STATISTICS NETHERLANDS
National Accounts
P.O.Box 4000, 2270 JM Voorburg
The Netherlands

AN INFORMATION-SYSTEM FOR ECONOMIC, ENVIRONMENTAL AND SOCIAL STATISTICS

integrating environmental data into the SESAME

Steven J.Keuning and Jolanda G.Timmerman*)

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Abstract

The 1993 SNA mentions that a Social Accounting Matrix (SAM) can also be extended to deal with environmental issues. This would yield an information system that integrates economic, social and environmental statistics, also called SESAME (System of Economic and Social Accounting Matrices and Extensions). This paper shows how environmental data and environmental indicators can be integrated into such a SESAME. An application to the Netherlands is also included. This application implies that the presently available National Accounting Matrix including Environmental Accounts (NAMEA) and Social Accounting Matrix (SAM) are continued into a Social Accounting Matrix including Environmental Accounts (SAMEA).

The Dutch case-study also shows the interrelations between e.g. the employment of various types of workers (by sex, by educational level) and the environmental problems caused by the activities in which they are employed. Moreover, this pollution is also allocated to the subsectors that receive all kinds of wages and salaries and other value added categories. This enables a comparison with the consumption-based pollution by subsector. Most importantly, the SAMEA yields a framework for an integrated analysis and modelling of social, economic and environmental issues.

Contents

1. Introduction

Some time ago, a System for integrated Environmental and Economic Accounting (SEEA) was presented in an interim Handbook (United Nations, 1993). At present, work is going on in several countries to implement this Handbook or parts thereof. Meanwhile, Statistics Netherlands has experimented with a so-called National Accounting Matrix including Environmental Accounts (NAMEA); see e.g. De Haan and Keuning (1995) and De Haan, Keuning and Bosch (1993). Such a NAMEA is now compiled annually and released as an integral part of the regular National Accounts publication in the Netherlands (e.g. CBS, 1994).

By now, the NAMEA has gained some international recognition. For instance, a recent official communication from the Commission of the European Communities to the Council and the European Parliament proposes "... to establish within 2-3 years a European System of Integrated Economic and Environmental Indices (ESI). The System - which will resemble the Dutch NAMEA system, but will be developed using a common European System of Environmental Pressure Indices (ESEPI) - will be available to Member States and the EU in 2-3 years time. It will need permanent updating." (Commission of the European Communities, 1994, p. 4).

The 1993 System of National Accounts (SNA) contains a chapter on Social Accounting Matrices (SAM); see United Nations et al. (1993: Chapter XX). That chapter indicates that a further extension, in the direction of a so-called System of Economic and Social Accounting Matrices and Extensions (SESAME), is both useful and feasible. In this context, it states: "This approach could equally well be followed when dealing with environmental issues" (para. 20.33). Recently, the SESAME-concept has been elaborated and applied in so far as a linkage of social statistics and social indicators to the national accounts is concerned (Keuning, 1994b and 1995 (forthcoming)).

This paper shows how environmental data and environmental indicators can also be integrated into the SESAME-framework. For this purpose, the

next section provides a concise general introduction to the SESAME, while section 3 contains an application to the Netherlands. In practice, this entails the integration of a NAMEA and a SAM that are already available. The final section lists applications that go beyond the possibilities of presently available accounting systems and gives some directions for further research.

2. A System of Economic and Social Accounting Matrices and Extensions[1]

A SESAME is a statistical information system in matrix format, from which a set of core economic, environmental and social macro-indicators is derived. The system is driven, to a large extent, by the kind of information required for monitoring and policy-making at the macro-level. Although it is impossible to capture socio-economic development in a single indicator, it is equally clear that a prime task of national statistical offices is to comprise the countless numbers they collect to a manageable, "executive" summary. Such a summary typically describes trends in main indicators. At the same time, for analytical purposes a more detailed data framework is required. Obviously, the communication between policy-makers and analysts is optimally served if the core macro-indicators are all derived from an integrated information system such as a SESAME.

SESAME applies the basic idea of present-day national accounts to a wider set of data. The national accounts provide an integrated and systematic account of an economy at the meso-level (industries, sectors, etc.), from which key economic indicators at the macro-level are derived. SESAME follows Stone's (1986) advice by extending this principle to a wider set of statistics, notably social and environmental accounts. This extension is achieved by using multiple classifications and multiple measurement units in a single information system. The use of multiple classifications is a useful feature of the SAM, which is an essential part of a SESAME. All other meso-data are linked, in one way or another, to the SAM (cf. Keuning, 1994a).

In order to achieve a linkage between monetary and non-monetary data, the SAM-values are broken down into price (changes) and volume (changes). The linkages with other data are thus typically established in non-monetary units such as hours, calories, Gigajoules and "volume" changes. In this way, the necessary connections are made without distorting the

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1. This section is based on Keuning (1995, forthcoming).

essentially monetary system of the national accounts.

A SESAME registers for all variables both the national total value and its distribution among socio-economic household groups, categories of employed persons, etc. As a next step, a range of summary indicators can be derived from such a data set (e.g. Gross Domestic Product, population size, (un)employment, inflation, balance on current account of the balance of payments, income inequality, environmental indicator(s), daily calorie intake of the poorest subgroup, average number of years of schooling). Consistent indices covering distributional aspects can also be derived for all variables included in the system. Whatever set of aggregates is preferred, they would all share two crucial features: first, every indicator is computed from a single, fully consistent statistical system, and secondly, each indicator uses the most suitable measurement unit for the phenomenon it describes. In essence, SESAME meets the concern expressed in a United Nations' (1977b) report: "It is recognized by all that it is not practicable to make a direct measure of the welfare of a community in monetary or in any other terms. The best that can be done is to measure a number of factors that are generally supposed to contribute to or detract from welfare, not forgetting that the distribution of the aggregate among individuals may be as important from the welfare point of view as the aggregate itself."

The interaction between the design of a meso-level information system and the derivation of a set of core economic, social and environmental macro-indicators is a distinguishing feature of a SESAME. Thus a SESAME does not squeeze all welfare attributes into a single indicator as in e.g. Eisner (1989), Uno (1992) and the United Nations' (1993) Handbook on Environmental Accounting. This implies that a SESAME is a *statistical* framework, and not the (implicit) result of a model simulation. The only methodologically sound method to impute a money value to "goods" or "bads" that in reality were free of charge is a so-called "what-if" simulation. In other words, how would the economy have functioned if these benefits or costs had actually been paid. Such a modelling exercise should take into account the repercussions of such a hypothetical situation on the actual transactions. Simply subtracting imputed costs

from NDP yields an inconsistent figure, and the same applies to the addition of imputed benefits.

A SESAME extends the central framework of the 1993 System of National Accounts (SNA) (United Nations et al., 1993) by integrating the meso-data and the concomitant macro-indicators for e.g. (un)employment, educational attainment and environmental degradation. The scope of the United Nations' (1975) System of Social and Demographic Statistics (SSDS) is generally much broader, but its linkage to aggregate economic and environmental indicators is less explicit.

Finally, the main difference with the data base approach followed in a United Nations' (1979) publication is that the SESAME provides a fully consistent, analytical framework, analogous to Input-Output tables and SAMs.

3. A Social Accounting Matrix including Environmental Accounts (SAMEA) for the Netherlands

At present, both a 1990 SAM and a 1990 NAMEA are available for the Netherlands; refer to Timmerman and Van de Ven (1994), and De Haan and Keuning (1995), respectively. This section integrates these two frameworks, so that, for instance, the relationship between emissions of various pollutants and employment of workers of both sexes and seven skill levels can be analyzed. The same applies to e.g. the relationship between the use of natural resources and the income distribution.

First, an aggregate Social Accounting Matrix including Environmental Accounts (SAMEA) is shown in Table 1. This framework is almost the same as the aggregate NAMEA; refer to De Haan and Keuning (1995; Table A2). As in the NAMEA, the environmental accounts (accounts 13-15) in the SAMEA do not express transactions in money terms but include information on the environment as it is observed in reality: that is in physical units.

