

**A Social Accounting Matrix for Namibia, 2004
A Tool for Analysing Economic Growth,
Income Distribution and Poverty**

**Glenn-Marie Lange (Earth Institute, Columbia University)
Klaus Schade (NEPRU)**

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THE NAMIBIAN ECONOMIC POLICY RESEARCH UNIT

Postal: P. O. Box 40710, Ausspanplatz, Windhoek, Namibia

Street: Cnr Louis Raymond & Grant Webster, Windhoek, Namibia

Tel.: +264 61 277500 *Fax:* +264 61 277501

eMail: nepru@nepru.org.na *Web Site:* www.nepru.org.na

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Disclaimer

The opinions presented are those of the authors and should not be regarded as the views of SIDA.

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List of abbreviations

AGOA	African Growth and Opportunity Act
BoP	Balance of Payment
CBS	Central Bureau of Statistics
CGE	Computable general equilibrium
CFC	Consumption of fixed capital
GDP	Gross domestic product
GOS	Gross operating surplus
IO	Input-output
ILO	International Labour Organisation
LaRRI	Labour Resource and Research Institute
LFS	Labour Force Survey
NAB	Namibian Agronomic Board
NAMEX	Namibian macro-econometric model
NCA	Northern Communal Areas
NDP	National Development Plan
NEPRU	Namibian Economic Policy Research Unit
NHIES	Household Income and Expenditure Survey
NOS	Net operating surplus
NPISH	Non-profit institutions serving households
N\$	Namibia Dollar
ROW	Rest of the world
SA	South Africa
SAM	Social accounting matrix
SIDA	Swedish International Development Cooperation Agency
SUT	Supply and use table
UN	United Nations
US	United States of America
VCF	Veterinary Cordon Fence

1. Introduction

Economic growth is often cited as a necessary condition for improvement of living standards. Persistent income inequalities, however, have led to the recognition that economic growth alone may not reduce poverty and income inequality; one must also take into account the distribution of benefits from economic growth among different segments of the population, especially the poorest households. Real GDP may grow by 5% in a given year, but this figure doesn't tell policy-makers which households benefit from this increase in national income. For example, the additional income may go mostly to middle or upper-income households, may go mainly to poor households, or may benefit all households equally. As a country with an extremely unequal household income distribution, it is critical for Namibia to monitor this aspect of economic development. It is also important to assess the likely impacts of policy actions on income distribution, and to design long-term development strategies that target poverty.

Namibia, like many countries, has established poverty reduction as a development objective and has designed various policies to achieve this objective, which are described in the National Development Plans. Examples include investment in transportation infrastructure, the establishment of Export Processing Zone industrial parks, and the promotion of agricultural diversification into high value crops such as table grapes. How much will they contribute to poverty reduction?

Other government policies, such as fuel taxes or trade liberalization, may not be specifically designed to target poverty, but can have far-reaching effects on the incomes of different kinds of households, and the economic incentives faced by different sectors of the economy. Are these policies consistent with government's poverty reduction objectives? External economic events, such as oil price increases or drought, can also have unequal effects on different households. Without an appropriate economic tool, there is no way to assess the macro-economic impact of economic policies and external events on income distribution, and especially the status of the poorest households.

The Social Accounting Matrix (SAM) is a tool that can provide such an economic analysis. The SAM is a database that provides a snapshot picture of the economy in one year, showing, among other things, how income is generated, how it is distributed among different households, and how different households spend their income. SAMs are used to build economy-wide macroeconomic models explicitly designed to analyse the distributional impacts of policy change, that is, the effects on employment, incomes and poverty of different household groups. That makes it uniquely suited to addressing Namibia's broad development challenges: promoting sustainable economic growth, lowering income inequalities, and reducing poverty.

The SAM model differs from Namibia's only other macroeconomic model, NAMEX, because of its focus on explicit representation of how household income is generated and used. NAMEX - the Namibian macro-econometric model - has been mainly used

to forecast government revenues and other macroeconomic indicators from highly aggregate economic data (See Tjipe *et al.*, 2004 for description of this model).

1.1 Who uses SAMs?

SAM-based models are widely used throughout the world in both developed and developing countries. The range of policy applications include:

- Trade policy: impact of trade liberalisation on exports, imports, household income, government revenue from tariffs, and the environment
- Tax policy: impact on poor households of different forms of taxation
- Sectoral planning for cross-cutting issues such as water, energy, land use - what is the economy-wide impact of new projects and policies, infrastructure development, etc. Vulnerability to external "shocks" - energy price increases, drought, exchange rate changes, etc.
- Education and labour force planning: anticipating future need for workers with specific skills/training
- Other cross-cutting issues, such as HIV/AIDS

1.2 How will Namibia benefit from the SAM?

For Namibia, the SAM is an extremely valuable tool, providing a model that can help policymakers think systematically about what kind of future they want and what actions to take today in order to achieve that future. As an economy-wide model, the SAM provides a concrete basis for moving away from sectoral planning to integrated, economy-wide planning. The National Development Plans (NDP) and Vision 2030 are two planning exercises, for the medium term and the long-term, that can benefit from analysis using a SAM-based model. The SAM can provide quantitative answers to questions like:

- Will the growth of leading sectors be sufficient to achieve the desired level of GDP growth?
- If Namibia is to move away from a resource-based economy (minerals, fisheries), how much will other sectors have to grow to replace them?
- Who will benefit from economic growth? Will the growth strategy reduce poverty significantly?
- Are there unanticipated constraints, conflicts among sectors that might prevent implementation of all strategies?
- What skills will the labour force need, and what education do we need to provide today in order to ensure that Namibian workers with the right skills are available in the future?

- How sensitive is the development strategy to external events like exchange rates, energy prices, trade regulations, etc.

Integrating the use of SAM modelling in the development planning process will help to *improve dialogue* about feasible economic objectives and concrete actions to achieve them. Its contribution to policy dialogue comes from its ability to quantify the mostly qualitative descriptions of sector strategies found in many planning documents, so that the economic outcomes can be calculated. Examples of outcomes include the number of jobs created (by skill-level, by industry, by gender) and the wages paid, the distribution of income among different household groups, the effects of growth in manufacturing on upstream industries (suppliers of inputs like raw materials, electricity, transportation, etc.) and downstream (users of products like other industries, consumers, transportation, etc.), the balance of trade, etc.

1.3 The SAM Programme at NEPRU

The current SAM programme, based in NEPRU, began in mid-2002 with funding from SIDA and was planned to coincide with the new Household Income and Expenditure Survey. However, the NHIES was unexpectedly delayed and did not start until August 2003. The SAM Programme decided to go ahead and construct a *preliminary SAM* for 2002 based on the 1993/94 NHIES, which was presented in 2004 (Lange *et al.*, 2004). There are many other examples of SAMs constructed on the basis of relatively old data for critical components, such as the Supply and Use Table and NHIES. The purpose of the preliminary SAM was to collect the other necessary data for the SAM, which can be easily updated when the 2003/2004 NHIES is ready. More importantly, the preliminary SAM was used to introduce the SAM to policymakers and begin to demonstrate the many policy applications of a SAM. The SAM has a major contribution to make for planning exercises such as Vision 2030, and the National Development Plans, as well as sector master plans, such as the Water Master Plan.

This report presents the final SAM for 2004, which is based on the 2003/2004 NHIES.

The SAM project team includes the authors of this study as well as two consultants, Mr. Jürgen Hoffmann who has provided expertise on agriculture and food processing sectors, and Mr. Jan Redeby of Statistics Sweden, who has provided assistance regarding use of the Namibian national accounts for constructing the SAM. Our colleagues at CBS, notably Mr. Hangula, the Government Statistician, and Ms. Kali, Deputy Director for Economic Statistics, have provided extensive assistance and support. Numerous individuals and companies have also assisted in constructing the SAM by providing data or feedback on the data the SAM team gathered.

In addition to constructing a SAM, the SAM Programme has two other major activities:

- 1) training and capacity building and
- 2) ways to improve the national accounts.

In its first year, the SAM Programme focused strongly on training. Several formal training workshops have been held on modelling with SAMs, most recently, a CGE (computable general equilibrium) modelling course. Course participants have included NEPRU staff as well as staff from the major government partners in the SAM project, the Bank of Namibia, National Planning Commission, and the Ministry of Finance. Staff from other agencies, notably the Ministry of Environment and Tourism, has also attended. In addition to formal training workshops, weekly seminars have been held over several months.

In the process of constructing the SAM, the project team is working closely with the Central Bureau of Statistics and the Bank of Namibia. A SAM is especially useful for assessing national accounts; it is common practice among statistical offices to construct a core component of the SAM, the Supply and Use Table (SUT), as a consistency check on the national accounts. When the preliminary SAM 2002 was published, it included a section on differences between the published National Accounts and the National Accounts estimated by the SAM. For some sectors, these differences were significant and the revisions were incorporated in the official National Accounts. Other changes will only be made during the rebasing of the National Accounts, a major exercise in which all sectors can be reviewed and updated. The SAM 2004 also identifies several ways to improve the national accounts which are discussed in this report.

1.4 Outline of the report

In the next section, the structure of a SAM is described along with the major data sources used for each component of the SAM. The discussion of the data sources is intended to provide an overview of the strengths and weaknesses of the data. Section 3 describes the SAM in greater detail. It discusses the classifications used for each account in the SAM. It also summarises the assumptions and methodologies used to estimate missing data for the preliminary SAM, and to balance the preliminary SAM.

