TWINNING CONTRACT

JO/13/ENP/ST/23


# Strengthening the capabilities of the Department of Statistics in Jordan





# MISSION REPORT

**on**

**Activity 1.10: Supply and Use Tables and Its Relation to Input-Output Tables**


Mission carried out by
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# Table of contents

# List of Abbreviations

| DoS | Department of Statistics of Jordan |
|---|---|
| ToR | Terms of Reference |
| SUT | Supply and Use matrices |
| VAT | Value added tax (the general sales tax) |
| NA-products | National accounts products (the product classification used in the SUT) |
| FOB | Free on board |
| CIF | Cost, insurance, freight |
| IOT | Input-output table |
| GVA | Gross Value Added |

# 1. General comments

This mission report was prepared within the Twinning Project "Strengthening the capabilities of the Department of Statistics in Jordan". It was the seventh mission to be devoted to national accounts within Component 1 of the project.

The main purposes of the mission were:

o   To resolve remaining issues regarding the draft balanced 2010 SUT,
o   To focus on changes needed in the current system in order to comply with the ESA10/SNA08
o   To introduce the DoS staff to requirements regarding supply and use tables and input output tables in the ESA 2010 / SNA2008
o   To present a draft of the 2010 IO table for Jordan, based on the 2010 SUT and Gross Value Added data prepared during activity 1.9
o   To make an introduction to the R-program preparing the IO
o   To introduce Input-Output Analysis using an Input-Output model

The consultants would like to express their thanks to all DoS officials and individuals met for the kind support and valuable information which they received during their stay in Jordan and which highly facilitated their work.

The views and observations stated in this report are those of the consultants and do not necessarily correspond to the views of EU, DoS or Statistics Denmark.

# 2. Assessment and results

## *2.1 SUT 2010*

The balanced supply and use table that was finished in the January mission was updated with a few adjustments shortly after. It was, however, made clear that changes can still be expected as a result of closer inspection of its content. Among the outstanding issues were:

*   The output of paid services from general government was insufficient compared to export of such services according to the Balance of Payments. To the extent that a correction of public sales revenue had to be adjusted upwards, it had to be decided whether to retain the value of output or the value of government final consumption within the area in question. The decision was to keep the original value of output and to reduce government consumption with the amount from the increase in sales revenue based on the assumption that the estimated production value has been correctly calculated as sum of costs.
*   An adjustment to output and export of medical services that had been entered as a provisional solution to the "medical tourism"-problem had to be reconsidered taking into account the discussions with the Central Bank and Ministry of Finance during the January mission.
*   A considerable input in public administration seems to be a payment for hospital services to patients. Showing this as a purchase belonging to COFOG 01 in industry 75 would leave the impression that this is administrative services. It was decided to move the use of these services back to industry 85 and to classify its final use as "health services".
*   A provisional solution to the classification of a considerable output of electronic gadgets seemed unsatisfactory and needs to be revised.
*   It seemed incredible that very little consumption of food takes place within general government. Some food consumption must be expected within the armed forces, prisons, hospitals etc. A search

within the information from government accounts produced estimates for the hitherto missing values for total food-consumption in these industries.

- Building materials available for input in construction end up having a higher value than expected when construction output was estimated. Production should be increased as it is credible that the uncertain estimate of input, and hence the output of unobserved activities had been underestimated.
- Earlier it had not been decided which of the product codes for water and electricity should be used for specific purposes. A look into the balances for water, sewerage and waste-disposal showed furthermore a need to create a consistent version of these outputs that should sum op to the value from their common data-source.

The corrected SUTs will be made available in a fully balanced version before the next – and –last mission in this project, and a final symmetric I-O table will be compiled based on the result.