For a discussion of Table 1, it is referred to De Haan and Keuning (1995; section 2). The only difference with the aggregate NAMEA presented there relates to the SAMEA-breakdown of the Distribution and Use of Income Account into three subaccounts. This serves to provide a better insight into the income distribution and use by household subsector. Neither these subaccounts nor household subsectors are distinguished in the NAMEA.

The additional information contained in the SAMEA, in comparison with the NAMEA, is only revealed in the detailed tables. For instance, wages and salaries by branch of industry, as shown in the Generation of Income Account, are broken down by sex and by seven educational levels. Concomitantly, full-time equivalent employment by branch of industry has also been subdivided by these labour categories. This enables an analysis of the relationship between the remuneration of each labour category and the pollution that is caused by the economic activities in which they are employed. By way of illustration, Table 2 shows the contribution of each labour category to total employment, the wage bill and five major

Table 1: Consolidated Social Accounting Matrix including Environmental Accounts for the Netherlands, 1990 (account 1-12 in million guilders)

ACCOUNT (classification)		Goods and services (Product groups)		Consumption of households (Purposes) Environment	Other purpos	Production (Branches of industries)	Generation of income (Primary input categories)	Primary distribution of income (Institutional sectors)	Secondary distribution of income (Institutional sectors)	Use of disposable income (Institutional sectors)	Capital	Tax account (Categories of taxes and subsidies) Environmental	Other taxes
		1.a	1.b	2.a	2.b	3	4	5	6	7	8	10.a	10.b
Goods and services (Product groups)		Trade and transport margins		Consumption of households		Intermediate consumption				Consumption of government	Gross capital formation		
Environmental cleansing services	1.a			24	-	5174				1228			
Other goods and services	1.b	-	-	693	302379	477664				73567	113406		
Consumption of households (Purposes)										Consumption of households			
Environment	2.a									717			
Other purposes	2.b									302379			
Production	3	Output, basic prices											
(Branches of industries)		6342	946428										
Generation of income (Primary input categories)	4					Gross Domestic Product, factor cost						VAT not handed over to the government	
						466663						1614	
Primary income distribution (Institutional sectors)	5						Net National Generated Income factor cost	Property income				Taxes less subsidies on production	
							409770	205490				1428	46562
Secondary income distribution (Institutional sectors)	6							Net National Income, market prices	Unrequited current transfers n.e.c.			Taxes on income and wealth and social contribution	
								457129	237425			2030	175220
Use of disposable income (Institutional sectors)	7								Net Disposable National Income				
									453876				
Capital	8						Consumption of fixed capital			Net National Saving			
							58230			75980			
Financial balance	9										Net Lending of the Total Economy		
											18550		
Tax account (Categories of taxes and subsidies)		Taxes less subsidies on products				Other taxes less subsidies on production			Taxes on income and wealth and social contributions		VAT on land and other levies on investment		
Environmental taxes	10a		609			819			2030				
Other taxes	10b	84	44584			2450			174283		1054		
Rest of the world (ROW) (Current)	11	Import of goods and services (cif)					Compensation of employees to ROW	Property income to RO	Unrequited curre transfers to ROW			Taxes paid to the rest of the world	
		255830					1130	50090	13700			130	
Rest of the world (ROW) (Capital)	12										Unrequited capital transfers to ROW		
											2090		
Substances (CFCs and halons in 1000 kg, gas in pj, oil in tj and other substances in million kg)						Absorption of substances in production							
CO2	13a												
N2O	13b												
CH4	13c												
CFCs and halons	13d												
NOx	13e												
SO2	13f												
NH3	13g												
P	13h												
N	13i												
Waste	13j					2829							
Gas	13k					2310							
Oil	13l					150							
Global environmental themes											Environmental Indicators		
Greenhouse (GWP)	14a										182591		
Ozone Depletion (ODP)	14b										4756		
National environmental themes													
Acidification (AEQ)	15a										160		
Eutrophication (EEQ)	15b										294		
Waste production (KG)	15c										22890		
Natural resource depletion (PJ)	15d										7438		
TOTAL		Supply, purchasers' prices		Consumption of households		Input, basic prices	Allocation of generated income	Destination of quid-pro-quo income	Destination of secondary income	Current expenditure	Capital expenditure	Taxes less subsidies and social contribution	
		6426	1247450	717	302379	948960	469130	712710	881320	453880	135100	3458	223522

	Rest of the world (ROW) (Current)	Rest of the world (ROW) (Capital)	Substances (CFCs and halons in 1000 kg, gas in pj, oil in tj and other substances in million kg)												Global environmental themes		National environmental themes				TOTAL
			CO2	N2O	CH4	Halons	NOx	SO2	NH3	P	N	Waste	Gas	Oil	Green-house effect	Ozone layer depletion	Acidi-fica-tion	Eutro-phica-tion	Waste	Natural resource depletion	
	11	12	13a	13b	13c	13d	13e	13f	13g	13h	13i	13j	13k	13l	14a	14b	15a	15b	15c	15d	
1.a	Exports of goods and services (fob)																				Use, purchasers' prices 6426
1.b	279740																				1247450
2.a			Emission of pollutants from households 33919	2	3	800	164	6	-	15	120	6783									Final consumption of households 717
2.b																					302379
3			Emission of pollutants from industries 124579	59	690	5331	394	202	213	163	1258	18936									Output, basic prices 948960
4	Compensation of employees from ROW 850																				Generated income 469130
5	Property income from ROW 49460																				Quid-pro-quo income 712710
6	Unrequited current transfers from ROW 9510																				Secondary income 881320
7																					Disposable income 453880
8		Unrequited capital transfers from ROW 890	Other changes in natural resources										9748	-							Capital income 135100
9		Net lending of the rest of the world -18550																			-
10a	Taxes received from the rest of the world																				Taxes less subsidies and social contri-*butions* 3458
10b	1070																				223522
11			Trans boundary pollution from the rest of the world				96	111	27	20	417										Current payment to the rest of the world 320880
12	Balance of payment of the rest of the world -19750																				Capital flows to the rest of the world -17660
	Trans boundary pollution to the rest of the world														Allocation to global environmental themes		Allocation to national environmental themes (Immission of substances)				Destination of substances
13a															158498						158498
13b															61						61
13c															693						693
13d																6131					6131
13e	492																162				654
13f	164																155				319
13g	110																130				240
13h	25																	173			198
13i	584																	1211			1795
13j																			22890		25719
13k																				7438	9748
13l																				-150	
14a																					Theme-equiva-lents (global) 182591
14b																					4756
15a																					*Theme-equiva-*lents (national) 160
15b																					294
15c																					22890
15d																					7438
	Current receipts from the rest of the world 320880	Capital flows from the rest of the world -17660	Origin of substances 158498	61	693	6131	654	319	240	198	1795	25719	9748	-	Theme-equivalents (global) 182591	4756	Theme-equivalents (national) 160	294	22890	7438	

Table 2: Contribution to GDP, employment and environmental themes per primary input category, 1990

PRIMARY INPUT CATEGORIES	Gross Domestic Product (factor cost)	Total employ-ment (full-time equivalents)	ENVIRONMENTAL THEMES: Greenhouse effect (GWP)	Ozone layer depletion (ODP)	Acidifi-cation (AEQ)	Eutrophi-cation (EEQ)	Accumulation of waste (mln KG)
	in % of total employed persons						
Male with basic education	7	8	9	10	10	12	12
Male with lower general secondary education	4	4	3	4	4	4	4
Male with higher general secondary education	12	14	16	17	19	24	19
Male with lower vocational education	3	3	2	3	2	2	2
Male with middle vocational education	28	27	36	33	36	35	33
Male with higher vocational education	13	9	13	14	11	7	10
Male with university training	8	5	5	7	4	4	5
Female with basic education	2	3	2	1	1	2	2
Female with lower general secondary education	2	3	1	1	1	1	1
Female with higher general secondary education	3	5	3	2	3	3	2
Female with lower vocational education	1	2	1	1	1	1	1
Female with middle vocational education	9	11	5	4	5	4	5
Female with higher vocational education	5	5	2	2	2	1	2
Female with university training	2	1	1	1	1	-	1
Male with low education	27	28	31	34	36	42	38
Male with high education	49	41	55	55	51	45	48
Female with low education	8	13	6	5	6	7	6
Female with high education	16	18	8	6	7	5	8
Total	100	100	100	100	100	100	100
	in % of total primary input categories						
Total wages and salaries	49	100	38	52	27	19	47
Employers' social contributions	8	-	6	8	4	3	8
Operating surplus/mixed income (gross)	43	-	57	40	68	78	45
Total	100	100	100	100	100	100	100

environmental problems. The latter proportions have been computed by allocating, first, the pollution equivalents per environmental problem to the substances that cause these problems, secondly, the pollution equivalents by substance to the economic activities that emit these substances, and finally, the pollution equivalents by economic activity to the primary input categories that generate the value added in these activities.