The process of compiling a SAM always reveals errors and omissions in the national accounts. In fact, statistical offices often compile supply-and-use-tables, a core component of the SAM, as a means to check the national accounts and improve them. So, it is not surprising that numerous differences between the Namibian SAM and the published national accounts were revealed. These differences are discussed in Section 4 of the report. Most of these differences resulted simply from the omission of data: through industry surveys, the SAM team found economic activities that were not included in the national accounts. Other differences were revealed as inconsistencies between product supply and demand during the balancing of the SAM. It is unfortunate that the rebasing of the National Accounts did not take place prior to constructing the SAM. The rebasing would have brought into the National Accounts additional data, some of which the Central bureau of Statistics has already obtained, to improve the accuracy of the National Accounts.

Generally, the SAM team has taken a very conservative approach to discrepancies between the SAM and the national accounts, taking the national accounts data as given in most instances. For example, the reader may note that informal and unregistered business is not well represented in the national accounts. The SAM does not include an estimate of this missing activity at this time because we could not provide a credible 'guesstimate' without extensive survey work. It is certainly an important area for future work, especially because of the role it often plays in poverty reduction. On the other hand, the NHIES provides the basis for a new estimate of Communal agriculture sector, which is not yet incorporated in the National Accounts. Because the new figure for this sector is so different from the past, we decided to include the new figure in the SAM. Even with a very conservative approach, GDP in the SAM is 3.3% higher than GDP for 2004 in the published national accounts.

Section 5 concludes by outlining future work: potential policy applications of the SAM and priorities for data improvement, following the rebasing of the National Accounts. The full SAM 2004 is provided in Appendix 3.

2. The Structure of a Social Accounting Matrix

The framework for the Social Accounting Matrix (SAM) was first developed in the 1950s as an extension of the core national accounts in order to integrate the economic and social aspects of development (Pyatt and Round, 1985). The SAM began to be implemented for policy in the 1970s, when it became clear that economic development, measured by growth in GDP, could not ensure poverty reduction, and that a tool to monitor income distribution was needed. The SAM is now included as part of the 1993 revision of the System of National Accounts, the framework used by virtually all countries for compiling national accounts (UN, 1993, Chapter XX).

The SAM is a comprehensive, economy-wide database using a double-entry bookkeeping approach to present the data in a square table format. Data from the National Accounts and statistics about households and other institutions are used to construct accounts for

- Supply of products from imports and domestic production
- Production structure of each industry
- Generation of income by each industry
- Redistribution of incomes among institutions, for example transfers among different groups of households, transfers from government to households, taxes paid by households and enterprises to government, etc.
- Detailed expenditure patterns of households and other institutions
- Savings and investment
- Transactions with the rest of the world (ROW), imports and exports

Each account is represented by a row and column, as seen in Figure 1: reading the SAM across a row shows the incomes or sales revenue of an account, while reading the SAM down a column shows the expenditures or outlays of that account. The principle of accounting requires that total revenue (row total) equals total expenditure (column total).

Figure 1 Structure of a Social Accounting Matrix

		PRODUCTION ACCOUNTS		PRIMARY INCOME	INSTITUTION ACCOUNTS			CAPITAL ACCOUNT	REST OF WORLD ACCOUNT	TOTAL INCOMES
		Commodities	Activities	Factor Payments	Households	Enterprises	Government			
PRODUCTION	Commodities	Trade margins	Intermediate use of commodities		Household Consumption Expenditure		Government Consumption Expenditure	Investment & Change in Inventories	Exports	Total use of commodities
	Activities	Domestic supply								Domestic supply of commodities
	Factors		Net Value Added						Factor Income from Abroad	Factor income
INSTITUTIONS	Households			Labour incomes	Inter-household transfers	Enterprise income distributed to households	Government Transfers to Households		Remittances from Abroad	Household income
	Enterprises			Undistributed profits			Transfers to Enterprises		Enterprise Income from abroad	Enterprise Income
	Government	Taxes less subsidies on products	Taxes less subsidies on production	Taxes on labour profits and	Taxes on household income & property	Direct taxes on Enterprises			Government Income from World	Government revenue
CAPITAL ACCOUNT			Consumption of Fixed Capital		Household Saving	Enterprise savings	Government Saving		Capital Account BoP	Total savings
REST OF WORLD ACCOUNT		Imports		Factor payments abroad	Remittances abroad	Transfers abroad	Transfers abroad			Total imports
TOTAL EXPENDITURES		Total Commodity Supply	Total domestic output	Total factor outlay	Household expenditure	Enterprise Expenditure	Government expenditure	Capital expenditure	Total exports	

2.1 Explanation of main accounts

Commodities and Activities. The SAM distinguishes commodities (markets for the goods and services) from activities, that is, the domestic production of products by industries. This distinction is important because some activities may produce more than one commodity. For example, farming activities may produce both livestock and crop products, or the fishing industry may produce both fish and processed fish products. Reading down the column of the commodity account shows how much of each commodity is supplied by domestic activities (the detailed SAM will show this for each activity or industry) and how much is imported from the Rest of the World (ROW). There are two additional entries in this column:

- Trade margin, which is the difference between the price received by the producer and the price paid by the purchaser. This difference is the 'mark-up' added by wholesale or retail traders. Similar margins for transportation from producer to purchaser and other associated services (insurance) are also included, reflecting the cost of moving a product from the producer (or, in the case of imports, from the border) to the purchaser.
- Taxes less subsidies on products include taxes like the fuel levy or import tariffs on specific products.

The sum of this column is the total supply of commodities available in the economy, valued at the prices purchasers pay. Reading across the row shows the uses for all commodities: as inputs to domestic production activities, and to final users including households, government, investment and ROW (exports). Total use of commodities is equal to total supply.

The activity accounts show production by domestic industry: across the activity account rows, the amount of each commodity an industry supplies, down the activity account column, the cost of production which includes the inputs required for production, 'factor inputs' and taxes on production.

Factor accounts. Factor accounts consist of factor inputs to production: labour, capital, and rent on property. Labour is often disaggregated into several types by occupation, skill level or other characteristics. Income to capital often distinguishes the gross operating surplus (GOS) of formally organised enterprises from the surplus earned by the self-employed, which is called 'mixed income.' The earnings of the self-employed, such as farmers, are called 'mixed income' because the surplus of sales revenue over input costs includes both a payment for their own labour as well as a payment for capital inputs. It is difficult to impute the labour cost, so the national accounts simply leaves the surplus as mixed income. SAMs that focus on labour may attempt to disaggregate mixed income into its two parts (EC, 2003). Some factor income is earned abroad and some payments must be made to the ROW for external factors used in the domestic economy.

Institution accounts. There are three major categories of institutions: households, enterprises and government. Households obtain income (across the row) by supplying labour as a factor in production, but also receive transfers from other households, from government, from ROW, and distributed earnings (interest and dividend payments) from enterprises. The expenditure of households (down the column) includes purchases of goods and services for consumption, transfers made to other households, taxes paid to government, remittances to ROW and savings.

Enterprises receive income from factor markets for the capital they provide and use the income by distributing it to households and ROW, paying taxes, and saving (retained earnings). Government receives income from various kinds of taxes and transfers from ROW, which include development assistance; like the other institutions, government uses its income for purchases of goods and services, transfers, and saving.

Capital account. The capital account consists of Savings across the row and expenditures for Investment down the column.

Rest of the World account. The economy's interactions with ROW is represented in the last row and column. Income is obtained by ROW from sales of imports (of goods, services and factors) to the domestic economy; ROW spends income in the domestic economy from its purchase of Namibia's exports, the use of Namibian factors of production (labour and capital), transfers and foreign net borrowing/lending which constitutes the balance of payments.

2.2 Main data sources and the Macro SAM

A SAM is highly data-intensive and requires integration of data collected by many different agencies, often collected for different purposes and not always directly compatible. A major activity is to adjust the data from different sources so they are compatible, an issue discussed in greater detail in section 3.1.

The major data sources used to construct a SAM are listed below along with general comments on their coverage and availability. A more detailed discussion follows in the next section of this report.

- *Integrated, or consolidated, National Accounts:* fully integrated accounts are not regularly published by the CBS but can largely be constructed from available data
- *Supply and Use Tables (SUT):* these tables cover the commodity and activity accounts described above. A fully detailed SUT has never been estimated for Namibia; only row and column totals have been calculated as part of a consistency check for the national accounts, and there has been no attempt in the CBS to balance row and column totals. A major activity of the SAM project has been to collect data to develop a Supply and Use Table for Namibia, and to balance them.
- *Disaggregated commodity trade data:* these data are available from CBS and the Bank of Namibia.

