 plus SR 176 for air tickets (MISD, 2000d)

**Figure 4.9 Actual expenditures per visitor per diem collected by CBS**

	<b>In Rupee per diem</b>	<b>In % of total expenditures</b>
Hotel receipt per diem	SR 308	42%
Restaurant	SR 59	8%
Car Hire	SR 21	3%
Taxis and buses	SR 11	1%
Excursions	SR 53 <sup>24</sup>	7%
Handicrafts	SR 22	3%
Other Shopping	SR 5	1%
Unallocated	SR 11	1%
Pre-payments <sup>25</sup> and others	SR 40	5%
Air ticket <sup>26</sup>	SR 212 <sup>27</sup>	29%
<b>Total</b>	<b>SR742</b>	<b>100%</b>

Figure 4.9 shows that 44% of the daily tourist expenditures are for hotel bills, about 25% is spent for flights and 8% for restaurant bills.

An analysis of the actual situation with personal interviews done with the tourists by Ms. Günther shows a different situation<sup>28</sup>. The second column of Figure 4.10 shows the actual figures from interviews. Compared to the data published by CBS it turns out that only 1/3 of the daily expenditures are captured as foreign exchange. The following arguments can explain the differences:

- i) Surveys done by CBS only capture expenditures done in foreign exchange and ignore expenditures done in Rupees.
- ii) Money changed in the parallel market can not be captured by CBS.
- iii) Due to the lack of foreign exchanges not all expenditures of the tourists are declared by the residents.

<sup>24</sup> Includes expenditures for domestic air tickets, boat tickets

<sup>25</sup> For car hire, tours and trips

<sup>26</sup> Information about Air ticket expenditures aren't collected neither by MISD nor by CBS.

<sup>27</sup> Assuming that 96% of visitors arrive to Seychelles by airplane stay on average 11 days and spend in average daily SR 46 for domestic flights (one trip to Prahlin/La Digue). ( $0.96 \times 1900 / 11 = 166 + 46 = 212$ )

<sup>28</sup> Except for the air ticket information, which was calculated from the figures published in the annual Report of Air Seychelles

- iv) A considerable percentage of the holiday budget of tourist are spent before beginning holidays. From this amount only a little fraction is returned to the Seychelles. (Günther, 2004).

For our purposes, it is necessary to aggregate few figures and disaggregate other ones for the usage of information on tourism development in ten years. The following table shows the information for the different scenarios adapted to our needs<sup>29</sup>.

**Figure 4.10 Expenditures per visitor per diem today and in the different scenarios**

	Acutal situation		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	SR	%	SR	%	SR	%	SR	%	SR	%
Total	1401	100	1506	107	1241	89	1288	102	2219	158
Hotel	600	100	600	100	450	75	600	100	1000	167
Restaurant	300	100	300	100	225	75	300	100	540	180
Air Transport	212	100	212	100	212	100	212	100	216 <sup>30</sup>	102
Sea Transport	18 <sup>31</sup>	100	18	100	18	100	18	100	14 <sup>32</sup>	78
Land Transport <sup>33</sup>	66	100	86	130	66	100	66	100	90	136
Food/ beverage <sup>34</sup>	25	100	50	200	50	200	25	100	50	200
Manufactures <sup>35</sup>	67	100	100	149	100	149	67	100	102	152
Other services <sup>36</sup>	113	100	140	124	120	106	137 <sup>37</sup>	121	207	183

<sup>29</sup> Consult Appendix xy for detailed information about the different assumptions

<sup>30</sup> In the other scenarios is assumed that only 1% of tourist travels to Prahlin/La Digue by helicopter in this scenario 5% travels by helicopter

<sup>31</sup> Assuming that 30% of tourists travelling to Prahlin/La Digue takes the boat & 10% by Cargo ship ( $0.3*600+0.1*150=195/11=18$ )

<sup>32</sup> Assuming that 25% of tourists travelling to Prahlin/La Digue takes the boat & 5% by Cargo ship ( $0.25*600+0.05*150=157/11=14$ )

<sup>33</sup> Assumption that instead of renting a bicycle or rent an oxcart, assumed for La Digue, the tourists spend the same amount for taxi, car renting and bus tickets on the whole Seychelles

<sup>34</sup> Assuming that 50% of expenditures named as others by Ms. Günther, are for food and beverage and the remaining 50% are for other manufacturing

<sup>35</sup> Assumption: Handicraft + 50% of Others

<sup>36</sup> Assumption: Excursion + Pre-payments and others

In three out of four cases the expenditures will increase. From a minimum of 2% to a maximum in the five-star-destination scenario of 78%. But the distribution of increases between the different items varies considerably. In the restaurant segment the variance is very high. In scenario 2 the expenditures for meals decrease by 25% in contrast in scenario 4 the visitors are willing to pay 80% more than in the actual situation.

For further analysis it is important to consider the assumption that the input distribution between the different industrial sector remains the same<sup>38</sup>.

We now calculated the change in demand between the actual situation and the one expected in 2013. Figure 4.11 gives a summary of the expected differences.

**Figure 4.11 Differences between actual situation and possible scenarios in 2013**

	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	ΔSR	Δ%	ΔSR	Δ%	ΔSR	Δ%	ΔSR	Δ%
Total	105	7	-160	-11	24	2	1098	78
Hotel	0	0	-150	-25	0	0	400	67
Restaurant	0	0	-75	-25	0	0	520	173
Air Transport	0	0	0	0	0	0	4	2
Sea Transport	0	0	0	0	0	0	-4	-22
Land Transport <sup>39</sup>	20	30	0	0	0	0	24	36
Food/ beverage <sup>40</sup>	25	100	25	100	0	0	25	100
Manufactures <sup>41</sup>	33	49	33	49	0	0	35	52
Other services <sup>42</sup>	27	24	7	6	24	21	94	83

<sup>37</sup> Sum of Excursion, Pre-payments and Entrance Fee in nature area

<sup>38</sup> Cf. chapter 3.3

<sup>39</sup> Assumption that instead of renting a bicycle or rent an oxcart, assumed for La Digue, the tourists spend the same amount for taxi, car renting and bus tickets on the whole Seychelles

<sup>40</sup> Assuming that 50% of expenditures named as others by Ms. Günther, are for food and beverages and the remaining 50% are for other manufacturing

<sup>41</sup> Assumption: Handicraft + 50% of Others

<sup>42</sup> Assumption: Excursion + Pre-payments and others

To calculate the change in demand for 2013, we need to consider two effects. On the one hand a change in the visitors' expenditures structures, as discussed above, needs to be considered. On the other hand, there will be an increase in demand as a result of the annual increment of the number of tourists and change of the length of stay (see Figure 4.12)

**Figure 4.12 Changes in number of visitors and length of stay**

	<b>Actual situation</b>	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>
Estimated visitors per year <sup>43</sup>	132,000	170,000	145,200	136,000	155,800
Estimated average length of stay	10.1 days	10.1 days	10.4 days	10.1 days	10.1 days

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<sup>43</sup> For scenario 1, it is possible to calculate, that for an increase of 29% of total visitors arriving to Seychelles, the number of overnight visitors for La Digue will increase by 111%. This correlation is adopted for all scenarios.

## 5 Results

### 5.1 Effects of the singular scenarios

In chapter 4.3 we discussed the different multipliers for the Seychelles economy. Afterwards we analysed the changes estimated in the four scenarios and adapted the corresponding figures to the structure of our input-output model. The per diem per visitor information were multiplied with the estimated number of visitors and the average length of stay (Stynes, 1998), to understand the value of demand in 2013. From these results we deducted the actual demand for the analysed sector. Hence, we received the changes in demand that the different scenarios will induce. In the following sections these changes will be discussed for the singular scenario.

#### Scenario 1: Free Development

The first scenario assumes that the tourism will grow in the same manner as in the last ten years. The local authorities will follow the so far adopted policy, regardless of sustainability.