Table 2 provides an indication for the type of labour that might benefit or suffer from a shift in economic structure towards less polluting activities. For instance, it appears that women are typically working in industries that burden the environment less. They make up 24% of the wage bill and 31% of employment, but account for only 11-14% of the environmental stress equivalents. To some extent, the same applies to men with lower secondary -vocational or general- education (accounting for 7% of wages and employment, and 5-7% of the pollution) and men with a university degree (accounting for 8% of the wage bill, 5% of total employment and 4-7% of the problems). On the other hand, a relatively large share of the environmental problems is caused by activities that employ relatively many men with middle-level education (higher general secondary, and middle vocational education). Their share in the wage bill equals 40%, in employment 41%, and in the stress equivalents by theme 50-59%. Evidently, these differences are closely related to the representation of each labour category in services, which contribute relatively much to GDP and relatively little to the environmental themes incorporated in the SAMEA (cf. Tables A1 and A2 in the Appendix).

The bottom of this table shows that the contribution of operating surplus and mixed income to GDP is lower than their contribution to most of the environmental problems. In particular, this applies to eutrophication, which is predominantly caused by an activity with many self-employed, i.e. agriculture. An exception to this rule is ozone layer depletion, which is associated with two manufacturing industries with a comparatively high share of compensation of employees in value added.

The SAMEA also contains the allocation of these value added categories to institutional subsectors, including ten household groups. This means that the above allocation of pollution units to primary input categories can be taken one step further, so that the contribution of each subsector is revealed. This is done in Table 3. In this table the contribution of each subsector to total population, Gross National Generated Income and the five environmental themes are presented. In the first instance, the allocation of these latter proportions revealed a weakness of the SAMEA: the classifications were too aggregated. Among other things, the SAMEA did not distinguish between operating surplus and mixed income, which led to an anomalous result. The present Dutch SAMEA meets this latter shortcoming, by disaggregating the item operating surplus/mixed income (gross) in six categories: corporate operating surplus, four mixed income categories and a category for the "net rental value of owner-occupied housing". By means of the allocation of pollution units to these more disaggregated primary input categories, and the allocation of this extended set of value added categories to the institutional subsectors, the correct contributions of each subsector to the five environmental problems could be computed.

It appears from table 3 that in most cases the contribution of the corporate sector to the environmental problems surpasses its contribution to national income. However, this does not apply to the environmental theme eutrophication. The whole household sector contributes 80% to this problem and 70% thereof can be ascribed to self-employed agricultural households. Moreover, the farmers also accounted for a very large share (50% of all households) of the acidification problem and, to a less extent (19%), of the greenhouse effect. As mentioned before, the ozone layer depletion is associated with two manufacturing industries; see table A2. These industries have a relatively high share of wages and salaries in value added and thus the main part of the ozone layer depletion is allocated to the employees' household groups (77% of the household sector's total). The self-employed engaged in "other" activities (including manufacturing) also contribute a fair part (18%) to this environmental problem.

Table 3: Contribution to GNGI, population and environmental themes per institutional (sub)sector, 1990

			Total population	Gross National Generated Income (factor cost)	Total employment (full-time equivalents)	ENVIRONMENTAL THEMES				
						Greenhouse effect (GWP)	Ozone layer depletion (ODP)	Acidification (AEQ)	Eutrophication (EEQ)	Accumulation of waste (mln KG)
			in % of all sectors							
Corporations			-	26	-	39	27	31	20	31
General government			-	1	-	1	1	1	1	1
Households			100	73	100	60	72	68	80	68
Total			100	100	100	100	100	100	100	100
			in % of all household groups							
HOUSEHOLDS	Wages and salaries	Single-person	5	9	10	7	8	5	3	8
		Multi-person without children	22	36	39	31	35	20	12	35
		Multi-person with children	37	34	32	30	34	19	11	33
	Mixed income	Agriculture and fishery	2	4	1	19	-	50	70	6
		Trade, restaurants, repair	2	4	8	1	1	1	-	1
		Business and pers. serv.	2	6	3	3	1	2	1	4
		Other and property income	2	3	4	7	18	3	2	10
	Transfer income	Age	15	2	1	1	1	1	-	1
		Other	12	1	2	1	1	1	-	1
	Other		2	-	-	-	-	-	-	-
	Total		100	100	100	100	100	100	100	100

For the rest, it is not surprising that the households with transfer income are hardly involved in polluting production.

Table 3 has now allocated the pollution caused by production to household subsectors. The same can be done for the pollution caused by consumption. In the SAMEA, household subsectors' consumption of various categories of goods and services is grouped according to consumption purpose. Next, the emission of substances is shown per consumption purpose. The rationale behind this "detour" is, first, that the classification of consumption purposes can be made more homogeneous qua emissions than the general classification of goods and services; for, the general product classification also serves to distinguish between various kinds of production, capital formation, exports, and so on. Secondly, product groups are often not a suitable entry for policy. For instance, in the SAMEA presented in this paper, consumption expenditures for motor fuel, passenger cars and (car) repair services have been combined into the consumption purpose "private transport". This grouping presupposes that e.g. an energy levy would affect not only motor fuel consumption but also expenditures on cars and car repair services. Such effects can then be simulated with a SAMEA-based model.

Table 4 shows preliminary results of such an allocation of consumption-based pollution to household subgroups.[2] A striking result is that, in contrast with all other households, the contribution of employees' households to the acidification problem surpasses their share in total consumption. Almost all the acid emissions caused by household consumption can be attributed to the use of private transport; see table A3. Next, as table A4 demonstrates, the share of employees' households in the use of private transport is analogous to their contribution to the acidification problem, from the consumption side.

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2. Only three consumption purposes have been distinguished. The item "other purposes" is a jumble of all kinds of goods and services and therefore the emissions associated with this purpose cannot be properly allocated. Consequently, the distribution of emission substances associated with "other purposes" among household groups is proportional to the distribution of the heterogeneous item "other purposes" among household groups.

Table 4: Contribution to final consumption expenditure, population and environmental themes per household group, 1990

			Total population	Household consumption	ENVIRONMENTAL THEMES				
					Greenhouse effect (GWP)	Ozone layer depletion (ODP)	Acidification (AEQ)	Eutrophication (EEQ)	Accumulation of waste (mln KG)
			in % of total households						
HOUSEHOLDS	GROUPS	Wages and salaries	Single-person	4.6	7.4	7.6	7.3	7.9	7.4	7.3
			Multi-person without children	22.1	28.1	30.3	27.5	32.8	28.5	27.6
			Multi-person with children	36.9	27.9	28.9	27.7	30.0	28.2	27.7
		Mixed income	Agriculture	1.9	1.7	1.6	1.7	1.5	1.6	1.7
			Trade, restaurants, repair	1.9	1.8	1.6	1.8	1.4	1.8	1.8
			Business and pers. serv.	2.3	2.9	2.8	3.0	2.6	2.9	3.0
			Other and property income	2.0	1.9	1.7	1.9	1.5	1.8	1.9
		Transfer income	Age	14.5	16.9	15.9	17.2	14.8	16.7	17.1
			Other	11.9	9.5	8.4	9.8	7.2	9.3	9.8
		Persons in institutions		1.8	1.9	1.1	2.1	0.3	1.8	2.1
		Total		100	100	100	100	100	100	100

Contrasting their minimal share in the polluting *production*, "aged" households contribute a significant part to the pollution caused by *consumption*. Furthermore, the contribution of households with other transfer income (12% of total population) to the accumulation of waste (9.8% of all households) surpasses their modest share in total household consumption (9.5%).