- *Taxes and subsidies*: taxes and subsidies on products and production are provided in the national accounts. Detailed trade taxes are not published but can be provided by the Ministry of Finance.
- *Surveys and Censuses of Agriculture*: extensive information about agricultural production levels is available from the Ministry of Agriculture, Water and Rural Development, the Namibian Agronomic Board, and other institutions, although mainly limited to the commercial sector.
- *Surveys and Censuses of Manufacturing and Services, Mining, and Fishing*: CBS used data from the 1994 Census of Manufacturing to establish benchmark figures for industry output and value-added in the national accounts, and these are still used for many sectors of the economy. CBS also carries out quarterly and annual surveys of output and value-added of selected manufacturing and service industries, usually the large companies that are likely to maintain good financial records. A mining company survey is carried out annually for the national accounts by the Ministry of Mines and Energy. It surveys the large companies that account for most of the activity. A survey of fishing companies is also carried out annually. Service industries are mostly not included, although some figures are obtained from the tourism sector organizations such as the Namibia Tourism Board and Hospitality Association of Namibia. An extension of the CBS Manufacturing survey to service industries is planned for the future.
- As a general observation, most data collection efforts (except for the fishing company survey) tend to focus on larger companies and do not have an established mechanism for identifying new companies and incorporating them in the survey sample over time. Small scale and informal business is not surveyed, although the national accounts attempts to include some of these activities by applying a 'raising factor' to survey data.
- *Employment surveys*: The Ministry of Labour has carried out several labour force surveys (LFS), the latest in 2004. The LFS provides some information about formal and informal employment, based on the International Labour Organisation (ILO) definition of informal employment.
- *Survey of Labour Costs*. A Wage Survey was carried out in 2003. The survey had major problems and the data could not be used. This remains a major weakness of the SAM—data for total labour costs are provided in the national accounts and in industry surveys, but no data about the disaggregation of labour income by occupation or skill level is available. Even the government, the largest private employer, was not able to provide this data.
- *Namibia Household Income and Expenditure Survey*: the first NHIES was done in 1993-1994 and a new one for 2003/2004 became available in 2007. At the aggregate level, this NHIES appears more plausible than the first—it accounts for approximately 80% of private consumption estimated independently for the National Accounts. The 1993/94 NHIES accounted for less than half of private consumption. There are some questions about the 2003/2004 NHIES, notably concerning the share of expenditures for food (roughly 20%), which is very low for a country at this level of per capita average income.

In all countries, the most important data sources for constructing a SAM are the detailed Supply and Use Table and the NHIES (or a Household Budget Survey). In Namibia, the NHIES is available, but no SUT is available. Missing data for the SUT has been estimated using a number of methods described in the next section: direct industry surveys by the SAM project, use of data from surveys undertaken for other studies, experts' judgement, and 'borrowing' structural relationships from other economies which are expected to be similar. The resulting Macro SAM is shown in Figure 2. It differs somewhat from the published national accounts—GDP is 3.3% higher—for reasons that will be discussed in Section 4.

The Macro SAM is shown below.

Figure 2 Macro SAM for Namibia, 2004 (millions of N\$)

		2004 CURRENT ACCOUNTS						CAPITAL	ROW			
		PRODUCTION ACCOUNTS		GENERATION of INCOME		SECONDARY DISTRIBUTION OF INCOME, Institutions						
		1. Activities	2. Products	3. 1 Compensation of employees	3.2 Gross Operating Surplus	4. Households (+ NPISH)	5. Enterprises	6. Govt	7. Capital Account	8. Rest of World	9. Total Incomes	
CURRENT ACCOUNTS	PRODUCTION ACCOUNTS	1. Activities	66,239							66,239		
		2 Products	32,116			22,723		9,027	8,834	17,207	89,908	
	PRIM. GEN. Of INC.	3. 1 Comp. of employees	14,198							56	14,253	
		3.2 GOS	19,675							1,427	21,102	
	Institutions	4. Households+N(I SH)			14,154	2,001	333	7,953	2,110		26,551	
		5. Enterprises				18,256			1,275		19,531	
		6. Govt	250	3,567			2,762	2,129		4,371	13,079	
	7. Capital Account						733	9,449	478		-1,826	8,834
	8. Rest of World			20,102	100	845			189			21,235
9. Total Expenditures		66,239	89,908	14,253	21,102	26,551	19,531	13,079	8,834	21,235		

3. The Namibian SAM: Methodology and Data Sources

For policy analysis, a more detailed SAM is required than the Macro SAM presented in the previous section. This section summarises the approach taken to constructing the SAM 2004.

The detailed SAM disaggregates the macro SAM accounts into many sub-components, which are shown in Table 1 (the classification scheme for each account of the SAM is provided in Appendix 1). The classification emphasises the importance of agriculture and associated food processing activities to the economy. There are 4 agricultural products and farming activities, and 4 processed food products and activities. Originally, we had hoped to disaggregate agriculture into 15 products and farming activities, but no data were available, and there were insufficient funds for the necessary surveys. We had also anticipated separating Diamond cutting, which is becoming an important industry in Namibia. It is currently included in Wood products, furniture and miscellaneous manufacturing. In 2004, the diamond cutting industry was just getting started, and even today, little reliable information is available. CBS includes diamond cutting companies in its survey of manufacturers, but the data received require cleaning and further consultation with the companies before they can be used. Finally, although tourism is not a separate sector in the national accounts, a dummy sector was created for Foreign Tourism because of its importance to the economy¹.

Note that there are two more commodities than manufacturing industries. These extra commodities represent products not manufactured in the Namibian economy: petroleum products and the purchase by Namibian residents of products abroad. Purchases abroad include estimates of purchases by business travellers, government staff and Namibian tourists travelling abroad.

The Factor accounts distinguish skilled and unskilled labour, as well as 3 categories of Mixed Income and Gross operating surplus. There is no information in the national accounts about informal activities.

The Institution Accounts distinguish 6 categories of households: urban and rural, distinguished by main source of income. For urban households, the main sources of income include

- Wages & salaries in cash
- Business and commercial agriculture
- Other, mainly pensions and cash remittances

For rural households the main sources of income include:

¹ The creation of a dummy sector is described below in Section 3.2.

- Wages & salaries in cash
- Business and commercial agriculture
- Subsistence farming, pensions, cash remittances and other sources

**Table 1
Components of the detailed SAM**

Component	SAM 2004
Commodities (32 + Trade margins)	4 Agricultural products 4 Processed food products 22 Other products, manufactured and services 2 Foreign tourism (by residents overseas, and by non-residents in the Namibian economy) Trade margins
Activities (30)	4 Agricultural activities 4 Food processing 21 Other manufacturing & services Foreign tourism
Factors of production (5)	Skilled labour Unskilled labour Mixed income in Commercial Agriculture Mixed Income in Traditional Agriculture Gross operating surplus
Institutions (9)	NPISH Enterprises Government 6 Households: Urban (3) Rural (3)
Capital (1)	Savings (row) & Investment (column)
Rest of World (1)	Imports (row) & Exports (column)

3.1 Methodology: “top-down” versus “bottom-up” approach

In constructing a SAM, a choice must be made about whether to take a “top-down approach” or a “bottom-up approach.”² The top-down approach takes macroeconomic totals from the national accounts for industry production, household consumption, etc., and uses them as the row and column sums of the SAM. The challenge then becomes one of disaggregating the rows and columns so that they match the sums.

These row and column totals remain fixed during the construction of the SAM - they are used as control totals - and the individual cells in the rows and columns are then estimated by applying some distribution of totals derived from sources outside the national accounts. In many developing countries, SAMs have been estimated fairly quickly (in a matter of weeks or months) by applying distributions obtained from other countries. The resulting inconsistencies - that is, the row and column sums are no longer equal - are eliminated by applying a mechanical balancing process to the entire

² This discussion is based mainly on European Commission (2003), Keuning and deRuijter (1998), and Thorbecke (2001).

matrix. The two most common methods are the long-established RAS method (Bacharach, 1970) and the more recent 'cross-entropy' method developed by Sherman Robinson and his colleagues (Robinson *et al.*, 1998).

The top-down approach depends on two important assumptions: the accuracy of the control totals from the national accounts (or other sources), and the accuracy of the external data used for distribution of row and column totals. The accuracy of both sets of factors can vary enormously across different components of the SAM. Regarding control totals, national accounts totals for the output of activities like the mining industry may be quite accurate when only a few large companies are involved because it is relatively easy to measure the volume and value of output. On the other hand, the output of transportation services or business services is likely to be much more difficult to measure because the physical output is not always well defined and these services are provided by many small operators, making surveys expensive. Hence these column totals may not be very accurate.

Regarding distribution of column totals, it is common to apply industry input cost coefficients from one country to the total output of the same industry in the target country. Whether the input coefficients of one country accurately reflect those of another depends on many factors, including similarity of product mix and technology, relative prices of inputs, age of the industry, etc.

The bottom-up approach to constructing a SAM draws more extensively on primary data and undertakes adjustment of inconsistencies by further research into all data for the SAM rather than a mechanical balancing. In this approach, one returns to the primary data from which the national accounts were constructed to review its accuracy. In addition, new data may be collected. If the new data are considered more reliable or more comprehensive, all the figures from the national accounts may be adjusted to be consistent with the new data. Inconsistencies are not adjusted by means of a mechanical balancing tool - rather, inconsistencies are met with more research into a sector to resolve the discrepancies. This approach is preferable where there are large discrepancies between the primary data and the national accounts. Small, remaining discrepancies can be resolved by routine balancing methods. (This point is discussed more thoroughly in Thorbecke, 2001).