Figure 5.1 Total effect of scenario 1 on the economy in 2013

Sector	Scenario 1			
	Output	Salary	Government	Employment
Hotels	492799200.00	103626000.00	57570000.00	2248
Restaurants	310878000.00	42601800.00	43753200.00	1021
Air Transport	210736904.00	39869144.00	17086776.00	570
Sea Transport	10155348.00	2556108.00	1243512.00	39
Land Transport	106214024.00	33415648.00	8950620.00	517
Food/ Beverage	112392800.00	18907200.00	22058400.00	444
Manufacture	183697588.00	29655216.00	23888924.00	555
Other services	162408404.00	19740248.00	46658768.00	502
<b>Totals</b>	<b>1589282268.00</b>	<b>290371364.00</b>	<b>221210200.00</b>	<b>5896</b>

In Figure 5.1 we can see that the total output, including direct and indirect effects, will increase by almost SR 1'600 million, which corresponds to an increase comparable to 50% of the actual GDP. This scenario will create almost 6'000 fulltime jobs and increase salaries by SR 300 millions. Half of the created jobs in total will be in the Restaurants and Hotels sectors.

But also the government will have an important increase in revenues. More than SR 200 millions additional taxes and duties will be paid in 2013.

### Scenario 2: Authentic Creole Style

In this scenario the authentic Creole live style and culture will be promoted, while the natural strengths of the island are preserved. The number of tourists visiting the island will increase by 10% reaching an approximate total of 145'000 visitors per year. Due to the increased attractiveness, the average length of stay will increase slightly to 10.4 days.

Figure 5.2 Total effect of scenario 2 on the economy in 2013

Sector	Scenario 2			
	Output	Salary	Government	Employment
Hotels	-257'621'760.00	-54'172'800.00	-30'096'000.00	-1'175
Restaurants	-162'518'400.00	-22'271'040.00	-22'872'960.00	-534
Air Transport	97'121'270.40	18'374'294.40	7'874'697.60	262
Sea Transport	4'680'244.80	1'178'020.80	573'091.20	18
Land Transport	20'779'862.40	6'537'484.80	1'751'112.00	101
Food/ Beverage	90'252'360.00	15'182'640.00	17'713'080.00	357
Manufactury	137'554'428.00	22'206'096.00	17'888'244.00	416
Other services	55'309'980.00	6'722'760.00	15'890'160.00	171
<b>Totals</b>	<b>-14'442'014.40</b>	<b>-6'242'544.00</b>	<b>8'721'424.80</b>	<b>-384</b>

Figure 5.2 shows that the movement in demand has significant negative effects. In terms of output there will be a decrease of about SR 14.4 millions. Additionally, the local economy will lose almost 380 jobs and the total salaries will be reduced by SR 6.2 millions. It is interesting to notice that although the output and the salaries decrease, the total government revenues still increase by SR 8.7 millions.

### Scenario 3: Nature Preservation

For this scenario we assume that there will not be any changes in visitors expenditures. To be able to preserve the nature, the tourists have to pay a fee to visit the islands. This fee will be collected by an NGO, classified as "other services".

Figure 5.3 Total effect of scenario 3 on the economy in 2013

Scenario 3				
Sector	Output	Salary	Government	Employment
Hotels	51'873'600.00	10'908'000.00	6'060'000.00	237
Restaurants	32'724'000.00	4'484'400.00	4'605'600.00	108
Air Transport	22'182'832.00	4'196'752.00	1'798'608.00	60
Sea Transport	1'068'984.00	269'064.00	130'896.00	4
Land Transport	4'746'192.00	1'493'184.00	399'960.00	23
Food/ Beverage	2'161'400.00	363'600.00	424'200.00	9
Manufactory	6'036'164.00	974'448.00	784'972.00	18
Other services	67'932'196.00	8'256'952.00	19'516'432.00	210
<b>Totals</b>	<b>188'725'368.00</b>	<b>30'946'400.00</b>	<b>33'720'668.00</b>	<b>668</b>

The amounts accounted for the sectors hotels until manufacturing, are only an effect of change in number of visitors, arriving to the Seychelles. We can see in Figure 5.3, that a visitors' increase of only 4'000 people and the introduction of a conservation fee, will generate an additional output of about SR 200 millions. Additionally, 668 can be created and the total amount of earned salary will rise by almost SR 31 million. The government receipts will also increase by nearly the same amount.

#### Scenario 4: Five-Star-Eco-Tourism

The Seychelles are converted in a high-price eco tourism destination. The tourist establishment will be strongly nature-oriented, with a high level of comfort. The tourist are interested in nature and want to explore it in a ecological way, like nature walks, snorkeling, fishing, etc.

Figure 5.4 Total effect of scenario 4 on the economy in 2013

Scenario 4				
Sector	Output	Salary	Government	Employment
Hotels	1'655'632'400.00	348'147'000.00	193'415'000.00	7'551
Restaurants	1'214'387'640.00	166'416'084.00	170'913'816.00	3'989
Air Transport	148'290'139.20	28'054'891.20	12'023'524.80	401
Sea Transport	-2'892'195.60	-727'967.60	-354'146.40	-11
Land Transport	95'463'180.00	30'033'360.00	8'044'650.00	465
Food/ Beverage	97'046'860.00	16'325'640.00	19'046'580.00	384
Manufactory	158'733'094.80	25'625'073.60	20'642'420.40	480
Other services	316'893'822.60	38'517'481.20	91'041'319.20	979
<b>Totals</b>	<b>3'683'554'941.00</b>	<b>652'391'562.40</b>	<b>514'773'164.00</b>	<b>14'237</b>

The effects of the estimated figures for scenario 4 are impressive. According to Figure 5.4 the total output will increase by SR 3'683 millions, which equals the actual GDP of the islands. The biggest effects are in the Hotels and Restaurants sectors, which will affect the economy with an increase of about three billions rupees. We also notice a slight decrease in the sea transport sector. But not only the employees will earn additional SR 652 millions, also the government, which can increase its revenues by more than SR 514 millions, will profit from this scenario. It is important to notice that it will probably not be possible to fill all the 14'237 newly created jobs with Seychellois, especially not the more than 11'500 jobs in the hotel and restaurant industry. Therefore, workforces have to be imported from abroad.

## 5.2 Discussion of results

In this chapter we discuss the results elaborated in the previous chapter. It is important to bear in mind that the estimated figures for the scenarios were elaborated especially for the island La Digue and not for the whole country.