4. Conclusions and Applications

The SAMEA presented above has demonstrated the feasibility of integrating economic, environmental and social statistics into a single information system. Combining a SAM and a NAMEA provides more insight into the relationships between the stress put on the environment, on the one hand, and (un)employment and the income distribution, on the other hand. Above, a straight-forward allocation of pollution caused by production and consumption to subsectors has been shown. The production-caused environmental problems have been allocated to the subsectors on the basis of their share in the income generated by each economic activity. An alternative approach might start from the proposition that production-based pollution should also be allocated to the categories of demand that are satisfied by this production. Because the SAMEA is a matrix framework, a simple Leontiev-type analysis can then be applied to compute the direct and indirect effects on the environment of the consumption pattern by household group.

The SAMEA contains only statistics. In addition to the monetary national accounts, this concerns physical data on e.g. environmental pressure and employment. This information system yields consistent and undisputed core indicators on these issues. In addition to its monitoring function, the SAMEA can be used as a data framework for all kinds of modelling, including all conventional macro-economic simulations. All simulations with SAMEA-based models yield consistent projections for both economic and environmental and (some) social indicators. A common usage of such models would have far-reaching implications: the consequences of intended policies for environmental pressure are then always incorporated, not only for those policies that directly affect the environmental debate, but also for all other policies. In other words, if regular macro-models, that are now based on the purely monetary national accounts, are extended so that the SAMEA-type information is used, generated and presented, the environmental consequences of all intended (fiscal, monetary) policies are automatically taken into account. This can only be achieved if the summary indicators that result from the model simulations are

a) derived from an underlying analytical framework, and

b) not themselves based on bold and heavily debated modelling assumptions.

The present paper is only the starting-point for a really comprehensive information system. First of all, a time-series of SAMEAs should become available. Besides, more details should be added. Particularly, the number of consumption purposes and of production activities should be enlarged, in order to increase the realism of the implicit homogeneity assumptions in analyses. Further, although the SAMEA provides a good insight into the (distribution of the) costs of environmental policies, it does not yet show the benefits.

In order to identify the incidence of environmental pressure, the present SAMEA already distinguishes between global and national environmental themes. For the former themes it may be assumed that each citizen is equally affected, so that the benefits of any reduction in environmental pressure would be distributed in the same way. For the other themes, it is necessary, and perhaps also sufficient, to subdivide the environmental theme equivalents and the labour and household groups by region. The classification of regions should be such that they are fairly homogeneous qua environmental burden. Any subsequent analysis will then show both the immediate costs, in terms of less income or higher unemployment, and the benefits, in terms of less environmental pressure, of all kinds of environmental policies. For an analysis of the possible longer-term economic benefits of more stringent environmental policies, the SAMEA should provide more details on the origin and destination of capital formation. The SAM for the Netherlands already offers these ideas; refer to Timmerman en Van de Ven (CBS, 1994).

Other subjects for further research are: first, a more complete coverage of social issues and concomitant indicators, and secondly, the incorporation of balance sheets and changes therein; refer to the SEEA. The former subject has been tackled to some extent by Kazemier and Exel (1992), in so far as time use is concerned, and by Keuning (1995) concerning demographic and educational variables. At the moment, Statistics Netherlands is developping a SESAME which extends the SAM with socio-demographic data.

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Statistical Annex

Table A1: GDP at factor cost by primary input category and by industry, 1990

			Agriculture forestry and fishing	Mining and quarrying	Food, beverage and tobacco-processing industry	Manufac-turing	Paper and printing industry	Petroleum industry	Chemical, rubber and plastic-processing industry	Public utilities	Construc-tion	Other services	Transport and storage	Environ-mental cleansing services	Total
			3.a	3.b	3.c	3.d	3.e	3.f	3.g	3.h	3.i	3.j	3.k	3.l	Column 3
			in % of total wages and salaries												
		Male with basic education	4.1.a	13	7	17	12	8	4	9	5	16	4	14	14	7
		Male with lower general secondary education	4.1.b	4	2	6	4	5	1	4	2	3	3	7	3	4
P		Male with higher general secondary education	4.1.c	28	14	18	21	14	10	14	14	31	7	23	10	12
R		Male with lower vocational education	4.1.d	2	2	2	2	5	2	3	1	1	3	4	2	3
I	C	Male with middle vocational education	4.1.e	35	28	33	34	38	46	33	51	41	24	30	23	28
M	A	Male with higher vocational education	4.1.f	3	25	8	13	8	26	16	19	4	14	9	2	13
A	T	Male with university training	4.1.g	2	16	2	5	3	3	10	2	1	11	2	1	8
R	E	Female with basic education	4.1.h	2	-	3	1	1	-	1	1	-	2	-	12	2
Y	G	Female with lower general secondary education	4.1.i	1	-	2	1	2	1	1	1	-	3	1	4	2
	O	Female with higher general secondary education	4.1.j	4	-	4	2	2	1	2	2	-	4	1	11	3
I	R	Female with lower vocational education	4.1.k	1	2	1	1	2	-	1	1	-	2	1	1	1
N	I	Female with middle vocational education	4.1.l	4	3	4	3	6	6	4	3	1	12	4	18	9
P	E	Female with higher vocational education	4.1.m	1	1	2	1	3	-	2	2	-	7	2	-	5
U	S	Female with university training	4.1.n	-	-	-	-	1	-	1	-	-	2	-	-	2
T		Total		100	100	100	100	100	100	100	100	100	100	100	100	100
			in % of GDP												
		Wages and salaries	4.1	14	5	48	59	54	23	46	32	58	52	54	67	49
		Employers' social contributions	4.2	2	1	8	9	9	4	7	3	14	9	8	13	8
		Operating surplus/mixed income (gross)	4.3+4.4	84	94	44	32	38	73	47	65	27	39	38	20	43
		GROSS VALUE ADDED/GDP (factor costs)	Row 4	100	100	100	100	100	100	100	100	100	100	100	100	100

Table A2: Detailed presentation of the ORIGIN of substances (account 13) in the SAMEA of 1990

		CO2	N2O	CH4	Halons	NOx	SO2	NH3	P	N	Waste	Gas	Oil
		14a	14b	14c	14d	14e	14f	14g	14h	14i	14j	14k	14l
		in % of total											
PRODUCTION													
Agriculture, forestry and fishing	3a	6	56	76	-	8	1	99	83	89	6		
Mining and quarrying	3b	1	-	10	-	1	1	-	-	-	7		
Food, beverage and tobacco-processing industry	3c	3	-	-	-	3	1	-	1	-	11		
Manufacturing	3d	9	-	-	44	8	10	-	6	2	6		
Paper and printing industry	3e	1	-	-	-	1	-	-	-	-	2		
Petroleum industry	3f	9	-	-	-	5	35	-	-	-	-		
Chemical, rubber and plastic-processing industry	3g	18	29	-	53	11	12	1	10	2	16		
Public utilities	3h	31	-	12	-	19	22	-	-	2	3		
Construction	3i	2	-	1	-	6	1	-	-	1	20		
Other services	3j	9	2	-	2	16	1	-	-	2	14		
Transport and storage	3k	7	3	-	-	20	11	-	-	2	11		
Environmental cleansing services	3l	3	10	1	-	1	2	-	-	-	4		
Total		100	100	100	100	100	100	100	100	100	100		

Table A3: Contribution of household consumption purposes to environmental themes, 1990