## 2.2 Changes needed to comply with ISIC 4 and SNA08 / ESA 2010

Until now the SUTs have been compiled using the NACE 3.1 industry classification. This was the classification used in source-data for 2010. Statistics for 2011 is being collected coded by ISIC 4 as well as ISIC 3.1. As these statistical sources become available it will be possible to provide detailed conversion tables between the values of production and intermediate consumption according to  old and new ISIC.  With the conversion to ISIC 4 it will be necessary to choose whether in the future the number of industries shall follow the new 2-digit classification or a classification by 64 industries is sufficient. The latter is the requirement by the EU transmission programme.

While it is still too early to start work on this conversion, it seemed appropriate to begin the discussion on how to implement the conversion. The experts proposed that the 2010 SUTs should, as a starting point, be converted to ISIC 4. In this way structures from the balanced 2010 tables can be reused in SUTs for 2011 and - if and where it is necessary - for following years.

A presentation was also made on the most important changes to the figure required by a transition to SNA2008 /ESA 2010. Among those that will probably have an effect in Jordan a few could be mentioned:

- A new "change of ownership"-criterion for imports and exports. This could be relevant if Jordanian enterprises produce manufacturing services for non-resident enterprises and receive goods for processing from abroad.
- Construction of buildings or civil engineering works that is performed by non-resident enterprises is no longer considered part of the domestic construction activity and –similarly- construction abroad produced by domestic enterprises should no longer be treated as part of the foreign country's construction activity. Instead import and export of construction for GFCF should be shown in the account for ROW.
- According to SNA2008 / ESA2010 Research and development should be capitalized as GFCF. One may question which kinds of R&D that need to be capitalized according to SNA, but it seems that at least the R&D that can meaningfully be considered to be used up in production over a number of years should be included in GFCF and written off as CFC over the following years. Like own-account production of software it may be difficult to obtain good figures for this from business accounts, and estimates based employment and wages/salaries of "researchers" in combination with a mark-up could be the only feasible solution. Such estimates will under any circumstances be uncertain.
- SNA 2008 requires that weapon-systems are capitalized. It may already be possible to identify goods used for defence activities as imports in the balance of payment. It will – however – be necessary to distinguish between more or less durable goods used for military purposes.
- The calculation of production in non-life insurance should not use actual damages of the year in question any more. Instead the calculation should use "Adjusted" (average) damages or the calculation should if necessary use the sum of costs.

## 2.4 Input-output table 2010

Between the last and this mission a draft version of an input-output table for Jordan 2010 was prepared by the consultants. The table has methodological as well as empirical characteristics that are partly a developed in the work with SUT during the last 12-15 month, and partly chosen by the consultants on the basis of their experience and recommendations in manuals like ESA 2010.

- In order to go from SUT to an input-output table it is required to make an assumption about the relationship between products and industries. There are 4 different general assumptions to choose between. It is suggested to base the compilation of the Jordanian IOT on the assumption of *Fixed product sales structure*. It means that each product has its own specific sales structure, irrespective of the industry where it is produced. Sales structure here refers to the proportions of the output of the product in which it is sold to the respective intermediate and final users. This assumption is the most widely used, not only because it is more realistic than its alternatives, but also because it requires a relative simple mechanical compilation procedure. Furthermore, it does not generate any negatives in the IOT that would require manual rebalancing. This assumption leads to an **industry by industry input-output table**.
- The procedure to go from SUT in basic prices to on the basis of this assumption has been illustrated on various Powerpoint slides that were presented to the staff.
- The resulting table has 59 industries as defined by the 2 digit ISIC 3.1 classification. At the most detailed level there are some empty columns, meaning that in these industries there is no activity at all and therefore no input. The classification of industries is international standard and therefore the empty rows and columns should not be deleted from the table.
- There is one row of imports by 59 industries. It will be possible with a relatively little effort to calculate full import matrices. It requires the compilation of a list in which all products in the SUT are assigned a characteristic industry. Thus, for those products that are imported but not produced domestically, it should be decided which industry would be the most likely to have produced the product in question had it not been imported. With the help of this information and the assumption that all imported products are produced with the same technology as if they had been produced domestically, it is possible to compile import matrices as a replacement for the current import vector.
- The final demand is composed in the following way. There are 14 groups of household consumption categorized by the COICOP classification. Then there is only one category of both Non-Profit Institutions Serving Households (NPISH) and Individual Government Consumption. The collective Government Consumption is divided by 10 COFOG groups. There are 7 different groups of Gross Fixed Capital Formation. There is only 1 group of Changes in Inventories which is the sum over the various groups of Changes in Inventories that are found in the SUT. Then there is one group of Acquisitions less disposals of valuables. Finally there is one column of Exports.
- The values mentioned above are all measured in basic prices. In order to raise the table to purchaser's price level the different value layers must be added. The first item is *Product taxes less subsidies* that are added to the table as row below the table in basic prices. The exact same thing is done to the VAT, which is also added as a row. Both rows are obtained from the SUT as column totals of the Product tax matrix and the VAT matrix respectively.
- The final layer between basic and purchasers prices is the trade and transport margins. The inclusion of these is probably the most difficult part of the compilation of input-output tables. The job is to distribute the margins produced between intermediate consumption and the various groups of final demand in the input-output table.