Figure 5.5 Comparison of the different scenarios

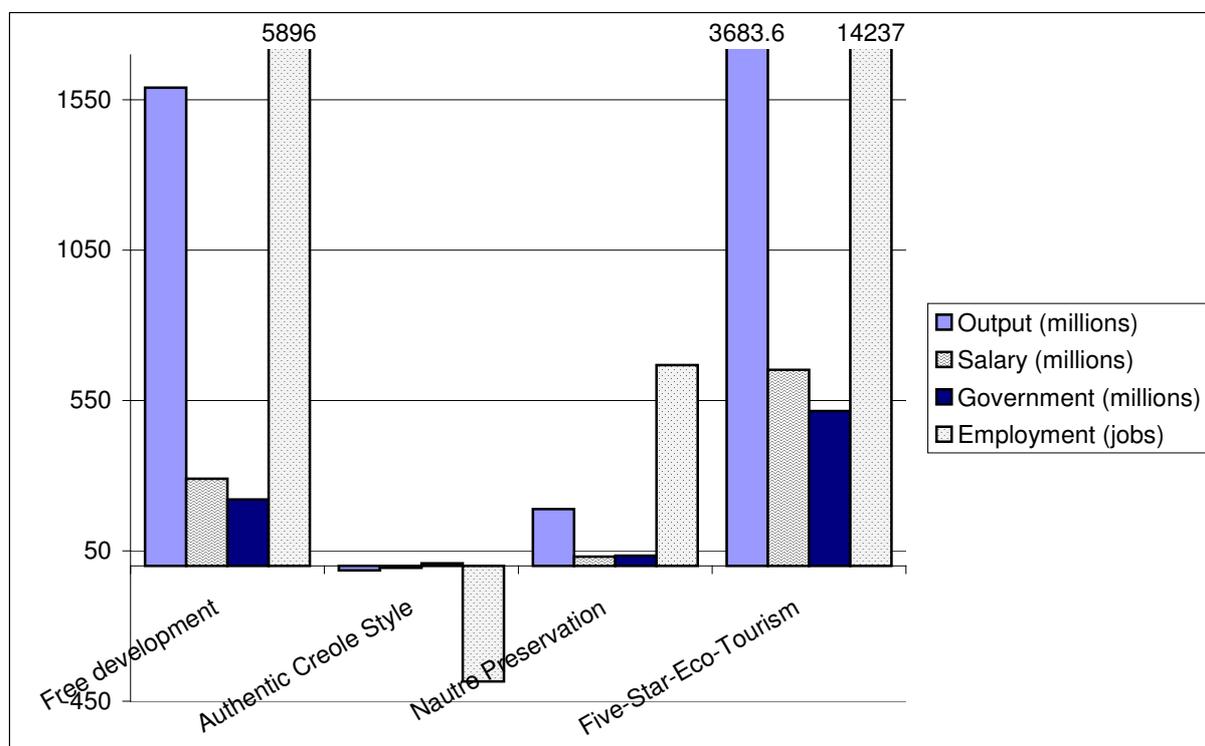


Figure 5.5 summarises the results. We can clearly see that the economic contribution of the scenarios „Free development” and “Five-Star-Eco-Tourism” differs umpteen times from the other two scenarios.

Very surprising are the effects of the „Authentic Creole Style“. Even though the number of visitors increases by about 10% and also the length of stay increases by a week, it is not possible to recompense the effect induced by the change in visitors expenditures. Considering that one of the aims of this scenario is to improve the consumption of native products for the benefit of the local economy, it is demoralising to observe that the expected improvement cannot be achieved. Even worse is that more than 400 people will lose their jobs and both output and salaries will decrease. It is also interesting to notice that although salary and output decrease, government revenues still increase<sup>44</sup>.

More interesting is the “Nature Preservation” scenario, which will have positive effects on all four issues. The number of employees increases considerably. But this effect has to be re-dimensioned. Especially one of the assumption made for the input-output model has to be questioned. As explained in chapter 3.3, we assume that all the companies within one sector have the same input structure. It is discussible whether the production function of the Non Governmental Oraganisation (NGO) which will collect the conservation fee is comparable with the average of the companies classified as “other services”.

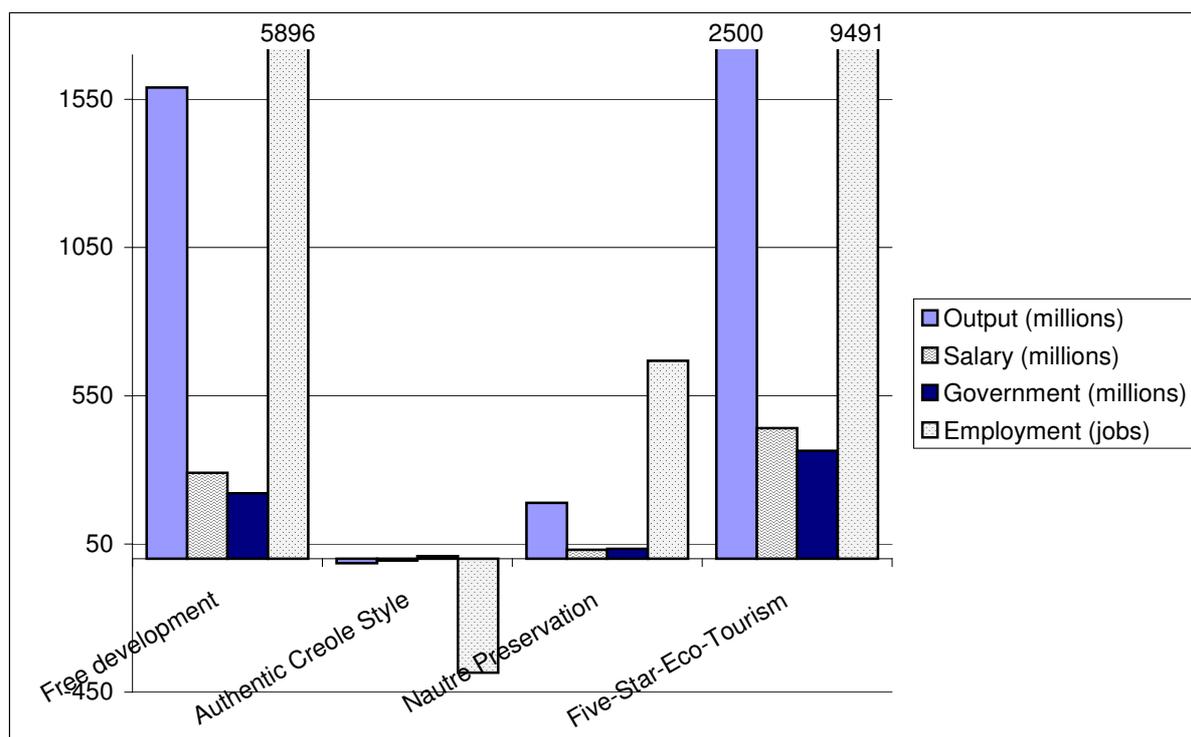
Scenario four is, from an economic view, the most profitable one. The number of additional employees is very high and also the effect on the salaries is very important. Especially in this scenario it is important to question the results. As explained in chapter 4.4.1 we assume a considerable increase in expenditures. This expenditures are related to the fact that the targeted group of visitors demands a higher quality of services and goods, but with our model, we assume that the increased expenditures will lead to an increase in demand, and not only in quality. To meet the increased demand for quality, the companies do not necessarily need to increase input. Many products will be substituted by other ones of higher quality, a fact that is not taken into account by our model. Therefore we assum, that 50% of expenditures increment will not lead to an increase in demand, but only to a substitution between products of different quality<sup>45</sup>. The result of this calculation is presented in Figure 5.6. The situation is similar to the one presented before. The reduction of the expenditures for hotel and restaurant only decreased the totals nominally. But the effect as a whole remains the same.

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<sup>44</sup> Shows how important it is, not to focus on government revenues, when planing future tourism policy.

<sup>45</sup> The effect was recalculated with following changes in expenditures per diem per visitor:  
hotel new: SR 800 (before 1000), restaurant new SR 420 (before 540)

Figure 5.6 Comparison of the scenarios, considering substitute effect in scenario 4



### 5.3 Comments

Due to the several assumptions of the model and the different constraints encountered during the data collection and the adaptation of the information to the model, few notes are important.

#### 5.3.1 Comments about the model

The model makes very restrictive assumptions, which need to be considered, when interpreting the results. The model implicitly assumes that the resources have no opportunity costs. But an increased tourist expenditure will push prices upwards, increase demand for imports and will consequentially change the redistribution of income (Archer, 1977). This will cause a change in consumption patterns.

Also capacity constraints are neglected. If the local industry is unable to satisfy the increased demand, goods and services will have to be imported, and therefore a part of the multiplier effect will disappear. Contrary, also underutilisation of capacity is not considered. Especially in the hotel sector, where the bed occupancy rate is less than 100%, which means, that addi-

tional tourists can be accommodated by the existing hotels with marginal increases in inputs from other sectors.

An other important point is the homogeneity of services and goods within a sector assumed by the model. The bigger the aggregation, the more heterogeneous products and services are mixed and the more unrepresentative the average production function is. On the other hand, it is very difficult and expensive to collect such data. (Briassoulis, 1991)

### **5.3.2 Comments about the data**

First, it is important to remember that the analysis assumes an unaltered industry structure in 2013. It has to be considered that the data for the input-output model are from 1999 and therefore we assume a constant state of the industry composition during 14 years. In a European country like Switzerland, with a very high flexibility in the industry, such an assumption would be inadequate. But my stay on the islands for five weeks revealed that the unhurried way of life of the Seychellois is concordant with this assumption and therefore the model is quite representative.