		ENVIRONMENTAL THEMES					
		Household consumption	Greenhouse (GWP)	Ozone layer depletion (ODP)	Acidifi-cation (AEQ)	Eutrophi-cation (EEQ)	Accumulation of waste (mln KG)
		in % of total purposes					
PUR-	Environment	-	-	-	-	-	-
PO-	Private transport	9	48	-	90	18	2
SE	Other	91	52	100	10	82	98
	Total	100	100	100	100	100	100

Table A4: Final consumption expenditure by purpose and by household group, 1990

				PURPOSES			
				Environ-ment	Private transport	Other	Total
				2a	2b	2c	
				in %			
		Wages and	Single-person	8	8	7	7
		salaries	Multi-person without children	34	33	27	28
H			Multi-person with children	31	30	28	28
O							
U	G	Mixed	Agriculture and fishery	1	1	2	2
S	R	income	Trade, restaurants, repair	2	1	2	2
E	O		Business and per.serv.	3	3	3	3
H	U		Other and property income	2	1	2	2
O	P						
L	S	Transfer	Age	13	15	17	17
D		income	Other	6	7	10	10
		Persons in institutions		-	-	2	2
		Total		100	100	100	100

Statistics Netherlands
National Accounts Occasional Papers

NA/01 Flexibility in the system of National Accounts, Van Eck, R., C.N. Gorter and H.K. van Tuinen (1983).
This paper sets out some of the main ideas of what gradually developed into the Dutch view on the fourth revision of the SNA. In particular it focuses on the validity and even desirability of the inclusion of a number of carefully chosen alternative definitions in the "Blue Book", and the organization of a flexible system starting from a core that is easier to understand than the 1968 SNA.

NA/02 The unobserved economy and the National Accounts in the Netherlands, a sensitivity analysis, Broesterhuizen, G.A.A.M. (1983).
This paper studies the influence of fraud on macro-economic statistics, especially GDP. The term "fraud" is used as meaning unreporting or underreporting income (e.g. to the tax authorities). The conclusion of the analysis of growth figures is that a bias in the growth of GDP of more than 0.5% is very unlikely.

NA/03 Secondary activities and the National Accounts: Aspects of the Dutch measurement practice and its effects on the unofficial economy, Van Eck, R. (1985).
In the process of estimating national product and other variables in the National Accounts a number of methods is used to obtain initial estimates for each economic activity. These methods are described and for each method various possibilities for distortion are considered.

NA/04 Comparability of input-outp+1x-1Yput tables in time, Al, P.G. and G.A.A.M. Broesterhuizen (1985).
It is argued that the comparability in time of statistics, and input-output tables in particular, can be filled in in various ways. The way in which it is filled depends on the structure and object of the statistics concerned. In this respect it is important to differentiate between coordinated input-output tables, in which groups of units (industries) are divided into rows and columns, and analytical input-output tables, in which the rows and columns refer to homogeneous activities.

NA/05 The use of chain indices for deflating the National Accounts, Al, P.G., B.M. Balk, S. de Boer and G.P. den Bakker (1985).
This paper is devoted to the problem of deflating National Accounts and input-output tables. This problem is approached from the theoretical as well as from the practical side. Although the theoretical argument favors the use of chained Vartia-I indices, the current practice of compilating National Accounts restricts to using chained Paasche and Laspeyres indices. Various possible objections to the use of chained indices are discussed and rejected.

NA/06 Revision of the system of National Accounts: the case for flexibility, Van Bochove, C.A. and H.K. van Tuinen (1985).
It is argued that the structure of the SNA should be made more flexible. This can be achieved by means of a system of a general purpose core supplemented with special modules. This core is a fully fledged, detailed system of National Accounts with a greater institutional content than the present SNA and a more elaborate description of the economy at the meso-level. The modules are more analytic and reflect special purposes and specific theoretical views.

NA/07 Integration of input-output tables and sector accounts; a possible solution, Van den Bos, C. (1985).
The establishment-enterprise problem is tackled by taking the institutional sectors to which the establishments belong into account during the construction of input-output tables. The extra burden on the construction of input-output tables resulting from this approach is examined for the Dutch situation. An adapted sectoring of institutional units is proposed for the construction of input-output tables.

NA/08 A note on Dutch National Accounting data 1900-1984, Van Bochove, C.A. (1985).
This note provides a brief survey of Dutch national accounting data for 1900-1984, concentrating on national income. It indicates where these data can be found and what the major discontinuities are. The note concludes that estimates of the level of national income may contain inaccuracies; that its growth rate is measured accurately for the period since 1948; and that the real income growth rate series for 1900-1984 may contain a systematic bias.

NA/09 The structure of the next SNA: review of the basic options, Van Bochove, C.A. and A.M. Bloem (1985).
There are two basic issues with respect to the structure of the next version of the UN System of National Accounts. The first is its 'size': reviewing this issue, it can be concluded that the next SNA should contain an integrated meso-economic statistical system. It is essential that the next SNA contains an institutional system without the imputations and attributions that pollute the present SNA. This can be achieved by distinguishing, in the central system of the next SNA, a core (the institutional system), a standard module for non-market production and a standard module describing attributed income and consumption of the household sector.

NA/10 Dual sectoring in National Accounts, Al, P.G. (1985).
Following a conceptual explanation of dual sectoring, an outline is given of a statistical system with complete dual sectoring in which the linkages are also defined and worked out. It is shown that the SNA 1968 is incomplete and obscure with respect to the links between the two sub-processes.

NA/11 Backward and forward linkages with an application to the Dutch agro-industrial complex, Harthoorn, R. (1985).
Some industries induce production in other industries. An elegant method is developed for calculating forward and backward linkages avoiding double counting. For 1981 these methods have been applied to determine the influence of Dutch agriculture in the Dutch economy in terms of value added and labour force.

NA/12 Production chains, Harthoorn, R. (1986).
This paper introduces the notion of production chains as a measure of the hierarchy of industries in the production process. Production chains are sequences of transformation of products by successive industries. It is possible to calculate forward transformations as well as backward ones.

NA/13 The simultaneous compilation of current price and deflated input-output tables, De Boer, S. and G.A.A.M. Broesterhuizen (1986).
A few years ago the method of compiling input-output tables underwent in the Netherlands an essential revision. The most significant improvement is that during the entire statistical process, from the processing and analysis of the basic data up to and including the phase of balancing the tables, data in current prices and deflated data are obtained simultaneously and in consistency with each other.

NA/14 A proposal for the synoptic structure of the next SNA, Al, P.G. and C.A. van Bochove (1986).

NA/15 Features of the hidden economy in the Netherlands, Van Eck, R. and B. Kazemier (1986).
This paper presents survey results on the size and structure of the hidden labour market in the Netherlands.

NA/16 Uncovering hidden income distributions: the Dutch approach, Van Bochove, C.A. (1987).

NA/17 Main national accounting series 1900-1986, Van Bochove, C.A. and T.A. Huitker (1987).
The main national accounting series for the Netherlands, 1900-1986, are provided, along with a brief explanation.

NA/18 The Dutch economy, 1921-1939 and 1969-1985. A comparison based on revised macro-economic data for the interwar period, Den Bakker, G.P., T.A. Huitker and C.A. van Bochove (1987).
A set of macro-economic time series for the Netherlands 1921-1939 is presented. The new series differ considerably from the data that had been published before. They are also more comprehensive, more detailed, and conceptually consistent with the modern National Accounts. The macro-economic developments that are shown by the new series are discussed. It turns out that the traditional economic-historical view of the Dutch economy has to be reversed.

NA/19 Constant wealth national income: accounting for war damage with an application to the Netherlands, 1940-1945, Van Bochove, C.A. and W. van Sorge (1987).

NA/20 **The micro-meso-macro linkage for business in an SNA-compatible system of economic statistics**, Van Bochove, C.A. (1987).

NA/21 **Micro-macro link for government**, Bloem, A.M. (1987).
This paper describes the way the link between the statistics on government finance and national accounts is provided for in the Dutch government finance statistics.