A Handbook on SAMs by the European Commission discusses the advantages and disadvantages of both approaches:

Top down approach

Advantages: SAM can be constructed quickly, at low cost with relatively little data or capacity

Disadvantages: It is often not possible to justify the resulting detailed SAM, discrepancies between the SAM and the actual economy are hidden, and problems with the macro control totals cannot be corrected. If discrepancies are large, the SAM becomes less reliable for policy analysis

Bottom-up Approach

Advantages: SAM is a better representation of the real economy, inconsistencies can be identified and resolved, national accounts can be improved by researching inconsistencies

Disadvantages: time-consuming and resource intensive (based on EC, 2003, p. 92)

Summarising, the Handbook points out the choice between a top-down and bottom-up approach is essentially balancing a trade-off between speed/cost and accuracy. While the bottom-up approach results in a more accurate SAM - highly desirable for policy applications with the SAM - it is also more time consuming and expensive to construct a SAM in this manner. Clearly, every SAM must weigh tradeoffs between the level of resources that can be put into construction of a SAM and the desired level of accuracy.

Why not just use the top-down approach in Namibia? The starting point for the top-down approach is accepting row and column totals, in particular, totals for products and activities from the national accounts. However, there are several reasons to question the reliability of these totals, at least for some goods and services. The supply and use in the national accounts do not balance - published national accounts are provided by using a mechanical balancing method, but there has never been an investigation into the discrepancies between supply and use for individual commodities and industries.

A detailed supply and use table, which would help improve the national accounts, has never been constructed for Namibia. Furthermore, there has been no overhaul of many of the benchmarks for compiling the national accounts since the mid-1990s, 10 years ago. The benchmark figures for output and value-added in many industries as well as commodity supply are still based on the 1994 Census of Manufacturers; growth may be based on indirect measures such as population growth or an arbitrarily assigned growth factor. There are no regular, comprehensive surveys of service industries, including major ones like trade, construction, transportation, hotels and restaurants. Survey data are very limited and there is no monitoring system to ensure that new companies are added to the surveys. Informal activities are not surveyed. Early SUTs constructed by the SAM project and a SAM put together for a training course revealed large inconsistencies at the industry and commodity level in the national accounts - large enough to warrant further investigation rather than mechanical balancing, especially as one of the objectives of the SAM project is to improve the accuracy of the national accounts.

Because the SAM is entirely new to most Namibian policy-makers, accuracy and the ability to justify the SAM are high priorities. Very little macroeconomic modelling has been undertaken in Namibia, and no multi-sectoral, meso-level modelling has been done before, so policy-makers and other potential users of the SAM need to be convinced of the reliability of the SAM. For this reason, as well as the weaknesses of the national accounts, a bottom-up approach is preferred. However, it was not possible, nor was it necessary, to undertake large-scale primary data collection for all components of the SAM. For the Namibian SAM, a combination of bottom-up and top-

down approaches was used. The combination approach tends to minimise the disadvantages while maximising the advantages.

In this combined approach, some new data were assembled directly from primary sources or were collected through surveys, and all the data in the national accounts were reviewed. The data from the national accounts were initially taken for some sectors as control totals, and adjusted as necessary. Data taken as control totals included those available from the national accounts or NHIES that were considered either 1) reasonably reliable, 2) too expensive to replace through primary data collection, and/or 3) not likely to be critical for the policy applications to which the SAM would be put. The combined approach allowed for feedback and research into discrepancies. Discrepancies are resolved not through mechanical balancing techniques, but through an investigative process of consultation with experts and research to learn more about the economy. This approach improves both the SAM and the national accounts. The remaining discrepancies are resolved through mathematical balancing.

3.2 Data sources

The data sources are summarised in this section.

3.2.1 Commodity and activity accounts

The commodity and activity accounts constitute an important component of the SAM and are described in some detail. We begin with the first set of accounts for the SAM, the supply of commodities. For each of the commodities, there are 4 possible entries: the amount of a commodity supplied by a domestic industry, import of commodities, trade margins and taxes on products. Initially, all figures were obtained from the national accounts except traditional agriculture, some food processing and textile products for which other sources were used. Figure for other commodities were revised during the course of reconciling inconsistencies.

Significant discrepancies in the National Accounts were found for marketing margins, taxes on products and imports—the amounts for each product did not sum to the total figure used in the national accounts.

Discrepancies between supply and use:

- Marketing margins, 6%
- Taxes on products, 16%
- Imports, 5%

For the 2004 SAM, we kept the totals in the National Accounts were used and the discrepancy distributed among products.

The second set of accounts contains the accounts for intermediate consumption - the purchase of goods and services by industries as inputs for production - as well as

value-added, which includes factors of production and taxes less subsidies on production. Much of the data collection and revision efforts of the SAM project focused on these accounts.

For almost all industries, the industry value-added and *total* intermediate consumption from the National Accounts was used. The challenge was to disaggregate total intermediate consumption. For Agriculture, Fishing and Mining, survey and other data sources were used. For some Manufacturing and Service sectors, surveys provided the structure of intermediate consumption. But for other industries, the SAM relied, at least in part, on 'borrowed' input structures from the South African SUT for 2002. As described below, for some sectors (e.g., Beverages and other food processing) there was some information from the national accounts about major inputs to production - mainly as inputs from agriculture or imports. For these sectors, the major input was used, and the remaining inputs distributed using the South African SUT coefficients. Table 2 summarises the major data sources; each component is discussed in more detail below.

Table 2 Major data sources for supply and use accounts of the SAM

	Surveys and other data	South African SUT	COMBINATION: Major inputs from Namibian national accounts + SA SUT
Agriculture	x		
Fishing	x		
Mining	x		
Meat processing, Fish processing	x		
Grain milling	X		
Other manufacturing	Part	Part	Part
Electricity and Water	X		
Services		X	
Government	X		Part: Intermediate consumption of 7 major items from annual government reports were further disaggregated based on the South African SUT

Agriculture

The SAM divides agricultural activities into four subsectors producing four agricultural products:

Agricultural Products	Agricultural Activities
Cereal crops	Cereal crop farming, commercial
Grapes, horticulture, and other crops	Commercial farming of grapes, horticulture and other crops
Commercial livestock	Livestock farming, commercial
Food for own consumption	Traditional agriculture

This classification of products and activities differs somewhat from the one used in the national accounts. The national accounts distinguish only two agricultural activities:

- commercial agriculture producing crops and livestock
- own-account agriculture (also called communal agriculture, subsistence agriculture), which includes all agricultural activity and home production taking place in communal areas. The primary product of this activity is food for own consumption.

The SAM agricultural classifications are not based on land tenure, i.e., whether farming takes place on land under commercial or communal tenure. Rather, commercial livestock agriculture is defined as farming oriented primarily toward production of animals for sale, regardless of where it occurs. Traditional agriculture is defined as farming primarily for household food security and non-market reasons; this occurs exclusively in communal areas. The Ministry of Agriculture is encouraging traditional farmers in communal areas to increase their market-oriented farming, and there were some indications that a number of farmers are doing so. An estimate of market-oriented cattle production in communal areas was included as part of commercial livestock farming in the preliminary SAM. However, a brief survey carried out by the SAM team recently in the northern communal areas revealed that this phenomenon is much smaller than expected.

Surveys undertaken for the 2002 SAM discovered underestimates of commercial agricultural activity in the National Accounts, particularly in the horticultural sector for grapes and vegetables, but these were corrected in the 2004 National Accounts. A major data collection effort was undertaken for the 2002 SAM. For intermediate consumption and labour costs, surveys were administered for grapes and livestock. For other farming activities, secondary sources were used (see Appendix 2 for major secondary sources). Gathering of data from administrative and secondary sources, design and administration of surveys, and interpretation of the data relied mainly on the expert opinion of our main agricultural consultant, Mr. Jürgen Hoffmann. We did not have the resources to repeat this data collection effort, and used the structural coefficients developed in 2002 for the 2004 SAM.

Commercial Crop Farming: the value of output and the cost of inputs were estimated separately for the following products, distinguishing irrigated from dryland production:

Maize: White, dryland

White, irrigated
 Yellow, dryland
 Wheat, irrigated
 Lucerne, irrigated
 Sunflower, dryland
 Groundnuts, dryland
 Cotton, irrigated
 Cotton, dryland
 Grapes, irrigated
 Other horticultural products, irrigated

The general methodology was to estimate input costs and the value of output on the basis of hectares planted. Input costs per hectare are multiplied by total hectares planted to get total costs for each crop, j :

$$C_j = c_j \times H_j$$

C is total N\$ of inputs of product j (including labour)

c is the N\$ of input of product j per hectare planted

H is total hectares planted for crop j

Note: When figures were not provided for 2002, price indexes were applied to convert them to 2002 prices.

Costs and yield were calculated separately for irrigated and dryland production.

The value of output is obtained by multiplying actual output in tons (or other physical unit) times its unit price in N\$ in a given year.

$$X_j = p_j \times O_j$$

X is the total N\$ value of output of crop j

p is the N\$ unit price of the crop j

O is total output in tons

These figures for each crop were then aggregated into the two commercial farming activities in the SAM.

Commercial Livestock Farming. Commercial livestock farming includes the following subsectors:

Commercial cattle farming south of VCF

Market-oriented cattle farming north of VCF

Commercial small stock farming south of VCF

Dairy farming

Other livestock: pigs, poultry, ostrich, seals, game, etc.

The value of output is measured as the offtake of animals plus changes in inventories, the method currently used in the national accounts³. Input costs for the major livestock sectors are calculated on the basis of inputs per head of livestock and herd size. In the commercial livestock sector, herd size and offtake are obtained from administrative records; inputs per animal were obtained from survey data and secondary sources.