Second, the scenarios utilised in our analysis were originally built for the little island La Digue, on which the construction of tourism facilities are not yet as advanced as on the main island Mahé. To be in accordance with the general parameters assumed in certain scenarios it would be necessary to dismantle certain facilities. A requirement, which will not be easily accepted by the correspondent facilities' owners and the habitants and therefore the practicality of it needs to be analysed.

Third, the reliability of the information presented by MISD is uncertain, due to the fact that only a small and unrepresentative part of the companies returned the questionnaires for the National Accounts. A uncertainty factor which could easily have been avoided, had the already existing law been enforced.

## **5.4 Further investigations**

In Ms. Günther's study, we got an idea on the sustainability of the different effects. An in-depth analysis of the economic effects was now accomplished with the present study. To get a complete picture of the consequences of the scenarios, it will be indispensable to do a feasibil-

ity study. On the organisational and legal side of things, the measures that need to be taken have to be analysed and evaluated.

The input-output model gives no answer to questions such as “what is the optimum level of production in each sector to achieve objectives A, B, C, etc.?” or “what is the cost-effectiveness of promoting tourism in region X?” (Briassoulis, 1991). An alternative quantitative methods like cost-benefits analysis and optimisation will be able to answer the proposed questions (Kottke, 1988).

As discussed in one of Mr. Fletcher’s papers the differences in habits and interests of the different visitors vary considerably between the different origin nations (Fletcher, 1989). The different scenarios will not have the same effect for all visitors. To plan successful marketing campaigns, a clear definition of which countries have to be targeted with which scenario, is essential.

In addition, a regional input-output analysis in the Seychelles will inform about the effects of changes in demand for the different regions of the Seychelles islands. In this way it would be possible to directly analyse the effect for La Digue.

But for all this further investigation, the first step needed is a clear commitment of all the involved ministries, to provide all the necessary information and human resources. The way how data is collected and archived needs to be revised and readjusted.

## **5.5 Summary**

From an economic point of view, three out of four scenarios will have a positive effect on the national economy. Only the “Authentic Creole Style “ has to be eliminated, as the negative effects exceed the positive ones. This result is in contrast with the results presented by Ms. Günther. It is important to point out that Ms. Günther focused especially on direct effects and neglected indirect ones. Additionally, we need to bear in mind that the economic effects of the scenarios were only one of three dimensions in Ms. Günther’s study and therefore the analysis was quite superficial. Additionally, information from another countries had to be used.

This study provides further assistance in choosing the best scenario. Due to the fact that the sustainability study done by Ms. Günther revealed a propensity to scenario two and three, namely “Authentic Creole Style” and “Nature Preservation”, this analysis would fortify the

tendency to the “Nature Preservation” scenario<sup>46</sup>. But to implement this scenario, the actual environmental laws have to be enforced and the population need to become aware of the importance of such a development for the future generations.

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<sup>46</sup> Although the results presented in [chapter xy](#) would tend more to the Five-Star Eco-Tourism, different negative aspects discussed in-depth in Ms. Günther study, are sufficient to undermine the economic aspect

## 6 Appendix

### 6.1 Cover letter sent to the companies with the questionnaire

#### MINISTRY OF TOURISM AND TRANSPORT

#### TOURISM DEPARTMENT

#### TOURISM DEVELOPMENT DIVISION

Independence House, Victoria, P.O. Box 92, Republic of Seychelles  
Telephone: (248) 611100 Telefax: (248) 224035, E-mail: [mtt@tourism.sc](mailto:mtt@tourism.sc)



Please address all correspondence to the Principal Secretary

Mrs. Frauke Fleischer-Dogley  
Independence House  
P O Box 92  
Victoria

Friday, 06 August 2004

PUBLIC UTILITIES CORPORATION (ELECTRICITY DIVISION)  
FINANCIAL MANAGER  
BOIS DE ROSE AVENUE

Dear Sir or Madame

#### QUESTIONNAIRE FOR AN INPUT-OUTPUT-ANALYSIS OF SEYCHELLES ECONOMY

MASTER-THESIS OF JEAN-PIERRE VALENGHI, UNIVERSITY OF ZURICH, SWITZERLAND IN  
COLLABORATION WITH THE MINISTRY OF TOURISM AND TRANSPORT

As per the article below, published in Nation on Saturday 31 July 2004, a project to evaluate the economic impact of tourism in Seychelles is being implemented by the Ministry of Tourism and Transport in collaboration with the University of Zurich.

For detailed analysis of the linkages between the different sectors in an island economy, it is indispensable to identify how the expenditures and the sales of the individual companies are distributed.

For this reason the attached questionnaire has been designed to provide us with the required data.

Therefore I would kindly request you to fill in the attachment and to return it (even if the questionnaire is not complete with all the required data) by the 14 August 2004 to the Ministry of Tourism and Transport, attention Frauke Fleischer-Dogley or by Email: [FFDogley@tourism.sc](mailto:FFDogley@tourism.sc)

***All the information will be treated strictly confidential.***

Thanking you in advance for assisting us in collecting the necessary data which will not only enable us to implement the project but finalise the master thesis of Mr. Jean Pierre Valenghi.

Yours sincerely

**Frauke Fleischer-Dogley**  
**Director International Cooperation**  
**For Principal Secretary**

### How much is tourism really worth?

The second study of Seychelles' tourism industry to be conducted this year by a student of Zurich University got underway last week, with Jean-Pierre Valenghi examining the economic value of tourism to the islands.

Studying for his Masters in Management Economics, Mr Valenghi originally intended to focus specifically upon La Digue, but due to a lack of data has extended his research to the whole country.

The five week study is focusing upon data from the Management and Information Systems Division of the Ministry of Economic Planning and Central Bank statistics, to begin to determine the financial impact of tourism on the national economy.

It is hoped that the study will provide further information to be used in the establishment of a national Tourism Satellite Account, designed to accurately set out the economic worth of tourism to Seychelles.

Mr Valenghi said that through interviews with various organisations he hopes to establish what data is currently being collected and what needs to be gathered.

"We have a lot of data, but don't yet know how to use it," he said.

The Swiss student's report is due to be submitted to the Ministry of Tourism and Transport in late November.

## 6.2 Questionnaire sent to the companies

**STRICTLY CONFIDENTIAL**

1/1

Ministry of Tourism and Transport  
Independence House  
Mrs Frauke Fleischer-Dogley  
P O Box 92  
Victoria  
Tel. 611100  
Email: ffdogley@tourism.sc

**INPUT-OUTPUT-ANALYSIS**

*For the Calendar Year 1999 & 2000*

**General Information**

Name of enterprise \_\_\_\_\_

Name of Respondent \_\_\_\_\_

Telephone Number \_\_\_\_\_

Sector:

- |  |   |
|--|---|
| <input type="checkbox"/> Agriculture & Forestry          | <input type="checkbox"/> Air Transport                                |
| <input type="checkbox"/> Fishing and Fish manufacturing  | <input type="checkbox"/> Sea transport                                |
| <input type="checkbox"/> Food, beverage or tobacco       | <input type="checkbox"/> Ferry  |
| <input type="checkbox"/> Petroleum                       | <input type="checkbox"/> schooner                                     |
| <input type="checkbox"/> other manufacturing companies   | <input type="checkbox"/> Hirecraft (Boat Charter, yacht, liveaboards) |
| <input type="checkbox"/> Electricity and water           | <input type="checkbox"/> Tour Operator                                |
| <input type="checkbox"/> Construction                    | <input type="checkbox"/> Communication                                |
| <input type="checkbox"/> Distributive Trade              | <input type="checkbox"/> Storage                                      |
| <input type="checkbox"/> Hotel (large) 25 rooms and more | <input type="checkbox"/> Other services                               |
| <input type="checkbox"/> Other Tourist accommodation     | <input type="checkbox"/> Bank   |
| <input type="checkbox"/> Restaurant                      | <input type="checkbox"/> Insurance                                    |
| <input type="checkbox"/> Car rental                      | <input type="checkbox"/> others                                       |
| <input type="checkbox"/> Land Transport (Bus,Taxi)       | <input type="checkbox"/> Diving Business/ centres                     |