  In the bridge column of the supply table in the SUT it is indicated how large the production of trade and transport margins is. These numbers are then divided by supplying industry. The method is firstly to calculate rows of each industry's relative share of the total supply of the products in question (the ones containing margins). Then these shares are multiplied by margin part of the

6

products. For retail trade margins this is it, but the wholesale trade margins must be added to the transport margins to get the official wholesale and trade margin by supplying industry.

The next step is to go to the use side and take the column sums of the retail trade margin matrix as well as the column sums of the wholesale trade margin matrix (Dimension 1*95). These vectors are then multiplied by the coefficient vectors of supply (59*1) to get full matrices (59*95).

Then finally everything is put together in an Excel spreadsheet for presentation purposes.

The calculation ended in an input-output table that was a little out of balance. Therefore the consultants managed to build a balancing procedure that is to be used as the last step in the compilation procedure.

The intention is at the last mission to present a revised compilation procedure where the final balancing of the input-output table no longer is needed.

*Software for the compilation procedure*
The first version of the input-output table for 2010 was compiled by the consultants using the software GAUSS. As this is a rather expensive tool it was suggested in an earlier mission that the staff should have the free tool "R" installed on their PC's and the compilation procedure transferred from the GAUSS software to R. However, at the beginning of this mission it was clear that neither the staff nor the consultants had the required had had the time and resources to perform such a transfer.

Therefore a second best solution was suggested which was to compile the input-output table in Excel. During the mission the staff as well as the consultants worked out a procedure in a sequence of Excel sheets to compile the input–output table. The solution works, but is definitely not as good as a solution where data is loaded into dedicated matrix operations software like GAUSS or R. There is a (steep) learning curve but once it is implemented operations and compilations becomes much easier and much more secure with a reduction of human mistakes made in the very manual process copying data and formulas to and from Excel.

On the other hand it must be noted that the Excel solution has its advantages as well. It is easy (easier) to implement, and it is much easier for people without programming experience to see how the table is actually made. Thus, this solution is far more pedagogical for someone who is used to work with Excel.

At the end of the mission various ways of using the input-output tables was presented by the consultants. An input-output table can quite easily by converted into an input-output model with which it is possible to carry out a large number of analyses of the economic structures in a country. As example employment multipliers by industry is quite often very interesting to government as well as other contractors investing large sums in e.g. infrastructure. A few examples based on the new Jordanian Io table for 2010 were presented. After the presentation a vector of employment by industry was compiled by the staff and it was used right away to calculate employment multipliers for Jordan 2010.

# 3. Conclusions and recommendations

A "balanced" version of the SUTs for 2010 was produced in the previous mission. Looking closely at the figures a number of deficiencies were detected. This mission was used to address the problematic areas. A number of decisions were made on how to solve these last problems and the experts are going to ensure that the necessary corrections are made. A final version of the SUTs should be ready before the next mission in April.