Traditional Agriculture. The estimate of traditional or communal agriculture is still based on the 1993/94 NHIES, increased every year by a raising factor. The data from the 2003/2004 NHIES have not yet been incorporated in the National Accounts. However, since we are using the 2003/2004 NHIES for household consumption it was essential to have estimates of production by communal agriculture that matches this. We estimated output of this sector from the 2003/2004 NHIES, based on consumption in-kind. Output was 38% higher than that recorded in the National Accounts, and most of this difference was due to a higher production and use of firewood. Other studies of wood use in Namibia supported the higher use of firewood found in the 2003/2004 NHIES (Barnes *et al.*, 2005).

Fishing and Fish processing

The figures in the national accounts for output and value-added for these two activities were used in the SAM. For intermediate consumption, information from the annual survey of fishing companies, carried out by the Ministry of Fisheries and Marine Resources, was used.

Mining

The Ministry of Mines and Energy carries out an annual survey of the major mining companies, which is used to provide data to the national accounts for output and value-added. For 2004, the SAM project appended to this survey a supplemental questionnaire about detailed intermediate consumption; these data were used to disaggregate intermediate inputs to production in Mining (as well as Metal processing, which is integrated with several mining activities in Namibia).

Manufacturing and Services

³ Offtake as a measure of output has the advantage of being very simple: sales volume and value are readily observable and, for formal markets, regularly monitored and reported. However, the method recommended by the System of National Accounts for representing the output of livestock intended for sale that are reared for more than 1 year is 'work in progress'. This approach treats livestock as an inventory, which is only later sold. This method is more complicated than the offtake method; it is not yet used in the national accounts.

For all Namibian manufacturing and service industries, the data about output, value-added, and total intermediate consumption from the national accounts were initially taken as control totals. The remaining task is to disaggregate total intermediate consumption by product. In terms of information available about industry input structure, industries are divided into three categories:

1. Industries for which full information about detailed input structure was available from surveys
2. Industries for which partial information about inputs was available from the national accounts
3. Industries for which no information is available about input structure from the national accounts or Namibian surveys

In the first case, the information from industry surveys is converted into percentage shares of commodities used as intermediate inputs. These shares, the structure of production, are then applied to the total intermediate consumption from the national accounts. Only a few manufacturing industries make use of survey or administrative data: *Meat processing, Grain milling, Metal processing, Electricity and Water utilities*. Other industries were surveyed, but often refused to provide data. Ironically, while many countries face difficulties in carrying out surveys because of the large number of companies that must be covered, Namibia faces difficulties because of the small number of companies in some industries, such as Beverages and Textiles, in which a single company may dominate the industry.

In the second case, the national accounts may be able to provide information for the most important input to an industry, for example, milk inputs to Dairy. This figure was used, and the remaining products in intermediate consumption were distributed in the same proportion as those in the corresponding South African industry. This was done in Fish processing, for example, where the input of fish was provided by the Ministry of Fisheries to the National Accounts. Fish inputs accounted for 81% of all intermediate inputs; the remaining 19% was disaggregated using the figures from the South African SUT.

In the third case, for industries for which no information about detailed input structure is available, the distribution of intermediate inputs from the SA SUT was applied to total intermediate consumption in the Namibian national accounts. The amount of a given product, i , purchased by Namibian industry j , or T_{ij}^N , is calculated as the product of intermediate consumption of industry j in Namibia, IC_j^N , and the share of product i in the total intermediate consumption of the corresponding South African industry, s_{ij}^{SA} .

$$T_{ij}^N = s_{ij}^{SA} IC_j^N$$

$$IC_j^N = \sum_{i=1}^n T_{ij}^N$$

where

$$s_{ij}^{SA} = \frac{T_{ij}^{SA}}{IC_j^{SA}}$$

Two adjustments were made when the input structure from South Africa is used to estimate the inputs to Namibian industries:

- In the South African SUT, only one agricultural commodity input is represented. The industries for which agricultural inputs are most important, food processing, had additional information from the national accounts which allows identification of the detailed agricultural input. The allocation of agricultural inputs to other industries was determined by experts' judgment on a case-by-case basis.
- Inputs of Coal, crude petroleum and natural gas must be redistributed to other energy sectors. Namibia's use of coal is limited to metal processing and some electricity production in cases of power disruptions. Namibian industry does not use crude petroleum or natural gas. The share of coal, crude petroleum and natural gas input from the SA SUT was reallocated to purchases of refined petroleum products.

Table 3 shows the method that was used for each of the manufacturing and service industries in the Namibian SUT. Estimates of intermediate consumption were based on the most detailed level of classification for industry which could be obtained; these were then aggregated to the SAM classification.

Table 3 Sources used to estimate intermediate inputs by industry

	Surveys and other data	South African SUT	SA SUT combined with major inputs from Namibian national accounts
Meat processing	X		Livestock inputs
Fish processing			Fish inputs
Grain milling	X		
Manufacture of beverages		x	
Manufacture of other food products		x	
Manufacture of textiles and leather goods		x	
Manufacture of wood; other manufacturing		x	
Manufacture of paper; printing and publishing		x	
Manufacture of chemicals		x	
Rubber, plastic products manufacture		x	
Man of other non-metallic mineral products		x	
Manufacture of basic metals	x		
Manufacture of fabricated metal products, Machinery		x	
Electricity supply	Part	Part	Imports of electricity
Water supply	Part	Part	
Construction		X	
Wholesale and retail trade; repairs		X	
Hotels and restaurants		X	
Transport and storage		X	
Communications		X	
Banking, Insurance		X	
Real estate activities		x	
Business service activities		x	
Sewage and refuse disposal, etc.		x	
Other community, etc. services		x	

Government Services

Government services consist of Central and Local Government, accounting for roughly 95% and 5%, respectively of total government expenditures. The figures in the national accounts for output, value-added, and total intermediate consumption are considered quite accurate because they are obtained from administrative records. The only issue is the disaggregation of intermediate consumption into detailed goods and services. For Local government, the detailed financial records of the municipality of Windhoek were used. For Central government, the Ministry of Finance reports annual expenditures on goods and services in *State Revenue Fund: Estimate of Revenue and Expenditure for the Financial Year*. The purchase of goods and services is disaggregated into 7 main categories: Travel and subsistence allowance, Materials and supplies, Transport, Utilities, Maintenance expenses, Property rental and related charges, Other services and expenses. While some of these categories could be

readily allocated to commodities in the Namibian SAM (e.g., Transport, Property rental), others were disaggregated according to the South African SUT.

Tourism

Full representation of tourism requires construction of Tourism Satellite Accounts, for which there is not sufficient data at this time (the Ministry of Environment and Tourism is considering the construction of Tourism Satellite Accounts later this year). Creation of a 'dummy sector' is a commonly used method to represent an activity of interest, when that activity may not correspond to an actual industry. All national accounts, for example, create a dummy sector for owner-occupied housing, although it is not an actual market where transactions take place.

There is no tourism industry in the national accounts; rather, tourism consists of a combination of several activities and products, dominated by accommodation, restaurants, and transportation services. However, given the importance of tourism to the economy, it is useful to create a dummy industry to represent tourism explicitly. The national accounts include an estimate of the total value of foreign tourism, represented as "the purchase of products in the Namibian economy by non-residents;" which amounted to N\$2,749 million in 2004. Only the total amount of foreign tourism spending is given in the national accounts, not the values for specific goods and services that foreign tourists have purchased. In the SAM, the composition of foreign tourism purchases was estimated from a report by the Ministry of Environment and Tourism.

There is no estimate of the value of domestic tourism at this time.

3.2.2 Factor accounts

The primary generation of factor income by activity was partially discussed in the previous section. Total compensation of employees is provided by the National Accounts and these figures were used, except as mentioned above. The disaggregation of Compensation of employees into skilled and unskilled labour is presently based on the ratios of skilled and unskilled labour by industry in the South African SAM. The number of employees by skill level for Namibia can be calculated from the Labour Force Survey (LFS), but there is no reliable information about earnings by occupation or skill level.

There are several other remaining entries in the SAM for factor accounts:

Factor incomes payable and receivable abroad: these are obtained from the national accounts. It is assumed that all labour income payable and receivable is skilled labour.

Distribution of mixed income from commercial agriculture: this is split among rural and urban households who, in the 2001 Census, identified their primary

source of income as commercial agriculture. Urban households relying mainly on commercial agriculture engage only in livestock farming.

Distribution of mixed income from traditional agriculture: this factor payment is distributed to households whose primary source of income is subsistence agriculture.

Distribution of GOS: GOS is distributed to Enterprises.

Distribution of labour incomes: All compensation of employees is distributed to households. Information about major *sources* of household income is obtained from the NHIES and has been used to classify households, but the *quantity of income* received from each source is notoriously elusive and represents a serious challenge for most SAMs. The 2003/2004 NHIES has an income component but the results were not available by mid- 2008 for the SAM. We used similar distribution as the 2002 SAM which made use of information from the 1993/94 NHIES and other data sources

Skilled labour income: taxes are paid only on annual incomes above N\$24,000, which is typically more than an unskilled worker would earn (LaRRI, 2004), so it was assumed that only households with skilled workers would pay taxes. It was further assumed that taxes were roughly proportional to earnings. Earnings of skilled labour were then distributed among households in proportion to the share of income taxes paid by households, as reported in the 1993/94 NHIES. Some categories of households were assumed to provide no skilled labour: those whose main source of income was subsistence farming, gifts and remittances, and pensions.