2/2

Expenditures for services and goods:	In thousands of Rupees (thousands) 1999	In thousands of Rupees (thousands) 2000	In % of the total intermediate output 1999	In % of the total intermediate output 2000
Agriculture & forestry sector: Livestock, meat and dairy products, Rice, Other food grains, sugar, fruits & vegetables, Tea, wood & wood products				
Fishing sector Fish, fresh and frozen, incl. Shark-fins				
Food/beverage & tobacco sector Other foods and food preparations, tobacco & tobacco manuf., beverages				
Petroleum Production sector : (fuel, etc.)				
Other manufacturing company Textiles, wearing apparel, leather prod. & footwear Paper & paper prod., printing & publishing, chemicals, Plastic, non metal mineral prod.				
Electricity and water companies				
Repair and maintenance of fixed capital				
Hotel (large) bills (1)				
Other bills of tourist accommodation				
Restaurants or Catering services costs				
Car rental costs				
Land transport (Taxicab, SPTC)				
Air transport (Air Seychelles, other airlines)				
Sea transport				
Tour operators				
Communications & storage costs				
Other costs ( Interest payments, bank charges, selling and advertising costs, etc.)				
<b>Total intermediate output</b>			<b>100%</b>	

Salaries paid to employee		
Taxes and duties paid		
Subsidies received		
Number of employees		

**Intermediate Input-Output-Analysis (optional)**

Services and Product sold to:	In Rupees (thousands) 1999	In Rupees (thousands) 2000	or	In % of the total input 1999	In % of the total input 2000
Companies in the agriculture and forestry sector (ex. SMB Argro Ind.,)					
Companies in the fishing sector (ex. SMB prawn prod., Oceana Fisheries, Sea Harvest, etc.)					
Companies in food/beverage manufacturing & tobacco sector (ex. Sey Brew, SMB Foodprod., IOT)					
Petroleum Production sector (SEPEC)					
Other manufacturing company					
Electricity and water companies					
Construction companies					
Distributive trade (Retail food, clothing, etc.) (ex. SMB Supermarket, Temooljee, etc.)					
Hotels (large) (1)					
Other tourist accommodation					
Restaurants					
Car rental					
Land transport (Taxicab, SPTC)					
Air transport (Airlines)					
Sea transport (Shipping companies)					
Tour operators					
communications & storage companies					
Other services					
<b>Total intermediate Input</b>				100%	
To privates					
To government					
Total Exports					
Total revenue					

Notice:

- (1) Large hotels:
- Mahé:
- BERJAYA BV BEACH RESORT & CASINO
  - BANYAN TREE RESORT
  - BERJAYA MAHE BEACH RESORT
  - COCO D'OR HOTEL
  - CORAL STRAND HOTEL
  - LE MERIDIEN BARBARONS
  - LE MERIDIEN FISHERMAN'S COVE
  - SUNSET BEACH HOTEL
  - THE PLANTATION CLUB RESORT & CASINO
- Praslin:
- ACAJOU HOTEL
  - B.PRASLIN BEACH RESORT
  - COCO DE MER HOTEL
  - COTE D'OR LODGE
  - HOTEL MARECHIARO
  - INDIAN OCEAN LODGE
  - LA RESERVE HOTEL
  - L'ARCHIPEL HOTEL
  - LEMURIA
  - PARADISE SUN HOTEL
  - NEW EMERALD COVE
- other:
- LA DIGUE ISLAND LODGE
  - ALPHOHSE ISLAND
  - DENIS ISLAND LODGE
  - STE ANNE RESORT



### 6.3 Hawaii sectors

- 1 Sugarcane
- 2 Vegetables
- 3 Macadamia nuts
- 4 Pineapples
- 5 Other fruits
- 6 Coffee
- 7 Greenhouse and nursery products
- 8 Dairy cattle and milk production
- 9 Poultry and eggs
- 10 Cattle Ranching
- 11 Hog and pig farming
- 12 Misc. livestock
- 13 Aquaculture
- 14 Other agricultural products
- 15 Commercial fishing
- 16 Support activities for agriculture
- 17 Landscape services
- 18 Mining
- 19 Single family housing construction
- 20 Multiple family housing construction
- 21 Commercial building construction
- 22 Hotel construction
- 23 Road construction
- 24 Other construction
- 25 Maintenance & repair construction
- 26 Fruit and vegetable product mfg
- 27 Sugar mfg
- 28 Confectionery product mfg
- 29 Meat product mfg
- 30 Dairy product mfg
- 31 Bakeries and grain product mfg
- 32 Beverage mfg
- 33 Snack food mfg
- 34 Coffee and tea mfg
- 35 Other food product mfg
- 36 Apparel and textile mfg
- 37 Wood product mfg
- 38 Furniture mfg
- 39 Paper mfg
- 40 Printing
- 41 Chemical mfg
- 42 Petroleum mfg
- 43 Rubber & plastic product mfg
- 44 Non-metallic mineral product mfg
- 45 Metal product mfg
- 46 Electrical product mfg
- 47 Transportation equipment mfg
- 48 Misc. product mfg
- 49 Truck transportation
- 50 Warehousing
- 51 Water transportation
- 52 Air transportation
- 53 Ground passenger transportation
- 54 Support activities for transportation
- 55 Couriers
- 56 Sightseeing transportation
- 57 Publishing
- 58 Software & information services
- 59 Motion picture and sound production
- 60 Motion picture exhibition
- 61 Radio and TV broadcasting
- 62 Cable TV
- 63 Telecommunications
- 64 Electricity
- 65 Gas production & distribution
- 66 Wholesale trade
- 67 Motor vehicle and parts dealers
- 68 Furniture and home furnishing stores
- 69 Electronics and appliance stores
- 70 Building materials & gardening equipment dealers
- 71 Food stores
- 72 Health and personal care stores
- 73 Gas stations
- 74 Apparel & accessory stores
- 75 Sporting goods, hobby, book, and music stores
- 76 Department stores
- 77 Other general merchandise stores
- 78 Misc. store retailers
- 79 Nonstore retailers
- 80 Banking and credit intermediation
- 81 Securities and investment activities
- 82 Insurance
- 83 Owner-occupied dwellings
- 84 Real estate

85 Equipment rental  
 86 Automobile rental  
 87 Legal services  
 88 Accounting services  
 89 Architectural and engineering services  
 90 Computer systems design services  
 91 Management, scientific, and consulting services  
 92 Research and development services  
 93 Advertising  
 94 Photographic services  
 95 Other professional services  
 96 Administrative and facilities support services  
 97 Employment services  
 98 Business support services  
 99 Travel arrangement & reservation services  
 100 Investigation & security services  
 101 Services to buildings & dwellings  
 102 Waste management & remediation services  
 103 Educational services  
 104 Doctors and dentists  
 105 Nursing and residential care facilities  
 106 Hospitals  
 107 Other medical services  
 108 Social assistance  
 109 Performing arts and related services  
 110 Amusement services  
 111 Recreation services  
 112 Golf courses  
 113 Museums and historical sites  
 114 Accommodation  
 115 Eating and drinking places  
 116 Dry-cleaning and laundry services  
 117 Automotive repair services  
 118 Other repair services  
 119 Personal care services  
 120 Death care services  
 121 Parking lots and garages  
 122 Other personal services and households  
 123 Organisations  
 124 Other state and local gov't enterprises  
 125 State and local gov't enterprises: Water and sewer  
 126 State and local gov't enterprises: Transit  
 127 Federal gov't enterprises: Postal service  
 128 Other federal gov't enterprises