A draft input-output table for 2010 had been compiled prior to the mission using GAUSS software. During the mission an Excel based compilation of the same table was put together which is easier to understand and more pedagogical. Also a few applications of the new input-output table was presented. Before or during the next mission the input-output table will be updated with data from the final SUT-version.

Furthermore, a solution that will circumvent the final balancing of the input-output table will be presented and implemented in the Excel based solution.

A more complete description had been made on how to use the macro-system. The paper now explains how macro-facilities are used in automatic final adjustments. Furthermore a paper was presented to the DoS staff with description of the sequence of adjustments needed in the final balancing of supply and uses including the balancing of VAT and trade and transport margins.

It is recommended that the DoS staff look further at those corrections that will be needed to bring the SUT in accordance with SNA2008 / ESA2010 as preparation for the discussion in the coming mission.

A status on the double-coded primary statistics for 2011 can also be useful as preparation for the discussion on how to convert the industry-classification from NACE rev.1 to NACE rev.2.

In preparation for the next mission the staff is encouraged to familiarize themselves even more with the Excel based compilation of the input-output table and the calculation of the employment multiplier.

*Annex 1. Terms of Reference*

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# Terms of Reference

# EU Twinning Project JO/13/ENP/ST/23

# 1 - 5 March 2015

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**Component 1: National Accounts**

**Activity 1.10: Input-Output Tables**

**0. Mandatory results and benchmarks for the component**
- The national accounts system in Jordan updated to SNA 2008 (Apr 2015)
- The national accounts system in Jordan will cover the informal sector (Apr 2015)
- Assessment report on current situation (Jan 2014)
- Review of the GDP methodology (Apr 2014)
- Plan for how to change base year in the fixed price calculations (Jan 2015)
- Plan for how to improve the current accounts (Jan 2015)
- Present and discuss the concept of different types of agricultural accounts (Jan 2015)
- Data sources, compilation methods, and balancing in relation to supply and use tables reviewed and updated towards SNA08 principles (Apr 2015)
- Provide recommendations on how to update input-output tables (Apr 2015)
- Update the methodology for calculation the informal sector (Apr 2015)

**1. Purpose of the activity**
o Resolve remaining issues regarding the draft balanced 2010 SUT, cf. section 3 in the mission report for activity 1.9
o Special focus on changes needed in the current system in order to comply with the ESA10/SNA08
o To introduce the DoS staff to requirements regarding supply and use tables and input output tables in the ESA 2010 / SNA2008
o To present the 2010 IO table for Jordan, based on the 2010 SUT as well as the GVA data prepared during activity 1.9
o Introduction to and familiarization with the R-program preparing the IO
o Introduction to Input-Output Analysis using an Input-Output model

**2. Expected output of the activity**
o Balanced SUT for the year 2010
o Input output table for the year 2010
o DoS staff introduced to and trained in the methodology for compiling IO-tables based on SUT
o DoS staff introduced to and familiarized with the R-programs compiling the IO table
o DoS staff introduced to IO Analysis using an IO-model
o DoS staff introduced to the Danish and in general European experiences in compiling Supply and Use tables and Input-Output tables

**3. Participants**


DoS:
Mr Moawiah Alzghoul Director of National Accounts Directorate, and component leader

Annual national accounts
Amal Abu Afeefeh - Head of the Annual Accounts Division
Khairallah Almarzoug
Farhan Mohammad
Loay Alrawashdeh
Ali Zaitoun
Aycha Abou Shairah

Input-output division
Murad Bani-Hamad
Murad Omari

Quarterly accounts division
Walid Battah - Head of the Quarterly Accounts Division
Jaber Alfazza
Walaa Gharram

**MS experts**
Mr. Søren Larsen, Senior Adviser, National Accounts division, Statistics Denmark
Mr. Peter Rørmose Jensen, Senior Adviser, National Accounts division, Statistics Denmark