NA/22 **Some extensions of the static open Leontief model**, Harthoorn, R.(1987).
The results of input-output analysis are invariant for a transformation of the system of units. Such transformation can be used to derive the Leontief price model, for forecasting input-output tables and for the calculation of cumulative factor costs. Finally the series expansion of the Leontief inverse is used to describe how certain economic processes are spread out over time.

NA/23 **Compilation of household sector accounts in the Netherlands National Accounts**, Van der Laan, P. (1987).
This paper provides a concise description of the way in which household sector accounts are compiled within the Netherlands National Accounts. Special attention is paid to differences with the recommendations in the United Nations System of National Accounts (SNA).

NA/24 **On the adjustment of tables with Lagrange multipliers**, Harthoorn, R. and J. van Dalen (1987).
An efficient variant of the Lagrange method is given, which uses no more computer time and central memory then the widely used RAS method. Also some special cases are discussed: the adjustment of row sums and column sums, additional restraints, mutual connections between tables and three dimensional tables.

NA/25 **The methodology of the Dutch system of quarterly accounts**, Janssen, R.J.A. and S.B. Algera (1988).
In this paper a description is given of the Dutch system of quarterly national accounts. The backbone of the method is the compilation of a quarterly input-output table by integrating short-term economic statistics.

NA/26 **Imputations and re-routeings in the National Accounts**, Gorter, Cor N. (1988).
Starting out from a definition of 'actual' transactions an inventory of all imputations and re-routeings in the SNA is made. It is discussed which of those should be retained in the core of a flexible system of National Accounts. Conceptual and practical questions of presentation are brought up. Numerical examples are given.

NA/27 **Registration of trade in services and market valuation of imports and exports in the National Accounts**, Bos, Frits (1988).
The registration of external trade transactions in the main tables of the National Accounts should be based on invoice value; this is not only conceptually very attractive, but also suitable for data collection purposes.

NA/28 **The institutional sector classification**, Van den Bos, C. (1988).
A background paper on the conceptual side of the grouping of financing units. A limited number of criteria are formulated.

NA/29 **The concept of (transactor-)units in the National Accounts and in the basic system of economic statistics**, Bloem, Adriaan M. (1989).
Units in legal-administrative reality are often not suitable as statistical units in describing economic processes. Some transformation of legal-administrative units into economic statistical units is needed. This paper examines this transformation and furnishes definitions of economic statistical units. Proper definitions are especially important because of the forthcoming revision of the SNA.

NA/30 **Regional income concepts**, Bloem, Adriaan M. and Bas De Vet (1989).
In this paper, the conceptual and statistical problems involved in the regionalization of national accounting variables are discussed. Examples are the regionalization of Gross Domestic Product, Gross National Income, Disposable National Income and Total Income of the Population.

NA/31 The use of tendency surveys in extrapolating National Accounts, Oudde-ken, Frank and Gerrit Zijlmans (1989).
This paper discusses the feasibility of the use of tendency survey data in the compilation of very timely Quarterly Accounts. Some preliminary estimates of relations between tendency survey data and regular Quarterly Accounts-indicators are also presented.

NA/32 An economic core system and the socio-economic accounts module for the Netherlands, Gorter, Cor N. and Paul van der Laan (1989).
A discussion of the core and various types of modules in an overall system of economy related statistics. Special attention is paid to the Dutch Socio-economic Accounts. Tables and figures for the Netherlands are added.

NA/33 A systems view on concepts of income in the National Accounts, Bos, Frits (1989).
In this paper, concepts of income are explicitly linked to the purposes of use and to actual circumstances. Main choices in defining income are presented in a general system. The National Accounts is a multi-purpose framework. It should therefore contain several concepts of income, e.g. differing with respect to the production boundary. Furthermore, concepts of national income do not necessarily constitute an aggregation of income at a micro-level.

NA/34 How to treat borrowing and leasing in the next SNA, Keuning, Steven J. (1990).
The use of services related to borrowing money, leasing capital goods, and renting land should not be considered as intermediate inputs into specific production processes. It is argued that the way of recording the use of financial services in the present SNA should remain largely intact.

NA/35 A summary description of sources and methods used in compiling the final estimates of Dutch National Income 1986, Gorter, Cor N. and others (1990).
Translation of the inventory report submitted to the GNP Management Committee of the European Communities.

NA/36 The registration of processing in supply and use tables and input-output tables, Bloem, Adriaan M., Sake De Boer and Pieter Wind (1993).
The registration of processing is discussed primarily with regard to its effects on input-output-type tables and input-output quotes. Links between National Accounts and basic statistics, user demands and international guidelines are examined. Net recording is in general to be preferred. An exception has to be made when processing amounts to a complete production process, e.g. oil refineries in the Netherlands.

NA/37 A proposal for a SAM which fits into the next System of National Accounts, Keuning, Steven J. (1990).
This paper shows that all flow accounts which may become part of the next System of National Accounts can be embedded easily in a Social Accounting Matrix (SAM). In fact, for many purposes a SAM format may be preferred to the traditional T-accounts for the institutional sectors, since it allows for more flexibility in selecting relevant classifications and valuation principles.

NA/38 Net versus gross National Income, Bos, Frits (1990).
In practice, gross figures of Domestic Product, National Product and National Income are most often preferred to net figures. In this paper, this practice is challenged. Conceptual issues and the reliability of capital consumption estimates are discussed.

NA/39 Concealed interest income of households in the Netherlands; 1977, 1979 and 1981, Kazemier, Brugt (1990).
The major problem in estimating the size of hidden income is that total income, reported plus unreported, is unknown. However, this is not the case with total interest income of households in the Netherlands. This makes it possible to estimate at least the order of magnitude of this part of hidden income. In this paper it will be shown that in 1977, 1979 and 1981 almost 50% of total interest received by households was concealed.

NA/40 **Who came off worst: Structural change of Dutch value added and employ-- ment during the interwar period**, Den Bakker, Gert P. and Jan de Gijt (1990).
In this paper new data for the interwar period are presented. The distribution of value added over industries and a break-down of value added into components is given. Employment by industry is estimated as well. Moreover, structural changes during the interwar years and in the more recent past are juxtaposed.

NA/41 **The supply of hidden labour in the Netherlands: a model**, Kazemier, Brugt and Rob van Eck (1990).
This paper presents a model of the supply of hidden labour in the Netherlands. Model simulations show that the supply of hidden labour is not very sensitive to cyclical fluctuations. A tax exempt of 1500 guilders for second jobs and a higher probability of detection, however, may substantially decrease the magnitude of the hidden labour market.

NA/42 **Benefits from productivity growth and the distribution of income**, Keuning, Steven J. (1990).
This paper contains a discussion on the measurement of multifactor productivity and sketches a framework for analyzing the relation between productivity changes and changes in the average factor remuneration rate by industry. Subsequently, the effects on the average wage rate by labour category and the household primary income distribution are studied.

NA/43 **Valuation principles in supply and use tables and in the sectoral accounts**, Keuning, Steven J. (1991).
In many instances, the valuation of transactions in goods and services in the national accounts poses a problem. The main reason is that the price paid by the purchaser deviates from the price received by the producers. The paper discusses these problems and demonstrates that different valuations should be used in the supply and use tables and in the sectoral accounts.

NA/44 **The choice of index number formulae and weights in the National Accounts. A sensitivity analysis based on macro-economic data for the interwar period**, Bakker, Gert P. den (1991).
The sensitivity of growth estimates to variations in index number formulae and weighting procedures is discussed. The calculations concern the macro-economic variables for the interwar period in the Netherlands. It appears, that the use of different formulae and weights yields large differences in growth rates. Comparisons of Gross Domestic Product growth rates among countries are presently obscured by the use of different deflation methods. There exists an urgent need for standardization of deflation methods at the international level.

NA/45 **Volume measurement of government output in the Netherlands; some alternatives**, Kazemier, Brugt (1991).
This paper discusses three alternative methods for the measurement of the production volume of government. All methods yield almost similar results: the average annual increase in the last two decades of government labour productivity is about 0.7 percent per full-time worker equivalent. The implementation of either one of these methods would have led to circa 0.1 percentage points higher estimates of economic growth in the Netherlands.