Unskilled labour income was distributed among households relying mainly on wages (urban and rural), subsistence farming, pensions, and gifts & remittances, assuming that households relying on business or commercial farming provided no unskilled labour. It was further assumed that households whose main source of income was subsistence farming, gifts & remittances, and pensions had virtually zero savings. For these households, an amount of unskilled labour income was allocated so that income matched (or was slightly higher) than expenditures. The remaining income from unskilled labour was divided between urban and rural wage earners: rural households earned the same amount from skilled and unskilled labour and the balance was allocated to urban wage-earning households, who earned somewhat more skilled labour income than unskilled. This is consistent with the LFS which reports more skilled workers in urban areas than in rural areas.

3.2.3 Institution accounts

Households: Expenditures by households were estimated using data from the 2003/2004 NHIES, taking the upper tail of the 90% confidence interval for average expenditure on each item by each household group. Total expenditures accounted for

roughly 80% of household consumption estimated in the National Accounts, so no further adjustments were made until we began the process of reconciling supply and use accounts.

- Taxes reported in the 2003/2004 NHIES were far less than those reported in government budget and the National Accounts. We used the total taxes paid by households reported in the national accounts and distributed them among households in proportion to.
- Inter-household transfers recorded in the NHIES were very low, much lower than the figure for 2002 based on the 1993/94 NHIES. The 2003/2004 figure did not appear credible, so we used the 2002 figure and increased it 5% annually to estimate transfers in 2004. Gifts were similarly distributed, based on NHIES data. Only net gifts are represented in the SAM, so it was assumed that only two categories of households received significant net gifts: those in both rural and urban areas that relied primarily on gifts, pensions and subsistence farming for income.
- Transfers to NPISH from households for church, and other social organizations were obtained from the 2003/2004 NHIES.

NPISH: Figures for this institution are taken from the national accounts, as there is no other information available

Enterprises: The major expenditures for this institution include the distribution of enterprise earnings, payments of taxes and savings (retained earnings). Payments of taxes are obtained from the national accounts. Distribution of enterprise earnings was made as a balancing item to cover household expenditures. It should be noted that enterprise earnings include mixed income of the self-employed, for which there is no estimate in the national accounts, so even relatively poor households may derive some income from enterprises.

Government: Its primary expenditure is the purchase of government services. Other figures for transfers to enterprises, households, payments to ROW, and savings are taken from the national accounts, based on the Ministry of Finance's annual report, *State Revenue Fund: Estimate of Revenue and Expenditure for the Financial Year*.

3.2.4 Capital account and Rest of World account

Figures for these two accounts are taken from the national accounts, except for the Balance of Payments, which is a balancing item in the SAM. The Capital account provides an estimate of investment (Gross Fixed Capital Formation) and changes in inventories by commodity. The estimates of changes in inventories in the national accounts are, except for livestock, considered rather crude; for two industries (mining and fishing/fish processing) with relatively limited interdependence with the rest of the economy.

There was a large discrepancy in the national accounts between supply and use of investment. Reported investment, N\$9.2 billion, was 20% higher than investment measured through commodity flows (use of commodities).

The capital account also includes sources of Savings, which have been discussed under the institutional accounts. The Balance of Payments represents Namibia's net savings with the Rest of the world. Because the BoP is a balancing item and the SAM differs slightly from the national accounts, the BoP will also differ from that reported in the published SAM. Differences with the published national accounts are discussed in Section 4.

Trade statistics provide merchandise imports and exports by detailed commodity; exports of a few products were adjusted when we had better data (e.g., table grapes, textiles, discussed below). These may be disaggregated in the final SAM by country of origin/destination for Namibia's main trading partners. The Bank of Namibia compiles statistics on trade in services as well as other financial transactions, which are included in the national accounts. The methods and data quality have not yet been examined in much detail. Given the importance of foreign tourism for the Namibian economy, some work on this sector is warranted.

3.2.5 Labour accounts

The SAM includes all monetary flows in the economy; payments for labour are included, but not the actual number of people employed. However, employment is a very important policy issue so the SAM was extended to include employment. Employment was based on the Labour Force Survey (LFS) of 2004, distinguishing skilled from unskilled labour.

3.2.6 Balancing the SAM

Even with good data for every component of the SAM, there would still be discrepancies between row and column totals. Discrepancies arise because of differences in the design and purpose of survey instruments, sampling errors, and other problems. In the SAM project, reconciliation of these discrepancies provides an opportunity to learn more about how the economy functions and to improve the national accounts, one of the major objectives of the SAM Project. In the course of constructing the SAM, it was clear that several major adjustments needed to be made. Consistency with the national accounts is important, so adjustments were made only where there was very strong justification. Once all the major adjustments were introduced, the small remaining discrepancies (under 5%) were balanced using RAS.

A number of issues were discovered during compilation of the 2002 SAM; some were corrected in the National Accounts while others still exist, and will only be addressed during the rebasing process. The major adjustments for the 2004 SAM include:

All agricultural production: the survey data and secondary sources provided a value-added component of output that was somewhat higher than the share assumed in the national accounts. The SAM used the figures from survey and secondary data sources.

Traditional agriculture: New figures from the 2003/2004 NHIES were used.

Beverages, Dairy and Other food processing: Figures for Beverages and Dairy are considered fairly accurate because there are a few major producers. Other food processing is not well measured; considering the products in this category which are manufactured domestically (mainly bread and other prepared foods) it appeared that the output of this industry was greatly overestimated; it was reduced in the SAM. The same problem was found in compiling the 2002 SAM. Since there were no changes to this part of the National accounts since then, it is not surprising to find this problem. Hopefully it will be addressed during the rebasing of the National Accounts.

Textiles: Although textiles may no longer be a very important industry in Namibia, in 2004 it was important. The figures for output and exports in the National Accounts were too low. We obtained more accurate figures based on the value of United States' imports of textiles from Namibia from the US government's trade statistics. Since most production took place under the US AGOA program, US imports represent most of Namibia's exports. This figure was used as a lower bound estimate of the output and export of the Textile industry in 2004.

Services. Services are notoriously difficult to measure. Two subsectors are particularly problematic in the Namibian National Accounts: Business services and Other social services.

Business services: When the 2002 SAM was compiled it was clear that Business services were greatly underestimated in the National Accounts. The 2002 SAM increased output of this industry, but this adjustment has not been reflected in the National Accounts. Consequently, the 2004 SAM must also adjust this sector upward.

In the national accounts, mineral exploration comprises 40% of Business services. The rest of Business Services is assumed to be growing at a constant annual rate of 2.5% from 1993, although it is not clear how the base year figure was derived. The 2.5% annual growth is slower than GDP growth; since it is highly likely that business services have been growing at least as fast, if not faster, than GDP, it seemed clear that the national accounts' estimate of Business services was too low and needed to be increased. Output was increased by 40%, which roughly satisfied the demand for Business services generated by the rest of the economy.

Other social services: The 2003/2004 NHIES indicated that the purchase of these services is significant and far higher than what is estimated in the National Accounts. Across all household groups, expenditures on funeral and funeral-related items accounted for 60% of purchases in this commodity group. Output of this industry was increased by 14% to reconcile with the NHIES data.

4. GDP for 2004 in the SAM and Published National Accounts

The revisions made for the SAM result in a different estimated of GDP for 2004, one that is higher than the published national accounts. These effects are summarised in Table 3. The contribution to GDP of Agriculture, Manufacturing and Services are somewhat higher than published figures; other figures are the same. The net effect is that GDP is 3.3% higher than the published figure. Because consistency with the national accounts was important, changes were introduced into the SAM very conservatively; it is likely that GDP is underestimated in other ways.

Table 4 GDP in 2004: estimates from the national accounts and the SAM (million N\$)

	National Accounts GDP	SAM GDP	SAM GDP minus NA GDP
Agriculture	1,873	2,149	276
Fishing	1,547	1,547	
Mining	3,489	3,489	
Manufacturing	4,001	4,065	64
Electricity & water	1,197	1,197	
Construction	1,100	1,100	
Services*	1,197	1,197	852
Taxes - subsidies on products	3567	3567	
GDP at Market prices	36,496	37,689	1,193
GDP % change			3.3%

* This includes adjustments for FISIM.

Note: Explanation of the differences between the SAM and the published national accounts is found in section 3.

5. Next Steps: Extending the SAM and Policy Applications

We undertook some primary data collection and policy analysis. However, more could be done in future in order to verify and update sectoral data. The SAM is largely confined to the areas covered by the National Accounts. There are several areas where it would be very useful for policy analysis to extend the SAM and these are described below. With the rebasing of the National Accounts, there is an opportunity to collect and introduce new data that will greatly improve the SAM.

5.1 Extending the SAM

Numerous data weaknesses have been identified in this report. Many of these weaknesses can be at least partially improved by data from surveys that are currently underway or being processed by CBS and other organizations. The following items are priorities for future work on a SAM:

Agriculture: more detailed representation of agricultural sectors, focusing on better representation of agriculture in the communal areas. The Namibia Agricultural Union began a survey of commercial farmers in 2008 that can provide this data. It will start to be available in 2009.