## *Annex 2 Programme for the mission*

| Time | | Place | Event | Purpose / detail |
|------|------|-------|-------|------------------|
| Sunday, morning | 08.30 – 10.00 | Hotel /DoS | Meeting with RTA | To discuss the programme of the week |
| Sunday, morning | 10.00 – 12.00 | DoS | Meeting with BC Component Leader and BC Experts | Information and follow-up on activities since activity 1.9. What is the status regarding the balancing? |
| | 12.00 – 01.00 | | Break / Preparations / Report writing | Break / Preparations / Report writing |
| Sunday, afternoon | 01f.00 – 03.30 | DoS | Meeting with BC Component Leader and BC Experts | Continued. |
| | 03.30 – 04.00 | | Preparations / Report writing | Preparations / Report writing |
| Monday, morning | 08.30 – 09.00 | DoS | Preparations / Report writing | Preparations / Report writing |
| | 09.00 – 11.00 | | Meeting with BC Component Leader and BC Experts | Presentation of the 2010 IO table for Jordan |
| | 12.00 – 01.00 | | Break / Preparations / Report writing | Break / Preparations / Report writing |
| Monday, afternoon | 01.00 – 03.30 | DoS | Meeting with BC Component Leader and BC Experts | Presentation and introduction to the R-program preparing the IO table |
| | 03.30 – 04.00 | | Preparations / Report writing | Preparations / Report writing |
| Tuesday, morning | 08.30 – 09.00 | DoS | Preparations / Report writing | Preparations / Report writing |
| | 09.00 – 12.00 | | Meeting with BC Component Leader and BC Experts | Continued from Monday afternoon. |
| | 12.00 – 01.00 | | Break / Preparations / Report writing | Break / Preparations / Report writing |
| Tuesday, afternoon | 01.00 – 03.30 | DoS | Meeting with BC Component Leader and BC Experts | Introduction to Input-Output Analysis using an Input-Output model |
| | 03.30 – | | Preparations / | Preparations / Report writing |

| | 04.00 | | Report writing | |
|---|---|---|---|---|
| Wednesday, morning | 08.30 – 09.00 | DoS | Preparations / Report writing | Preparations / Report writing |
| | 09.00 – 12.00 | | Meeting with BC Component Leader and BC Experts | Continued from Tuesday afternoon. |
| | 12.00 – 01.00 | | Break / Preparations / Report writing | Break / Preparations / Report writing |
| Wednesday, afternoon | 01.00 – 03.30 | DoS | Meeting with BC Component Leader and BC Experts | Discussions of the changes needed in the current system in order to comply with the ESA10/SNA08 |
| | 03.30 – 04.00 | | Preparations / Report writing | Preparations / Report writing |
| Thursday, morning | 08.30 – 09.00 | DoS | Preparations / Report writing | Preparations / Report writing |
| | 09.00 – 11.30 | | Meeting with BC Component Leader and BC Experts | Discussions of open issues. |
| | | | Ad-hoc meetings | Final clarifications with BC Experts, preparation of report and presentation for BC Project Leader |
| Thursday, morning | 11.30 – 12.30 | DoS | Meeting with BC Component Leader | Presentation for BC Project Leader |
| Thursday, noon | 12.30 – 01.00 | DoS | Debriefing with BC Project Leader | Conclusions and decisions and their consequences for the future work and the implied work programme for BC Experts |

## Annex 3. People met

DoS:
Mr Moawiah Alzghoul Director of National Accounts Directorate, and component leader

Annual national accounts
Amal Abu Afeefeh - Head of the Annual Accounts Division
Khairallah Almarzoug
Farhan Mohammad
Loay Alrawashdeh
Ali Zaitoun
Ayman Nasir

Input-output division
Murad Omari
Aysha Hashim Abu-Shaira

Quarterly accounts division

Walid Battah - Head of the Quarterly Accounts Division
Jaber Alfazza
Walaa Gharram

**<u>RTA team</u>**
RTA, Thomas Olsen,
RTA Assistant, Christine Salman
Interpreter, Riham Abdelhadi