NA/46 **An environmental module and the complete system of national accounts**, Boo, Abram J. De, Peter R. Bosch, Cor N. Gorter and Steven J. Keuning (1991).
A linkage between environmental data and the National Accounts is often limited to the production accounts. This paper argues that the consequences of economic actions on ecosystems and vice versa should be considered in terms of the complete System of National Accounts (SNA). One should begin with relating volume flows of environmental matter to the standard economic accounts. For this purpose, a so-called National Accounting Matrix including Environmental Accounts (NAMEA) is proposed. This is illustrated with an example.

NA/47 **Deregulation and economic statistics: Europe 1992**, Bos, Frits (1992).
The consequences of deregulation for economic statistics are discussed with a view to Europe 1992. In particular, the effects of the introduction of the Intrastat-system for statistics on international trade are investigated. It is argued that if the Statistical Offices of the EC-countries do not respond adequately, Europe 1992 will lead to a deterioration of economic statistics: they will become less reliable, less cost effective and less balanced.

NA/48 **The history of national accounting**, Bos, Frits (1992).
At present, the national accounts in most countries are compiled on the basis of concepts and classifications recommended in the 1968-United Nations guidelines. In this paper, we trace the historical roots of these guidelines (e.g. the work by King, Petty, Kuznets, Keynes, Leontief, Frisch, Tinbergen and Stone), compare the subsequent guidelines and discuss also alternative accounting systems like extended accounts and SAMs.

NA/49 **Quality assessment of macroeconomic figures: The Dutch Quarterly Flash**, Reininga, Ted, Gerrit Zijlmans and Ron Janssen (1992).
Since 1989-IV, the Dutch Central Bureau of Statistics has made preliminary estimates of quarterly macroeconomic figures at about 8 weeks after the end of the reference quarter. Since 1991-II, a preliminary or "Flash" estimate of GDP has been published. The decision to do so was based on a study comparing the Flash estimates and the regular Quarterly Accounts figures, which have a 17-week delay. This paper reports on a similar study with figures through 1991-III.

NA/50 **Quality improvement of the Dutch Quarterly Flash: A Time Series Analysis of some Service Industries**, Reininga, Ted and Gerrit Zijlmans (1992).
The Dutch Quarterly Flash (QF) is, just like the regular Quarterly Accounts (QA), a fully integrated statistic based on a quarterly updated input-output table. Not all short term statistics used to update the QA's IO-table are timely enough to be of use for the QF, so other sources have to be found or forecasts have to be made. In large parts of the service industry the latter is the only possibility. This paper reports on the use of econometric techniques (viz. series decomposition and ARIMA modelling) to improve the quality of the forecasts in five parts of the service industry.

NA/51 **A Research and Development Module supplementing the National Accounts**, Bos, Frits, Hugo Hollanders and Steven Keuning (1992).
This paper presents a national accounts framework fully tailored to a description of the role of Research and Development (R&D) in the national economy. The framework facilitates to draw macro-economic conclusions from all kinds of data on R&D (also micro-data and qualitative information). Figures presented in this way can serve as a data base for modelling the role of R&D in the national economy.

NA/52 **The allocation of time in the Netherlands in the context of the SNA; a module**, Kazemier, Brugt and Jeanet Exel (1992).
This paper presents a module on informal production, supplementing the National Accounts. Its purpose is to incorporate informal production into the concepts of the SNA. The relation between formal and informal production is shown in the framework of a Social Accounting Matrix (SAM). To avoid a controversial valuation of informal production, the module constists of two SAMs. One expressed in actual prices with informal labour valued zero, and one which expresses the embedded informal labour input measured in terms of hours worked.

NA/53 **National Accounts and the environment: the case for a system's approach**, Keuning, Steven J. (1992).
The present set of main economic indicators should be extended with one or a few indicators on the state of the environment. This paper lists various reasons why a so-called Green Domestic Product is not suitable for this purpose. Instead, a system's approach should be followed. A National Accounting Matrix including Environmental Accounts (NAMEA) is presented and the way to derive one or more separate indicators on the environment from this information system is outlined.

NA/54 **How to treat multi-regional units and the extra-territorial region in the Regional Accounts?**, De Vet, Bas (1992).
This paper discusses the regionalization of production and capital formation by multi-regional kind-of-activity units. It also examines the circumstances in which a unit may be said to have a local kind-of-activity unit in the extra-territorial region and what should be attributed to this "region".

NA/55 **A historical Social Accounting Matrix for the Netherlands (1938)**, Den Bakker, Gert P., Jan de Gijt and Steven J. Keuning (1992).
This paper presents a Social Accounting Matrix (SAM) for the Netherlands in 1938, including related, non-monetary tables on demographic characteristics, employment, etc. The distribution of income and expenditure among household subgroups in the 1938 SAM is compared with concomittant data for 1987.

NA/56 **Origin and development of the Dutch National Accounts**, Den Bakker, Gert P. (1992).
This paper describes the history of national accounting in the Netherlands. After two early estimates in the beginning of the nineteenth century, modern national accounting started in the 1930s on behalf of the Tinbergen model for the Dutch economy. The development spurred up after World War II to provide data to the government for economic planning purposes. In the 1980s, the development was towards a flexible and institutional approach.

NA/57 **Compiling Dutch Gross National Product (GNP); summary report on the final estimates after the revision in 1992**, Bos, Frits (1992).
This summary report describes the sources and methods used for compiling the final estimate of Dutch Gross National Product after the revision of the Dutch National Accounts in 1992. Attention is focused on the estimation procedures for 1988. A more extensive report is also available (**NA/57_Ext.**).

NA/57_Ext. **Compiling Dutch Gross National Product (GNP); full report on the final estimates after the revision in 1992**, Bos, Frits and Cor N. Gorter (1993).
This report describes the compilation of the final estimate of Dutch Gross National Product after the revision of the Dutch National Accounts in 1992. Attention is focused on the estimation procedures for 1988. The description covers i.a. data sources, sampling features of the surveys, grossing up procedures, adjustments for underreporting and the integration process.

NA/58 **The 1987 revision of the Netherlands' National Accounts,** Van den Bos, C and P.G. Al (1994).
The 1987 revision that was completed in 1992 has improved the Dutch National Accounts in three ways. First, new and other data sources have been used, like Production statistics of service industries, the Budget Survey and Statistics on fixed capital formation. Secondly, the integration process has been improved by the use of detailed make- and use-tables instead of more aggregate input-output tables. Thirdly, several changes in bookkeeping conventions have been introduced, like a net instead of a gross registration of processing to order.

NA/59 **A National Accounting Matrix for the Netherlands**, Keuning, Steven and Jan de Gijt (1992).
Currently, the national accounts typically use two formats for presentation: matrices for the Input-Output tables and T-accounts for the transactions of institutional sectors. This paper demonstrates that presently available national accounts can easily be transformed into a National Accounting Matrix (NAM). This may improve both the transparency and analytic usefulness of the complete set of accounts.

NA/60 **Integrated indicators in a National Accounting Matrix including environmental accounts (NAMEA); an application to the Netherlands**, De Haan, Mark, Steven Keuning and Peter Bosch (1993).
In this paper, environmental indicators are integrated into a National Accounting Matrix including Environmental Accounts (NAMEA) and are put on a par with the major aggregates in the national accounts, like National Income. The environmental indicators reflect the goals of the environmental policy of the Dutch government. Concrete figures are presented for 1989. The NAMEA is optimally suited as a data base for modelling the interaction between the national economy and the environment.

NA/61 **Standard national accounting concepts, economic theory and data compilation issues; on constancy and change in the United Nations-Manuals on national accounting (1947, 1953, 1968 and 1993)**, Bos, Frits (1993).
In this paper, the four successive guidelines of the United Nations on national accounting are discussed in view of economic theory (Keynesian analysis, welfare, Hicksian income, input-output analysis, etc.) and data compilation issues (e.g. the link with concepts in administrative data sources). The new guidelines of the EC should complement those of the UN and be simpler and more cost-efficient. It should define a balanced set of operational concepts and tables that is attainable for most EC countries within 5 years.