Industry Output and Input Structure: CBS carries out annual surveys of manufacturing industries, and is piloting surveys of services industries as well, but this information about industry output and value-added has not yet been systematically incorporated in the National Accounts. This information will greatly improve the data in the National Accounts and should be incorporated in the SAM. However, the survey data cannot be used in their present form because there has been no survey data cleaning or checking data for accuracy. Furthermore, there is no current comprehensive list of companies that can be used to scale up survey results.

Tourism is a rapidly growing and dynamic sector with many components. The basis for measuring tourism activities in the economy is a Tourist Exit Survey, but the last one was done in 2002 and urgently needs to be updated. It needs to collect much more detailed information about spending than has been collected in the past. Other countries in which tourism is economically important undertake a tourist exit survey every year or every two years. Furthermore, study is needed to relate the spending by tourists to production in the Namibian economy. These surveys are usually undertaken by the Ministry of Environment and Tourism for its own planning and management needs. But the survey should be done in close cooperation with CBS to ensure that results are consistent with the National Accounts.

Informal sector activities: There is currently no representation of the informal sector. Not only is GDP likely to be underestimated because of the missing

economic activity in the informal sector, but this information is critical for development and poverty alleviation—both monitoring and designing policies and programmes to deal with poverty.

Income distribution: The NHIES provided detailed information about household expenditures, but information about income was not available when the SAM was constructed. This is a critical component of the SAM. The 1993/94 NHIES did not provide any reliable information about the amount of income households received from different sources. It is hoped that when this information is available from the 2003/2004 NHIES, it will be of better quality and can be incorporated.

Wages and employment: We were not successful in obtaining information about wage payments by occupation or skill level in most industries, and had to rely on the shares of skilled and unskilled labour from the South African SAM. For employment, we used the 2004 Namibia Labour Force Survey. It would be very useful to develop a Labour SAM, as described in (European Commission, 2003), which would include comprehensive information about employment by occupation, gender, full-time and part-time, and wages.

Trade margins: the information about trade and transportation margins in the National Accounts is very sketchy and needs improvement through surveys.

Energy SAM: With the increasing importance of the energy sector, it would be quite useful to develop energy accounts, which include the use by all sectors of the economy of different forms of energy: electricity, petroleum products, biofuels and unconventional fuels. It would be possible to start building such a SAM in cooperation with Nampower and the Ministry of Mines and Energy.

5.2 The SAM: What caused the change in income distribution between 1993/94 and 2003/04?

The NHIES 2003/04 showed substantially reduced income inequality in Namibia. Is this a permanent change or just a temporary one? We can only answer that if we understand how different factors have contributed to this change. The change attributable to structural factors (e.g., the mix of goods & services produced, exported, and imported; the technology used in production; the relative shares of wages and profits, etc.) can be measured using a SAM.

5.3 The SAM, Vision 2030 and NDPs

The most far-reaching application is for analysis of Vision 2030. Vision 2030 is an excellent example of an attempt at integrated, cross-sectoral planning and the 2002 SAM was applied in a very crude way to assess the quantitative implications of Vision 2030 (Lange, *et al.*, 2004). The analysis revealed that there is a need for much more economic input into Vision 2030 if its objectives are to be achieved. It is also clear that

the foundation for Vision 2030 must be laid in the National Development Plans. The SAM can be of enormous assistance in this process, by addressing questions such as the following

Economic Growth and Poverty Reduction

- What sectors have the greatest impact on poor households?
- Will mining and fisheries activities continue to grow in the future? If not, what activities will replace these mainstays of the Namibian economy?
- How will HIV/AIDS affect labour supply & productivity? How will it affect household well-being?
- *Trade and Poverty Linkages:* What exports have the greatest poverty-reduction potential? How will Namibia be affected by trade liberalisation within SACU? What taxes should be raised to replace declining SACU tariff revenues?
- *Tourism and Poverty Reduction:* Tourism is one of Namibia's fastest growing exports and it has the potential to act as an engine of growth, but how much can it grow? How can high-value tourism be promoted? How much do local communities and poor households benefit from different types of tourism?
- *Gender, Education and Development:* What sectors create the greatest opportunities for women? What will be the labour demands in the future by occupation and by gender? What kind of education and training will future workers need?

Water, electricity, energy

- What are future demands likely to be and how can they best be met?

The SAM can make a major contribution toward improving the development process

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Appendix 1. Classifications in the SAM

A. PRODUCT ACCOUNT CLASSIFICATION

	Product Name	CPC Code
1	Commercial cereal crops	01a-01c
2	Other commercial crops and forestry	01, 03
3	Commercial livestock	02a-02c
4	Food for own consumption	02d
5	Fish	04
6	Mining	011-016
7	Meat and meat products	21a
8	Prepared and preserved fish	21b
9	Grain mill products	23a
10	Beverage, other food products and tobacco	21c, 22, 23b, 24, 25
11	Textiles; wearing apparel; leather; footwear	26-29
12	Wood and wood products; furniture; manuf. products n.e.c.	31, 38-39
13	Paper & publishing	32
14	Coke; petroleum products	33
15	Chemicals; rubber and plastic	34-36
16	Other non-metallic mineral products	37
17	Basic metals	41
18	Machinery and equipment	42-49
19	Electricity; electricity distribution services	17,69a
20	Water; water distribution services	18, 69b
21	Buildings and Civil engineering works	53,54
22	Trade services; repair services	61,62
23	Lodging; restaurant services	63
24	Transportation services	64-67
25	Communication	68,69
26	Finance and insurance	71
27	Services from own dwellings	72a
28	Real estate services; Business services	72b,73,81-83, 84b, 85-87
29	Other services	91-99
30	Government services	not in CPC codes
31	Purchases by residents abroad	
32	Purchases in Namibia by non-residents	

B. ACTIVITY ACCOUNT CLASSIFICATION

	Industry Name	ISIC Code
1	Commercial cereal crops	011a-011b
2	Other commercial crops and forestry	011c-011f
3	Commercial livestock	012
4	Traditional agriculture	013
5	Fishing	5
6	Mining	12-14

7	Meat and meat products	1511
8	Prepared and preserved fish	1512
9	Grain mill products	1531
10	Beverage, other food products and tobacco	pt. 15,155,
11	Manufacture of textiles, wearing apparel; leather; footwear	17-19
12	Manufacture of wood and furniture; Printing & publishing; manufacturing n.e.c.	20-22, 36
13	Manufacture of paper; printing and publishing	21-22
14	Manufacture of chemicals, rubber and plastic products	24-25
15	Man. of other non-metallic mineral products	26
16	Manufacture of basic metals	28
17	Manufacture of fabricated metal products and machinery and equipment n.e.c	29-35
18	Electricity supply	40
19	Water supply	41
20	Construction	45
21	Wholesale and retail trade; repair	50-52
22	Hotels and restaurants	55
23	Transportation	60-63
24	Communications	64
25	Financial intermediation	65-67
26	Owner-occupied dwellings	70a
27	Real estate activities; rental and business activities	70b-74
28	Social, community and personal services activities excl. government services	80-93, 95
29	Government services	
30	Foreign tourism	Dummy industry

C. FACTOR ACCOUNT CLASSIFICATION

Factor Input	
1	Labour, skilled
2	Labour, unskilled
3	Mixed income, commercial agriculture
4	Mixed income, traditional agriculture
5	Gross operating surplus

D. INSTITUTION ACCOUNT CLASSIFICATION

Institution	
Households	
1	Urban: wage & salaries in cash
2	Urban: business activities including farming
3	Urban: pensions, cash remittances and other sources of income
4	Rural: wage & salaries in cash

5	Rural: business activities & commercial farming
6	Rural: subsistence farming, pensions, cash remittances and other sources of income
Other institutions	
7	NPISH (Non-profit institutions serving households)
8	Enterprises
9	Government

E. OTHER ACCOUNTS

Accounts	
Taxes	
	Taxes on products
	Taxes on production
	Income and property taxes from households and enterprises
	Trade taxes included under SACU payment from ROW to Government
Capital accounts	
	1 account to represent saving and investment
ROW	
	1 account to represent imports and exports

Appendix 2. Major Secondary Sources of Data for Agriculture

Source	Study
Namibian Resource Consultants (2002) Study of the utilisation of GMO's	Study compared the input costs and yields of GMO and non-GMO crops and livestock for 2002
NAU, unpublished farm surveys. 2001	Surveys of input costs for commercial production of white maize, cotton for several years (1999-2001) in 2001 prices.
NAU, unpublished farm surveys. 2002	Surveys of input costs for commercial cattle farming, 2002
Namibian Resource Consultants (1996)	Assessment of the competitiveness of cereal production in Namibia compared to cereal production elsewhere in the region.
Development Consultants for Southern Africa (DECOSA). <i>The Prospects of Domestic Import Substitution in Various Agricultural Commodities</i> . Report to NDC and MAWRD, 2001	Surveys of current farming for horticultural crops, cereal crops, dairy and chicken.
J.I. Barnes, unpublished livestock enterprise models	Detailed farming enterprise models for livestock under different systems of production
Pro And Associates, International comparison of beef competitiveness.	Some data about input costs for livestock in 2001
MAWRD, Farm surveys for Caprivi, Kavango, Ohangwena, Omusati	Surveys of subsistence crop production and input costs by region in the years 1995-1999. Figures are given for 3 different systems of farming in each region, based on numbers of livestock.