129 Federal gov't: Military  
 130 Federal gov't: Civilian  
 131 State and local government

#### 6.4 Seychelles sectors

1 Fish. fresh and frozen, incl. shark-fins  
 2 Livestock, meat and dairy products  
 3 Rice  
 4 Other food grains and Hours thereof  
 5 Sugar and sugar preparations  
 6 Fruits and vegetables  
 7 Tea  
 8 Other food and food preparation  
 9 Forestry, wood and wood products  
 10 Mining and quarrying.  
 11 Beverages  
 12 Tobacco and tobacco manufacturing  
 13 Textiles, wearing apparel. Leather prods. & footwear  
 14 Paper and paper prods., printing & publishing  
 15 Petroleum and petrol, prods.  
 16 Chemicals, rubber & plastic products  
 17 Non-metallic mineral prods. (excl. Petroleum)  
 18 Metal & metal prods.  
 19 Machinery & equipment (excl. Transport equip.)  
 20 Transport equipment  
 21 Other manufactures  
 22 Electricity & water  
 23 Construction  
 24 Communication  
 25 Wholesaled & retail trade  
 26 Hotels and restaurants  
 27 Transport  
 28 Finance and insurance  
 29 Real estate & business services  
 30 Community, social & personal services  
 31 Other unspecified  
 32 Services produced by government  
 33 Services produced by private non-profit organisation  
 34 Domestic services of households

## 6.5 Input-output table for the Seychelles 1999

			Producers															Final Demand								
			1	2	3	4	5	6	7	8	9	11	13	14	15	16	17	18	Total intermediate Output	Private Consumption	Government consumption	Fixed capital formation	Exports	Less Imports	Total Outputs	
Producers	1	Agriculture and forestry	18.78	0.46	112.64	-	1.45	-	-	-	1.56	4.66	0.05	-	0.08	-	0.12	-	<b>139.79</b>	234.10	-	-	1.05	209.20	<b>165.74</b>	
	2	Fishing	-	-	114.53	-	0.03	-	-	-	0.98	4.84	0.01	-	0.01	-	0.03	-	<b>120.42</b>	94.00	-	-	36.30	223.88	<b>26.84</b>	
	3	Foodbeverage manufacture	0.76	4.03	52.12	0.37	6.95	5.03	-	28.26	87.26	56.01	0.35	17.87	0.70	-	15.20	-	<b>274.92</b>	281.06	2.26	-	548.09	72.83	<b>1'033.50</b>	
	4	Petroleum Products	7.74	4.64	8.58	45.57	4.44	75.35	58.78	21.40	1.95	1.36	6.14	117.63	2.11	3.36	4.18	-	<b>363.23</b>	82.00	29.05	-	173.11	373.04	<b>274.34</b>	
	5	Other manufacturing	5.59	2.72	65.03	37.26	26.19	4.00	218.97	22.22	31.64	11.04	2.51	3.96	2.15	73.97	34.36	-	<b>541.60</b>	212.00	24.14	674.70	15.46	1'240.84	<b>227.06</b>	
	6	Electricity and water	2.64	0.01	11.65	14.63	7.81	1.70	4.71	6.87	35.86	14.58	0.82	3.14	0.49	11.99	16.04	-	<b>132.95</b>	64.80	60.70	-	-	-	<b>258.45</b>	
	7	Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	764.68	-	-	<b>764.68</b>	
	8	Distribution of goods	6.44	2.49	70.51	13.89	60.30	3.70	68.88	43.54	12.85	23.53	4.53	28.77	1.57	24.75	112.96	-	<b>478.71</b>	-	-	-	-	-	<b>478.71</b>	
	9	Hotels	0.12	-	1.67	0.57	1.54	0.31	0.45	2.38	0.55	0.26	0.72	3.58	0.07	3.88	1.49	-	<b>17.61</b>	3.03	0.28	-	517.20	-	<b>538.12</b>	
	11	Restaurants	0.13	0.75	7.62	3.82	2.11	1.13	2.04	5.44	5.53	4.01	0.96	17.63	0.27	11.78	5.49	-	<b>68.70</b>	21.47	1.25	-	66.80	-	<b>158.22</b>	
	13	Land transport (passenger)	0.53	0.92	1.80	0.65	1.60	0.38	3.07	17.59	5.33	1.96	1.81	70.74	14.88	22.93	3.14	-	<b>147.31</b>	28.36	91.79	-	41.60	-	<b>309.26</b>	
	14	Air transport	1.11	0.22	1.84	0.32	4.84	2.41	0.84	6.19	4.58	2.45	0.59	18.07	0.05	26.08	6.93	-	<b>76.52</b>	177.93	15.53	-	407.11	144.20	<b>532.89</b>	
	15	Sea transport	2.06	0.75	30.40	24.70	2.36	4.80	24.51	5.08	1.05	2.04	5.70	3.69	0.66	8.02	5.89	-	<b>121.70</b>	70.58	27.29	-	161.49	218.10	<b>162.96</b>	
	16	Communications	0.35	0.09	3.93	0.90	6.71	2.03	7.78	20.35	15.90	2.12	2.13	10.72	0.12	224.82	112.13	-	<b>410.07</b>	157.00	76.33	-	-	-	<b>643.40</b>	
	17	Other services	4.83	0.12	47.16	12.82	61.18	9.86	51.17	101.91	121.37	64.73	18.30	40.78	13.80	126.82	30.29	-	<b>705.14</b>	128.91	148.86	-	192.06	221.96	<b>953.01</b>	
	18	Government	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	448.52	-	-	<b>448.52</b>	
	<b>Total Goods &amp; Services</b>		<b>51.08</b>	<b>17.20</b>	<b>529.47</b>	<b>155.49</b>	<b>187.50</b>	<b>110.69</b>	<b>441.20</b>	<b>281.25</b>	<b>326.41</b>	<b>193.59</b>	<b>44.60</b>	<b>336.60</b>	<b>36.95</b>	<b>538.40</b>	<b>348.24</b>	-	<b>3'598.67</b>	<b>1'555.24</b>	<b>926.00</b>	<b>1'439.38</b>	<b>2'160.47</b>	<b>2'704.05</b>	<b>6'975.71</b>	
	Value added	19	Compensation of employees	37.73	7.60	122.00	60.00	48.50	45.80	188.50	141.10	159.62	20.97	47.80	71.30	39.90	54.40	93.30	422.00	1'560.52						<b>1'560.52</b>
		20	Gross operating surplus	24.40	32.42	19.80	53.40	66.41	-1.85	135.00	54.69	91.09	9.10	17.85	44.98	55.50	119.80	160.10	-	882.69						<b>882.69</b>
		21	Indirect taxes, net	0.59	0.38	220.70	1.40	1.10	32.20	-	304.71	12.34	3.56	0.30	0.60	14.50	36.60	339.80	-	968.98						<b>968.98</b>
21		Total primary inputs	<b>62.72</b>	<b>40.40</b>	<b>362.50</b>	<b>114.80</b>	<b>116.01</b>	<b>76.15</b>	<b>323.50</b>	<b>500.50</b>	<b>263.05</b>	<b>33.63</b>	<b>65.95</b>	<b>116.88</b>	<b>109.90</b>	<b>211.00</b>	<b>593.20</b>	<b>422.00</b>	<b>3'412.19</b>						<b>3'412.19</b>	
21		Total Inputs	<b>113.20</b>	<b>57.60</b>	<b>874.50</b>	<b>270.00</b>	<b>296.90</b>	<b>182.90</b>	<b>764.70</b>	<b>754.90</b>	<b>589.46</b>	<b>227.22</b>	<b>110.30</b>	<b>436.50</b>	<b>146.30</b>	<b>749.40</b>	<b>927.00</b>	<b>422.00</b>	<b>6'922.88</b>						<b>6'922.88</b>	