NA/62 **Revision of the 1987 Dutch agricultural accounts,** Pauli, Peter and Nico van Stokrom (1994).
During the recent revision of the Dutch national accounts, new agricultural accounts have been compiled for the Netherlands. This paper presents the major methodological and practical improvements and results for 1987, the base year for this revision. In addition, this paper demonstrates that a linkage can be established between the E.C. agricultural accounting system and the agricultural part of the standard national accounts.

NA/63 **Implementing the revised SNA in the Dutch National Accounts,** Bos, Frits (1993).
This paper discusses the implementation of the new United Nations guidelines on national accounting (SNA) in the Netherlands. The changes in basic concepts and classifications in the SNA will be implemented during the forthcoming revision. The changes in scope will be introduced gradually. Important changes scheduled for the near future are the incorporation of balance sheets, an environmental module and a Social Accounting Matrix.

NA/64 **Damage and insurance compensations in the SNA, the business accounts and the Dutch national accounts,** Baris, Willem (1993).
This paper describes the recording of damages to inventories and produced fixed assets in general, including damages as a result of legal product liability and of the liability for damage to the environment. In this regard, the 1993 System of National Accounts and the practice of business accounting are compared with the Dutch national accounts.

NA/65 **Analyzing economic growth: a description of the basic data available for the Netherlands and an application,** Van Leeuwen, George, Hendrie van der Hoeven and Gerrit Zijlmans (1994).
This paper describes the STAN project of the OECD and the Dutch national accounts data supplied to the STAN database, which is designed for a structural analysis of the role of technology in economic performance. Following an OECD analysis for other industrial countries, the importance of international trade for a small open economy such as the Netherlands is investigated. The STAN database is also available on floppy disk at the costs of DFL. 25, an can be ordered by returning the order form below (Please mention: STAN floppy disk).

NA/66 **Comparability of the sector General Government in the National Accounts, a case study for the Netherlands and Germany**, Streppel, Irene and Dick Van Tongeren (1994).
This paper questions the international comparability of data concerning the sector General Government in the National Accounts. Two differences are distinguished: differences due to lack of compliance with international guidelines and institutional differences. Adjustments to National Accounts data are reflected in a separate module which comparises Germany versus The Netherlands. The module shows that total General Government resources as well as uses are substantially higher in the Netherlands.

NA/67 **What would Net Domestic Product have been in an environmentally sustainable economy?, Preliminary views and results**, De Boer, Bart, Mark de Haan and Monique Voogt (1994).
Sustainable use of the environment is a pattern of use that can last forever, at least in theory. This pattern is likely to render a lower net domestic product than the present economy. The coherence between reductions in pressure on the environment and changes in net domestic product is investigated with the help of a simple multiplier model. This model is based on a National Accounting Matrix including Environmental Accounts (NAMEA).

NA/68 **A Social Accounting Matrix for the Netherlands, concepts and results,** Timmerman, Jolanda G. and Peter J.M. van de Ven (1994).
In this paper a Social Accounting Matrix (SAM) for the Netherlands is presented. Two years are covered: 1988 and 1990. The SAM is an integrated data framework based on national accounts extended with information on distribution of income, consumption and wealth among household. Furthermore, labour income and employment are subdivided into several labour categories. The tables of the SAMs of both 1988 and 1990 are available on separate floppy disks at the costs of DFL. 65 each.

NA/69 **Analyzing relative factor inputs of Dutch exports: An application of the 1990 Social Accounting Matrix for the Netherlands** (forthcoming), Reininga, Ted (1995).
In this paper the validity of neoclassical trade theory for explaining Dutch international trade patterns is studied. The analysis is carried out with the use of a Social Accounting Matrix for The Netherlands. This study corroborates the outcome of other recent analysis in this field: classical trade theory offers a better starting-point to understand Dutch trade patterns than neoclassical trade theory. Moreover, these recent studies point to the increasing relevance of insights derived from modern trade theory. The results presented here seem to support this point of view.

NA/70 **SESAME for the evaluation of economic development and social change**, Keuning, Steven J. (1994).
This paper elaborates on the concept of a System of Economic and Social Accounting Matrices and Extensions, or SESAME for short. The SESAME-concept serves to meet the criticism that conventional national accounts take a too limited view at social, environmental and economic development. SESAME details the monetary accounts and couples non-monetary information in an integral system approach. SESAME is meant as a synthesis of national accounts and the social indicators approach.

NA/71 **New revision policies for the Dutch National Accounts**, Den Bakker, Gert P., Jan de Gijt and Robert A.M. van Rooijen (1994).
This paper presents the (new) revision policy for the Dutch National Accounts. In the past, several major revisions of national accounting data have been carried out in the Netherlands. In the course of time, the policy has changed several times. Recently, the aim has become to publish relatively long time-series shortly after the publication of the revised benchmark year data.

NA/72 **Labour force data in a National Accounting framework**, Den Bakker, Gert P. and Jan de Gijt (1994).
This paper deals with the Dutch interwar labour force data. Starting with census data the estimation of the working and non-working labour force by industry and by occupational type is described and the results are discussed. The data have been estimated within the national accounts framework. It is the first time that labour market figures at a meso-level have been estimated which are linked to other national accounting figures.

NA/73 **Integrated estimates of productivity and terms-of-trade changes from a Social Accounting Matrix at constant prices**, Keuning, Steven J. 1994).
This paper demonstrates that measures of real income change for the total economy can best be derived from real income changes per subsector. For this purpose a Social Accounting Matrix (SAM) at constant prices has been compiled. By breaking down value added at constant prices into constant price estimates for each primary input category, productivity changes by industry can be estimated as an integral part of the regular national accounts compilation. The national total trading gain or loss from a change in the terms of trade is as well allocated to subsectors, thus embedding the estimation of this macro-measure into a meso-consistency framework. These ideas have been applied in a case-study for Indonesia.

NA/74 **Taking the environment into account: The Netherlands NAMEA's for 1989, 1990 and 1991**, De Haan, Mark and Steven Keuning (1995).
The National Accounting Matrix including Environmental Accounts (NAMEA) contains figures on environmental burdens in relation to economic developments as reflected in the National accounts. NAMEA's for the Netherlands in 1989, 1990 and 1991 have now been completed. They include a more detailed industrial classification and a series of environment taxes and levies, plus environmental protection expenditures by industry and households. Further, the depletion of two important mineral resources in the Netherlands is now incorporated in the NAMEA's.

NA/75 Economic theory and national accounting, Bos, Frits (1995).
This paper describes the relationship between economic theory and national accounting. This relationship is often misunderstood, by economic theorists and national accountants alike. Attention is drawn to the consistency required in a national accounting system, to national accounts figures as a transformation of primary data and to the fundamentally different valuation principles employed in economic theory and national accounting (forward looking and analytic versus backward looking and descriptive). The gap between economic theory and national accounting can only be bridged by satellite accounts, as in these accounts consistency with the overall system and valuation at current exchange value are not strictly required.

NA/76 An information-system for economic, environmental and social statistics, Keuning, Steven.J and Jolanda G.Timmerman (1995).
The 1993 SNA mentions that a SAM can also be extended to deal with environmental issues. This entails the integration of a SAM and a NAMEA into a SAMEA (Social Accounting Matrix including Environmental Accounts), a further extension into the direction of a so-called SESAME (System of Economic and Social Accounting Matrices and Extensions). This paper shows how environmental data and environmental indicators can be integrated into such a system. A Dutch case-study shows the interrelations between e.g. the employment of various types of workers (by sex/educational level) and the environmental problems caused by the activities in which they are employed. Moreover, this pollution is also allocated to the subsectors that receive value added. This enables a comparison with the consumption-based pollution by subsector. The SAMEA yields a framework for an integrated analysis and modelling of social, economic and environmental issues.

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