Appendix 3. Namibian SAM 2004 (million N\$ in current prices)

A Social Accounting Matrix for Namibia, 2004

		Products																																Subtotal			
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	P31	P32				
Products	P1 Commercial cereal crops																																		-		
	P2 Commercial other crops																																			-	
	P3 Commercial animal products																																			-	
	P4 Traditional agriculture																																			-	
	P5 Fishing																																			-	
	P6 Mining																																			-	
	P7 Meat processing																																			-	
	P8 Fish processing																																			-	
	P9 Grain milling																																			-	
	P10 Beverages&other food proc																																			-	
	P11 Textiles																																			-	
	P12 Wood, Furniture, Misc																																			-	
	P13 Paper, printing																																			-	
	P14 Petroleum products																																			-	
	P15 Chemicals & rubber																																			-	
	P16 Non-metallic mineral prod																																			-	
	P17 Basic Metals																																			-	
	P18 Fabr metals, Machinery																																			-	
	P19 Electricity																																			-	
	P20 Water																																			-	
	P21 Construction																																			-	
	P22 Trade; repairs																																			-	
	P23 Hotels and restaurants																																			-	
	P24 Transport																																			-	
	P25 Communication																																			-	
	P26 Finance and insurance																																			-	
	P27 Real estate, own																																			-	
	P28 MktRealEst + BusServ																																			-	
	P29 Other private services																																			-	
	P30 Government services																																			-	
	P31 Direct purch. abroad by res																																			-	
	P32 Tourism-nonresident																																			-	
	Trade Margin	48	34	61	-	-	-	107	15	50	1,125	226	137	116	1,735	417	97	-	1,977	-	-	-	-	6,146										-			
	SUBTOTAL	48	34	61	-	-	-	107	15	50	1,125	226	137	116	1,735	417	97	-	1,977	-	-	-	-	6,146	-	-	-	-	-	-	-	-	-	-			
Activities	A1 Commercial cereal crops	123																																123			
	A2 Commercial Other crops		445																																445		
	A3 Commerc animal products			1,147																			59												1,207		
	A4 Traditional agri-culture				1,070																														1,070		
	A5 Fishing					839			1,718																										2,557		
	A6 Mining						7,807																												7,807		
	A7 Meat pro-cessing							943																											943		
	A8 Fish pro-cessing								1,584																											1,584	
	A9 Grain milling									686																										686	
	A10 Bev&other food proc										3,195																									3,195	
	A11 Textiles											871																								871	
	A12 Wood, Furniture, Misc												388																							388	
	A13 Paper; printing&publish													300																						300	
	A14 Chemicals, rubber, plastic																805																			805	
	A15 Other non-metal mineral prod.																	313																		313	
	A16 Manuf of basic metals																		1,020																	1,020	
	A17 Fabric. metal prod, Machin																			892																892	
	A18 Electricity																				1,034															1,034	
	A19 Water																					715														715	
	A20 Con-struction																						3,959													3,959	
	A21 Trade; repairs																							6,642												6,642	
	A22 Hotels and res-taurants																								1,441											1,441	
	A23 Transport																									3,401										3,401	
	A24 Commu-nication																										2,010									2,010	
	A25 Finance and insurance																												2,563							2,563	
	A26 Own Real estate																													1,748						1,748	
	A27 MktRealEst + BusServ.																																3,961			3,961	
	A28 Other private, soc. Services																																	2,161			2,161
	A29 Govern-ment services																																	9,649			9,649

		Products																										Subtotal								
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	P31	P32	Subtotal		
A26	Own Real estate																											1,748	-	-	-				1,748	
A27	MktRealEst + BusServ.																																		3,961	
A28	Other private, soc. Serv.																																		2,161	
A29	Govern-ment services																																		9,649	
A30	Tourism, foreign																																		2,749	
	SUBTOTAL	123	445	1,147	1,070	839	7,807	943	3,302	686	3,195	871	388	300	-	805	313	1,020	892	1,034	715	4,019	6,642	1,441	3,401	2,010	2,563	1,748	3,961	2,161	9,649	-	2,749	66,239		
Factors																																				
F1	Labour, skilled																																			
F2	Labour, unskilled																																			
F3	Mixed income, comAgr																																			
F4	Mixed income, Trad Agr																																			
F5	GOS																																			
	Subtotal																																			
Institutions																																				
I1	U-W&S																																			
I2	U-Bus																																			
I3	U-other																																			
I4	R-W&S																																			
I5	R-Bus-Frm																																			
I6	R-Subs-Oth																																			
I7	NPISH																																			
I8	Enterprises																																			
I9	Govt	9	37	38	-	-	367	59	14	-	970	203	55	44	278	170	15	-	717	-	-	-	15	216	-	-	-	-	356	5	-	-	-	3,567		
	Subtotal	9	37	38	-	-	367	59	14	-	970	203	55	44	278	170	15	-	717	-	-	-	15	216	-	-	-	-	356	5	-	-	-	3,567		
Capital																																				
K1	Saving																																			
ROW																																				
R1	Imports	111	445	24	-	12	106	244	-	15	1,753	1,257	900	566	1,790	2,286	434	479	6,729	128	-	60	-	-	780	102	135	-	1,119	-	-	625	-	20,102		
	TOTAL	291	961	1,271	1,070	851	8,280	1,353	3,332	751	7,043	2,557	1,481	1,027	3,803	3,678	860	1,499	10,315	1,162	715	4,079	510	1,657	4,182	2,111	2,699	1,748	5,435	2,165	9,649	625	2,749	89,908		

			Activities																														Subtotal		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30			
Factors	F1	Labour, skilled	1	11	18	-	148	878	18	103	23	94	35	45	46	39	23	79	79	165	62	175	765	33	250	173	103	-	203	432	2,217	-	6,219		
	F2	Labour, unskilled	4	43	70	-	566	434	25	141	31	128	49	34	35	33	22	54	60	56	65	87	895	169	428	178	93	-	169	493	3,617	-	7,979		
	F3	Mixincome, comAgr	84	263	799																													1,146	
	F4	Mixincome, Trad Agr				856																												856	
	F5	GOS					714	2,166	82	503	264	797	458	94	30	180	89	219	154	542	308	833	2,290	442	810	822	624	1,686	2,068	208	1,289	-	17,673		
	Subtotal		88	317	887	856	1,428	3,478	126	747	318	1,020	542	173	111	253	134	352	293	763	434	1,095	3,950	644	1,489	1,173	819	1,686	2,440	1,133	7,124	-	33,872		
Institutions	I1	U-W&S																																-	
	I2	U-Bus																																-	
	I3	U-other																																-	
	I4	R-W&S																																-	
	I5	R-Bus-Frm																																-	
	I6	R-Subs-Oth																																-	
	I7	NPISH																																-	
	I8	Enterprises																																-	
	I9	Govt																																-	
	Subtotal		-	-	1	-	119	11	0	3	-	5	-	-	-	10	-	-	-	-	-	5	35	9	9	-	-	62	72	-	70	-	250		
Capit K1	Saving																																-	-	
ROW R1	Imports																																	-	-
	TOTAL		123	445	1,207	1,070	2,557	7,807	943	1,584	686	3,195	871	388	300	805	313	1,020	892	1,034	715	3,959	6,642	1,441	3,401	2,010	2,563	1,748	3,961	2,161	9,649	2,749	66,239		

		Factors					Institutions									Capital	ROW	Total	
		F1	F2	F3	F4	F5	I1	I2	I3	I4	I5	I6	I7	I8	I9	K1	R1	Total	
Factors	F1	Labour, skilled															56	6,275	
	F2	Labour, unskilled																7,979	
	F3	Mixed income, comAgr																1,146	
	F4	Mixed income, Trad Agr																856	
	F5	GOS																1,427	
Subtotal																		1,483	19,100
Institutions	I1	U-W&S	5,110	6,920	-	-	12,031							1,646	-	1,646		13,677	
	I2	U-Bus	177	-	115	-	292							2,031	-	2,031		2,323	
	I3	U-other	-	-	-	-	-	9	2	-	4	1		751	329	1,097		1,097	
	I4	R-W&S	782	1,058	-	-	1,840							1,437	-	1,437		3,277	
	I5	R-Bus-Frm	106	-	1,031	-	1,137							683	-	683		1,821	
	I6	R-Subs-Oth	-	-	-	856	856	126	24	-	58	19		994	1,165	2,386		3,242	
	I7	NPISH	-	-	-	-	-	45	4	6	13	14	7	409	617	1,115		1,115	
	I8	Enterprises					18,256	18,256							1,275	1,275		19,531	
	I9	Govt					-	2,016	221	-	331	193	-	2,129	4,891		4,371	13,079	
Subtotal		6,175	7,979	1,146	856	18,256	34,411	2,196	251	6	407	227	7	10,081	3,385	16,562	-	4,371	59,161
Capital	K1	Saving						337	176	-	66	154	-	9,449	478	10,661		1,826	8,834
ROW	R1	Imports	100			845	944									189		189	21,235
TOTAL		6,275	7,979	1,146	856	19,100	35,355	13,677	2,323	1,097	3,277	1,821	3,242	1,115	19,531	13,079	59,161	8,834	21,235