## 6.6 Transaction table for the Seychelles 1999

		Producers																	
		1	2	3	4	5	6	7	8	9	11	13	14	15	16	17	18		
		Agriculture and forestry	Fishing	Food/beverage manufacture	Petroleum Products	Other manufacturing	Electricity and water	Construction	Distribution of goods	Hotels	Restaurants	Land transport	Air transport	Sea transport	Communications	Other services	Government	Households	
Producers	1	Agriculture and forestry	0.17	0.01	0.13	-	0.00	-	-	-	0.00	0.02	0.00	-	0.00	-	0.00	-	0.03
	2	Fishing	-	-	0.13	-	0.00	-	-	-	0.00	0.02	0.00	-	0.00	-	0.00	-	0.01
	3	Food/beverage manufacture	0.01	0.07	0.06	0.00	0.02	0.03	-	0.04	0.15	0.25	0.00	0.04	0.00	-	0.02	-	0.04
	4	Petroleum Products	0.07	0.08	0.01	0.17	0.01	0.41	0.08	0.03	0.00	0.01	0.06	0.27	0.01	0.00	0.00	-	0.01
	5	other manufacturing	0.05	0.05	0.07	0.14	0.09	0.02	0.29	0.03	0.05	0.05	0.02	0.01	0.01	0.10	0.04	-	0.03
	6	Electricity and water	0.02	0.00	0.01	0.05	0.03	0.01	0.01	0.01	0.06	0.06	0.01	0.01	0.00	0.02	0.02	-	0.01
	7	Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	Distribution of goods	0.06	0.04	0.08	0.05	0.20	0.02	0.09	0.06	0.02	0.10	0.04	0.07	0.01	0.03	0.12	-	-
	9	Hotels	0.00	-	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	-	0.00
	11	Restaurants	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.04	0.00	0.02	0.01	-	0.00
	13	Land transport (passenger)	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.01	0.02	0.16	0.10	0.03	0.00	-	0.00
	14	Air transport	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.04	0.00	0.03	0.01	-	0.03
	15	Sea transport	0.02	0.01	0.03	0.09	0.01	0.03	0.03	0.01	0.00	0.01	0.05	0.01	0.00	0.01	0.01	-	0.01
	16	Communications	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.03	0.03	0.01	0.02	0.02	0.00	0.30	0.12	-	0.02
	17	Other services	0.04	0.00	0.05	0.05	0.21	0.05	0.07	0.13	0.21	0.28	0.17	0.09	0.09	0.17	0.03	-	0.02
	18	Government	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18a	Household	0.33	0.13	0.14	0.22	0.16	0.25	0.25	0.19	0.27	0.09	0.43	0.16	0.27	0.07	0.10	1.00	-



## 6.8 overview of the general scenarios assumptions

Important aspects	Actual situation	Scenario 1: Free Development	Scenario 2: Authentic Creole Style	Scenario 3: Nature Preservation	Scenario 4: Five-Star-Eco-Tourism
<b>Accommodation</b>	23 hotels and guesthouses 414 beds	High increase: 19 new small hotels and one large hotel 900 beds	Low Increase: 5 new guesthouses 574 beds	25 hotels and guesthouses 420 beds	Low increase: 4 luxurious hotels 500 beds
<b>Land use for hotels and guesthouses</b>	10.4 hectares	29.4ha	11.4 hectares	10.4 hectare	33.4 hectare
<b>Tourist arrivals</b>	34'000 overnight tourists and 55'000 day tourists. Total = 89'000	72'000 overnight tourists and 73'00 day tourists Total = 145'000	47'000 overnight tourists and 55'000 day tourists Total = 102'000	35'000 overnight tourists and 73'000 day tourists Total = 108'000	40'000 overnight tourist and 37'000 day tourists Total = 77'000
<b>Tourism products &amp; Services</b>	Low variety 8 restaurants and 12 shops 1 diving centre 1 horse riding centre 1 centre organising excursions	Wide variety 18 restaurants 1 discotheque 20 shops 6 centres proposing diving, water sports, excursions, etc.	Wide variety 13 restaurants 25 shops Creole village Cultural events Traditional handicrafts 4 centres proposing diving, snorkelling, excursions, eco-trails, etc.	Low variety 9 restaurants 15 shops 1 diving centre 1 horse riding centre 3 centres proposing nature attractions like eco-trails	Wide Variety 18 restaurants 16 shops 5 centres proposing diving, fishing, snorkelling, excursions, eco-trail tours, etc.
<b>Transport</b>	45 motor vehicles. 20km road	70 motor vehicles Road extension	< 40 motor vehicles 20km road	15-20 motor vehicles 20km road	<40 motor vehicles Road extension >Helicopter arrival
<b>Economic contribution</b>	Contribution by employment in 1997 = SR11'000'000	Contribution by employment in 2013 = SR27'000'000	Contribution by employment in 2013 = SR18'000'000	Contribution by employment in 2013 = SR14'000'000 15\$ fees per tourist	Contribution by employment in 2013 = SR22'000'000
<b>Labour forces in tourism</b>	37.5% working in tourism sector 352 labour forces	50% working in tourism sector Immigration of labour forces 816 labour forces	50% working in tourism sector Low immigration rate 567 labour forces	40% working in tourism sector No immigration 431 labour forces	50% working in tourism sector High immigration rate in short term 669 labour forces
<b>Enforcement of laws &amp; regulations</b>	Weak enforcement of laws and regulations	Weak enforcement of laws and regulations	Enforcement of laws and regulations	Enforcement of laws and regulations	Enforcement of laws and regulations
<b>Environmental awareness</b>	Low awareness	Low awareness	High awareness	High awareness	High awareness
<b>Population density</b>	1.9 persons per hectare. 2/3 concentrated on 38ha =>35 persons per ha	2.6 persons per hectare. Dispersion of housing	2.3 persons per hectare 2/3 concentrated on 47ha	2.2 persons per hectare 2/3 concentrated on 44ha	2.5 persons per hectare 2/3 concentrated on 49ha
<b>Population size</b>	2099	2600	2300	2240	2500
<b>Number of houses</b>	621	767	698	659	724
<b>Land use for housing constructions</b>	140.8 hectare Total built up area is about 300 ha	15 additional hectares for private houses	7.6 additional hectares for private houses	3.8 additional hectares for private houses	10.3 additional hectares for private houses
<b>Culture &amp; Tradition</b>	Not promoted. Modern lifestyle very important	Not promoted. Modern lifestyle predominant	Strongly promoted	Promoted	Not promoted. Modern lifestyle predominant
<b>Water supply</b>	90% supply guaranteed	<80% supply guaranteed. Desalination of sea water becomes compulsory	<80% supply guaranteed. A certain part must be made available by desalination	>80% supply guaranteed	<80% supply guaranteed Desalination of sea water becomes compulsory
<b>Sewage</b>	Some pollution of groundwater because of sewage	Possible increase in groundwater pollution	Concentration on Plateau increases risk of groundwater pollution	Well designed septic tanks or central sewage treatment plant decreases pollution	No contamination of groundwater expected from new 5*-hotels
<b>Rare and native animal species</b>	Main species: Paradise Flycatcher, Seychelles Swiftlet, Terrapins, marine turtles, coral reefs	Decrease in diversity and/or population of rare and native plant and animal species	Diversity and/or population of rare and native plant and animal species keeps the current ratio	Diversity and/or population of rare and native plant and animal species increases	Diversity and/or population of rare and native plant and animal species keeps the current ratio or increases
<b>Coastal erosion</b>	26% of beaches critically endangered by erosion	>30% of the total coastal area critically endangered by erosion	<30% of the total coastal area critically endangered by erosion	<30% of the total coastal area critically endangered by erosion	<30% of the total coastal area critically endangered by erosion
<b>Landscape aesthetics</b>	Anse Source d'Argent to Grand Anse, Petite Anse and mountain area, Pointe Turcy to Anse Patate, Pointe Cap Barbi, Rochers de La Passe Great heterogeneity of the landscape	Natural areas with an aesthetic value are overbuilt. Low heterogeneity of the landscape	Natural areas with an aesthetic value are preserved. Great heterogeneity of the landscape	Natural areas with an aesthetic value are preserved Great heterogeneity of the landscape	Natural areas with an aesthetic value are preserved Great heterogeneity of the landscape Unspoiled visual perception of the coastal areas decrease

Source: Günther, 2004

## 6.9 Tourism Satellite Account

While my stay on the Seychelles we analysed the possibility to introduce a Tourism Satellite Account for the Seychelles. Following a very short introduction:

All over the world, the Seychelles Islands are known as the paradise described in the bible. Their exceptional beauty attracts more than 130.000 foreigners every year. To meet visitors' wishes and demands, the local tourism industry offers a wide range of services by the local tourism industry. This industry accounts for approximately 20% of Seychelles' annual gross domestic product (GDP). A detailed understanding of tourists' expenditures is therefore indispensable.

To be able to measure the effects of the tourism consumption on the islands' economy a Tourism Satellite Account (TSA) should be implemented within the next two years.

Since 1995, the World Tourism Organisation (WTO) has been developing TSA. Main purpose of this tool is to establish a standardised method to measure tourism effects and to compare the collected data over time and between the countries. The collection of information regarding the tourism industry turns out to be rather complex, which make impossible to derive tourism's contribution to the local economy directly from the National Accounts. The figures associated with tourism are fragmented and dispersed due to the fact that a tourism industry sector as such does not exist. The services provided to the visitors are supplied by different companies scattered over several economic sectors. Therefore, a satellite system is needed that collects information from the different sectors with regarding to their contribution to the tourism sector. With TSA, WTO provides an internationally approved tool.

The modular concept of this systems, allows the countries to implement it gradually and adapt it to their needs and requirements.

TSA relies on the balance existing within an economy between the tourist-generated demand and supply of goods and services. It focuses separately on inbound, outbound and domestic tourism. In addition, it supplies a number of non-monetary data, which helps to interpret the monetary figures.

TSA provides ten standardised tables to present the collected figures. For a minimum version of TSA three tables have to be presented.

An analysis of the so far collected data by the Management and Information System Division (MISD) of the Seychelles shows that approximately 50% of the information needed for a basic version of TSA is already being collected. In some cases, the collected data is not complete or important details about the breakdown into sub-sectors is missing.

The most substantial information gap is encountered in the domestic tourism figures. So far, no information regarding the travel customs of residents within the country is being collected. A preliminary cost-benefit analysis of the collecting of data about domestic tourism has to be done. A positive result of such an analysis should be followed by the setting up of appropriate survey methods.

For a successful implementation of TSA, the awareness of its importance has to be increased among the ministries and companies involved in the tourism industry. The advantages of TSA as a planning tool not only for the government but also for the private sector are internationally recognised. Therefore, its rapid introduction together with the appropriate survey methods allowing for an actual presentation of the tourism related data is indispensable, especially for a country like the Seychelles, where the tourism industry is the main source of foreign exchange.

## 6.10 Approaches and methods used for the national accounts

1. To calculate the GDP, the Statistics and Database Administration Section (SDAS) of MISD uses a production approach (Commission of the European Communities-Eurostat (CECE), 1993) and is the same as recommended in the United Nations' System of National Accounts 1993. This approach measures the output of each producer and deduces the total value of inputs used by that producer. The difference determines the value added, which includes the salaries paid, the gross surplus and the direct or indirect taxes paid to the government. Adding all the value added produced by all kind of economic activities by residents makes up total GDP.
2. With the expenditure approach (CECE, 1993), the utilisation of the output after its production is measured. The final use of the country's output comprises the households' final consumption expenditure, government final consumption expenditure, capital formation and finally exports and imports of goods and services.

The collection of data for the national account is based on different data sources. Depending on the sector, information is collected directly from private and parastatal companies or is estimated by means of other figures. Each year the SDAS conducts a National Accounts Inquiry, sending questionnaires to almost all legally constituted companies engaged in production and trading activities in the Seychelles.

The companies are classified into the following sectors:

- I) Manufacturing
- II) Construction
- III) Public Utilities ( i.e. Electricity, Water, Telecommunication)
- IV) Transportation
- V) Tour Operators
- VI) Hotels, Guest Houses and Restaurants
- VII) Banks
- VIII) Insurance
- IX) Business Services
- X) Private Non-Profit Institution
- XI) Other Services

The annually sent questionnaires request information on following items:

- i) Production and Sales
- ii) Input Costs (i.e. Raw Materials used, Fuel, etc.)
- iii) Other Operating Costs
- iv) Employment (i.e. Number Of Employees And Wages and Salaries Paid)
- v) Depreciation Costs
- vi) Value of Stocks Held
- vii) Capital Expenditure

It has to be noted, however, that the response rate is not complete. In 1991 about 60% of the despatched questionnaires were returned while today only 35% of the questionnaires are returned by the enterprises<sup>47</sup>. Consequentially, a substantial amount of estimation has to be made on a number of indicators and indices related to the type of activity to be measured.

The above-mentioned sectors of economy make about 60% of total GDP. The following paragraphs explain how the information of the remaining sectors is collected.

The information about the structure of the **government expenditures** and revenues is collected from the annually published budget report by the Ministry of Finance. It has to be noted that this way of doing it implies one important constraint. The information about expenditure published in the annual report of the Ministry of Finance is not subdivided in the same manner as the data of the production companies. This considerably complicates the assignment of governmental costs to the appropriate sector. This leads the SDAS to present the government expenditures as one figure, dispensing of breaking it down into different sectors.

The gross output of **agriculture** is obtained as the total sum of expenditure on food (excluding fish) of both the resident and tourist populations plus the exports less the imports of agricultural and livestock products. Intermediate consumption is obtained as a certain percentage of gross value of estimated agricultural production.

For the timber production there exist no direct data estimates. Output of the **forestry sector** is estimated based on the timbers input in the manufacturing sector. As for agricultural products, the intermediate consumption is assumed as a certain percentage of the total output.

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<sup>47</sup>

SMB being the biggest merchant for fish, the total output of the **fishing sector** is estimated by multiplying the total catches of fish with the average price SMB pays for the different types of fish. Intermediate consumption is computed using a weighted average based on changes in the import price index.

In the **building and construction sector**, building, electrical and plumbing contractors are canvassed. To avoid double counting, subcontracted work by one firm to the other is eliminated. MISD also assumes that all the services supplied by the construction sector is destined for the formation of fix capital and maintenance activities in the building sector and are therefore judged to be irrelevant.

To estimate the figures regarding the **distribution sector**, the outputs from agriculture, forestry, fishing and each sub-sector of manufacturing have been estimated. For the intermediate consumption the data is based on the annual national accounts inquiry questionnaires.

The expenditures on GDP are calculated in market prices. It comprised the following components:

- a) **Private final consumption expenditure** was estimated based on the analysis of the income and expenditure survey 1997, which is repeated approximately once all four years. The data was collected adopting the personal interviews method (MISD, 2002b). An overall sample of 10% (around 1788 households (MISD, 2000a)) was interviewed by special trained officers over the period of two weeks.
- b) **Government final consumption expenditure** bases on the government accounts as contained in the Ministry of Finance's Budget Report.
- c) **Gross Domestic fixed capital formation** is estimated based on a combination of expenditure approaches and commodity flow, which are computed using trade data (MISD 2000b), data on local production (MISD, 2000c) and expenditure.
- d) **Increase in stocks** data is relatively scanty (MISD, 2002a).
- e) As mentioned under c), **Exports of goods and services** data is estimated from the trade data.
- f) Also **Imports of good and services** are computed using data sources mentioned under c). In addition, reports on Visitors' Surveys (MISD, 2000d) conducted by the MISD and balance of payments data compiled by CBS form the backbone of such estimates.

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